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A TRANSDISCIPLINARY INTERVENTION FOR HIV AND OBESITY PREVENTION USING A PRE-ADOLESCENT INTER-GENERATIONAL APPROACH

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A thesis completed by published work, submitted to the Faulty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy.

Johannesburg, September 2020

DECLARATION

I, **Keshni Arthur, student number 9703301R**, declare that this thesis is my own work. It is being submitted for the degree of Doctor of Philosophy in the School of Public Health at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

I have read the sections on referencing and plagiarism in the WITS Plagiarism Policy. I am aware that the plagiarism is wrong and that the University of the Witwatersrand may take disciplinary action should plagiarism be found in this work. I have followed the required conventions in referencing the thoughts and ideas of others. I confirm that all of the work submitted in this thesis is my own unaided work except where I have explicitly indicated otherwise.

Signature: 

Name: Keshni Arthur

Date: 20 September 2020

To Kalia and Kaell Arthur,

my supportive, intelligent and always cheerful children,
who have proved, without a research study,
that inter-generational knowledge transfer from child to parent is possible
and most importantly that statistical significance is insignificant
in the significance of life.

(This dedication was written by Kalia (15) and Kaell (11) and is our contribution to this PhD; not because the researcher (our mum) was too busy writing up this thesis but to also show her that knowledge from adult to child was transferred.)

PUBLICATIONS ARISING FROM THIS STUDY

Arthur K, Christofides N, Nelson G. (2020) Development of a pre-adolescent inter-generational intervention to address HIV and obesity using intervention mapping. *Health Education Journal*: 1–16. DOI:10.1177/0017896920937042.

Arthur K, Christofides N and Nelson G (2020) Educators' perceptions of organisational readiness for implementation of a pre-adolescent transdisciplinary school health intervention for inter-generational outcomes. *PLoS ONE* 15(1): 1–19. DOI: 10.1371/journal.pone.0227519.

Arthur K, Christofides N and Nelson G (n.d) Process evaluation of a pre-adolescent transdisciplinary health intervention for inter-generational outcomes. (Under review, Evaluation and Program Planning)

Arthur K, Christofides N and Nelson G (n.d) Effectiveness of a pre-adolescent inter-generational intervention to address HIV and obesity using a pretest-posttest design. (Under review, *BMC Public Health*)

ABSTRACT

Background: South Africa, together with many low-and middle-income countries, is in the midst of a health transition, characterised by the double burden of communicable and non-communicable disease. The obesity epidemic is a key contributor to the rise in non-communicable diseases and, together with HIV/AIDS, is a leading cause of early mortality. Transdisciplinary research approaches that integrate common health issues at an early life-stage into a single intervention directed at both parents and children are very limited in the extant literature. In addition, the need to address the implementation of interventions and to ensure quality has been highlighted as requisite for successful programmes. Researchers have recommended a need for integrated models that re-formulate existing prevention programmes to produce holistic health interventions. Furthermore, engaging the education sector as a participant in health prevention offers a dynamic strategy because of the existing organisational, social and communication structures. A transdisciplinary research approach provides a collaborative opportunity to strengthen an intervention's infrastructure and improve its organisational functioning. Ensuring widespread translation of integrated, evidence-based practices into real-world settings requires the successful implementation of age- and culture-appropriate interventions. Since pre-adolescence is an important developmental period for prevention efforts – implementing interventions early not only permits lessons learnt early in life to be carried forward into adulthood, but could also influence inter-generational knowledge transmission from child to parent.

Aims and objectives: The study was designed to develop, implement and evaluate a transdisciplinary intervention that addresses HIV and obesity prevention, aimed directly at pre-adolescent learners (9 – 12 years old), and indirectly at their parents, to promote knowledge transfer. The four objectives of the study were: a) to develop a transdisciplinary intervention - *The CIrCLE of Life Initiative* - to address HIV and obesity prevention; b) to assess the level of organisational readiness in schools and to identify organisational facilitators, barriers and contextual factors that might suggest proactive improvements before implementation of the intervention; c) to assess implementation fidelity during a process evaluation of the intervention; and d) to evaluate the effectiveness of the combined HIV and obesity intervention.

Methods: The study was based on a mixed-methods approach. Five government-run primary schools in a district located in Gauteng province, South Africa were purposively selected, based on quintile classification and urban-rural classification. Intervention Mapping and implementation science theory facilitated the development of both the intervention and implementation strategies. The formative study involved a scoping review and needs analysis. The scoping review mapped the literature on

school-based health interventions designed to reduce the risk of HIV and obesity in pre-adolescents and their parents. The needs assessment evaluated the health status at selected schools, the environmental conditions and behaviour/s associated with disease, and the desired programme outcomes. In planning for implementation, an evaluation of organisational readiness at schools was conducted. Implementation climate and organisational readiness for implementing change were evaluated conjointly. Forty-six educators and school management staff answered a self-administered questionnaire and contributed to focus group discussions. Mean scores with standard deviations, or median scores with interquartile ranges, were calculated to determine levels of organisational readiness. Qualitative data were transcribed and analysed thematically. *The CIrCLE of Life Initiative* was implemented to 537 Grade 6 learners and their parents. Educators delivered the lessons to learners who communicated with parents through shared homework activities. Data were collected on an adapted Proctor's taxonomy of implementation outcomes to assess process outcomes. Qualitative and quantitative data were collected through educator logbooks, researcher observations and learner-parent workbooks. All qualitative data were transcribed and analysed. A pretest-posttest study design, with a three-month follow up, was used to assess effectiveness of the intervention. Both groups completed self-administered questionnaires. Differences in proportions between the two time points were tested using Chi-square or Fisher's exact tests.

Results: Through the needs assessment, it was found that educators perceived that health and lifestyle issues among learners affected classroom learning and saw a need for school-based health curricula. The scoping review shortlisted 11 studies which described successful interventions which informed the intervention-design. *The CIrCLE of Life Initiative* comprised a learning curriculum, environmental support and activity-based constituents that targeted the learner in the school environment and the parent in the home environment. The intervention was designed to increase knowledge about HIV and obesity, and enhance skills and strengthen self-efficacy in communication. The organisational readiness evaluation showed that the overall implementation climate and organisational readiness for implementing change median scores were acceptable, at 3.6 (IQR 3.2 – 4.1) and 4.3 (IQR 3.8 – 4.9), respectively. Results indicated that educators collectively valued the proposed change highly enough to commit to its implementation; the motivation for the intervention, associated goals and objectives, realisation for change, and the benefits thereof, were well-comprehended. Thirteen barriers and 13 facilitators suggested proactive improvements to the intervention and the implementation strategy. The process evaluation revealed high learner penetration (97.2%) but lower learner and parent exposure (44.3% and 55.5%, respectively). Differentiation between the various school contexts was observed. Results of the outcome evaluation showed that response rates were high for both learners (80.6%) and their parents (83.4%). There were positive changes in outcomes such as HIV knowledge ($p<0.001$), obesity awareness ($p=0.040$), and certain related skills and behaviours in both groups. Changes in the perceptions and attitudes of pre-adolescents were, however, limited. Learners

displayed a high intention to share gained knowledge with parents who also had a high intention to receive it (89.4% and 89.6%, respectively).

Conclusion: The transdisciplinary research approach used to facilitate collaboration between the health and education organisations, moved beyond the limitations of any single disciplinary focus to create a new synergistic way of addressing current public health concerns. Even with the complexities of a multi-level intervention, the study showed that through early stakeholder engagement, organisational readiness assessments and needs analysis that this approach can promote stronger forms of involvement and support in the processes needed for effective programme delivery and implementation. The statistically significant differences between pre- and post-test scores in the outcome evaluation confirmed the effectiveness of the intervention in increasing self-assessed HIV-related knowledge and obesity-related awareness, showing positive results in outcomes such as knowledge, obesity awareness and certain related skills and behaviours in both groups. As opposed to the conventional view that parents transfer knowledge to children, the study also provided promising findings that an inter-generational transfer of knowledge from pre-adolescent to parent is possible. The conceptual model of implementation research which brought together the four phases of intervention design, implementation strategy, and process and outcome evaluation also included other frameworks, that functioned within this model, to strengthen the overall outcome. The combination of Intervention Mapping and implementation science strategies not only strengthened the intervention and implementation development process but demonstrated the benefits of using implementation science in the early stages of intervention development. Although other models, such as the taxonomy of eight conceptually distinct implementation outcomes proved to be a valuable tool to assess the process evaluation, it lacked the dimension of context. The study also uniquely married organisational readiness for implementing change and implementation climate constructs to ascertain underlying organisational readiness levels and the associated barriers and facilitators. Overall the study also demonstrated how feedback loops between intervention development, implementation science strategies (organisational readiness and adaption) and process and outcome evaluation function to enhance design and implementation.

The CIrCLE of Life Initiative has the potential to create an immense impact through the synergy of its combined HIV and obesity health prevention components. Moreover, as it presents new findings in an area of limited research, it broadens the scope of research, particularly in the field of transdisciplinary approaches, targeting pre-adolescents in prevention programmes, and using pre-adolescents as agents of change in inter-generational knowledge transfer mechanisms.

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ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral therapy
BMI	Body mass index
CAPS	Curriculum and Assessment Policy Statement
CD	Communicable disease
COREQ	Consolidated criteria for reporting qualitative research
CVD	Cardiovascular disease
EBP	Evidence-based practice
FGD	Focus group discussions
HIV	Human Immunodeficiency Virus
ICS	Implementation Climate Scale
IM	Intervention Mapping
IS	Implementation science
LMIC	Low and middle income country
NCD	Non-communicable disease
OR	Organisational readiness
ORIC	Organisational readiness for change
PRISMA-ScR	Preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews
SSA	sub-Saharan Africa
STARI	Standards for reporting implementation studies
TB	Tuberculosis

DEFINITIONS

Attitudes: a set of emotions, beliefs, and behaviours toward a particular object, person, thing, or event. Attitudes are often the result of experience or upbringing, and can influence behaviour. While attitudes are enduring, they can also change (Cherry, 2020a).

Awareness: a quality or state of being aware. It is the knowledge and understanding that something is happening or exists (Webster, 2020).

Behaviour change: a research-based consultative process for addressing knowledge, attitudes, and practices. It provides relevant information and motivation through well-defined strategies, using a mix of media channels and participatory methods. Behaviour change strategies focus on the individual as a locus of change (UNICEF, 2011).

Communicable disease: a disease that is spread from an infected person, animal, or inanimate reservoir to a susceptible host, either directly or indirectly through a variety of ways, including contact with blood and bodily fluids, breathing in an airborne virus, and insect bites (World Health Organization, 2017). Examples of diseases include HIV, tuberculosis, malaria.

Knowledge: acquaintance with facts, truths, or principles, as from study or investigation; general erudition (Dictionary.com, 2020a).

Knowledge transfer: the exchange of knowledge between and among individuals, and within and among teams, organisational units, and organisations. This exchange may be focused or unfocused, but it usually does not have a clear *a priori* objective (Paulin and Suneson, 2012)**.**

Non-communicable disease: also known as chronic diseases or lifestyle diseases, non-communicable diseases are medical conditions that are not passed from person to person, and are of long duration and slow progression. The four main types of non-communicable diseases are cardiovascular diseases (such as heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes (World Health Organization, 2017)**.**

Perception: the act or faculty of perceiving, or apprehending by means of the senses or of the mind; cognition; understanding (Dictionary.com, 2020b).

Pre-adolescence: the period of human development preceding adolescence; the approximate ages of 9 to 12 (The free Dictionary, 2017).

Self-efficacy: a person's belief in their ability to succeed in a particular situation. These beliefs are determinants of how people think, behave and feel (Bandura, 1995).

Self-esteem: a person's overall sense of self-worth or personal value. It describes how much one appreciates and likes oneself. It involves a variety of beliefs about oneself, such as the appraisal of one's own appearance, beliefs, emotions, and behaviours (Cherry, 2020b).

Skills: An ability and capacity acquired through deliberate, systematic, and sustained effort to smoothly and adaptively carry out complex activities or job functions involving ideas (cognitive skills), things (technical skills), and/or people (interpersonal skills) (BusinessDictionary.com, 2020).

Transdisciplinary research: research efforts conducted by investigators from different disciplines, working jointly to create new conceptual, theoretical, methodological and translational innovations that integrate and move beyond discipline-specific approaches, to address a common problem (Harvard, 2014).

ORGANISATION OF THE THESIS

This doctoral thesis is organised into 10 chapters. **Chapter 1** introduces the problem of high prevalence of both HIV and obesity, and discusses key concepts associated with addressing prevention efforts. The chapter provides a justification for the research, posits the study's rationale, and concludes with the aim and objectives of the study. Finally, a conceptual framework adapted from implementation science methodology is presented.

Chapter 2 comprises a review of the existing literature on HIV and obesity preventive evidence-based practices. Gaps in the literature are highlighted. A comprehensive overview of the theoretical underpinnings of the principal research themes is provided, followed by the use of implementation science in the evaluation of school-based health interventions.

Chapter 3 describes the methodology used in the four phases of the study. Phase one: intervention development, based on evidence-based practices, to determine intervention strategies; Phase two: organisational readiness, as part of the implementation strategy; Phase three: process (implementation) outcomes; and Phase four: effectiveness (service) outcomes - a measure of the implementation and intervention effectiveness. In Phase one, the intervention mapping protocol (Bartholomew et al., 2011) was used to design and develop the intervention. Implementation science methodology was used in the other phases, to develop and evaluate the implementation of the intervention within the schools and broader contexts.

Chapters 4-7 which comprise four scientific papers that have been submitted for publication, serve as the results section of the thesis. **Chapter 4** describes the process of the intervention design, i.e. development of a combined HIV and obesity prevention intervention that could support knowledge transfer and translation directly to pre-adolescent learners and indirectly to their parents, for immediate- and long-term benefits. *The CIrCLE of Life Initiative* was grounded on proficiency from both behavioural theory and evidence-based practices. Theoretical practices, such as the taxonomies of behaviour change, together with the application of the intervention mapping heuristic, were assimilated into the design and development of the intervention.

Chapter 5 describes the exploration of the organisational readiness of schools. Implementation climate and organisational readiness for implementing change were evaluated conjointly to assess the level of organisational readiness at schools and to identify organisational factors (facilitators, barriers and contextual factors). Findings suggested proactive improvements for the intervention and its implementation strategy.

Chapter 6 describes the process evaluation that facilitated the assessment of a selection of Proctor's taxonomy of implementation outcomes (Proctor et al., 2011), describes its processes, and acknowledges fundamental characteristics that could justify variability in the intervention impact and outcomes. The value of process evaluations and their benefits to the science of implementation is demonstrated.

Chapter 7 examines the quantitative data from the pretest-posttest outcome evaluation. Changes in self-assessed HIV and obesity knowledge and practices in both learners and their parents are presented. Data and their interpretation for possible inter-generational knowledge transmission are highlighted.

Chapter 8 presents a discussion to synthesise the key findings from Chapters 4-7. The qualitative and quantitative research components are integrated to establish an appropriate answer to the research inquiry.

Chapter 9 concludes the thesis by summarising the outcomes of the specific phases and the overall research. The chapter also sets out the recommendations for policy, research, practice and theory, based on the evidence gaps filled by this thesis.



Chapter 1: Introduction

Photo credit: Keshni Arthur, Traditional family structures

1.1. BACKGROUND

1.1.1 The double burden of communicable and non-communicable disease

The double burden of communicable disease (CD) and non-communicable disease (NCD) is a global public health concern (World Health Organization, 2012). Globally, NCDs were responsible for 68% of all deaths in 2015 and, according to the World Health Organization's projections, will be responsible for 74% of deaths by 2030. In this period, world mortality due to CDs is projected to decrease from 22% to 17% (World Health Organization, 2012). Communicable diseases such as human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) and tuberculosis (TB) and NCDs such as cardiovascular disease (CVD), cancers, chronic respiratory diseases and diabetes mellitus contribute significantly to the burden of disease (World Health Organization, 2017).

In low- and middle-income countries (LMIC), the double burden of disease affects an already fragile health system, resulting in further adverse impacts on health (Temu et al., 2014). Like many other LMICs, South Africa is in the midst of a health transition that is characterised by high levels of both CDs and NCDs. While South Africa continues to deal with the challenge of CDs, such as HIV/AIDS, the upsurge in obesity (Kruger et al., 2005) and accompanying NCDs, such as CVD and diabetes, present a novel set of problems (Mayosi et al., 2009). The obesity epidemic is a key contributor to the rise in NCDs and, together with HIV/AIDS, is a leading cause of early mortality in South Africa (Human Sciences Research Council, 2014).

This research focused on HIV and obesity since these conditions are prevalent in South Africa (Kruger et al., 2005; Mayosi et al., 2009; Puoane et al., 2002). In 2017, approximately 7.9 million South Africans of all ages (0+ years) were living with HIV (Simbayi et al., 2019). Human immunodeficiency virus prevalence among adults (15 to 49 years) is 20.6%; 26.3% among females and 14.8% among males (Simbayi et al., 2019). The burden of HIV continues to disproportionately affect different geographical regions and high-risk groups, adolescent and young girls (15 to 24 years) are especially vulnerable. There is a dramatic rise in HIV infection rates around the age of sexual debut (Krishnan et al., 2008; Mock et al., 2004) which is, on average, 16.7 years in South Africa (Pettifor et al., 2011). As HIV affects both individuals and communities; control efforts should be directed at both conditions (Temu et al., 2014).

An additional health concern in South Africa is malnutrition (deficiencies, excesses or imbalances in one's food intake (World Health Organization, 2018)), with over- and under-nutrition increasingly

contributing to the burden of disease. Over-nutrition can lead to overweight and obesity, while under-nutrition can result in stunting, wasting and in severe forms of kwashiorkor. Obesity is evident in low- and middle-income South African populations (Rossouw et al., 2012), residing in urban areas (Rossouw et al., 2012). However, in rural areas, there is a high prevalence of under-nutrition (Steyn et al., 2016).

The obesity problem in South African adult populations has been well-established. A greater risk of over-nutrition is seen in South African women (15 years and older), with about two-thirds (68%) being overweight (Body Mass Index (BMI) $\geq$ 25 kg/m2) or obese (BMI $\geq$ 30 kg/m2) compared to a third of men (31%) (Statistics South Africa, 2016). Based on weight-for-height, 13% of South African children younger than five years are overweight. This prevalence is more than twice the global average of 6.1% (Statistics South Africa, 2016).

1.1.2 Risks-factors for HIV and obesity

The link between obesity, poor health outcomes and all-cause mortality is well established (HSRC and MRC, 2013). Obesity increases the likelihood of NCDs such as diabetes, hypertension, coronary heart disease, stroke, certain cancers and osteoarthritis (World Health Organization, 2014). Furthermore, childhood obesity could lead to both diabetes mellitus and CVDs in later life (Rossouw et al., 2012). Encouraging the prevention of behavioural risk factors (tobacco use, alcohol consumption, unhealthy diet, physical inactivity) early in life could, therefore, prevent the onset of one or many NCDs (World Health Organization, 2017).

Risky sexual behaviours associated with HIV infection among adolescents include early sexual debut, multiple partners, gender and social norms, forced sex and lack of condom use (Shisana et al., 2014). A systematic review that synthesised factors associated with, and interventions to reduce sexual risk-taking among HIV-positive adolescents in sub-Saharan Africa (SSA) identified that living with a partner, living alone, gender-based violence, food insecurity, and employment were correlated with increased sexual risk-taking, while knowledge of own HIV-positive status and accessing HIV support groups were associated with reduced sexual risk-taking (Toska et al., 2017). Another systematic review that examined the efficacy of sexual risk reduction interventions among South African youth established that several existing interventions were not adequately targeted to the sub-populations of young people at highest risk and in highest prevalence settings (Scott-Sheldon et al., 2013).

HIV and obesity do not exist in parallel, but overlap, with the possibility of one exacerbating the other if diseases are already present. Relative to the general population, obesity prevalence is increasing among HIV-infected persons, resulting in numerous metabolic and inflammatory conditions (Lake, 2017). Due to initiatives such as the latest test and treat programme, data for SSA indicate a decline in HIV/AIDS mortality rates, resulting in increased life expectancy of people living with HIV/AIDS (Levitt et al., 2011), and possibly increasing the risk for NCDs in middle age (Lalkhen and Mash, 2015; Mayosi et al., 2009; Oni et al., 2015). HIV- and antiretroviral therapy (ART)-specific factors also contribute to obesity (Lake, 2017).

Unsafe sexual behaviour is a significant risk factor for HIV infection, while lifestyle behavioural factors such as unhealthy diet, insufficient physical activity and tobacco use are the major risk factors for obesity. Prevention of obesity, such as addressing lifestyles and behaviour will also impact on HIV, for instance, avoiding tobacco use and harmful use of alcohol, and eating a healthy diet will help people who are infected live a healthier life. The models, tools, and approaches developed in the implementation of HIV programmes could also be adapted to address obesity prevention (Nigatu, 2012). The essential elements of prevention of HIV infection and obesity — community and family support, patient involvement, and continuous follow-up — are similar despite differences in the origin, pathogenesis, and clinical features of the diseases (Temu et al., 2014).

1.1.3 Addressing HIV and obesity through a combined prevention approach

There is a need for integrated strategies that re-formulate existing prevention and treatment programmes to produce holistic health and wellness interventions (Wand and Ramjee, 2013). Although a few studies on integrated HIV and obesity disease management have proved successful (Janssens et al., 2007; Scholl and Cothran, 2011), evidence-based research on prevention interventions and their associated effectiveness, remain limited. A narrative review conducted on integration of HIV and NCD health promotion and prevention efforts found that although literature was limited, a fair amount of evidence existed to support the feasibility of integration (Juma et al., 2018). In addition, strategies already employed in the global response to HIV have provided the initial experience, tools, and platforms that could be useful in planning NCD-related prevention programmes.

Addressing HIV and obesity prevention using an integrated disease prevention approach has its benefits and will result in the effective use of limited resources (Wand and Ramjee, 2013). Interventions targeted against one of the disease burdens may impact the other, and it is, therefore,

paramount that interventions be conducted jointly, rather than competing for limited resources. For example, vertical disease programmes, with their targeted funding and interventions, have aimed to achieve specific results within a given time-frame, but at the expense of a holistic approach to managing health. An integrated approach seeks to prevent health problems in a comprehensive manner.

Preventive interventions are urgently required at policy, population, and programme levels (HSRC and MRC, 2013). Integrative approaches provide holistic options focused on the health needs of people and communities, and thereby enhance community self-reliance (Nigatu, 2012). Integration of HIV and obesity components can easily be included in comprehensive health education, communication and promotion packages for families at the household and community levels (Temu et al., 2014).

1.1.4 Using a transdisciplinary approach for HIV and obesity prevention

Numerous preventive interventions have tackled HIV, and an increasing number are addressing obesity. However, these are often small scale or pilot programmes with a limited effect at the population level (Harrison et al., 2010; Jemmott III et al., 2015; Miller et al., 2013; Naidoo et al., 2017; Scott-Sheldon et al., 2013). Furthermore, these health programmes are commonly sector-specific. Interventions using transdisciplinary research approaches to prevent such diseases could provide holistic healthcare solutions across disciplinary boundaries (Mensah, 2016).

Transdisciplinary research approaches comprise individuals from different disciplines working jointly to implement conceptual, theoretical, methodological, and translational programmes that integrate and move beyond discipline-specific areas to address a common problem that could provide holistic, collaborative solutions (Harper et al., 2010; Kessel and Rosenfield, 2008; Rosenfield, 1992). This approach moves beyond the limitations of any single disciplinary focus and creates new synergistic ways of conducting research and evaluation, and addressing critical public health issues (Holmes et al., 2008; Stokols, 2006).

A transdisciplinary research approach provides an opportunity for collaboration to improve the health and well-being of individuals and communities. Several studies have shown the benefit of transdisciplinary research approaches. For example, a collaborative partnership between South African community nurses and speech-language therapists and audiologists enhanced nurses' knowledge and attitudes toward the early identification and referral of at-risk children to speech-language therapists and audiologists (Moodley et al., 2000). Another study that improved patient care

in a rehabilitation and long-term acute care settings also showed value through a transdisciplinary team approach that shared responsibilities on healthcare delivery (Reilly, 2001). A transdisciplinary research approach was also used in Wales, in the development of a school health research network for a national culture of prevention, for health improvement in schools (Murphy et al., 2018). The importance of establishing transdisciplinary strategic partnerships to identify and develop opportunities for system reorientation was established. Team members' diverse disciplinary backgrounds and members' perspectives are beneficial in strengthening an intervention's infrastructure and improving its organisational functioning.

Prevention strategies for integrated HIV and obesity models require integrated multi-sectoral action (Oni and Unwin, 2015). Engaging the education sector, for example, as participants in health prevention programmes, could be a dynamic strategy because of their existing organisational, social and communication structures (Lloyd et al., 2011). The compulsory attendance of pre-adolescents in schools also benefits the strategy.

The interdependent relationship between health and education has been clearly documented by researchers (Basch, 2011; Kolbe, 2019). Although attempts have been made to include health education in school curricula, many South African schools still fail to offer health education programmes of sufficient quantity or quality (Deventer, 2009). Schools are often supportive of health improvements, but there are substantial challenges to improving health and well-being in the school setting (Langford et al., 2017). There has been a failure to integrate academic, policy, practice and public communities to co-produce school health improvement research and build in processes to understand intervention congruence with existing systems and structures, affecting their sustainability (Murphy et al., 2018). Thus, efforts for better integration between the health and education sectors must be a societal priority (Birch and Auld, 2019).

1.1.5 Health education curricula in South African schools

The South African public schools' Curriculum and Assessment Policy Statement (CAPS) ensures the holistic development of the learner throughout childhood (South African Department of Basic Education, 2018). The life skills subject is meant to equip Grade 4-6 learners with knowledge, skills and values that assist them to achieve their full physical, intellectual, personal, emotional and social potentials. Life skills aim to develop these learners through three study areas, namely, personal and social well-being, physical education and creative arts (South African Department of Basic Education, 2011). The focus of the syllabus is to increase learner knowledge and awareness of diseases (South

African Department of Basic Education, 2018), rather than to prevent disease and promote health.

According to the CAPS manual, health education is covered under personal and social well-being, after which formal assessments are conducted (South African Department of Basic Education, 2012). In Grade 4, the dietary habits of children and basic facts about HIV/AIDS education are taught. In Grade 5, healthy eating for children and dealing with stigma for HIV/AIDS education is covered. In Grade 6, basic first aid in different situations, food hygiene, CDs, and myths and realities of HIV/AIDS education are taught. The natural science subject also deals with human reproduction in Grade 7, and nutrition issues throughout certain Grades. Although the current curriculum includes CD education (e.g. HIV, TB, dysentery), NCD content is limited.

1.1.6 Preventive interventions directed at pre-adolescents for inter-generational transmission

Current prevention interventions are targeted at adult and adolescent populations, often ignoring pre-adolescent populations that might influence behaviour at an early stage (Baltussen et al., 2013; Dinaj-Koci et al., 2015). HIV prevention programmes have been proved effective in targeting adolescents (14-19 years old) and young adults (Jemmott III et al., 2015; Johnson et al., 2011). However, several HIV and obesity preventive interventions have shown the benefits of targeting pre- and early adolescents (Miller et al., 2013; Villarruel et al., 2008). Pre-adolescence (9-12 years old) could serve as an important developmental period for prevention efforts, such as shifting attitudes to address stigma and increasing awareness and knowledge about HIV and obesity (Dinaj-Koci et al., 2015; Zimmer-Gembeck and Helfand, 2008).

To reduce the burden of obesity, health promotion is recommended from an early age, while patterns of nutrition and physical activity are being established (Phaswana-Mafuya et al., 2013). In addressing HIV prevention, the pre-adolescent age group has yet to initiate sexual intercourse, and providing age- and culture-appropriate skills before sexual debut may serve to guide the developmental trajectory of future sexual behaviours toward safer practices (Zimmer-Gembeck and Helfand, 2008). Most sexual risk-reduction interventions are implemented in high school after many young people have already begun their sexual trajectories. Such programmes, which often focus on delaying the onset of sexual activity, reach young people too late (Miller et al., 2010). Youth receive the most protection through early and repeated exposure to interventions and health promotion, and prevention efforts should consider implementing HIV prevention and risk reduction programmes as a fixed component of education curricula, beginning in the pre-adolescent years and continuing during the adolescent years (Dinaj-Koci et al., 2014).

Identifying ways to develop and implement prevention interventions with other promotive health opportunities, and offering services in venues where pre-adolescents are likely to congregate, may have a higher probability of uptake than more conventional health prevention approaches (Pettifor et al., 2018). School-based disease promotion, prevention, surveillance and screening programmes have shown to benefit risk factors for HIV and obesity health outcomes (Temu et al., 2014). Several interventions have shown success by scholars' demonstrating the practice of good health habits and exhibiting socially responsible behaviour (Adab et al., 2015; Grydeland et al., 2014; Miller et al., 2013; Xu et al., 2015).

Implementing interventions early, not only permit lessons learnt early in life to be carried forward into adulthood (Adab et al., 2015; Dinaj-Koci et al., 2015; Johnson et al., 2018), but can also influence behaviours amongst parents[1] (Damerell et al., 2013). Many HIV and obesity prevention programmes engage with parents to facilitate better intervention outcomes in children. Parent participation includes assistance to change home environments (offering better nutrition and encouraging physical activity), assistance in communicating prevention messages (abstinence from sex), and reinforcement of interventions (Adab et al., 2015; Dinaj-Koci et al., 2015; Miller et al., 2013). However, research on approaches to engage children to transfer knowledge, enhance skills and influence health behaviours amongst their parents (upon whom they are most dependent for their health needs and well-being) is limited.

Research on inter-generational knowledge transfer from child to parent has been biased towards the qualitative analysis of 'perceptions' and 'opinions', limiting the ability to draw inferences about the influence of knowledge acquisition on exhibited behaviour (Damerell et al., 2013). Determining the direction of influence on inter-generational knowledge transfer is important (Knafo and Galansky, 2008). The conventional view is that parents teach their children, inculcating their knowledge, values and beliefs (Damerell et al., 2013). The bi-directional influence between parents and children is possible (Knafo and Galansky, 2008), yet studies on the impact of a child's influence on parent's knowledge, attitudes and behaviours remain limited and inconclusive.

1.1.7 Employing implementation science methodology for improved implementation and health outcomes

Implementation science (IS) is the study of methods to promote the adoption and integration of evidence-based practices (EBP) and interventions into public health settings. Implementation research

[1] The term 'parent' is considered to be synonymous with 'guardian' and 'care-giver' throughout this thesis.

also plays a vital role in identifying barriers to, and enablers of, effective health programming, and leveraging that knowledge to develop evidence-based innovations in effective delivery approaches. Successful implementation requires knowing what evidence-based interventions to implement and how to implement them (Durlak and DuPre, 2008).

Interventions require adaption to suit the context and population. For example, 'Healthkick', a South African nutrition and physical activity intervention did not significantly improve the quality of diet in children because the intervention model was not a suitable fit for the setting, in which it was implemented (Steyn et al., 2015). Evidence-based behavioural interventions that are socially and culturally acceptable for the prioritised population are necessary (Martinez et al., 2016). Implementation science assists EBPs to be integrated and adapted to suit specific contexts and environments.

There is, however, a gap in the implementation of successful research knowledge into practice. Although years of research have produced a large body of literature on successful prevention interventions to address a variety of health issues, their overall application in practice remains inconsistent (Bhattacharyya et al., 2009). Identifying EBPs that have proven effective can be integrated and adapted to suit specific contexts and environments. Key learnings or transparency from unsuccessful interventions also assist in the improvement process.

Implementation science methodology aims to close the gap between research and practice by identifying and evaluating the processes necessary to ensure successful widespread translation of EBPs into real-world settings (Bhattacharyya et al., 2009). Process evaluations identify inconsistencies between expected and observed outcomes and inform future implementation efforts. An essential role for process evaluations is to examine the quantity and quality of what was implemented (Moore et al., 2014). A process evaluation may be used to monitor and report on the implementation of the intervention, clarify causal mechanisms, and identify contextual factors (Nielsen et al., 2006) associated with variation in intervention delivery and outcomes.

Determining organisational factors (facilitators, barriers and contextual factors), through organisational readiness evaluations, could inform implementation efforts. For example, many studies have identified that health interventions in schools have had limited success because of poor implementation (Deventer, 2009; Langford et al., 2017). The reality of implementing programmes in a school environment involves the adaption of programmes to be a fit with the local context (Dusenbury et al., 2003) within a broader educational and health system and the committed engagement of stakeholders (Bartholomew et al., 2011; Hall et al., 2012). The implementation of such programmes is frequently dependent on the behaviour of stakeholders (participants and implementers)

within the system (Craig et al., 2008). An understanding of how the effects of such programmes are attained is less common, but an essential approach (Jamal et al., 2013).

1.2 JUSTIFICATION FOR THE RESEARCH

The high prevalence of HIV and obesity in South Africa is indicative of the ineffectiveness of preventive interventions, at a population level. Possible reasons for this include an absence or lack of transdisciplinary research approaches (Langford et al., 2011; Murphy et al., 2018), integrated, holistic health services (Juma et al., 2018; Nigatu, 2012; Temu et al., 2014), early life-stage interventions (Dinaj-Koci et al., 2015), interventions directed at both parents and children (Gerards et al., 2012; Villarruel et al., 2008), and implementation of interventions with quality (Juma et al., 2018).

Although researchers and health professionals advocate an integrated, holistic approach to HIV and obesity prevention with diverse benefits for organisations and societies (Juma et al., 2018; Narain, 2011; Temu et al., 2014), there are limited documented cases of such combined EBPs. Engaging the education sector as participants in a combined intervention to address HIV and obesity prevention is an important consideration.

Although schools are supportive of health improvements, obstacles to improve health and well-being in the school setting exist (Langford et al., 2017). A transdisciplinary research approach provides a collaborative opportunity to improve the health and well-being of learners and communities by collaborating with stakeholders from diverse disciplinary backgrounds. Their perspectives are beneficial in strengthening an intervention's infrastructure and improving the organisational functioning and readiness of the role players.

Targeting pre- and early adolescents in HIV and obesity preventive interventions has demonstrated benefit (Miller et al., 2013; Villarruel et al., 2008). Furthermore, the bi-directional influence between parents and children is possible (Knafo and Galansky, 2008), yet studies on the impact of a child's influence on parent's knowledge, attitudes and behaviours remain limited and inconclusive. Determining the direction of influence is important to decipher if inter-generational transmission is possible so that children can be engaged to influence healthy behaviour amongst their parents.

Although years of research have produced a large body of literature on successful interventions to address a variety of health issues, their overall application in practice remains inconsistent (Bhattacharyya et al., 2009). This research that was undertaken, and described here, is thus based on EBPs, taking into account previously identified facilitators and barriers. The study draws on a number

of promising existing programmes, to ensure that target populations are appropriately reached. Furthermore, evaluation of the implementation and intervention effectiveness contributes to the body of research knowledge, so that similar future endeavours can be enhanced.

To address these critical knowledge gaps, this thesis reports on the development and implementation of a school-based intervention to address HIV and obesity prevention directed at pre-adolescents and their parents for inter-generational knowledge dissemination. The research also helped establish if the desired outcomes from the combined evidence-based intervention were successful.

1.3 STUDY AIM AND OBJECTIVES

1.3.1 Study aim

The study aimed to develop, implement and evaluate a transdisciplinary intervention that addresses HIV and obesity prevention, aimed directly at pre-adolescent learners and, indirectly, at their parents, to promote knowledge transfer.

1.3.2 Objectives

The objectives of the study were:

- To develop a transdisciplinary intervention to address HIV and obesity prevention for pre-adolescent learners (9-12 years old) that could indirectly support knowledge transfer to their parents.
- To describe the level of organisational readiness in schools and to identify organisational facilitators, barriers and contextual factors that might suggest proactive improvements before the implementation of the intervention: *The CIrCLE of Life Initiative*.
- To describe implementation fidelity during a process evaluation of the intervention: *The CIrCLE of Life Initiative.*
- To evaluate the effectiveness of a combined HIV and obesity intervention: *The CIrCLE of Life Initiative*.

1.4 CONCEPTUAL FRAMEWORK

This study was aligned with the Proctor et al. (2009) conceptual model of implementation research, with selected elements conducted in four phases. **Figure 1-1** shows the adapted framework. Phase one: intervention development was based on EBPs to determine intervention strategies; Phase two: organisational readiness was part of the implementation strategy; Phase three: Process (implementation) outcomes, and Phase four: effectiveness (service) outcomes measured the intervention implementation. The heuristic model posits the study of implementation processes, reflecting prevailing quality improvement perspectives, and distinguishes but links key implementation processes and outcomes (Proctor et al., 2009).

According to Proctor et al. (2009), the conceptual model is an organised and resourced approach to bridge the gap between what is known and what is delivered, thereby characterising two strategies: evidence-based intervention strategies and separate strategies for intervention implementation(Proctor et al., 2009). The relationship between the first block – intervention strategies, and the second block - implementation strategies, needs to be empirically tested, particularly in light of evidence that different EBPs carry distinct implementation challenges (Isett et al., 2007). These studies often entail adaption and modification to increase external validity, feasibility and uptake that impact on sustainability. Evidence-based practices are evaluated through implementation, service, and client outcomes (third block). Implementation of the intervention may lead to further refinement for adoption. These EBPs are then ready for scale-up in other sites.

Implementation strategies (second block) comprise deliberate and purposeful efforts to improve the uptake and sustainability of interventions. Implementation strategies deal with the contingencies of various service systems/sectors/practice settings, as well as the human capital challenge of staff training and support, and various properties of interventions that make them more/less amenable to implementation (Proctor et al., 2009). Their description must be detailed so that independent observers can detect the presence and strength of the specific implementation activities.

Outcomes (third block) are separated into implementation outcomes, service outcomes and client outcomes. Successful implementation outcomes require that specified interventions are delivered in ways that ensure their success in the field, i.e. feasibly and with fidelity (Glisson and Schoenwald, 2005).

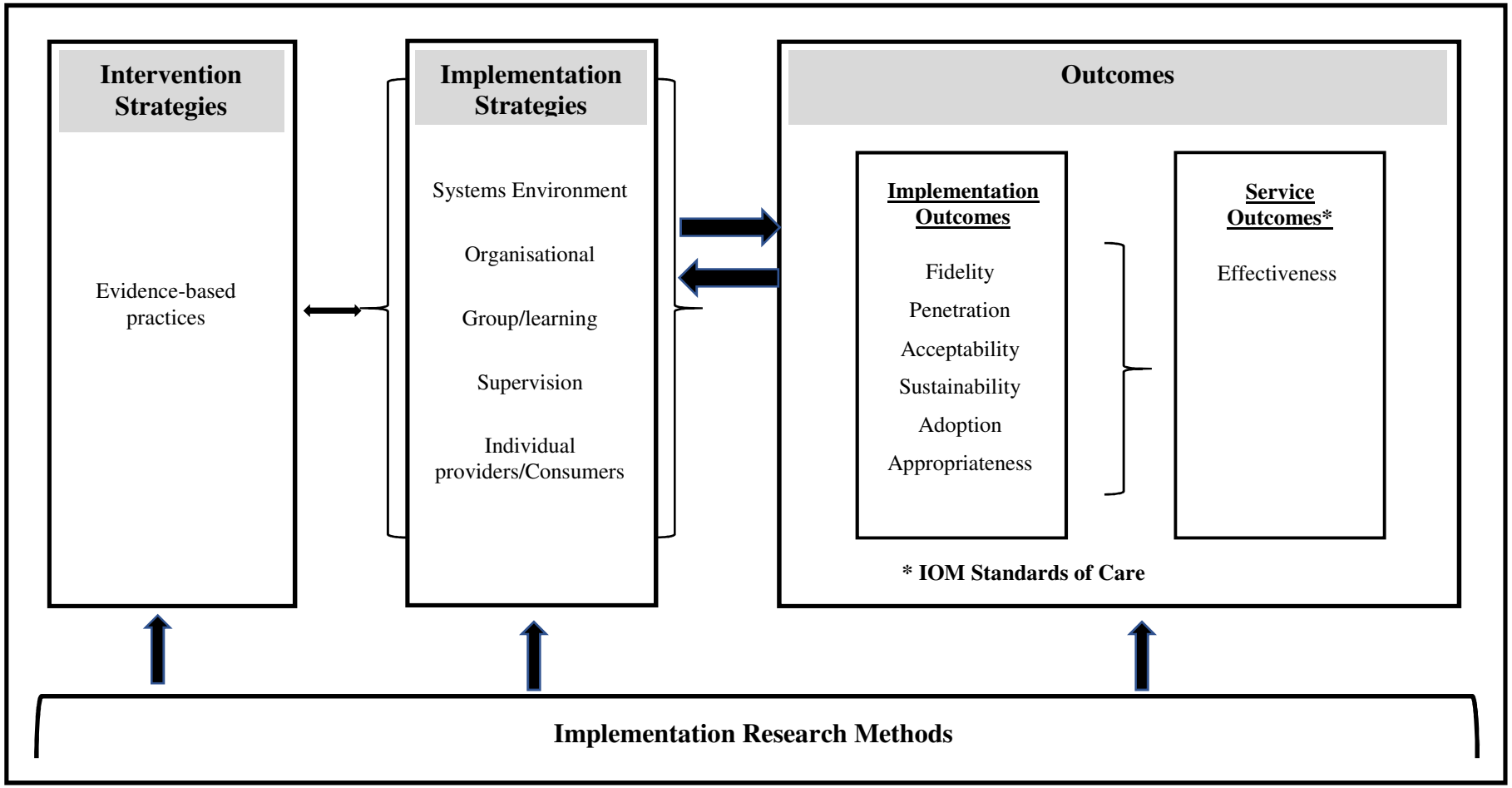


Figure adapted from (Proctor et al., 2009)

Figure 1-1 Conceptual model of implementation research

The conceptual model utilises various constructs to ascertain aspects of the broader experiences that coalesce implementation research. Implementation research models might differ significantly between different sectors or organisational platforms for health care delivery. The model, therefore, requires clearly defined constructs with a measurement model for each, and an analytic model hypothesising links between measured constructs. These include a variety of supports for implementers, EBP-related tool kits and algorithms, practice guidelines, system and organisational interventions and multi-level quality improvement strategies (Proctor et al., 2009). In addition, other specific frameworks were used within this conceptual framework of implementation research. These frameworks are further detailed in Chapter 3 (Methodology).



Chapter 2: Literature Review

Photo credit: Keshni Arthur, Learners on the playground

The literature review synthesises knowledge on the risk and protective factors, and the role of context in HIV and obesity prevention; international and local HIV and obesity prevention EBPs; and implementation facilitators and barriers. The culmination of the literature review highlights the gaps in the evidence-base.

2.1 RISK AND PROTECTIVE FACTORS, AND THE ROLE OF CONTEXT IN HIV AND OBESITY PREVENTION

2.1.1 Introduction to the socio-ecological model

A socio-ecological model reveals the complex interplay of factors between individual, inter-personal, and community and societal levels (Centre for Disease Control and Prevention, 2018). Although health disparities are manifested at the level of the individual, other levels such as families, communities, and organisations should also be considered when investigating the associations of disparities for prevention outcomes (Holmes et al., 2008). Preventive health interventions require community engagement rather than an approach that involves addressing individuals on a one-to-one basis (Temu et al., 2014). Therefore, an intervention directed at pre-adolescents must prioritise the individuals and their specific needs, but must also investigate other contexts and influences wherein HIV and obesity interventions could intersect.

Upstream social determinants that influence behaviours that lead to HIV and obesity are complex and often intertwined. A range of factors that put pre-adolescents at risk for HIV and obesity, or protect them from contracting the disease/s, have been identified. The socio-ecological model depicted in **Figure 2-1** demonstrates the factors that influence HIV and obesity in pre-adolescents. The figure also provides a comprehensive list of combined factors related to HIV and obesity prevention at all points on the pre-adolescent structural spectrum.

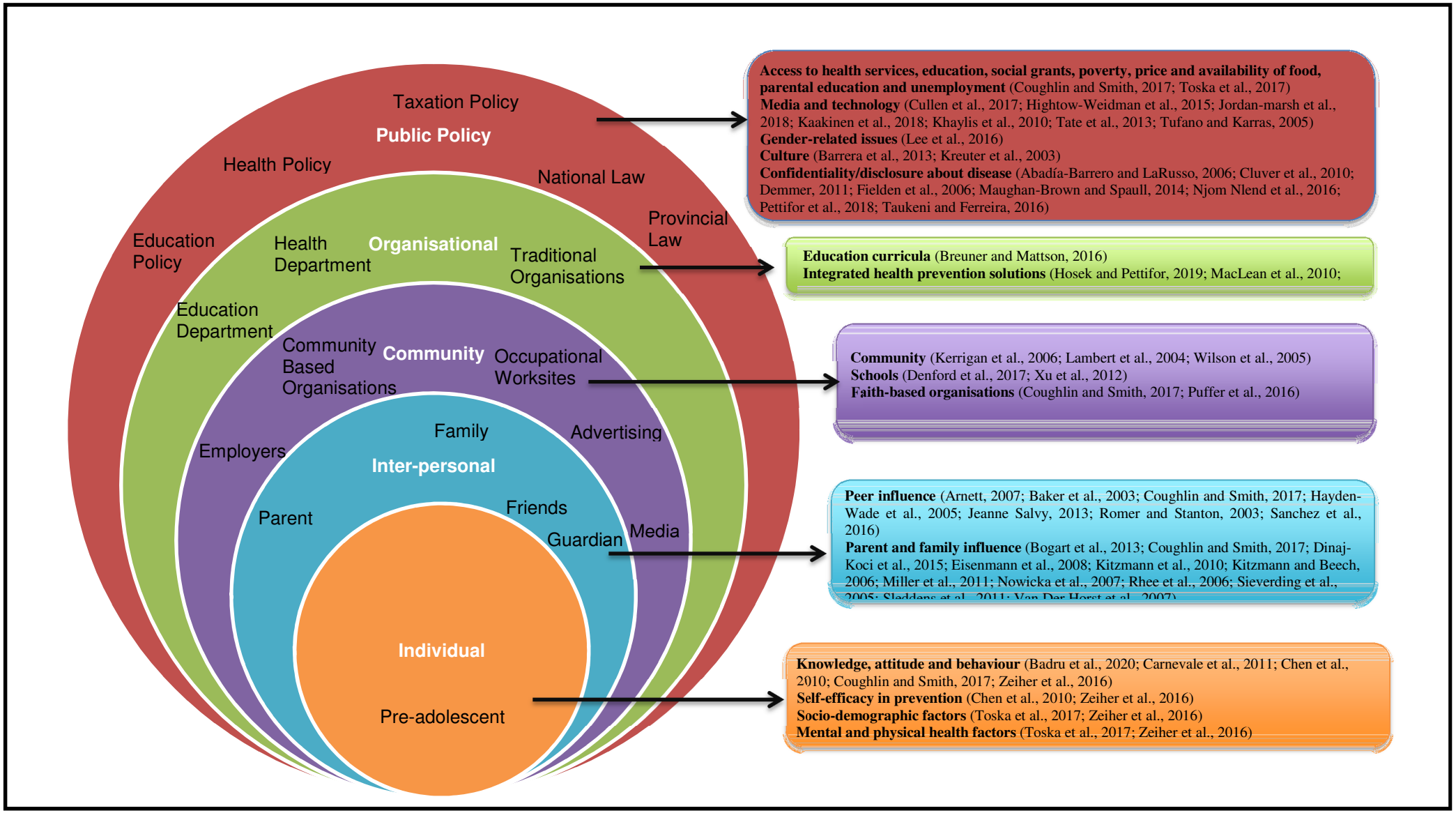


Figure 2-1 Socio-ecological model of factors influencing HIV and obesity health outcomes in pre-adolescents

2.1.2 Risk and protective factors that influence HIV in pre-adolescents

The individual level

Biological, cognitive and socio-economic factors influence HIV health outcomes in pre-adolescents (Barimani Aboksari et al., 2020; Dinaj-Koci et al., 2014). A systematic review found that the individual level was influenced by socio-demographic factors (e.g. age, gender, rural residence and informal housing); mental and physical health factors (e.g. clinical depression, anxiety); and knowledge, attitude and behavioural factors (e.g. drinking alcohol, and sexually transmitted infection prevention knowledge) (Toska et al., 2017). Other literature documented the increase in health-risk behaviours (e.g. substance use, unsafe sexual behaviour) during early adolescence (de Sousa et al., 2018; Nwagu, 2016; Storholm et al., 2018). The pre-adolescent developmental period is associated with an increase in health-risk behaviours (Wang et al., 2014). As a result of developmental changes, pre-adolescents frequently engage in multiple risk behaviours, often resulting in long-term negative health consequences, such as HIV infection.

Factors that influence HIV in pre-adolescents include a lack of HIV-related knowledge (Badru et al., 2020; Carnevale et al., 2011), high-risk sexual behaviours (Chen et al., 2010) and a lack of self-efficacy in HIV prevention (Chen et al., 2010). Badru et al. (2020) suggest a need for increased attention on pre-adolescents, particularly in the provision of age-appropriate, functional sexuality education, including HIV, at the family- and school-level. Increasing age is a significant demographic correlate of a pre-adolescent's ability to offer accurate responses to having heard of HIV and accurately naming a mode of HIV transmission and prevention (Carnevale et al., 2011). The age of the target audience at the time of the intervention largely influences the effectiveness of early adolescent sexual risk reduction interventions. However, despite this postulated importance, few studies have shown a direct comparison of outcomes associated with age at the time of intervention delivery (Dinaj-Koci et al., 2014). Dinaj-Koci et al. (2014) demonstrated that HIV prevention and risk reduction interventions have better outcomes if implemented during the pre-adolescent years and, if possible, also during adolescent years.

The inter-personal level

The inter-personal-level examines a pre-adolescent’s closest relationships such as parents and family (Dinaj-Koci et al., 2015; Miller et al., 2011) and social circle such as peers (Arnett, 2007; Romer and Stanton, 2003) that influence their behaviour that may affect the likelihood of HIV infection.

Perceptions of peers' unhealthy behaviours increase the chances that a pre-adolescent will engage in similar behaviour (Arnett, 2007). For example, pre-adolescents who perceive their peers to be having sex will engage in similar behaviour more often than those who do not perceive their peers to be doing so (Romer and Stanton, 2003; Sanchez et al., 2016).

Parental supervision has been known to decrease early sexual initiation, substance use and unsafe sexual behaviour (Bogart et al., 2013; Miller et al., 2011; Sieverding et al., 2005). Conversely, less parental supervision have been associated with higher levels of substance abuse and unsafe sexual practices (Hadley et al., 2015). Parental supervision helps prevent pre-adolescent unsafe behaviour by limiting such activities and creating a more conducive environment in which pre-adolescents will comply with parents' expectations (Sieverding et al., 2005).

The community level

Beyond family and peer contexts, social settings such as neighbourhoods, in which social relationships occur, play an important role in behaviour. Neighbourhood disorganisation, such as violence and substance abuse, is commonly associated with HIV (Lambert et al., 2004; Wilson et al., 2005). The well-being of a community is also positively associated with good sexual health (Kerrigan et al., 2006).

Faith-based interventions can possibly strengthen positive family processes and help protect children from negative behaviour (Puffer et al., 2016). Implementation with religious congregations may be a promising strategy for improving sustainability of interventions, especially in low-resource settings.

The societal level

The societal level includes broader factors such as public policy (Centre for Disease Control and Prevention, 2018) that either encourage or inhibit HIV. Certain structural factors, such as access to health services, education and social grants; and poverty, food insecurity, parental education and unemployment, affect pre-adolescents (Toska et al., 2017). The societal level maintains economic or social inequalities between groups and can influence pre-adolescents with education curricula (Breuner and Mattson, 2016), integrated health prevention solutions (Hosek and Pettifor, 2019), media and technology (Hightow-Weidman et al., 2015), gender-related issues (Lee et al., 2016), and confidentiality/disclosure about HIV (Taukeni and Ferreira, 2016).

Age-appropriate education about sexuality provided by school and health professionals help pre-adolescents make informed choices about relationships and responsible sexual activity (Breuner and Mattson, 2016). HIV services should be offered as part of a broad programme on sexuality, and sexual and reproductive health, with a public health and individual health rights lens (Pettifor et al., 2018).

Lee et al., (2016) have shown that controlling for age, sexual experience, and substance use, Taiwanese females had higher HIV/AIDS preventive self-efficacy than males. Addressing gender differences is, therefore, important (Lee et al., 2016).

Confidentiality and disclosure about HIV status are important to a pre-adolescent (Taukeni and Ferreira, 2016). A lack of communication about HIV/AIDS compromises disease knowledge and increases vulnerability to risky behaviour (Abadía-Barrero and LaRusso, 2006; Njom Nlend et al., 2016). HIV-related stigmatisation and discrimination by pre-adolescents towards their peers have a major impact at the individual level. Stigma is a risk factor for bullying and poorer mental health outcomes among HIV infected pre-adolescents (Cluver et al., 2010). Stigma surrounding sexuality, sexual risk and HIV prevents HIV disclosure (Fielden et al., 2006; Pettifor et al., 2018), and may deter parents' disclosure of a child's HIV status, resulting in treatment delays for HIV positive children (Demmer, 2011). Pettifor et al. (2018) confirmed that stigma could prevent adolescents from seeking information and health services, resulting in riskier behaviour and HIV. There is a need for early interventions (before Grade six) to reduce stigma and discrimination among pre-adolescents (Maughan-Brown and Spaull, 2014).

Technology (mobile technologies and social media) offers tools to reach, engage and retain pre-adolescents in HIV prevention interventions. In keeping with current trends, pre-adolescents use technology more often and, therefore, technology-based HIV interventions are a way of modern engagement (Hightow-Weidman et al., 2015).

2.1.3 Risk and protective factors that influence malnutrition (obesity) in pre-adolescents

The individual level

South Africa has a complex mix of under- and over-nutrition, especially in low-income communities, with defined determinants that influence a child's nutritional outcomes in relation to stunting or overweight and obesity (Steyn et al., 2005). The individual-level identifies attitudes, beliefs, health

literacy and behaviours as factors influencing obesity outcomes in pre-adolescents (Coughlin and Smith, 2017). Nutritional and physical activity behaviour, biological determinants and diseases, early childhood determinants, psycho-social determinants, food environments, social environments, health promotion and prevention, socio-economic and demographic factors, and socio-cultural determinants influence childhood obesity (Zeiher et al., 2016).

The prevalence of obesity increases as children transition into adolescence (Nicklaus et al., 2005). As this transition occurs, food preferences and behaviours established during earlier developmental periods often continue into adulthood (Demory-Luce et al., 2004; Mikkilä et al., 2005).

The inter-personal level

The inter-personal level examines close relationships with peers and family that may increase the risk of obesity (Coughlin and Smith, 2017). Research in social psychology has shown that social norms can possibly influence the initiation and maintenance of a variety of obesogenic-related behaviours (Baker et al., 2003). Experiences such as peer rejection, peer victimisation and friendships contribute to the development and maintenance of obesity (Hayden-Wade et al., 2005; Jeanne Salvy, 2013). Weight stigmatisation and prejudices against overweight individuals begin in early childhood (Jeanne Salvy, 2013). The involvement of pre-adolescents' peer networks in prevention efforts may be important to promote positive behaviour (Jeanne Salvy, 2013).

The importance of the inter-personal level is further explained by the fact that obesity may spread in social networks in a quantifiable and discernible pattern that is dependent on the nature of social ties. For example, connected persons might share an exposure to common environmental factors, the experience of simultaneous events, or other common features (e.g. genes) that result in either weight gain or loss, simultaneously, which suggests a role for a process involving the induction and person-to-person spread of obesity (Christakis and Fowler, 2007).

Parental involvement has been associated with greater success in the prevention and treatment of obesity (Kitzmann et al., 2010; Kitzmann and Beech, 2006). Family factors, such as good relationships between parent and youth, and a positive parenting style, may have a more significant outcome on pre-adolescent obesity (Rhee et al., 2006; Sleddens et al., 2011). Good parent-pre-adolescent relationships can influence the obesity by helping pre-adolescents cope more effectively with the problems of adolescence and offering them positive parental guidance related to a healthy lifestyle, a healthy body image, and a healthy nutrition (Nowicka et al., 2007; Van Der Horst et al., 2007), all of which are linked to obesity. Parents influence children's eating habits by influencing

nutrition patterns in the home (Eisenmann et al., 2008). Parents influence children's physical activity behaviour by encouragement or promoting physical activity, and by preventing sedentary behaviour (Eisenmann et al., 2008).

The community level

Socio-ecological models show how factors at the community level (e.g. schools, neighbourhoods, faith communities, community-based organisations, community coalitions) and institutional level (e.g. academic institutions, health care organisations, state and local health departments) influence health (Coughlin and Smith, 2017). Faith-based intervention approaches involve the promotion of healthy behaviours by addressing obesity at grass-roots levels (Coughlin and Smith, 2017). Other interventions are aimed at pre-adolescents using school-based approaches (Xu et al., 2012).

Many schools provide meals which are either funded by the Government or purchased at the school tuckshop. A Cochrane review by (Waters et al., 2011) suggested that increased efforts in the school curriculum that include healthy nutrition, physical activity and body image; increased physical activity; and improvements in the nutritional quality of food in schools, is required.

The societal level

Factors at the societal levels are influenced by laws and regulations that govern diet, nutrition and physical activity in diverse communities (Coughlin and Smith, 2017). For example, food products are required to have labels that provide information about the caloric and nutritional content. In South Africa, the Health Promotion Levy on sugary beverages (Department of National Treasury, 2017) also affects food purchases.

In current times, effective interventions are required to capture the attention of pre-adolescents living in a multi-media environment (Jordan-marsh et al., 2018; Tate et al., 2013). Web-based and technology-enhanced interventions can increase access, improve convenience, decrease cost, and increase participant engagement with dietary behaviour change strategies (Cullen et al., 2017; Kaakinen et al., 2018; Khaylis et al., 2010; Tufano and Karras, 2005). However, not all media and technology are accessible to different populations. Lifestyle interventions must also be culturally tailored or culturally relevant to be more readily adopted (Barrera et al., 2013; Kreuter et al., 2003).

A review of adolescent obesity prevention programmes found several multi-level factors that affect overweight/obesity prevalence (Doak et al., 2006). For example, at the school, community, and national levels, environmental influences include the school curriculum, transportation system, socio-economic status of populations, community recreational opportunities, community attitudes, the economy, and the price and availability of food. Preventive approaches to childhood obesity that focuses on upstream distal causes and interventions for prevention are encouraged. Multiple system levels would benefit from an integrated approach to intervention (MacLean et al., 2010).

2.1.4 A multi-level HIV and obesity prevention intervention

The socio-ecological model permits system change in addressing disease (Coughlin and Smith, 2017; MacLean et al., 2010). Besides clarifying pertinent factors, the socio-ecological model also suggests a need to act across multiple levels simultaneously (Centre for Disease Control and Prevention, 2018). A multi-level approach could probably sustain HIV and obesity prevention efforts compared to targeting only one of the levels.

While some studies have used only the social-ecological model to facilitate the planning of multi-level interventions (Booth et al., 2009), a few (Eisenmann et al., 2008; Gerards et al., 2015) have successfully implemented them in attempting to address the increasing prevalence of disease in pre-adolescents. Socio-ecological prevention strategies include mentoring and peer programmes (Kesten et al., 2013), and parent/family-focused prevention programmes (Eisenmann et al., 2008; Gerards et al., 2015).

Pre-adolescent interventions that aim to prevent HIV and obesity should be designed for both school and home environments. A recommended strategy was a home-based parental programme that was associated with schools (Velleman et al., 2005). Such programmes should be more preventive in nature and focus on behavioural challenges.

Family is constructed and developed through its generations (Hartman and Laird, 1983), and is shaped through mutual interactions and influences that create habitual ways of behaviour (Becvar and Becvar, 2006). Parents are uniquely positioned to fulfil the critical role of shaping pre-adolescent behaviour through their parenting practices. Support may also be required as children grow up, especially adolescent years where they exhibit challenging behaviour. In these circumstances, positive parenting relationships are required (Gerards et al., 2012).

The family environment shapes pre-adolescent's attitudes, behaviours, and influences a range of protective and risk factors (Velleman, Templeton, & Copello, 2005). The incorporation of activities for parents, and parent-child engagement in joint activities, have been recommended as important aspects of school-based prevention interventions (Rothwell and Segrott, 2011). When it comes to parent-child engagement, schools can be used to provide opportunities and services to both. Studies on school health interventions can be implemented as an education-only component at schools, or as an engagement component at home since family plays a role of social influence (Jørgensen et al., 2014).

Pre-adolescents regularly attend school, and some of what a young person 'learns' in school affect their life-long norms, attitudes and behaviours (Dick et al., 2006; Grunseit et al., 1997; Mavedzenge et al., 2011). Schools are uniquely positioned to create an environment in which good lifestyle habits can be consistently and positively promoted (Bennett et al., 2016; Fox, 2010; Rowling and Jeffreys, 2006). Aligning the forces and collaboration of public health professionals and school educators is essential to make school health education a societal imperative (Bennett et al., 2016; Birch and Auld, 2019).

2.2 EVIDENCE-BASED PRACTICES ON HIV AND OBESITY PREVENTION

2.2.1 HIV prevention interventions involving pre-adolescents and parents

A systematic review that synthesised factors associated with the effectiveness of youth HIV/AIDS prevention interventions in SSA showed that school-based, adult-led, curriculum-based interventions were effective in reducing reported risky sexual behaviour (Mavedzenge et al., 2011). Effective and feasible low-cost interventions to reduce risk are also urgently required for the younger generation (Toska et al., 2017).

A literature search on school-based HIV prevention interventions that targeted pre-adolescents and their parents was conducted. The review of published literature from 2007 to 2017 identified five EBPs (Bogart et al., 2013; Chen et al., 2009; Jemmott III et al., 2015; Miller et al., 2013; Villarruel et al., 2008). **Table 2-1** summarises the interventions.

Table 2-1 Summary of HIV interventions

Classification scheme	Target population	Intervention components	Outcomes measured	Results
HIV				
(No intervention name) Villarruel et al. Intervention (Villarruel et al., 2008)	Adolescent	small-group discussions, videos, interactive exercises such as role–plays, and skills-building activities.		✓
	Parent	Received support for parent–adolescent communication.		
(No intervention name) Jemmott et al. Intervention (Jemmott III et al., 2015)	Adolescent	HIV risk-reduction by increasing knowledge, behavioural beliefs, abstinence, increase self-efficacy in condom use. Sexual behaviours		✓
	Parent	Parent-child homework		
Parents Matter! (Miller et al., 2011)	Pre-adolescent	Promoting effective parent-child communication about HIV, sexuality and sexual risk reduction		✓
	Parent	Enhancing parenting skills and parents' awareness of adolescent sexual risk behaviour through discussion, videotapes, modelling, role-playing, group exercises, and homework assignments.		
Focus on Youth in the Caribbean (Chen et al., 2009)	Pre-adolescent	Includes discussions, risk avoidance strategies, communication and negotiation strategies and skills, HIV-related knowledge, and condom-use skills		✓
	Parent	A parental monitoring and communication programme for HIV prevention.		
Let's Talk! (Bogart et al., 2013)	Pre-adolescent	Parenting programme for parent-child communication about HIV and sexual health.		✓
	Parent	Parenting programme for condom use self-efficacy.		✓

Key

Anthropometry 

Sexual behaviour 

Physical activity behaviour 

Significant differences ✓

Communication 

Nutrition behaviour 

Sedentary behaviour 

No differences ✗

Villarruel et al.'s Intervention was implemented in Mexico and aimed to increase parent–pre-adolescent sexual-risk communication (Villarruel et al., 2008). The *Parents Matter! Program* similarly taught parents of pre-adolescents sexual communication and HIV-prevention skills, but was implemented in the United States of America (Miller et al., 2011). *Let's Talk!* was also a parenting programme that aimed to improve parent-child communication about HIV sexual health, and parent condom use, self-efficacy and behaviour (Bogart et al., 2013). *Let's Talk!* was implemented in South Africa. The *Focus on Youth in the Caribbean* was a behavioural, HIV risk-reduction intervention, implemented in the Bahamas, and emphasised skills development and practice in decision-making, negotiation and communication (Chen et al., 2009). The *Jemmott et al. Intervention*, implemented in South Africa, attempted to increase HIV/STD risk-reduction knowledge, and enhance skills and self-efficacy to negotiate abstinence and condom use (Jemmott III et al., 2015). This was the only HIV risk-reduction intervention that did not involve a pre-adolescent-parent communication component.

The communication elements in each of the four interventions were similar (Bogart et al., 2013; Chen et al., 2009; Miller et al., 2011; Villarruel et al., 2008). These studies attempted to increase the quality and quantity of parent-pre-adolescent communication. *Villarruel et al.'s Intervention* offered parents and pre-adolescents support on sexual-specific communication (e.g. parental values about sex, how to avoid risky situations, and dealing with discomfort about communication) and parent-adolescent communication, in general (e.g. creating opportunities for communication). The importance of family support in health was emphasised. The *Parents Matter! Program* focused on increasing parents' awareness about pre-adolescent sexual risk behaviour and taught them how to help their pre-adolescents avoid such risks. The intervention also enhanced parenting skills such as communication about sexual topics, and their confidence, comfort in communicating with their pre-adolescents about sexual behaviour. The *Focus on Youth in the Caribbean* intervention emphasised skills development and practice in decision-making, negotiation and communication.

The modalities used in each of the interventions were similar. *Villarruel et al.'s Intervention* included videos, group discussions, interactive and skills-building activities. Parents were given homework that needed to be completed with their child. The *Jemmott et al. Intervention* used intervention manuals, and included interactive exercises and games, group discussions and role-playing. The learners were given homework assignments to complete with a parent. In *Let's Talk!*, parents were taught communication skills and were allowed to practice each skill in a role play activity with their child. The *Parents Matter! Program* used many teaching strategies, such as structured learning experiences, videotapes, discussion, modelling, role-playing and homework assignments. In *Focus on Youth in the Caribbean*, the HIV-related knowledge was taught through stories, games and exercises that reinforced messages. Three of the studies used child-parent assisted homework as a modality (Bogart et al., 2013; Jemmott III et al., 2015; Villarruel et al., 2008).

All interventions varied in delivery time, duration and frequency, but all showed positive results. *Villarruel et al.'s Intervention* consisted of six 60-minute modules implemented on two consecutive Saturdays by trained adult facilitators. The *Jemmott et al. Intervention* consisted of 12 one-hour modules, with two modules delivered during each of six sessions on six consecutive school days, and was implemented by male and female adult co-facilitator pairs. *Let's Talk!* comprised five weekly two-hour group sessions for parents of adolescents, and was led by a trained facilitator and co-facilitator. The *Parents Matter! Program* had sessions that lasted 26 hours. The *Focus on Youth in the Caribbean* was a 10-session intervention; each session required about 75 minutes to complete; students were scheduled to receive one session per week.

Villarruel et al.'s Intervention outcome measures were general parent-adolescent communication, parent-adolescent sexual risk communication, and comfort with communication, and demonstrated an increase in the quality and quantity of parent-adolescent communication. The *Jemmott et al. Intervention* outcome was a self-report of sexual behaviours, which resulted in significant effects on HIV/STD sexual-risk behaviour in the early stages of entry into sexual activity. *Let's Talk!* measured condom use and parent-child communication, and showed improved parent-child communication about HIV and sexual health, as well as parent condom use self-efficacy and behaviour. The *Parents Matter! Program* outcome measured HIV prevention communication, parental perceptions of child readiness to learn about sex, and effective communication. The programme concluded that the intervention could help parents educate children about HIV and prepare them to avoid sexual risk. The *Focus on Youth in the Caribbean* outcome measures included perceived vulnerability, response efficacy, and intrinsic and extrinsic rewards; and demonstrated a reduction in HIV risk-behaviour among pre-adolescents.

The Parents Matter! Program was also evaluated in various settings and demonstrated significant results in promoting attitude and behaviour change among parents and pre-adolescents (Kamala et al., 2017). At a later stage, when participants of the *Focus on Youth in the Caribbean* intervention were re-evaluated for long-term effects, there was a positive carryover effect from the intervention (Dinaj-Koci et al., 2015).

In keeping with the socio-ecological model, all the interventions showed the overlap of the individual and inter-personal levels. The interventions also overlapped the school and home environments. The successful intervention results could be attributed to the use of the varying socio-ecological levels.

The school environment plays a critical role in health education and prevention programmes. There is some evidence that curriculum-based sexuality education interventions improved knowledge and reduced self-reported risk-taking; however, educational programmes alone have limited effect on the

number of youth infected with HIV (Mason-Jones et al., 2016). Various factors have shown benefit in targeting HIV in pre- and early adolescence. These factors include: targeting various levels in the socio-ecological model (Eisenmann et al., 2008), skill enhancement (Visser et al., 2004) and behaviour change (Coughlin and Smith, 2017).

2.2.2 Obesity prevention involving pre-adolescents and parents

Several systematic reviews (Kamath et al., 2008; Wang et al., 2013; Waters et al., 2011) have summarised the outcomes of previous childhood obesity prevention studies that were conducted in a variety of settings, such as school, community and family. Kameth et al. (2008) indicated that obesity prevention programmes caused change in targeted behaviours but had no significant effect on BMI. However, a Cochrane review of trials, published in 2011, showed that school-based programmes, targeted at 6-12 year olds, were effective in reducing adiposity (Wang et al., 2013). Wang et al. (2013) demonstrated that the evidence about the effectiveness of school-based interventions for childhood obesity prevention was moderate. Wang et al. (2013) also showed that school-based physical activity programmes with a family component, or a combination of diet and physical activity programmes in a school-based setting with home and community components, were most effective. Waters et al. (2011) stated that there was much heterogeneity in intervention components, and that previous trials had poorly-reported process and implementation measures.

A literature search of school-based obesity prevention interventions that targeted pre-adolescents and their parents was conducted. Six studies published from 2007 to 2017 were identified (Adab et al., 2015; Gentile et al., 2009; Gerards et al., 2015; Grydeland et al., 2014; Kipping et al., 2014; Xu et al., 2015). **Table 2-2** summarises the interventions.

Table 2-2 Summary of obesity interventions

Classification scheme	Target population	Intervention components	Outcomes measured	Results
OBESITY				
WAVES (Adab et al., 2015)	Pre-adolescent	Healthy nutrition plans School time physical activity Interactive skill based physical activity		✗
	Parent	Family mail-outs Signposting for family Healthy cooking skills for family		
Lifestyle Triple P (Gerards et al., 2015)	Pre-adolescent	Anthropometry, Dietary behaviour, Physical activity behaviour, Parenting practices, Parental self-efficacy in communication		✗
	Parent	Active skills training for parents on nutrition, physical activity Positive parenting strategies through parent workbook, recipe book and active games booklet		Parent reported outcomes in children ✓
Switch (Gentile et al., 2009)	Pre-adolescent	Pre-adolescents encouraged to 'Switch what you Do, Chew, and View'.		Children's dietary and sedentary behaviour only ✓
	Parent and community	Community awareness of healthy lifestyles and the prevention of childhood obesity, Advertising and media messages		
CLICK-Obesity (Xu et al., 2015)	Pre-adolescent	Classroom curriculum (knowledge and skills to promote health behaviours) School environment support (posters) Fun programs (picture painting, short paper writing and stage drama)		Behaviour and knowledge only ✓
	Parent	Family involvement (materials and resources that facilitate healthy behaviours)		
Active for Life Year 5 (Kipping et al., 2014)	Pre-adolescent	Lessons to children		✗
	Parent	Child-parent interactive homework plans. School newsletters for parents.		
HEIA (Grydeland et al., 2014)	Pre-adolescent	Promotes healthy nutrition, physical activity Lessons with learner booklet, posters for classrooms, sports equipment for recess activities, and		BMI in girls only, children of higher

		active commuting campaigns. Anthropometry influenced by gender, pubertal status, or level of parental education.		educated parents benefited more. 
	Parent	Fact sheets used for parents.		

Key

Anthropometry 

Sexual behaviour 

Physical activity behaviour 

Significant differences 

Communication 

Nutrition behaviour 

Sedentary behaviour 

No differences 

All six interventions aimed to prevent childhood obesity. Although there was heterogeneity in intervention components, all interventions targeted three outcomes: physical activity behaviour, dietary behaviour, and positive parenting.

The *WAVES* intervention, implemented in the United Kingdom, encouraged healthy eating and physical activity through an interactive skills-based programme. The *Switch* intervention attempted to change risk behaviours for obesity and promoted physical activity by encouraging learners to 'Switch what you Do, Chew, and View'. *Switch* was implemented in the United States of America. The *CLICK-Obesity* intervention was run in China, and comprised a classroom curriculum, which included education on nutrition and increased physical activity; school environment support; family involvement activities, and fun events. The *Lifestyle Triple P* strategy was implemented in the Netherlands, and included active skills training methods. Parents were taught nutrition, physical activity and positive parenting strategies. *HEIA* used a multi-level approach that included collaboration with the school, school-health services, and parent committees in Norway. Many modalities were used to promote a healthy diet, to increase physical activity, and to reduce screen-time.

Duration, times and frequency varied between interventions. The *WAVES* intervention was delivered over 12 months. The *Lifestyle Triple P* intervention was a 14-week intervention comprising 10 90-minute parental group sessions and four individual 15-30 minute telephone sessions. The *Switch* intervention required 60 minutes or more of activity per day, and to eat five fruits/vegetables or more per day. The *Active for Life Year 5* intervention was implemented in England, and provided 16 lesson plans to be delivered over two out of the three school terms in year 5 (6-7 months).

Although outcomes were the same, the modalities of most intervention varied. Examples included interactive skills-based programmes, workshops on healthy cooking skills signposting and mail-outs, positive parenting strategies, learner-parent workbooks, recipe books, and active games booklets. The *Lifestyle Triple P* and The *Active for Life Year 5* used parent-child shared homework activity as a modality.

The *HEIA* intervention was the only study that saw a change in BMI. It produced mixed results with a significant effect on BMI and BMI z score in adolescent girls, but not in boys. Children of higher educated parents benefitted more from the intervention. *WAVES* measured anthropometrics, diet and physical activity, but showed no statistically significant effect on preventing childhood obesity. *Lifestyle Triple P* assessed dietary and physical activity behaviour, parent's nutritional practices and body composition of family members. Although the *Lifestyle Triple P* intervention showed significant effects on some parent-reported child behaviours and parenting outcomes, there were no effects on

objectively measured physical activity. *Switch* measured anthropometric variables, screen time, physical activity and fruit and vegetable consumption. The results indicated small treatment effects for promoting children's nutrition and minimising screen time. *CLICK-Obesity* measured BMI, physical activity and sedentary behaviour patterns, dietary intake, and obesity-related knowledge. Positive outcomes were seen in behaviour and knowledge. *Active for Life Year 5* outcomes were sedentary behaviour, physical activity, and fruit and vegetable consumption, but was deemed ineffective.

Common outcomes of the six obesity studies focused on changing anthropometry, limiting sedentary behaviour and increasing physical activity, altering dietary behaviour, or combinations. Positive results included improved health behaviours and increased knowledge. Studies have shown improvements in health behaviour (increase in physical activity, healthier diets) as in *Switch* (Gentile et al., 2009) and *Click Obesity* (Xu et al., 2015), while others showed positive knowledge shifts such as those related to obesity (Xu et al., 2015) and healthy nutrition (Gentile et al., 2009).

All the interventions targeted more than one socio-ecological level (child and parent; or child, parent and community. Lifestyle *Triple P* was the only intervention that was delivered to parents only but targeted the children (Gerards et al., 2015). Even though, the Lifestyle *Triple P* was based on social learning principles and adopted an ecological perspective to support parents and children, the effects on children were not as effective.

One intervention was conducted in the home environment (Gerards et al., 2015) and one in the school environment (Grydeland et al., 2014). The others were conducted in both environments (Adab et al., 2015; Gentile et al., 2009; Kipping et al., 2014; Xu et al., 2015). A recommendation was that change in obesity prevention-related activities might require behavioural interventions with pre-adolescents, or upstream programmes at the inter-personal and societal level, and at the school organisational level (Kipping et al., 2014).

School health interventions could be implemented in either a school environment (playground) or a classroom. Both environments have shown challenges and benefits. Challenges of environmental programmes include a lack of programme recognition and decreased importance in the school routine (Saraf et al., 2012). Classroom interventions, however, have a captive audience, but time might be limited if the pressures of academic performance is high (Adab et al., 2015; Bogart et al., 2013; Jemmott III et al., 2015; Xu et al., 2015). For an effective intervention, both approaches should be combined (World Health Organization (WHO), 2019).

2.2.3 Lessons from South African prevention evidence-based practices

Healthkick, an example of a school-based nutrition and physical activity intervention, aimed at reducing diabetes risk factors (Steyn et al., 2015). The implementation of the intervention was unsuccessful. It did not significantly improve the quality of diet in children because the model was not a suitable fit for the low-income setting (Steyn et al., 2015). The authors highlighted that educators played a significant role in implementing school-based interventions, and that developing capacity within schools and their staff was not an easy task. Future interventions require increased parental involvement, increased support from the Department of Basic Education, and sufficient motivation and buy-in from schools (de Villiers et al., 2015).

The *Lovelife* campaign aimed to reduce HIV, other sexually transmitted infections and unwanted pregnancies among South African youth between the ages of 10 and 17 years. Specifically, the intervention's goal was to sustain changes in sexual behaviour and related social norms by offering guidance to prevent HIV through various media platforms and programmes (Pettifor et al., 2007). It was recommended that a range of evidence be used to assess the effect of large-scale, complex behavioural interventions as an alternative to randomised control trials. This large-scale campaign was difficult to evaluate because it had multiple components and rendered the evaluation of impact in a specific population more difficult. In its first two years of implementation, however, the campaign reached more than four million youth, with slightly more than half of youth and their parents recognising the intervention and considering it to be positive (Stadler and Hlongwa, 2002).

Soul Buddyz was a multi-level, school-based, HIV prevention programme that used a mass media television series (Johnson et al., 2018). Participation in *Soul Buddyz* was associated with a decrease in young women's HIV risk and suggested an impact on certain risky sexual behaviours. For example, ex-participants were more likely to be HIV negative than controls, and were more likely to have had only one sexual partner in the previous year. A factor that could explain the effectiveness of the programme was the nature of the intervention itself. The model was one of collective action and linked adolescents to adults and services. It was also not only a 'knowledge-based' intervention but included skill enhancements and the building of self-esteem (Johnson et al., 2018). Another mass media, life skills education programme, *Soul City*, demonstrated that life skills exposure was positively associated with puberty, HIV knowledge and risk perception, and condom use (Peltzer and Promtussananon, 2003). The studies showed that school-based prevention programmes that use other media platforms demonstrate a positive outcome on health status.

2.2.4 Specific outcomes for HIV and obesity prevention interventions

Knowledge and awareness of disease

It is believed that knowledge alone is insufficient to facilitate behaviour change (Kelly and Barker, 2016; Visser et al., 2004). There is a host of other things in life that get in the way of them changing behaviour (Kelly and Barker, 2016). For example, one may be knowledgeable about nutritional diets, but the cost and availability of food may prevent one from eating nutritional foods.

There is evidence that school-based interventions can increase sexual and reproductive health knowledge (Dick et al., 2006; Grunseit et al., 1997; Mavedzenge et al., 2011). However, despite evidence that in-school sexual education programmes can improve knowledge and reported sexual behaviour (Dick et al., 2006), neither of two rigorously-implemented and evaluated in-school interventions that measured biological outcomes showed a significant effect on any biological outcomes measured (Mavedzenge et al., 2011). Hence, giving information to people does not necessarily make them change behaviour (Kelly and Barker, 2016).

Enhancing skills

Educational programmes are the first of several steps in effecting change (Lawrence et al., 1995). Educational programmes alone are unlikely to have an effect on behaviour change (Kegeles et al., 1988), as an increase in knowledge does not result in behaviour change without experiential learning (Polacek et al., 2008). Thus, theoretically based programmes, combining both skills and knowledge modalities, are more likely to show behaviour change than those based on knowledge alone (Polacek et al., 2008). Bandura's (1986) social cognitive theory is useful in educational programmes because of its emphasis on vicarious learning, modelling and reinforcement through skills practice, discussions and scenarios (Bandura, 1986); and the theory supports ways for improving skills that could result in behaviour change (Lawrence et al., 1995). Programmes that use a combination of knowledge and skills are most effective in reducing health-associated risks (Polacek et al., 2008).

Behaviour change

In attempting to change behaviour, it is necessary to understand why people engage or do not engage in the behaviour of interest. A person who has a favourable attitude toward a behaviour is more likely to have stronger intentions to change that behaviour (Thompson et al., 2013). Intentions are

influenced by social expectations (the influence of family and friends) and individual attitudes (Thompson et al., 2013).

High-risk behaviour at the individual level is a result of intra-psychological processes associated with low self-esteem, external locus of control, lack of awareness of personal risk, and lack of self-efficacy (DiClemente, 1992). At an inter-personal level, peer-group norms, acceptance and pressure encourage high-risk behaviour (Visser et al., 2004). Shared meanings related to relationships, gender differences, sexuality and reproduction, are associated with the formation and maintenance of behaviour patterns (Visser et al., 2004). High-risk behaviour and its consequences are caused by the context within which they occur, and are related to social, cultural, economic and political processes (DiClemente, 1992).

Behaviour change requires acknowledging the importance of and providing ways for, dealing with behaviour change methods. For a behaviour change method to be effective, it must: target a determinant that predicts behaviour; be able to change that determinant; and be translated into a practical application in a way that preserves the parameters for effectiveness and fits with the target population, culture and context (Kok et al., 2015). Behaviour change methods attempt to change behaviour by endeavouring to change determinants. Personal determinants are defined as generic changeable psychological variables that are assumed to be causal antecedents of behaviour (Kelly and Barker, 2016). Beliefs, on the other hand, are defined as the specific lower-level elements of these determinants that, together, make up each determinant (Kelly and Barker, 2016). Effective behaviour change requires identifying the relevant determinants and underlying beliefs.

The role of health behaviours is observed to have driven attempts to change behaviour, however, most efforts have had limited success (Michie et al., 2014). It is necessary to assess the conditions preceding behaviour and to combine psychological ideas with sociological ideas.

Inter-generational knowledge transmission

Knowledge transfer is the ‘synthesis, exchange and ethically application of knowledge within a complex system of relationships’ (Jacobson et al., 2004). Knowledge is most commonly transferred from parent to child; however, the reverse is also possible. Christensen (2004) expressed the importance of children's roles in promoting health in families. Activities that children performed to enhance their own health also affected their family's health status directly (Christensen, 2004). As ‘little teachers’, children could improve their family's health (Sedighi et al., 2012).

Sedighi et al. (2012) have shown that Iranian children are capable of playing a role in raising families' knowledge of health. Their results show that neither gender nor the level of educational status affected knowledge transfer (Sedighi et al., 2012). The Mosavel (2009) study demonstrated the potential for a daughter-mother health advice transfer system, and identified the associated cultural challenges. The results suggested that health promotion programmes aimed at the mother might involve adolescent daughters as influential opinion leaders within Sri Lankan families. Although significant results were detailed; some mothers could not distinguish the semantic difference between information and advice (Mosavel, 2009). Evans et al. (2001) also established that knowledge transmission from child to parent was possible. Their findings showed that health education activities brought into the home environment from school, by children could significantly influence parents' self-management of asthma (Evans et al., 2001).

Interventions directed at pre-adolescents could influence their parents. Such an approach could stimulate interest and encourage engagement between child and parent and, in the process, transfer knowledge, influence attitudes and behaviour, and encourage healthier lifestyles in parents. Intervention in the domain of a pre-adolescent's health leads to improvement in knowledge, attitude, and behaviour of both children and parents (Barimani Aboksari et al., 2020). The child learns the related concepts and skills, and parents play an essential role in being instructors; education thereby occurs in both groups.

Potential pre-adolescent programmes could also address parents who need additional parenting support. Programmes designed to decrease conflict, facilitate problem-solving skills, and promote healthy relationships, can be accomplished through healthy communication (Kesten et al., 2013). Communication is a key element in knowledge transfer. Both children and parents must have adequate communication skills to achieve this. Parenting interventions from EBPs have shown that communication skills are central to good health behaviour (Wamoyi et al., 2014), especially in HIV and sex-related health practices (Mmari and Blum, 2009; Roche et al., 2008).

Different methods of knowledge transfer, as described by Damerell et al. (2013), include shared homework activities with parents, communication behaviours such as engaging in conversations, practical hands-on interactions with project work, and interactive activities. Although not a health intervention, this study conducted in the Seychelles, was significant because it supports the notion that knowledge can be transferred between generations and indirectly encourage targeted behavioural changes. Research on the impact of prevention programmes on families, rolled out at pre-adolescent stages, from a knowledge transfer perspective, is limited.

2.3 IMPLEMENTATION OF HEALTH PREVENTION INTERVENTIONS

Intervention effectiveness is differentiated from implementation effectiveness. When implementation efforts of an intervention fail, it is important to know if the failure occurred because the intervention was ineffective (intervention failure) or if it was conducted incorrectly or weakly (implementation failure) (Proctor et al., 2011). Intervention effectiveness is a necessary, but not sufficient, condition for achieving significant intervention outcomes (Klein and Sorra, 2008). Only through high-quality implementation can anticipated benefits and intervention effectiveness be achieved. Implementation outcomes are necessary preconditions for achieving desired changes in outcomes. This is because an intervention will not be effective if it is not implemented well (Nielsen et al., 2006).

2.3.1 Process evaluation

Intervention evaluation studies often focus on their content and immediate effects, with less emphasis on the processes that might explain, sustain or improve these effects. A criticism of outcome evaluations is the difficulty in explaining the processes by which the results of the interventions were attained (Nielsen et al., 2006). A Cochrane review of childhood obesity prevention studies found that, of 39 trials targeting children, around a third did not report process measures (Waters et al., 2014). For a comprehensive evaluation effort, emphasis has been placed on evaluating intervention processes (Oakley et al., 2006).

A process evaluation may be used to monitor and report fidelity (i.e. whether the intervention was delivered as intended) (Castro et al., 2004; Harn et al., 2013), quality of implementation (Craig et al., 2008; Driessen et al., 2010), causal mechanisms, and contextual factors (Nielsen et al., 2006) associated with variation in intervention delivery and outcomes. Reliable, valid and pragmatic evaluation is necessary for monitoring and assessing the success of implementation, and comparing the effectiveness of implementation strategies. Many studies have shown the benefit of conducting a comprehensive process evaluation (Griffin et al., 2017; Jäger et al., 2016).

2.3.1.1 Fidelity versus adaption

Adaption ensures that the intervention is appropriate and relevant for the target population as well as the needs and capacities of the implementing organisation (Mckleroy et al., 2006). The process occurs when EBPs are scaled into everyday practice (Escoffery et al., 2019). Adaptions may be made to the original programme's content, delivery, logistics, training and evaluation (Brown et al., 2017; Stirman

et al., 2012). The adaption process in real-world settings should ensure that an intervention is adapted in the best way, while preserving its effects.

The research on programme adaption of EBPs is relatively new, and efforts have been made to understand its use in practice. Commonly used adaptions include adding, shortening, lengthening, substituting, removing or re-ordering programme components; integrating another approach or intervention; loosening structure; or departing from the intervention (e.g. stopping the programme) (Stirman et al., 2012).

Despite the debate about the importance of fidelity versus adaption, some level of adaption is required (Carvalho et al., 2013). Adaptions are critical in the implementation process, but any change to the original EBP could reduce the EBP's effectiveness (Castro et al., 2004; Escoffery et al., 2018). The deliberation between fidelity and adaption resulted in adaption frameworks, suggesting steps to select, adapt and implement EBPs to tailor the programme to the new context, while minimising changes that could decrease the EBP effectiveness (Escoffery et al., 2019). Using theories, frameworks and models within implementation research improves EBP implementation and sustainability. Similarly, the use of adaption frameworks increases acceptability, fit and effectiveness (Escoffery et al., 2019). While there is no guarantee that, once an intervention is adapted, it will continue to show efficacy, a significant number of HIV prevention EBPs have maintained efficacy after adaption. However, modified interventions have a greater chance of success when attention is given to maintaining core elements and ensuring sufficient capacity for adaption and implementation. (Galbraith et al., 2009).

As EBPs are translated into practice, they will be directly applicable and ready for immediate implementation. However, there will be many communities for which these intervention packages may not be directly applicable (Lyles et al., 2006). Even when applicable to a community of interest, existing social, cultural and/or contextual factors within that community may not be appropriately addressed by the intervention. In such instances, adaption tailored to the community-specific needs may be the most efficient and effective method to fulfil unmet prevention needs (Lyles et al., 2006).

2.3.2 Barriers to implementation of school-based interventions

Several factors can impede the implementation process. If implementation barriers are identified early, then proactive actions can be taken to overcome them. Implementation is hindered by the external environment if existing structures and processes are not aligned with the implementation of the intervention (Burke et al., 2012). Integrating interventions in existing education systems requires

consideration in all its complexity, with a focus on sustainability (Gregory et al., 2007). The reality of implementing programmes in a school environment involves the adaption of programmes to be a fit with the local context (Dusenbury et al., 2003) within a broader educational and health system, and the committed engagement of stakeholders (Bartholomew et al., 2011; Hall et al., 2012). Implementers may meet resistance from those implementing the intervention, which can hinder its implementation (Burke et al., 2012). The implementation of such programmes is frequently dependent on the behaviour of stakeholders (participants and implementers) within the system (Craig et al., 2008).

The interests of implementers can impede implementation. This occurs when the stakeholders' interests are incongruent with the intervention (Burke et al., 2012). While recognised as agents of change in schools, educators are not experts in health (Darling-Hammond, 2003). Bennett et al. (2016) identified a number of recommended strategies: collaboration with staff on how a programme will impact their workload in a classroom, speaking with educators using the language of the education sector, providing professional development, and sanctioning minor modifications to an intervention so that it is adapted to meet the needs of a school community.

Evidence from reviews have identified the contribution of health prevention programmes in schools and the benefits thereof, in improving the health of children (Bonell et al., 2013; Langford et al., 2011). For example, The Whole School, Whole Community, Whole Child model was created to encourage education and health organisations to work together to improve student health and academic outcomes. The model focused on ‘‘what’’ should happen to improve student health and academic outcomes, by describing 10 school health components that should be coordinated (health education; nutrition environment and services; employee wellness; social and emotional school climate; physical environment; health services; counselling, psychological, and social services; community involvement; family engagement; and physical education and physical activity) (Hunt et al., 2015). Other models, such as the Comprehensive School Health Program have also been developed to describe the many aspects that constitute a school health programme and how such aspects could lead to improvements in health outcomes (Allensworth and Kolbe, 1987). Although these school health models have helped public health and school officials understand the roles schools can play in implementing health-related programmes and interventions, such efforts have not always resulted in significant improvements in health (Hunt et al., 2015). However, an understanding of how such interventions can be best implemented remains overlooked (Gugglberger and Inchley, 2014). Poorly implemented school-based programmes are less effective (Rones and Hoagwood, 2000).

Although there has been wide dissemination of EBPs, a similarly strong research base to guide programme implementation has been absent (Gregory et al., 2007). Schools have struggled to meet

the recommended levels of implementation (Mihalic and Irwin, 2004). For example, a process evaluation of a violence prevention intervention showed that only one-third of the teachers implemented the recommended programme dosage (Mihalic and Irwin, 2004).

2.3.3 Organisational readiness

Organisational readiness (OR) refers to 'the extent to which the organisation is both willing and able to implement an innovation and is a necessary precursor to its successful implementation' (Weiner, 2009). Not only does OR ensure the constructive use of implementation strategies, but it addresses barriers by providing tools that promote programme adoption and offer potential solutions to improve implementation efforts.

Effective implementation is the consistency and quality of the targeted organisational members' use of an innovation (Weiner, 2009). Effective implementation is a function of the strength of the organisation's climate for the implementation of that innovation, as well as the fit of that innovation to targeted users' values (Scaccia et al., 2015). Organisational readiness, therefore, examines organisational changes where collective behaviour change is necessary to effectively implement the change and, in some instances, for the change to produce anticipated benefits (Klein and Sorra, 2008). The implementation of an intervention requires OR (Weiner, 2009) as well as the targeted organisational members' commitment to using the intervention (Weiner, 2009). Organisational readiness could be influenced by the characteristics of the organisational members', their social norms, and their preparedness for the intervention.

2.3.3.1 Organisational readiness for implementing change

As an organisation-level construct, organisational readiness for implementing change (ORIC) is 'a shared psychological state in which members feel committed to implementing a change (change commitment) and confident in their collective capability to do so (change efficacy)' (Shea et al., 2014; Storkholm et al., 2018). Both change commitment and change efficacy are influenced by how favourably members assess implementation capability of either staff or the organisation, i.e. the task demands, resource availability, and the key features of the environment surrounding the intervention as barriers to, or facilitators for, change. Organisational readiness for change could vary as a function of how much members value the change (change valance) and how they appraise implementation capability (Ehrhart et al., 2014; Lyon et al., 2018).

2.3.3.2 Implementation climate

Implementation climate (IC) and other measures of the organisational context such as OR, work conjointly to ensure implementation effectiveness (Weiner et al., 2009). Implementation climate is defined 'as employees' shared perceptions of the extent to which their use of a specific innovation is rewarded, supported and expected within an organisation' (Weiner et al., 2009). It is shaped by an organisation's policies and practices. Staff develop a collective sense of the organisation's priorities and sanctioned means for achieving those priorities through interactions with each other and with implementation strategies (Weiner, 2009). Implementation climate can be strengthened by providing members with access to training and technical assistance, engaging them in decision-making, offering incentives and feedback on intervention use, and increasing intervention facilitators and removing barriers (Weiner, 2009).

Implementation effectiveness is achieved when the consistency and quality of targeted organisational members' use of an innovation is a function of the fit of the innovation to targeted users' values, and the strength of an organisation's climate for the implementation of the innovation (Weiner et al., 2009). Although innovation-values fit and IC are both important constructs, the latter has a greater potential to bring theoretical and practical improvements for effective implementation (Weiner et al., 2009).

Jacobs et al. (2014) warn that the results of IC are context-specific. Researchers must assess the study setting when measuring IC. Implementation climate is positively associated with implementation effectiveness; however, the measurement of IC or the extent to which organisational members perceive that innovation use is expected, supported and rewarded by their organisation remain unclear. Specifically, this is due to uncertainty as to whether IC should be measured as a global construct or whether individual or group-referenced items should be used; and whether IC should be assessed at the group or organisational level (Jacobs et al., 2014).

2.3.3.3 Evaluation of organisational readiness in different contexts

Evaluation of OR in various health settings has proved successful in identifying barriers and facilitators to readiness that required implementers' attention. Key concepts from ORIC were empirically investigated as an approach to understanding variations in initiating depression care improvement by Rubenstein et al. (2014). Their study supported the concept of OR to improve quality of care (Rubenstein et al., 2014). Organisational research also identified several organisational factors that promoted or inhibited effective implementation of comprehensive health promotion programmes

in varying worksites (Weiner et al., 2009). Another study evaluated the level of OR to implement a nurse-delivered self-management phone intervention to facilitate hypertension management within large complex health systems (Shaw et al., 2013). Their study also identified key facilitators and barriers of OR to change.

Another study explored OR to implement palliative care, based on evidence-based guidelines in nursing homes in Sweden (Nilsen et al., 2018). The aim was to identify barriers and facilitators to implementing evidence-based palliative care. There was, however, limited OR to develop evidence-based palliative care as a result of variation in the nursing home staff's change efficacy and change commitment, as well as restrictions in many contextual conditions. The authors identified considerable individual- and organisational-level challenges to achieving evidence-based palliative care in nursing homes.

Organisational readiness in schools

Understanding the OR of schools to implement interventions is essential if the implementation is to be optimal. Studies that have conducted OR at schools have focused on capacity building (Gugglberger and Dür, 2011; Oterkiil and Ertesvåg, 2014), organisational implementation context (Lyon et al., 2018), and school climate (Gregory et al., 2007). Factors associated with the implementation of programmes and reforms at schools include issues such as time (Naylor et al., 2015; Schaap et al., 2018) and resource availability (Naylor et al., 2015; Schaap et al., 2018). Other implementation issues are unique to specific studies and include supportive school climate (Naylor et al., 2015), the availability of staff (Schaap et al., 2018), and necessary teacher skills (Schaap et al., 2018). This demonstrates that the unique features of programmes implemented in different school contexts may have common barriers and facilitators, but are also likely to have unique implementation issues specific to different interventions or schools.

Implementation of a health intervention in the education sector requires refinement to address emerging problems and to yield sustained efforts (Stokols, 2006). The key factors underlying the successful implementation of a health intervention, including understanding how to maximise school engagement and identifying which features influence behaviour change for improved health outcomes, need to be understood to ensure that the programme has the potential to reach the target population, and for the health benefits to be realised. Schools vary in cultures, policies, procedures, resources and structures, which could influence readiness for change. Knowledge about school conditions facilitates teacher-led implementation of programmes in the classroom, however, this has lagged behind the practice (Gregory et al., 2007).

A study was conducted to explore school climate factors underlying implementation of evidence-based health and wellness policies and practices (Totura et al., 2015). It was concluded that an obesity prevention strategy for implementation relied on the supportiveness and structure of the school climate. Barriers to prevention could hinder efforts, even if the school was committed to the prevention, while stakeholder collaboration could enhance the process (Totura et al., 2015).

Programme implementation in schools have been difficult because of a lack of understanding of how school ecologies interact with health programmes. A study on a violence prevention intervention assessed the effects of school climate on level and rate of change in intervention implementation (Gregory et al., 2007). Findings offered recommendations for an ecological model of programme implementation that considered school-level contextual effects on adoption and sustainability of new programmes in schools.

Understanding the fundamentals of South African schools as an organisation is necessary, as rural schools experience more difficulties than urban schools due to poverty and under-development. The School Health Policy and Implementation Guidelines were implemented in 2003 in South Africa but had poor outcomes (South African Department of Basic Education, 2012). The sub-optimal provision of school health services was attributed to a range of implementation factors such as insufficient collaboration between Government departments; inequitable distribution of resources in both urban and rural settings; insufficient numbers of nurses to provide school health services, and their infrequent visits to schools; and infrequent or rare follow-up by implementers.

2.4 GAPS IN THE EVIDENCE-BASE

The literature review identified several critical gaps in the evidence-base, some of which this study aimed to address. The review details the benefits and need for an integrated HIV and obesity prevention; however, evidence on combined interventions is limited. A holistic intervention that combined HIV and obesity prevention was, therefore, investigated, as described in Chapter 4 (Intervention design).

Directing prevention interventions at pre-adolescents has only recently gained popularity. The literature review showed the value of targeting children at this early stage. In addition, research on the impact of prevention programmes rolled out at childhood stages, and the influence and impact on families and communities, is also a more recent approach. The conventional view is that parents teach their children, inculcating their knowledge, values and beliefs. Most EBPs have used parents to reinforce learnings. Although the bi-directional influence between parents and children is possible,

studies on the impact of a child's influence on parents' knowledge, attitudes and behaviours remain limited and inconclusive. Determining the direction of influence on inter-generational knowledge transfer is an important concept that requires investigation from knowledge transfer and health-seeking behaviour perspectives. Research on inter-generational knowledge transfer from child to parent has been biased towards qualitative studies, limiting the ability to draw inferences about the influence of knowledge acquisition on exhibited behaviour. This was the objective of Phase four of the study, as reported in Chapter 7 (Outcome evaluation of intervention).

Research has detailed many unsuccessful attempts of health initiatives implemented in school environments. A transdisciplinary approach has shown value in other contexts and might be beneficial in addressing these implementation inconsistencies. Using a transdisciplinary approach brings different perspectives from diverse disciplines of health and education to collaborate on problems and solutions. This approach of stakeholder engagement could benefit not only Phase one of this study, which entailed intervention design and development (Chapter 4), but could also play a role in Phase two which identified facilitators and barriers in the OR evaluation (Chapter 5).

Furthermore, schools and communities require a link between education, social development and health. Such a link can be established through health education and prevention initiatives at schools. The current school syllabus lacks content on NCDs and basic health promotion and disease prevention skills. The syllabus requires the inclusion of more preventive knowledge, skills enhancements, and risky behavioural change efforts. This study attempted to address these shortcomings through the designed intervention.

Implementation science reports a gap in the implementation of successful research knowledge into practice (Bhattacharyya et al., 2009). Although years of research have produced several successful EBPs on HIV and obesity, their overall application in practice remains inconsistent. Most programmes are on a small scale and have little effect at the population level. The study, therefore, included elements from various EBPs that have proved beneficial. This is also reported in Chapter 4 (Intervention design).

Researchers have tested both the ORIC and the IC constructs, but have usually only utilised one of the constructs as an outcome measure at any given time. To the author's knowledge, this study was the first to report the use of both constructs in one study, detailed in Chapter 5 (Organisational readiness for intervention implementation).

While there have been several studies implemented to address HIV and obesity prevention, the inadequate reporting of process measures has resulted in the poor interpretation of the study

effectiveness outcomes. Intervention evaluation studies often focus on their content and immediate effects, with less emphasis on the processes that might explain, sustain or improve these effects. A process evaluation (Chapter 6) was, therefore, incorporated into the study to allow for transparency in explaining the processes by which the results of the interventions were attained.

2.5 SYNTHESIS OF THE LITERATURE

A socio-ecological model has demonstrated the links between pre-adolescents and the inter-personal, community and societal levels. Developing an intervention that targets health prevention on more than one level may be more beneficial. The socio-ecological model demonstrates the need to target both pre-adolescents and their parents, within the organisational context of schools and homes.

The conceptual framework selected for this study recommended the use of EBPs. The literature review identified a number of HIV and obesity interventions that have been implemented with various successes and limitations. These health interventions targeted populations of specific age groups (pre-adolescents, adolescents and young adults); however, none focused on inter-generational transmission from pre-adolescent to parent. The literature review, also established that there were no integrated HIV and obesity preventive interventions. Communication between a child and parent was found to be a beneficial strategy in both HIV and obesity preventive interventions. This strategy has been shown to lower HIV and obesity-related risks, as well as facilitate behaviour change. Several factors influence behaviour change, which makes it a challenging practice. Key learnings from EBPs can be used to further enhance intervention design and implementation.

Many interventions have shown the potential for schools as venues for health prevention initiatives, particularly in HIV and obesity programmes. However, there have been a number of problems reported, regarding health intervention implementation at schools. For example, educators, who are not health experts, are expected to deliver lessons on health education, resulting in poor implementation of programmes. As indicated from the conceptual framework, OR evaluations in schools could identify barriers and facilitators that might offer proactive improvements to the intervention or its implementation.

Implementation science theory has shown the benefit and need for interventions to be adapted to target populations and contexts before implementation. Various components of EBPs that have been identified in the literature were adapted so that the intervention was a fit with learners and parents in the context of implementation. Interventions need to be appropriately planned, designed and implemented to ensure adoption and sustainability. As specified by the conceptual model, it is

imperative to conduct evaluations on both process and effectiveness outcomes. The literature has demonstrated the value and need for process outcomes, the results of which will increase intervention and implementation transparency.



Chapter 3: Methodology

Photo credit: Keshni Arthur, A classroom activity

Chapter Three sets out the overall study methodology by presenting the four phases that were aligned with the objectives. The detailed theoretical rationale underpinning the study design, methodology and analytical approaches that were employed in each of the phases is presented, followed by a discussion of ethical considerations.

3.1 STUDY DESIGN

The study was based on a mixed-methods approach (Zhang and Creswell, 2013), using a quantitative pretest-posttest outcome evaluation and a qualitative process evaluation that was conducted alongside it. The qualitative findings were used as complementary data to best understand, and to draw valid conclusions about the research problem (Morse, 1991). Concurrent triangulation (Creswell et al., 2003), was used to validate or expand the quantitative statistical results with the qualitative findings. Quantitative and qualitative data were analysed at the same time, but separately and the results were integrated during interpretation.

Figure 3-1 details the outline of the methodology. Phase one comprised the design and development of the intervention. Phase two was a cross-sectional mixed-method (qualitative and quantitative aspects) study that assessed the organisational readiness of schools. Phase three and four followed simultaneously. A baseline survey of pre-adolescent learners and their parents was conducted before implementation of the intervention designed in Phase one. During the implementation, a process evaluation was conducted, which primarily focused on implementation fidelity. A posttest survey of pre-adolescent learners and their parents was conducted after the implementation of the intervention.

Study aim	The study aimed to develop, implement and evaluate a transdisciplinary intervention that addresses HIV and obesity prevention, aimed directly at pre-adolescent learners and, indirectly, at their parents, to promote knowledge transfer.			
Objective	To develop a transdisciplinary intervention to address HIV and obesity prevention for pre-adolescent learners (9–12 years old) that could indirectly support knowledge transfer to their parents.	To describe the level of organisational readiness in schools and to identify organisational facilitators, barriers and contextual factors that might suggest proactive improvements before the implementation of the intervention: *The CIrCLE of Life Initiative*.	To describe implementation fidelity during a process evaluation of the intervention: *The CIrCLE of Life Initiative.*	To evaluate the effectiveness of a combined HIV and obesity intervention: *The CIrCLE of Life Initiative*.
Phase	Intervention strategies Phase one: Design and development of intervention	Implementation strategies Phase two: Organisational readiness	Implementation Outcomes Phase three: Process evaluation	Service Outcomes Phase four: Effectiveness evaluation
Research design	Qualitative study: Scoping review and needs assessment case study	Qualitative and quantitative study: Case study design	Qualitative and quantitative study: Cross-sectional design	Quantitative study: Pretest posttest outcome evaluation
Research method	Intervention Mapping Protocol	Implementation Climate Organisational Readiness for Change	The taxonomy of eight conceptually distinct implementation outcomes	Pretest-posttest outcome evaluation
Timeline	January – March 2018	May – June 2018	August – September 2018	
Output	Development of a pre-adolescent inter-generational intervention to address HIV and obesity using intervention mapping	Educators' perceptions of organisational readiness for implementation of a pre-adolescent transdisciplinary school health intervention for inter-generational outcomes	Process evaluation of a pre-adolescent transdisciplinary health intervention for inter-generational outcomes	Effectiveness of a pre-adolescent inter-generational intervention to address HIV and obesity using a pretest-posttest design

Figure 3-1 Outline of methodology

3.2 STUDY SITE

Five government-run primary schools in a district located in Gauteng province, South Africa, were purposely selected based on quintile classification and urban-rural classification. Urban and rural schools are categorised into five quintiles, based on the relative wealth of their communities (The Government Gazette, 2006). Schools in the most disadvantaged communities are classified as Quintile 1 schools and those serving the wealthiest communities, as Quintile 5 schools. Quintile 1, 2 and 3 schools do not charge fees. All schools are subsidised by the government. Quintile 1 schools receive the highest subsidy per learner while Quintile 5 schools receive the lowest.

Two schools were classified as Quintile 1, and one each as Quintile 2, 3 and 4. Quintile 5 schools were not assessed as there were no schools within the study site. The Quintile 4 school was the only fee-paying school and the only school that did not provide a national school nutrition programme (meals provided and subsidised by the school) (The Government Gazette, 1994). Three of the schools were located in rural areas while two were in urban areas. The learner complement per school ranged from 650 to 1 100 learners. There were approximately 100 Grade 6 learners in each school. The educator complement per school ranged from 25 to 30.

The study site was a ring-fenced peri-mining community, where mining was the main occupation of most parents. HIV and Tuberculosis are diseases common to the mining industry. Most learners were of Black ethnicity, with Setswana and isiXhosa being the two most commonly spoken languages. Learners of other ethnicities (White, Coloured) also attended the Quintile 4 school. Educators of other ethnicities (White, Coloured) were also employed at the Quintile 4 school. The language medium in all schools is English.

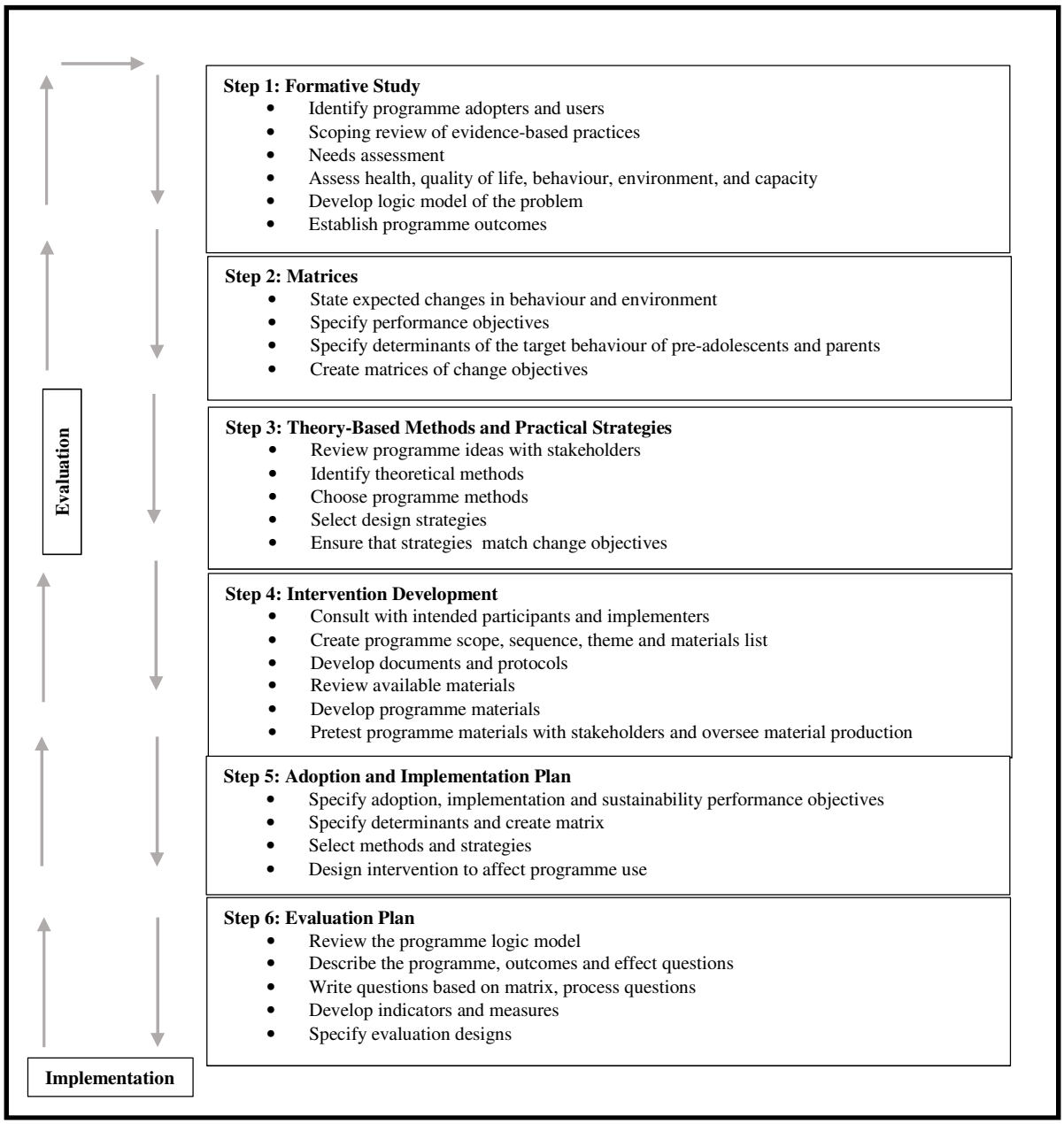
3.3 PHASE ONE: DESIGN AND DEVELOPMENT OF THE INTERVENTION

Phase one entailed the design and development of *The CIrCLE of Life Initiative*. The intervention mapping (IM) protocol, a stepwise technique for systematically applying EBPs and relevant behavioural theories, was used in intervention development (Bartholomew et al., 2011). The IM tool was also selected because it has shown to facilitate many of the required processes and placed much emphasis on the contexts in which the research is to be implemented. Other intervention development models that were considered focused primarily on production, diffusion and dissemination of research (Nilsen, 2015). The IM model prescribed six steps that elucidated practical support for guiding change, planning and managing implementation endeavours in the process of translating research into practice (Nilsen, 2015). Another reason for selecting the IM protocol was that it ascribed to a socio-

ecological model which targeted behavioural and environmental factors. This approach benefitted the inter-generational transmission strategy.

The IM protocol's six steps (Bartholomew et al., 2011) are illustrated in **Figure 3-2**. The steps include: the formative research, formulation of change objectives matrices, selection of theory-based methods and practical strategies, intervention development, development of an adoption and implementation plan, and evaluation planning.

For this study, the IM protocol was modified slightly. In Step 1, programme adopters and users were identified and were included in the needs assessment. A scoping review was also added into the formative study. Due to the transdisciplinary approach, stakeholders from various disciplines were also engaged at each step.



Steps adapted from (Bartholomew et al., 2011)

Figure 3-2 Intervention mapping steps and tasks, as modified for this research

3.3.1 Intervention Mapping Step 1

Step 1, the formative study, comprised a needs assessment and a scoping review. The scoping review was an additional component added to the IM protocol to identify relevant HIV and obesity-related EBPs. The formative research helped conceptualise the logic model of the problem.

3.3.1.1 The scoping review

The most common form of review used to broadly search the literature on a specific topic is a scoping review. Scoping studies are most suitable for questions portraying comparisons between interventions, programmes or approaches (Daudt et al., 2013).

The Arksey and O'Malley five-stage methodological process was used to conduct the scoping review (Arksey and O'Malley, 2005). The process was undertaken to determine the research question, identify relevant literature, select appropriate studies, chart the data, and collate, summarise and report results. The review mapped the literature on school-based health interventions designed to reduce the risk of HIV and obesity in pre-adolescents and their parents. The purpose of the review was to identify, describe and shortlist relevant EBPs.

Electronic databases that were searched from January to February 2018 included: Cochrane Database (via The Cochrane Library) and MEDLINE (via PubMed). The search strategy included the keywords 'HIV intervention', 'school-based', 'obesity intervention', 'adolescent' and 'parent'. An example of the search terms of MEDLINE (via PubMed) is presented in Appendix 2.

The PRISMA flow diagram (Liberati et al., 2009), presented in Chapter 4 (Design and development of the intervention) as **Figure 4-1,** shows the selection of studies that were included in the qualitative synthesis. A Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist (Tricco et al., 2018) was used to further improve the completeness and replicability of reporting of this review (Appendix 3).

The scoping review methodology is detailed in Chapter 4 (Design and development of the intervention).

3.3.1.2 The needs assessment

3.3.1.2.1 Study design

A case study approach was used to conduct the needs assessment. A case study comprises an empirical study that investigates a contemporary phenomenon within a real-life context; when the boundaries between phenomenon and context are unclear; and in which multiple sources of evidence are used (Yin, 1984). Case studies are often criticised for their robustness as a research method (Yin, 1984), however, an advantage of using a case study was that it was conducted within the context of its use. Methodology for the needs assessment is highlighted in Chapter 4 (Design and development of the intervention).

3.3.1.2.2 Participants

Participants were selected through a purposive sampling method. Participants included the management (heads of department, deputy headmasters and headmasters) and educators from the selected schools.

3.3.1.2.4 Data collection

The needs assessment was based on quantitative data from forty-six participants who answered a self-administered questionnaire that explored health status at their schools. Additionally, qualitative data was collected from semi-structured interviews and observations at schools.

Interviews were conducted, by the researcher, with school management and educators from each of the participating schools. The researcher was trained by the supervisors. The interviews were structured by an interview guide that contained questions and prompts that encouraged participants to consider the health status of the learners and their community that the school was in. Interviews ranged from 40 to 60 minutes and were audio-recorded. Individual interviews were scheduled with participants and were conducted in private, in classrooms. Permission to be audio-recorded was sought from all participants (Appendix 7). Immediately after each interview, the researcher completed field notes that captured the main themes of the interview and any information that was pertinent to the study. Field notes were used to document observations of the general functioning of the school.

3.3.1.2.3 Measurements

Educators answered a self-administered questionnaire that assessed the health status at the selected schools, the environmental conditions and behaviour/s associated with disease, and the desired programme outcomes (Appendix 8).

Examples of these issues included educators' perceptions of: the disease-related problems in schools; the prevalence of disease in schools; the prevalence of obesity among learners; the levels of physical activity among learners in schools; high-risk behaviour among learners in schools; the need for health programmes in schools; and whether health and lifestyle affected learning. Some questions such as the 'perceived disease-related problems in schools' were open-ended while the rest of the questions were based on a 5-point Likert scale (1 = not at all, to 5 = to a very great extent).

3.3.1.2.5 Data analysis

Questionnaire data were imported into Stata 14 for statistical analysis. Proportions or mean scores with standard deviations, or median scores with interquartile ranges, were calculated for educator perceptions of the health status of the learners and the community. Interviews and field notes were transcribed and analysed. All observations and documented details were transcribed with the permission of the participants.

3.3.2 Intervention Mapping Step 2

Each programme objective was subdivided into performance objectives, which were the expected sub-behaviours that had to be accomplished by the target groups (learners and parents) to achieve the programme objective. By crossing the determinants with the performance objectives, the more general performance objectives were translated into specific intervention objectives (the change objectives). Change objectives were formulated for each programme objective.

3.3.3 Intervention Mapping Step 3

All programme objectives were arranged by determinant. Theoretical methods to achieve the programme objectives were then identified and subsequently translated into practical strategies that

corresponded with the change objectives from the matrices. A theory-based change method is 'a technique for changing a behavioural determinant of individuals or environmental agents'. The practical application delivers the method to fit with the target population and the programme setting.

3.3.4 Intervention Mapping Step 4

Step 4 comprised a description of the scope and sequence of the components of the intervention. The information from all previous steps was combined with the intervention programme as the final result. The programme was designed (the overall structure of the programme, themes, channels, and vehicles of the programme), and materials striving for age and cultural appropriateness were produced. A proposal for the content of the intervention was made and discussed with all stakeholders.

3.3.5 Intervention Mapping Step 5

Step 5 supported the design of the implementation and adoption plan, which defined implementation objectives, methods and strategies. This step of the protocol had to be flexible enough to deal with the variability in local context between and within schools. Agreement about the strategy for programme adoption and implementation was reached during stakeholder meetings.

3.3.6 Intervention Mapping Step 6

Last, Step 6 entailed the development of the evaluation plan. A plan was developed to evaluate the effectiveness and to assess the quality of intervention implementation. All resources and tools required for the evaluation were developed.

3.4 PHASE TWO: ASSESSMENT OF ORGANISATIONAL READINESS

3.4.1 Study design

Phase two evaluated organisational readiness of the schools. A mixed-methods case study approach was used; qualitative and quantitative data were collected concurrently. Data were then integrated during analysis (Zhang and Creswell, 2013). A case study was the method of choice as the boundaries

between phenomenon (implementation of intervention) and context (schools) were unclear (Yin, 1984). The OR methodology is detailed in Chapter Five (Organisational readiness).

3.4.2 Participants

A purposive sampling method was used to select participants. Invited participants included all school management and all Grade 6 educators, as the intervention was targeted at Grade 6 learners.

3.4.3 Data collection

An information session was held with the school management and Grade 6 educators to inform them about the intervention and to discuss implementation strategies. Informed written consent was obtained from all educators who participated in the OR evaluation. Forty-six participants answered a self-administered questionnaire that explored OR at their schools. A focus group discussion (FGD) is used to explore views on health issues, programmes, interventions and research (Tong et al., 2018). The FGD comprised four to 15 participants, and followed at each school, lasting approximately 45-60 minutes. The interview guide had been pilot-tested with a separate group of educators and relevant changes made to the guide (Appendix 9). All FGDs were conducted in a suitable classroom. Focus group discussions were audio-recorded (Appendix 7) and transcribed verbatim. The transcripts were returned to two participants per school for comment and/or correction. Observations of the general functioning of the school were documented using field notes. The headmaster of each school gave consent for the researcher to observe occurrences during school hours (Appendix 6).

3.4.4 Measurement

The organisational readiness (**Figure 3-3**) was conducted in schools to ensure educator commitment to the implementation of the programme. The two diverse OR constructs, i.e. implementation climate and organisational readiness for implementing change, with differing scales and goals, had a similar design and compatibility features that permitted a congruent union of the two constructs.

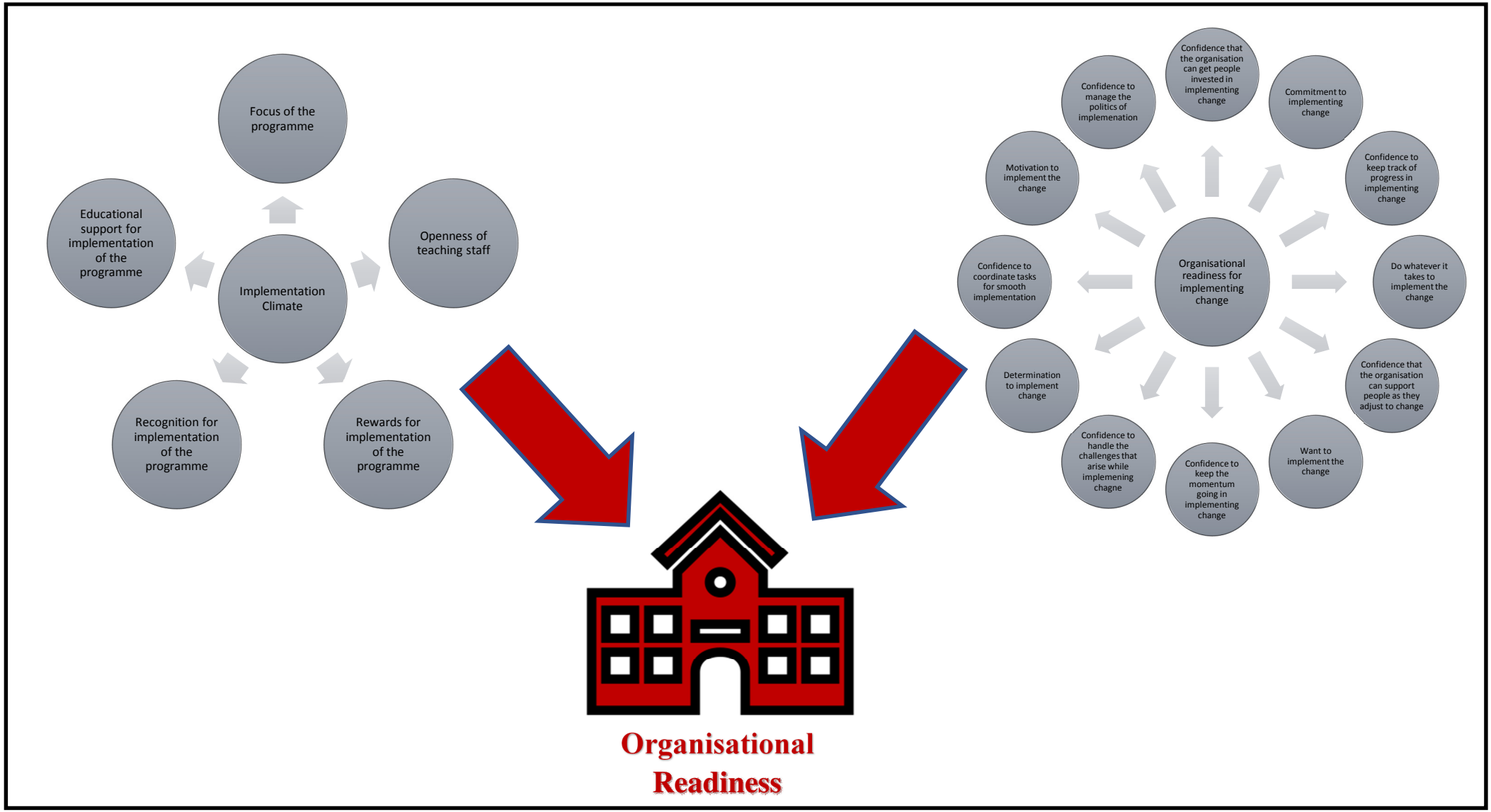


Figure 3-3 Methodology for organisational readiness

A 55-item questionnaire (Appendix 8) was designed to measure the implementation climate and OR for implementing change, and school-related characteristics such as the school quintile and socio-demographic characteristics of the participants.

The Implementation Climate Scale (ICS) (Ehrhart et al., 2014) is a validated tool used to assess the degree of strategic organisational climate supportive of EBP implementation. Measurement dimensions of team function in a school environment were adapted to represent the following scales: focus of the programme; openness of teaching staff; and recognition, educational support, and rewards for implementation of the programme. One scale (the selection for EBP) was excluded as it was irrelevant to this context.

The validated Organisational Readiness for Implementing Change (ORIC) questionnaire (Shea et al., 2014) defined in psychological terms, contained 12 items that measured educators' change commitment and change efficacy to implement the intervention.

Cronbach's alpha was calculated to assess the internal consistency of the subscales and composite scale. The Cronbach's alpha was 0.81 for the overall ICS scale and 0.93 for the overall ORIC scale indicating good internal consistencies.

3.4.5 Data analysis

Data from the questionnaires were captured using REDCap 9.3.1 - a secure web platform for building and managing databases, and exported into Stata 14 for statistical analysis. Educator perceptions of OR were described using proportions, mean scores (for normally distributed scales) or median scores (for non-normally distributed subscales, based on the Shapiro-Wilk test). The Kruskal-Wallis rank test was used to test differences between school, quintile, and fee-paying classifications.

The consolidated criteria for reporting qualitative research (COREQ) was used to ensure a good reporting standard of reliability and validity of the qualitative data (Tong et al., 2018). All FGD data were combined with the responses to the open-ended questions in the questionnaires and imported into Microsoft Excel for content analysis (Erlingsson and Brysiewicz, 2017), where all data were systematically transformed into an organised and concise synthesis of key results. Following thematic analysis reported by Braun and Clarke (Braun and Clarke, 2006), the data were reviewed for familiarity to generate initial coding. The codes were grouped in themes and subthemes, after which a core category emerged. Data saturation was reached after the third FGD, with the final two FGDs being coded to confirm this. The themes were subsequently revised to ensure that they retained the

core meaning evident in the initial data. The trustworthiness of the findings, i.e. the coding strategies and the framework that were generated, was independently checked by the research supervisors. Interpretations were discussed and challenged appropriately to achieve final consensus. No bias issues were identified.

3.5 PHASE THREE: PROCESS EVALUATION OF INTERVENTION EVALUATION

3.5.1 Study design

The process evaluation employed a mixed-methods approach (Zhang and Creswell, 2013); quantitative and qualitative data were collected concurrently and integrated during data analysis. The process evaluation methodology is detailed in Chapter Six (Process evaluation of intervention evaluation).

3.5.2 Participants

STATA 14 was used to generate the sample size of learners (n=410), using the syntax **sampsi .54 .44, alpha(.05) power(.8)**. The effect size of 10% between baseline and follow-up with a statistically significant difference at 0.05 with 80% power.

A total of 537 Grade 6 learners and their parents were invited to participate. All Grade 6 life orientation educators participated in the study. The seven educators were recruited and agreed to implement the programme in 12 Grade 6 classes. All learners and their caregivers were exposed to the intervention activities, and the process evaluation, therefore, included all learners and parents.

3.5.3 Data collection

Quantitative and qualitative data were collected concurrently between June and August 2018. Data collection methods and tools included: 1) checklists and logbooks completed by implementers (educators); 2) interviews with educators; 3) observations of lesson delivery and context; and 4) use of administrative data, such as attendance registers. Tools were selected to ensure that the resulting data would address the defined evaluation dimensions.

Seven interviews were conducted with implementers that lasted 30 minutes. The researcher conducted the interviews at the schools.

3.5.4 Measurement

Five outcomes from the taxonomy of the eight conceptually distinct implementation outcomes (acceptability, adoption, appropriateness, cost, feasibility, fidelity, penetration, and sustainability) formed the basis of the process evaluation (**Figure 3-4**) (Proctor et al., 2011). Adoption, cost and feasibility outcomes required long-term evaluation and were, therefore, excluded.

Linnan and Steckler acknowledged context (environmental aspects of the intervention setting) as another key dimension (Linnan and Steckler, 2002). Although not part of the Proctor et al. framework, context was added as an additional dimension in this study.

Logbooks were designed to collect self-reported data about intervention delivery from educators. The logbooks collected information on acceptability, appropriateness, penetration, sustainability, and the fidelity dimensions: adherence; exposure; participant responsiveness; and programme differentiation. The logbooks documented both quantitative (e.g. how many learners attended the lesson) and qualitative data (e.g. details of how the lesson was delivered, problems experienced). Processes were assessed by the completion of an implementation checklist in the logbook.

Data from learner-parent workbooks were extracted to document quantitative data (e.g. how many activities were completed/signed by parents).

Behavioural observations or field notes were used to provide an assessment of intervention implementation and were undertaken at every class. Fieldnotes of implementation experiences were documented (Appendix 11). Some of the items that were observed included adherence (e.g. programme delivered as planned, programme content), programme pedagogy (e.g. facilitators skills, credentials, preparedness, enthusiasm, attitude), implementation (e.g. programme exposure, programme dosage, amount of material received, participant responsiveness, programme differentiation) and general observations.

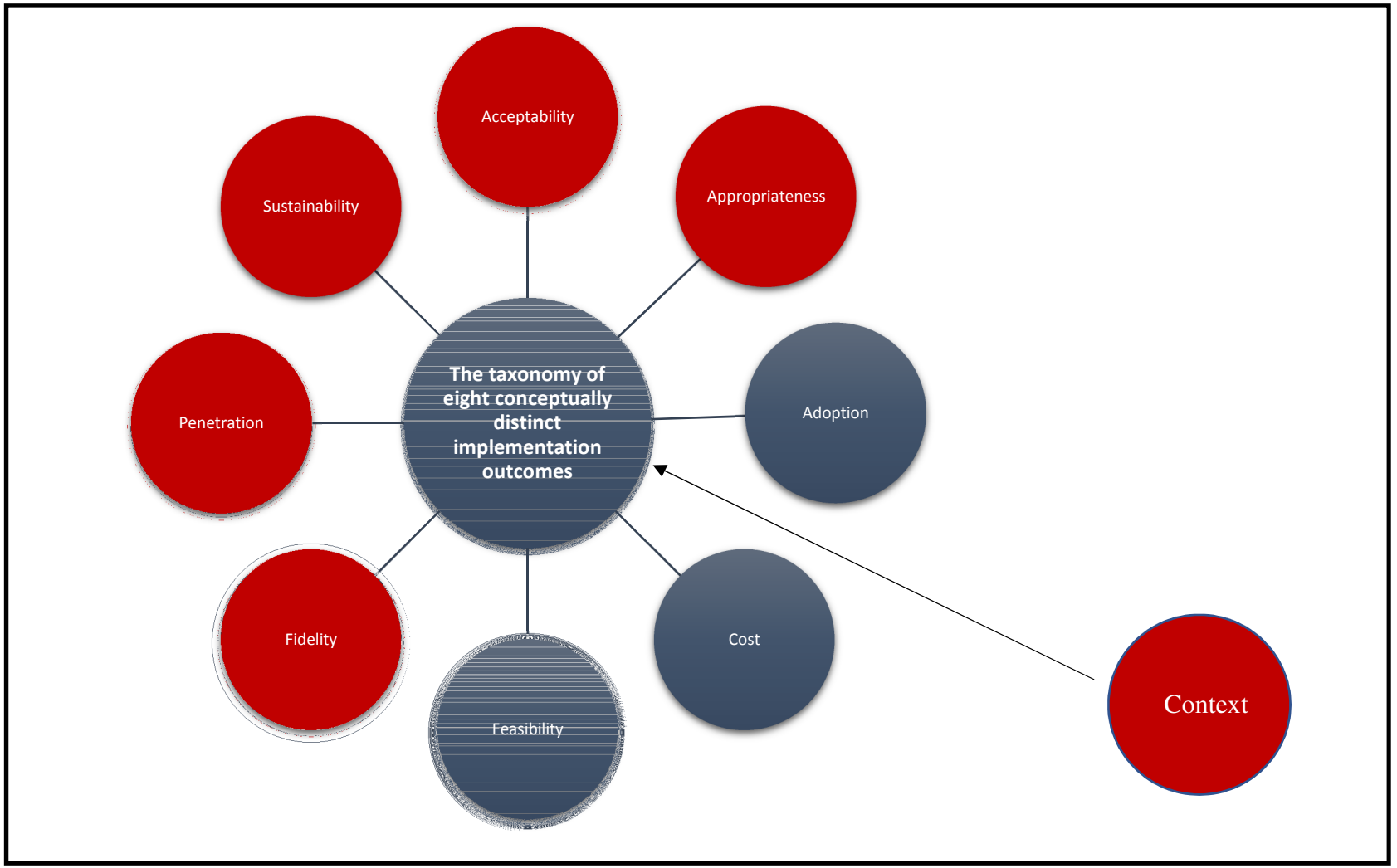


Figure 3-4 The taxonomy of eight conceptually distinct implementation outcomes

3.5.5 Data analysis

Multiple methods were used to measure the same evaluation dimension in order to triangulate findings and to ensure that data were available for each dimension. Triangulation of the data was necessary to create an accurate and holistic picture of the intervention implementation and the associated response. A reliability cross-check was performed between all data sources to ensure accuracy of reporting.

All data were captured using RedCap. The quantitative data were exported into Microsoft Excel, where ratios were calculated to show learner and parent, penetration and exposure rates. Learner penetration was calculated as the ratio of the number of learners who attended a given lesson or participated in an activity to the total number of learners in the Grade. Learner exposure was the ratio of the number of learners who completed the homework activities to the total number of learners in the Grade. Parent exposure was the ratio of the number of parents who signed the workbook to the total number of learners in the Grade. Dose delivered (what the programme delivered) was the function of the efforts of the educators and was calculated by the number of intended lessons of each intervention component delivered.

The COREQ was used to ensure a good reporting standard of reliability and validity of the qualitative data (Tong et al., 2018). Qualitative data collected from the educator logbooks and transcribed interviews with educators were combined with the responses to the open-ended questions in the questionnaires and imported into Microsoft Excel for content analysis (Erlingsson and Brysiewicz, 2017), where all data were systematically transformed into an organised and concise synthesis of key results. The qualitative data were used to better understand how each intervention component was delivered and its influence on various factors during delivery. A thematic analysis followed (Braun and Clarke, 2006). The themes were subsequently revised to ensure that they retained the core meaning evident in the initial data. The trustworthiness of the findings and the framework that was generated, was independently checked by the research supervisors. Interpretations were discussed to achieve final consensus. No bias issues were identified.

3.6 PHASE FOUR: OUTCOME EVALUATION

3.6.1 Study design

A pretest-posttest outcome evaluation was conducted (**Figure 3-5**).

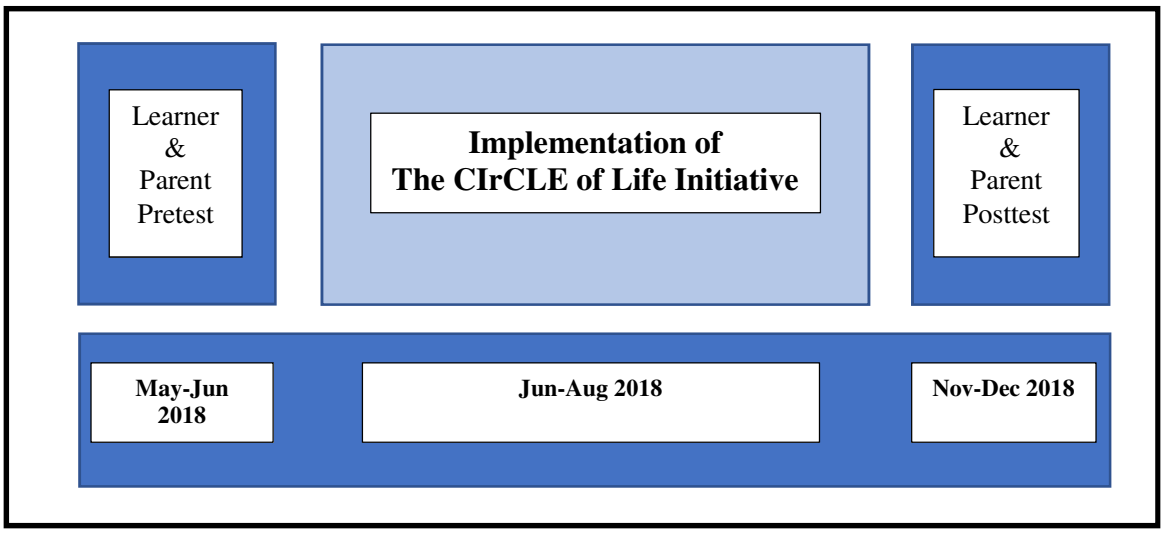


Figure 3-5 The pretest-posttest study

3.6.2 Participants

The intervention was rolled out to 537 Grade 6 learners (and one of each of their parents) at five government-run primary schools in a district located in Gauteng province, South Africa. The outcome evaluation of the study included parents (n=433) and learners (n=448) who gave consent/assent to participate in the study. Seven educators were recruited to implement the intervention to all 12 Grade 6 classes.

3.6.3 Data collection

The intervention was implemented during the 2018 school academic year. The learner and parent pretest evaluations were conducted in April and May 2018. Implementation of the intervention followed in June and August 2018. The posttests were conducted three months later, in November and December of 2018.

3.6.4 Measurement

Two outcomes were measured. The primary outcome was the effects and differences between the learner, pretest and posttest, and the parent, pretest and posttest. The second outcome determined whether the intervention, delivered to learners, could influence knowledge transfer in parents.
The 69-item learner pretest questionnaire (Appendix 12) and 67-item learner posttest questionnaire (Appendix 13) elicited learners' feedback regarding the following elements: socio-demographic characteristics (6 questions); HIV/AIDS-related knowledge, attitude, behaviour, practices and skills (21 questions); obesity-related awareness, attitude and skills (6 questions); nutrition-related awareness, attitude, behaviour and skills (14 questions); physical activity-related awareness, attitude, behaviour and skills (7 questions); cigarette and alcohol behaviour (4 questions); child-parent communication (8 questions); and general comments (3 questions). The 76-item parent pretest (Appendix 14) and 66-item posttest questionnaires (Appendix 15) elicited parents' feedback. Questions were similar to those in the learner questionnaire, with eight additional questions on socio-demographics.

The questionnaires were piloted in a group of 40 participants (20 learners and 20 parents) from the sample population, and were subsequently amended as required. These participants were excluded from the final analysis.

3.6.5 Data analysis

Data from the questionnaires were captured using REDCap. Data were imported into Stata 14 for statistical analysis. All data were recoded to categorical variables based on the distribution of the data. The analysis adjusted for the cluster sampling (schools), using the *svy* Stata command. Pre- and posttest categorical variables for learners and parents were compared. Chi-squared tests were conducted to determine if there were any significant differences between the variables pre- and posttest. Where sample sizes were small (<10), Fisher's exact test was used. In all analyses, differences were considered to be statistically significant at the 95% level.

The methodology for the pretest-posttest outcome evaluation is detailed in Chapter 7 (Outcome evaluation of the intervention).

3.7 ETHICAL CONSIDERATIONS

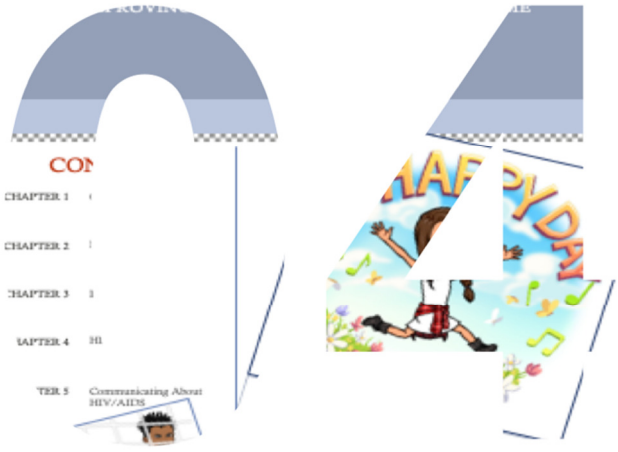
This study was conducted in accordance with Good Clinical Research Practice (Barton, 2007) and the Helsinki declaration of research ethics (World Medical Association, 1974). Ethical approval was obtained from the Human Research Ethics Committee of the Health Sciences Faculty, University of the Witwatersrand (clearance certificate no. M180220) (Appendix 16). The Gauteng Department of Education provided permission to conduct the study in the selected schools (clearance certificate no. 8/4/4/1/2) (Appendix 17). The headmaster of each school also provided permission to conduct the study (Appendix 6).

Informed consent and assent to participate in the study were sought from the parents and Grade 6 learners, respectively. The information sheet, parent consent form and learner assent forms are available in (Appendix 18). Informed consent was also obtained from all educators who participated (Appendix 4 and 5). Confidentiality and anonymity were maintained throughout the duration of the study.

Each participant was allocated a unique study code, not linked to the name, ensuring that responses could not be traced back to an individual. Audio recordings and transcripts were also coded with unique study numbers and were stored separately from the master list. All data were stored on the REDCap 9.3.1 data platform - a secure web platform for building and managing databases. Data on all computers and applications were password protected.

Undertaking research on pre-adolescents has unique challenges. The respect for a person's autonomy, justice, beneficence, and non-maleficence (do no harm) in the conduct of research with human participants was emphasised. Measures were put in place to minimise the potential harm to participants and to respond to any adverse consequences, i.e. emotional or psychological harm that might have resulted from the questions that were asked in this study. These included referring participants to public health service providers.

The health problems of HIV and obesity are highly emotionally charged. For example, learners may have lost loved ones due to HIV or be HIV positive themselves. They may also struggle with obesity in the family and may have encountered obesity-related stigma. There was, therefore, a strong contingency for counselling. A distress protocol was put into place for educators, learners and parents to address any emotional stress if the need arose. Counselling networks were established with the local health facilities. Any participant had to alert the researcher, who would make an appointment and assist the process.



Chapter 4: Design and development of the intervention

Photo credit: Keshni Arthur, The intervention workbook

Development of a pre-adolescent inter-generational intervention to address HIV and obesity using intervention mapping

4.1 ABSTRACT

Background: South Africa has a high prevalence of HIV and obesity. Interventions to date have primarily focused on adolescents and adults. Prevention of obesity, in particular, is not addressed substantively in the current pre-adolescent school curriculum. Education about factors underlying these issues early in life could reach beyond children, to their parents.

Objective: We aimed to increase awareness about HIV and obesity risks and prevention through the development of a combined intervention delivered directly to pre-adolescent learners and indirectly to their parents, for immediate- and long-term benefits.

Design: Scoping review and needs assessment

Setting: Five government-run primary schools in a district in Gauteng province, South Africa

Method: Five of the six-step intervention mapping protocol guided intervention development: 1. A formative study, comprising a scoping review and needs assessment; 2. Definition of programme objectives; 3. Selection of theory-based intervention methods; 4. Programme development; 5. Adoption, implementation and sustainability planning.

Results: Educators perceived that health and lifestyle issues among learners affected classroom learning and saw a need for school-based health curricula. They highlighted that HIV was an issue in their communities and that malnutrition was a concern in rural schools. The scoping review shortlisted 11 evidence-based practices which informed the design. Intervention components comprised a learning curriculum, environmental support and activity-based constituents that targeted the learner in the school environment and the parent in the home environment. The intervention was designed to increase knowledge about HIV and nutrition, enhance skills and strengthen autonomous self-efficacy in communication. Accompanying resources were designed, and implementation strategies were developed.

Conclusion: The scoping review and the needs assessment informed intervention development as well as critical adaptions. In particular, stakeholder engagement guided the tailoring of the intervention to fit the target populations and context.

4.2 BACKGROUND

In sub-Saharan Africa, the burden of communicable diseases (CD) and increasingly non-communicable diseases (NCD) affect an already fragile health system (Temu et al., 2014). South Africa, like many other developing countries, is in the midst of a health transition that is characterised by high levels of CDs, such as human immunodeficiency virus (HIV), and NCDs, such as cardiovascular disease and diabetes. In 2015, 33.4% of South African deaths were attributed to CDs and 55.5% to NCDs (Statistics South Africa, 2017). The obesity epidemic is a key contributor to the rise in NCDs and, together with HIV/AIDS, is a leading cause of early mortality (Human Sciences Research Council, 2014; Mayosi et al., 2009).

HIV affects an estimated 14.0% of the total South African population (Simbayi et al., 2019), with 26.3% being women in their reproductive ages (15-49 years) (Simbayi et al., 2019). Risky sexual behaviours that lead to HIV infection among young people include early sexual debut, multiple partners, forced sex and lack of condom use (Mkumbo et al., 2009).

Malnutrition, defined as deficiencies, excesses or imbalances in a person's food intake (World Health Organization, 2018) contributes to the disease burden. Over-nutrition can lead to overweight and obesity, while under-nutrition results in underweight (low weight-for-age). Women (15 years and older) are at greater risk of over-nutrition, with about two-thirds (68%) being overweight (Body Mass Index (BMI) ≥ 25 kg/m^2) or obese (BMI ≥ 30 kg/m^2) compared to one-third (31%) of men (Statistics South Africa, 2016). Based on weight-for-height, 13% of children under the age of five years are overweight; a prevalence of more than twice the global average of 6.1% (Statistics South Africa, 2016).

While recent attention on HIV/AIDS has been on access to treatment and improved adherence, prevention efforts that address risk factors remain critical (Mayosi et al., 2009). In particular, prevention has focused on promoting consistent condom use, going for HIV testing and reducing the number of sexual partners (Johnson et al., 2018; Peltzer and Promtussananon, 2003). Many of these prevention interventions have been directed at adolescents and young adults aged 15 to 24 years. A systematic review examining the efficacy of sexual risk reduction interventions among young people in this age group found that existing interventions did not adequately target sub-populations of young people at highest risk and in highest prevalence settings (Scott-Sheldon et al., 2013). Some HIV prevention, such as shifting attitudes to address stigma and increasing awareness and knowledge, can be initiated earlier. One example of an effort to reduce HIV that focused on pre-adolescents was a complex multi-level intervention called 'Soul Buddyz' (Johnson et al., 2018). The intervention implemented in South Africa found that participants reported fewer sexual partners, higher condom

use and lower prevalence of HIV approximately 10 years after participating in the extramural clubs (Johnson et al., 2018).

Similarly, to reduce the burden of NCDs, health promotion is recommended from an early age, while patterns of nutrition and physical activity are being established (Phaswana-Mafuya et al., 2013). For example, the intervention, 'Masikhusele iKamva Lethu' improved adolescents' nutritional intake, attitudes and knowledge (Jemmott et al., 2011). Other interventions, however, showed poor results. For example, 'Healthkick' did not significantly improve the quality of children's diets (Steyn et al., 2015). The high levels of poverty, substance abuse and HIV infection affected the fit of intervention for the setting. Intervention tasks were also not directly associated with existing daily activities. Children from low-income areas had little influence on their food choices, even though they showed improvements in their dietary knowledge (Oosthuizen et al., 2011).

The evidence-base for integrated prevention interventions remain limited (Juma et al., 2018). The intervention aimed to address two important health issues: poor nutrition and HIV, by revising the existing school curriculum, into a more holistic health prevention intervention. Health issues addressed jointly have benefits such as the efficient use of resources (Wand and Ramjee, 2013).

Interventions targeted at pre- and adolescent populations could influence behaviour at an early stage to prevent disease outcomes (Baltussen et al., 2013; Dinaj-Koci et al., 2015). Therefore, providing pre-adolescence (9-12 years old) with age- and culturally-appropriate knowledge and skills could serve as a crucial developmental period for prevention efforts to guide the developmental trajectory of future risky behaviours toward safer practices (Zimmer-Gembeck and Helfand, 2008).

Implementing interventions early in life could also stimulate interest and influence health behaviours amongst parents (upon whom children are most dependent for their health needs and well-being) (Damerell et al., 2013). Inter-generational knowledge transmission was, therefore, considered in intervention development. Family is constructed and developed through its generations (Hartman and Laird, 1983), and shaped through mutual interaction and influence that create habitual ways of behaviour and communication (how problem-solving, arguments or discussions occur) (Becvar and Becvar, 2006).

The Intervention Mapping (IM) protocol, developed by Bartholomew et al. (2011), is a stepwise technique for systematically applying evidence-based practice (EBP) and relevant theories in the development and implementation of interventions to encourage behaviour change (Bartholomew et al., 2011). The protocol has been used in intervention development of obesity (Stea et al., 2016) and HIV (Flash et al., 2018) and is recommended for public health interventions (Lloyd et al., 2011; Mkumbo et al., 2009). Intervention Mapping ascribes to a socio-ecological paradigm, which targets

behavioural and environmental factors. This approach links to the inter-generational transmission strategy. In a South African study that utilised IM, the researchers identified the need for flexibility in different contexts, and recommended adaptation of interventions to suit the specific needs of the population (Draper et al., 2014).

This paper details the IM approach used in the development of a combined HIV and obesity that could support knowledge transfer and translation directly to pre-adolescent learners and indirectly to their parents, for immediate- and long-term benefits. The intervention aimed to increase awareness about HIV and obesity risks and prevention in a South African district that had a high HIV prevalence. In this paper, the term 'parent' is considered to be synonymous with 'guardian'.

4.3 METHODS

Five of the six-step IM protocol guided intervention development: 1. A formative study; 2. Definition of programme objectives; 3. Selection of theory-based intervention methods; 4. Programme development; 5. Adoption, implementation and sustainability planning; and 6. Generation of an evaluation plan (not covered in this paper).

4.3.1 Methods (Step 1)

Step 1, the formative study, involved the conduct of a scoping review and needs analysis. These steps identified what required change, and if anything, for whom.

4.3.1.1 The scoping review

The scoping review mapped the literature on school-based health interventions designed to reduce the risk of HIV and obesity in pre-adolescents and their parents. The purpose of the review was to identify, describe and shortlist relevant EBPs. The methodological process outlined by Arksey and O'Malley (2005) was used to conduct the review (Arksey and O'Malley, 2005). Five stages were undertaken to determine the research question, identify relevant literature, select appropriate studies, chart the data, and collate, summarise and report results.

In selecting studies, the search parameters were limited to the following inclusion criteria: EBP of HIV or obesity school-based intervention studies that reported effectiveness as an outcome, including

both pre-adolescent/adolescent learners and their parents, English publications, and those published from 2007 to 2017. Grey literature, and those that mentioned 'intervention' in a framework without further elaboration of the interventions or intervention components were excluded.

The following electronic databases were searched from January to February 2018: MEDLINE (via PubMed) and Cochrane Database (via The Cochrane Library). The search strategy included the keywords 'school-based', 'HIV intervention', 'obesity intervention', 'parent' and 'adolescent'. The PRISMA flow diagram (Liberati et al., 2009) (**Figure 4-1**), shows a final selection of 11 studies that were included in the qualitative synthesis from an initial 200 records.

References were imported into an EndNote Reference Manager library, duplicates removed, full-text papers obtained, and records stored and managed. Tables summarised the identified studies for collation and reporting.

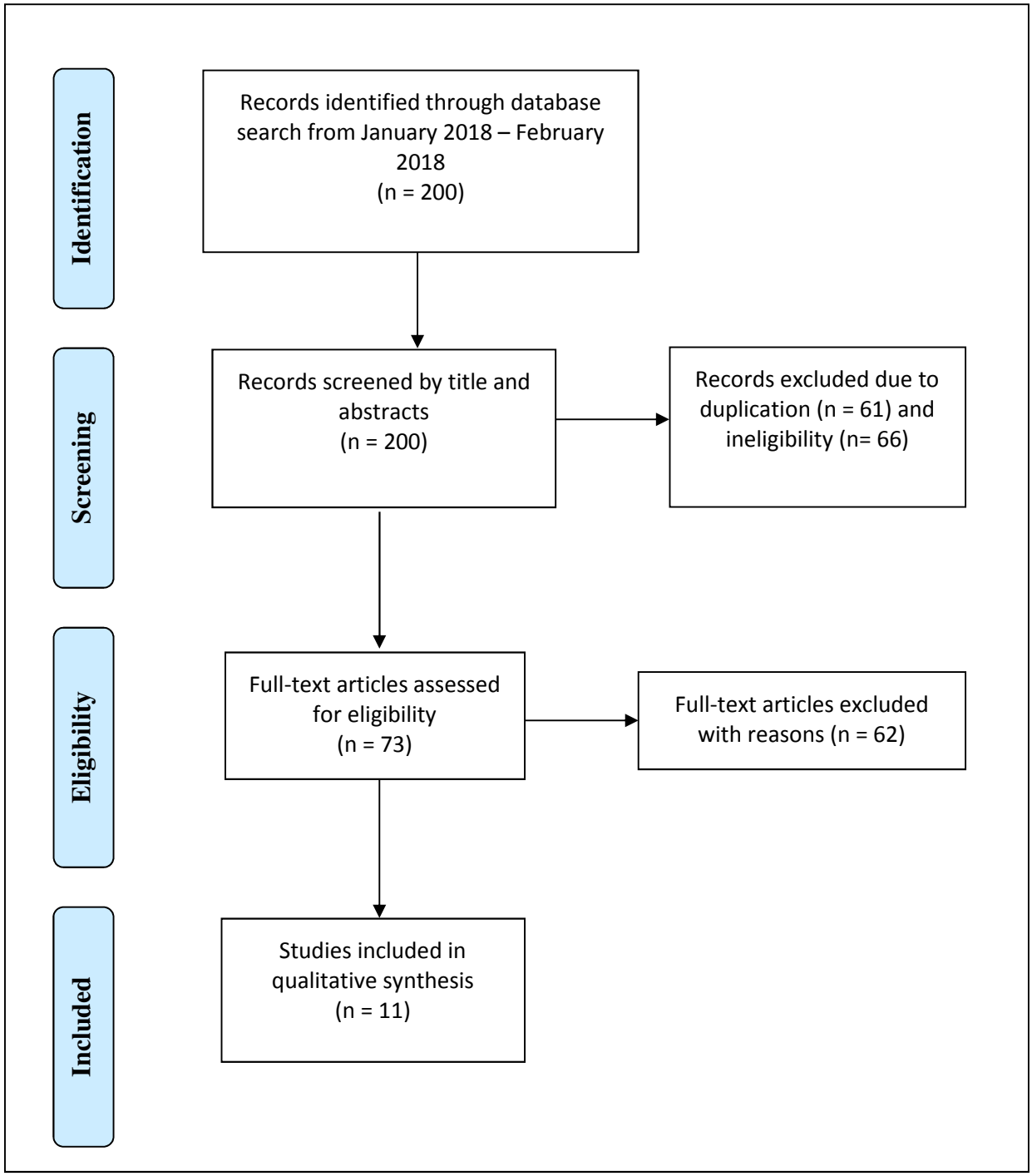


Figure 4-1 PRISMA flow diagram

4.3.1.2 The needs assessment

A needs assessment evaluated the HIV and obesity health status at selected schools; the environmental conditions and behaviour/s associated with disease, and the desired programme outcomes. It was conducted in May and June 2018 at five Government-run primary schools in a district located in Gauteng province, South Africa. Schools are categorised into five groups or quintiles, based on the relative wealth of their surrounding communities (The Government Gazette, 2006). Schools in the most impoverished communities are classified as Quintile 1 and schools serving the wealthiest communities, as Quintile 5. Two of the schools were classified as a Quintile 1 schools, and the other three represented Quintile 2, 3 and 4 schools. Three of the schools were in a rural area; two were located in an urban area.

An information session was held with the management (headmasters, deputy headmasters and heads of department) and educators of the schools, who would potentially interact with the programme. Educators answered a self-administered questionnaire and a discussion followed.

Questionnaire data were imported into Stata 14 for statistical analysis. Proportions or mean scores with standard deviations, or median scores with interquartile ranges, were calculated for educator perceptions of the health status of the learners and the community.

4.3.2 Methods (Step 2-5)

In Step 2, the programme objectives were formulated (i.e. the intervention targets, requiring change to modify behaviour) and matrices of change objectives, which were created by combining sub-behaviours with behavioural determinants that identified targetable beliefs. The matrices are detailed in the Supplementary File: Matrices of Change Objectives. In step 3, theory-based methods most likely to influence change were selected and translated into practical application, detailed in the Supplementary File: Practical Strategies for Intervention Design. In Step 4, the intervention was developed by integrating the practical applications into an organised programme. Step 5 involved planning for adoption and implementation.

Stakeholders were consulted during the various stages, viz. 20 pre-adolescent learners and their 40 parents; representatives from the health sector (two nutritionists, one exercise therapist, three occupational therapists, two physiotherapists and one child psychologist); and representatives from the education sector (27 educators and two departmental officials) and non-Governmental organisations (two representatives from the Soul City Institute). Consultations, in the form of focus

groups, small meetings and individual interviews were conducted during and after intervention design. This informed the content and influenced the tailoring of the intervention to fit local needs, resources and competencies.

The Human Research Ethics Committee of the Health Sciences Faculty, University of the Witwatersrand approved the study (clearance certificate no. M180220). Consent was obtained from all schools, and participants' confidentiality and anonymity were maintained. A distress protocol was put into place for educators, learners and parents to address any emotional stress if the need arose.

4.4 RESULTS

4.4.1 Step 1: Formative research and logic model of the problem

4.4.1.1 The scoping review

The scoping review identified 11 EBPs in total; six were related to obesity (Adab et al., 2015; Gentile et al., 2009; Gerards et al., 2015; Grydeland et al., 2014; Kipping et al., 2014; Xu et al., 2015) and five to HIV (Bogart et al., 2013; Chen et al., 2009; Jemmott III et al., 2015; Miller et al., 2013; Villarruel et al., 2008), outlined in detail **in Table 4-1**. The studies provided a base for the intervention design. Nine of the studies were conducted on pre-adolescents and their parents, but none tested inter-generational outcomes.

The obesity interventions commonly targeted three outcomes: physical activity behaviour, dietary behaviour, and positive parenting. Outcomes of the studies focused on change in BMI, physical and sedentary behaviour, dietary behaviour, or combinations thereof. Effective results included improved health behaviour and increased obesity-related, and healthy eating knowledge. Anthropometry changes, however, showed poor outcomes (Adab et al., 2015; Gerards et al., 2015). Intervention modalities included signposting, positive parenting strategies and parent workbooks.

The HIV-focused interventions included target populations of pre-adolescents and/or adolescents and parents. HIV-related knowledge was disseminated through interactive discussions and exercises to reinforce messages and to contextualise decision-making. All studies used improving parent-adolescent communication as a strategy, with three studies reporting significant effects. The strategies included communication about sexual risk, HIV prevention and comfort with communication.

Table 4-1 Descriptive summary of interventions

Classification scheme	Country	Target population	Theory-based	Intervention components	Intensity	Outcomes	Results
OBESITY							
WAVES (Adab et al., 2015)	United Kingdom	Pre-adolescents & parents	Unspecified	Healthy nutrition plans School time physical activity Interactive skill based physical activity Family mail-outs Signposting for family Healthy cooking skills for family	Twelve-month programme	Anthropometry, Dietary behaviour. Physical activity behaviour	No difference.
Lifestyle Triple P (Gerards et al., 2015)	Netherlands	Pre-adolescents & parents	Self-regulation principles	Active skills training for parents on nutrition, physical activity Positive parenting strategies through parent workbook, recipe book and active games booklet	Fourteen-week intervention.	Anthropometry, Dietary behaviour, Physical activity behaviour, Parenting practices, Parental self-efficacy in communication	Significant effects on parent reported child behaviours and parenting measures. No difference in anthropometry or objectively measured physical activity.
Switch (Gentile et al., 2009)	USA	Pre-adolescents & parents	Socio-ecological model	Pre-adolescents encouraged to 'Switch what you Do, Chew, and View'. Community awareness of healthy lifestyles and the prevention of childhood obesity, Advertising and media messages	Four month programme	Physical activity behaviour, Sedentary behaviour, Dietary behaviour, Anthropometry, Awareness about obesity	Significant effects for children's dietary behaviour and sedentary behaviour
CLICK-Obesity (Xu et al., 2015)	China	Pre-adolescents & parents	Theory of triadic influence	Classroom curriculum (knowledge and skills to promote health behaviours) School environment support (posters) Family involvement (materials and resources that facilitate healthy behaviours) Fun programmes (picture painting, short paper writing and stage drama)	One 30-minute lesson delivered each month for one academic year (8 months)	Anthropometry, Health behaviour, Behavioural determinants	Significant in improving health behaviours and obesity-related knowledge.
Active for Life Year 5 (Kipping et al., 2014)	England	Pre-adolescents & parents	Social cognitive theory	Lessons to children Child-parent interactive homework plans School newsletters for parents	Sixteen lesson plans delivered over two out of the three school terms in 6-7 months.	Physical activity behaviour, Sedentary behaviour, Dietary behaviour	No difference.
HEIA (Grydeland et al., 2014)	Norway	Pre-adolescents & parents	Socio-ecological model	Promotes healthy nutrition Increase awareness of healthy choices Increase physical activity Reduce screen-time. Lessons with learner booklet, posters for classrooms, sports equipment for recess activities, and active commuting campaigns. Fact sheets used for parents.	Twenty month intervention	Anthropometry influenced by gender, pubertal status, or level of parental education	Significant change in BMI in girls, but not in boys. Children of higher educated parents benefited more.
HIV							
(No intervention name)	Mexico	Adolescents & parents	Theory of reasoned	HIV risk reduction intervention for parents focused on parent–adolescent communication.	Six 60–minute modules	Parent–adolescent communication, Parent–	Significant effects to increase the quality and

Villarruel et al. Intervention (Villarruel et al., 2008)			action and planned behaviour	Parents and adolescents received content about pregnancy and HIV prevention and to support sexual– specific communication. Small-group discussions, videos, interactive exercises such as role– plays, skills-building activities and homework.		adolescent sexual risk communication, Comfort with communication	quantity of parent–adolescent communication related to general and sex–specific communication.
(No intervention name) Jemmott et al. Intervention (Jemmott III et al., 2015)	South Africa	Adolescents & parents	Social cognitive theory & Theory of reasoned action and planned behaviour	Interactive exercises, games, brainstorming, role-playing, group discussions, and comic workbooks	Twelve 1-hour modules.	Unprotected vaginal intercourse, Other sexual behaviours	Significant effects
Parents Matter! (Miller et al., 2011)	USA	Pre-adolescents & parents	Social and behavioural theories	Enhancing parenting skills and parents' awareness of adolescent sexual risk behaviour through discussion, videotapes, modelling, role-playing, group exercises, and homework assignments.	Five session of two and a half hours.	Parental perceptions of child readiness to learn about sex, HIV prevention communication, Communication effectiveness	Significant effects
Focus on Youth in the Caribbean (Chen et al., 2009)	Bahamas	Pre-adolescent, adolescent & parents	Social cognitive theory	Includes discussions, risk avoidance strategies, communication and negotiation strategies and skills, HIV-related knowledge, and condom-use skills as well as games and exercises to reinforce main messages, and a fictional family story to contextualize decision-making.	Ten weekly session of 75 minutes.	Sexual behaviour progression, Condom use	Significant effects in delay in sexual risk among pre-adolescents
Let's Talk! (Bogart et al., 2013)	South Africa	Pre-adolescent, adolescent & parents	Unspecified	Worksite-based parenting programme that improves parent-child communication about HIV and sexual health, and parent condom use self-efficacy and behaviour.	Five weekly two-hour group sessions	Parents' comfort in talking about sex, Parents' self-efficacy in condom use	Significant increase in parents' comfort with talking to their adolescent about sex

Behavioural theories informed many, but not all, of the interventions. Social cognitive theory provided a basis for several interventions, particularly the constructs of self-efficacy (an individual's confidence in his/her ability to perform the desired behaviour) (Kipping et al., 2014) and behavioural capability (knowledge and skills to influence behaviour) (Miller et al., 2011). Other interventions drew on the socio-ecological model (Gentile et al., 2009; Grydeland et al., 2014), which acknowledged that, while behaviour in children is determined partly by themselves, they are also directly dependent on parents (e.g. the food provided, opportunities for physical activity) and on behaviour patterns of the family, school and peer groups.

4.4.1.2 The needs assessment

Of the 51 eligible educators (i.e. management and Grade 6 educators) at the five schools, 46 (90.2%) consented to participate in the needs assessment survey. Most participants were female (71.7%); the mean age was 44.8 years, and the average teaching tenure was 16.5 years. All respondents had a post-high school qualification, with 71.7% having either an undergraduate or postgraduate degree. Overall, 41.3% of all respondents were in management positions. On average, there were nine participants per school (range 7-15), representing four quintiles: 37.0% from a Quintile 1, rural school; 15.2% from a Quintile 2, rural school; 32.6% from a Quintile 3, urban school, and 15.2% from a Quintile 4, urban school. Of the total respondents, 52.2% represented rural schools and 47.8% represented urban schools.

The study investigated the educators' understanding of the relationship between health and lifestyle, and learning, and the perceived factors that influence this in their schools and communities. Most respondents (89.1%) felt that the health and lifestyle of a child has a great or very great effect on his/her learning in the classroom. Most respondents (78.3%) also identified a great or very great need for health programmes at their schools.

Overall, 26.1% of respondents perceived that there was a high or very high prevalence of disease among learners at their schools; and 39.1% perceived a moderate prevalence. Disease-related problems differed between rural and urban schools and between quintiles. Fewer disease-related problems were reported in urban schools (34.4%) compared to rural schools (65.6%). According to respondents, asthma, obesity and influenza were the most common diseases in the urban schools; and HIV, malnutrition, obesity and tuberculosis were most common in the rural schools. Overall, 78.3% of respondents reported that obesity was a slight or moderate problem in their schools. Malnutrition was both perceived and observed to be a more significant issue at the rural schools, while obesity was more prominent in urban schools.

4.4.1.3 Logic model of the problem

The formative assessment was summarised into a problem-focused logic model, displayed in **Figure 4-2**. The model illustrates the causal pathway between the input (the required resources), processes (the various phases from conceptualisation to implementation) and the output strategies (the planning, preparation and implementation strategies) that will affect outcomes (to influence change in knowledge, skills and behavioural intention) and impact (to decrease incidence of HIV and obesity). The proposed outcomes were non-linear and part of a multi-faceted system that could not be fully captured using the logic model, hence the distinction between the HIV and obesity arrows. The model led to the identification of specific programme objectives and outcomes.

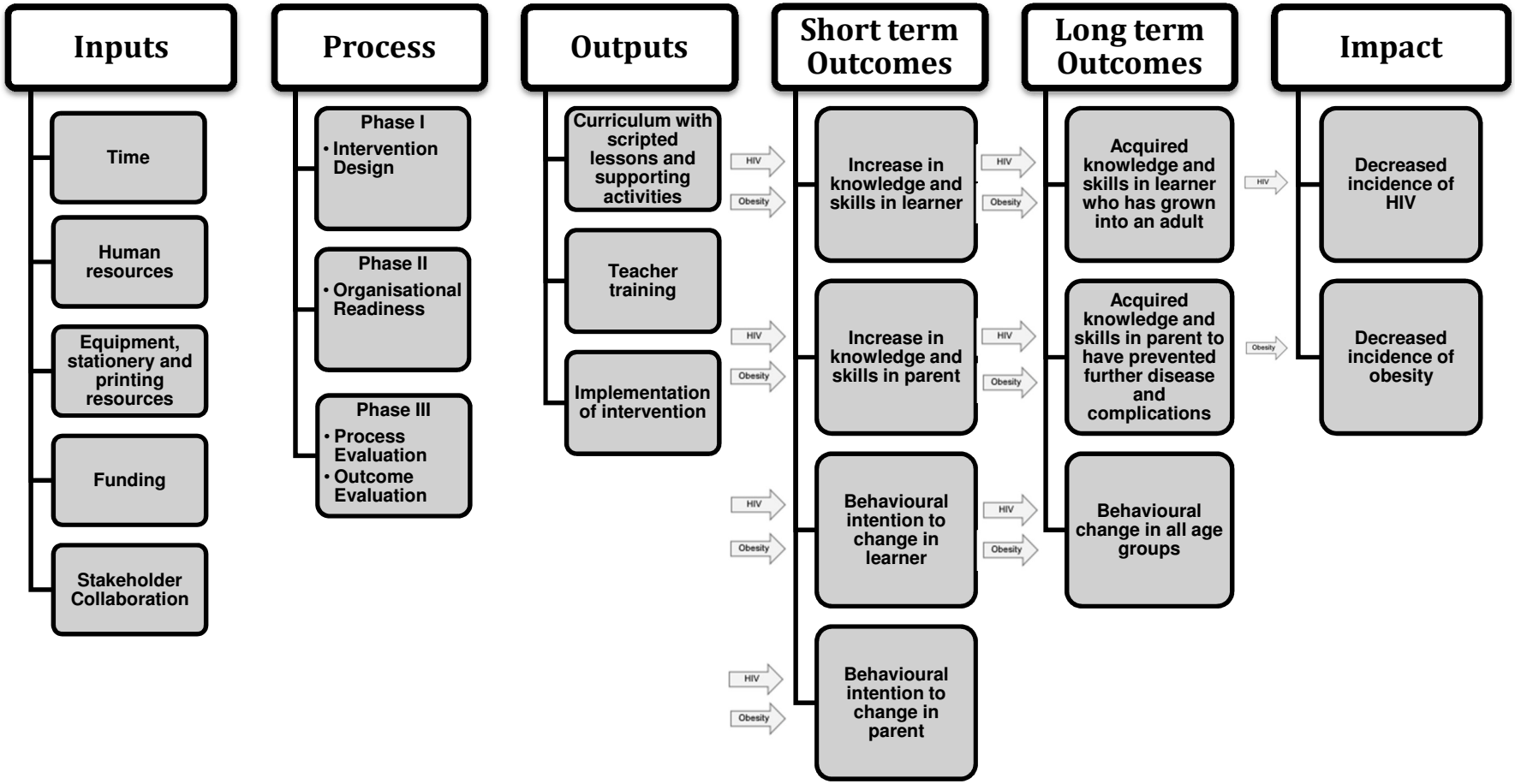


Figure 4-2 Logic model of the HIV and obesity problem

4.4.2 Step 2: Formulation of outcomes, performance objectives and change objectives

Three key behaviours were identified: 1) modifying diet, 2) increasing physical activity, and 3) increasing learner-parent communication to decrease HIV-related risk behaviours. These led to three interventions: 1) information dissemination to both learner and parent, 2) translation of knowledge into change skills, and 3) strengthening autonomous support and self-efficacy in communication. Performance objectives were identified to specify the action required by the target groups to modify behavioural change. The main determinants selected were knowledge, change skills and self-efficacy to communicate. Identified environmental determinants included: 1) social support, 2) social norms, 3) access to resources, and 4) organisational support.

The determinants and performance objectives were then matched to develop matrices of change objectives, detailed in **Table 4-2**:

- To increase health knowledge to prevent obesity/underweight and HIV infection in the short and long-term,
- To increase application of change skills to prevent obesity/underweight and HIV infection in the short and long-term, and
- To strengthen autonomous support and self-efficacy in communication.

Table 4-2 Matrices of change objectives

Change Objective I: Increase in health knowledge to prevent obesity/underweight and HIV infection in the short and long-term		
Behavioural Outcome I: Behavioural intention to change through application of knowledge to avoid risky behaviour that could result in obesity/underweight and HIV infection in the short and long-term		
Performance Objective 1: Communicate and reinforce obesity/underweight prevention knowledge to learners and their parents	**Personal Determinant**	
	Knowledge	Comprehend knowledge about obesity/underweight and show awareness of the advantages of proper nutrition and physical activity
	Belief	Believe that proper nutrition and physical activity are important for overall well-being
	Attitudes	Appreciate and value the benefits of proper nutrition and physical activity
	Self-efficacy	Express confidence to communicate with family about strategies to support obesity prevention
	External Determinant	
	Social Support	Receives social reinforcement from family, educators and peers about obesity/underweight and the advantages of proper nutrition and physical activity
	Social Norms	Appropriateness and acceptability of disseminated knowledge Perception that peers are communicating with families and seek support from family Modelling by parents and peers
	Access to Resources	Availability and accessibility to nutritious foods in the home and school environment
	Organisational support	School tuck-shops and feeding schemes to support healthy eating practices
Performance Objective 2: Communicate and reinforce HIV prevention knowledge to learner and parent/s.	**Personal Determinant**	
	Knowledge	Comprehend knowledge about HIV and show awareness of positive (sexual abstinence) and negative influences (alcohol, drugs) that could affect behaviour resulting in HIV infection in pre-adolescence and adulthood
	Belief	Believe that positive (sexual abstinence) and negative influences (alcohol, drugs) could affect behaviour resulting in HIV infection in pre-adolescence and adulthood
	Attitudes	Appreciate and value the benefits of positive (sexual abstinence) and negative influences (alcohol, drugs) could affect behaviour resulting in HIV infection in pre-adolescence and adulthood
	Self-efficacy	Express confidence to communicate with family about strategies to support obesity prevention
	External Determinant	
	Social Support	Receives social reinforcement from family, educators and peers about HIV prevention
	Social Norms	Appropriateness and acceptability of disseminated knowledge Perception that peers are communicating with families and seek support from family Modelling by parents and peers
	Access to Resources	Availability and accessibility of health facilities to test and administer medication if necessary close to home and school environments
Change Objective II Application of change skills to prevent obesity/underweight and HIV infection in the short and long-term		
Behavioural Outcome II		

Behavioural intention to change by application of skills to prevent obesity/underweight and HIV infection in the short and long-term		
Performance Objective 3: Encourage additional learning from activity-based change skills for obesity/underweight prevention	**Personal Determinant**	
	Knowledge	Comprehend knowledge skills about obesity/underweight and show awareness of the advantages of proper nutrition and physical activity
	Change Skills	Demonstrates skills to family and seek/offer support
	Belief	Believe that proper nutrition and physical activity are important for overall well-being
	Attitudes	Appreciate and value the benefits of proper nutrition and physical activity
	Self-efficacy	Express confidence to communicate with family about strategies to support obesity prevention
	External Determinant	
	Social Support	Encouragement from family, educators and peers to perform activity and to learn the skill set
	Social Norms	Appropriateness and acceptability of activity or skill set to be learnt and applied Modelling by family and peers
Performance Objective 4: Encourage additional learning from activity-based change skills for HIV prevention	**Personal Determinant**	
	Knowledge	Comprehend knowledge skills about obesity/underweight and show awareness of the disadvantages of risky behaviour
	Change Skills	Demonstrates skills to family and seek/offer support
	Belief	Believe that proper communication is important for overall support and well-being
	Attitudes	Appreciate and value the benefits of not indulging in risky behaviour
	Self-efficacy	Express confidence to communicate with family about strategies to support HIV prevention
	External Determinant	
	Social Support	Encouragement from family, educators and peers to perform activity and to learn the skill set
	Social Norms	Appropriateness and acceptability of activity or skill set to be learnt and applied Modelling by family and peers
Change Objective III Strengthen autonomous support and self-efficacy of learner and parent through dissemination of knowledge and change skills for improved communication		
Behavioural Outcome III Improved learner-parent communication to avoid risky behaviour that could result in obesity/underweight and HIV infection		
Performance Objective 5: Encourage learner-parent communication about HIV, obesity/underweight prevention in open informal discussion during family time	**Personal Determinant**	
	Knowledge	Comprehend knowledge about how to communicate with family Comprehend knowledge about risky behaviour and its linkage to HIV
	Change Skills	Demonstrate skills to communicate with family and seek/offer support
	Belief	Believe that communication and discussion of risky behaviour and its linkage to HIV are important to prevent negative consequences
	Attitudes	Appreciate and value the benefits of communication and discussion of risky behaviour and its linkage to HIV
	Self-efficacy	Confidence to communicate and converse with family about difficult topics such as HIV prevention and strategies to support prevention
	External Determinant	
	Social Support	Receives social reinforcement from family, educators and peers
	Social Norms	Perception that peers are communicating with families and seek

		support from family

4.4.3 Step 3: Selection of theory-based methods and practical strategies

Education alone will not necessarily change behaviour. Therefore, specific behaviour change theory, based on the taxonomy of behaviour change, by Kok et al. (2015) were identified and selected to influence change (Kok et al., 2015). Advance Organisers (theories of information processing) were used to increase HIV- and obesity-related knowledge. Guided Practice (social cognitive theory and theories of self-regulation) were used to enhance change skills. Discussion (theories of information processing) were used to increase self-efficacy in communication. Practical strategies were identified to apply the theoretical methods to practice. These delivery strategies, aimed at changing determinants, were organised into a coherent programme of practical strategies so that relevant methodology supplemented the logic model of change. The theory-based methods were translated into practical strategies that were matched to the change objectives from the matrices, detailed in **Table 4-3**.

Table 4-3 Practical strategies for intervention design

Change Objective I Increase in health knowledge to prevent obesity/underweight and HIV infection in the short and long-term	
Performance Objective 1	Communicate and reinforce obesity prevention knowledge to learner and their parents
Determinant	Knowledge
Theoretical Method	Advanced Organisers (Theories of information processing)
Implementation Strategy	Planned educator-delivered lessons at school for learner with notes that parents will also read through. Parents are expected to sign after reading through each lesson. The learner will be asked to verbally convey messages learnt during lesson time to their parents at home for reinforcement. Games and puzzles for reinforcement.
Performance Objective 2	Communicate and reinforce HIV prevention knowledge to learner and parents
Determinant	Knowledge
Theoretical Method	Advanced Organisers (Theories of information processing)
Implementation Strategy	Planned educator-delivered lessons at school for learner with notes that parents will also read through. Parents are expected to sign after reading through each lesson. The learner will be asked to verbally convey messages learnt during lesson time to their parents at home for reinforcement. Games and puzzles for reinforcement.
Change Objective II Increase in knowledge and application of change skills to prevent obesity/underweight and HIV infection in the short and long-term	
Performance Objective 3	Encourage additional learning from activity-based change skills for obesity prevention
Determinant	Change skills
Theoretical Method	Guided Practice (Social Cognitive Theory and Theories of Self-Regulation)
Implementation Strategy	Planned educator-delivered lessons of guided practice of skill at school for learner, with notes that parents will also read through. Parents are expected to sign after reading through each lesson. The learner will be asked to verbally convey skills learnt and practised during lesson time to their parents at home for reinforcement. There will be an activity for parent and learner to perform together as parent assisted homework.
Performance Objective 4	Encourage additional learning from activity-based change skills for HIV prevention
Determinant	Change skills
Theoretical Method	Guided Practice (Social Cognitive Theory and Theories of Self-Regulation)
Implementation Strategy	Planned educator-delivered lessons of guided practice of skill at school for learner, with notes that parents will also read through. Parents are expected to sign after reading through each lesson. The learner will be asked to verbally convey skills learnt and practised during lesson time to their parents at home for reinforcement. There will be an activity for parent and learner to perform together as parent assisted homework.
Change Objective III Strengthen autonomous support and self-efficacy of learner and parent through dissemination of	

knowledge and change skills for improved communication	
Performance Objective 5	Encourage learner-parent communication about HIV prevention in open, informal discussion during family time
Determinant	Self-efficacy
Theoretical Method	Discussion (Theories of Information Processing)
Implementation Strategy	HIV Communication Exercise for parent and learner to converse about HIV issues in an informal discussion.

4.4.4 Step 4: Intervention Development

A new intervention was designed based on the field intervention framework from the 'CLICK-Obesity Programme' (Xu et al., 2012, 2015), with additional components (e.g. the learner-parent workbook) selected from other EBPs (identified in the scoping review) to achieve the desired behavioural outcomes.

Adaptation is the process of modifying key characteristics of an intervention, recommended activities and delivery methods, without competing with or contradicting the core elements, theory and internal logic of the intervention thought most likely to produce the main effects (Mckleroy et al., 2006). Components were adapted as this intervention included both HIV and obesity. The content, duration, and dose of lessons delivered differed, due to the time-constraints of implementing during lesson time and alignment with the existing Grade 6 curriculum. The design accommodated educator preferences for content to suit the target community. For example, the needs assessment highlighted that although obesity was prevalent, malnutrition was a greater challenge amongst learners, prompting adaptations to the initially proposed intervention.

4.4.4.1 The CIrCLE of Life Initiative

The intervention was named the CIrCLE (Child Influencing paRent Communication for Life Education) of Life Initiative (**Figure 4.3**) has both a school and home environmental component, each of which comprises a learning curriculum, environmental support, and activity-based constituents. The school component targets the learner while the home environment component targets the parent.

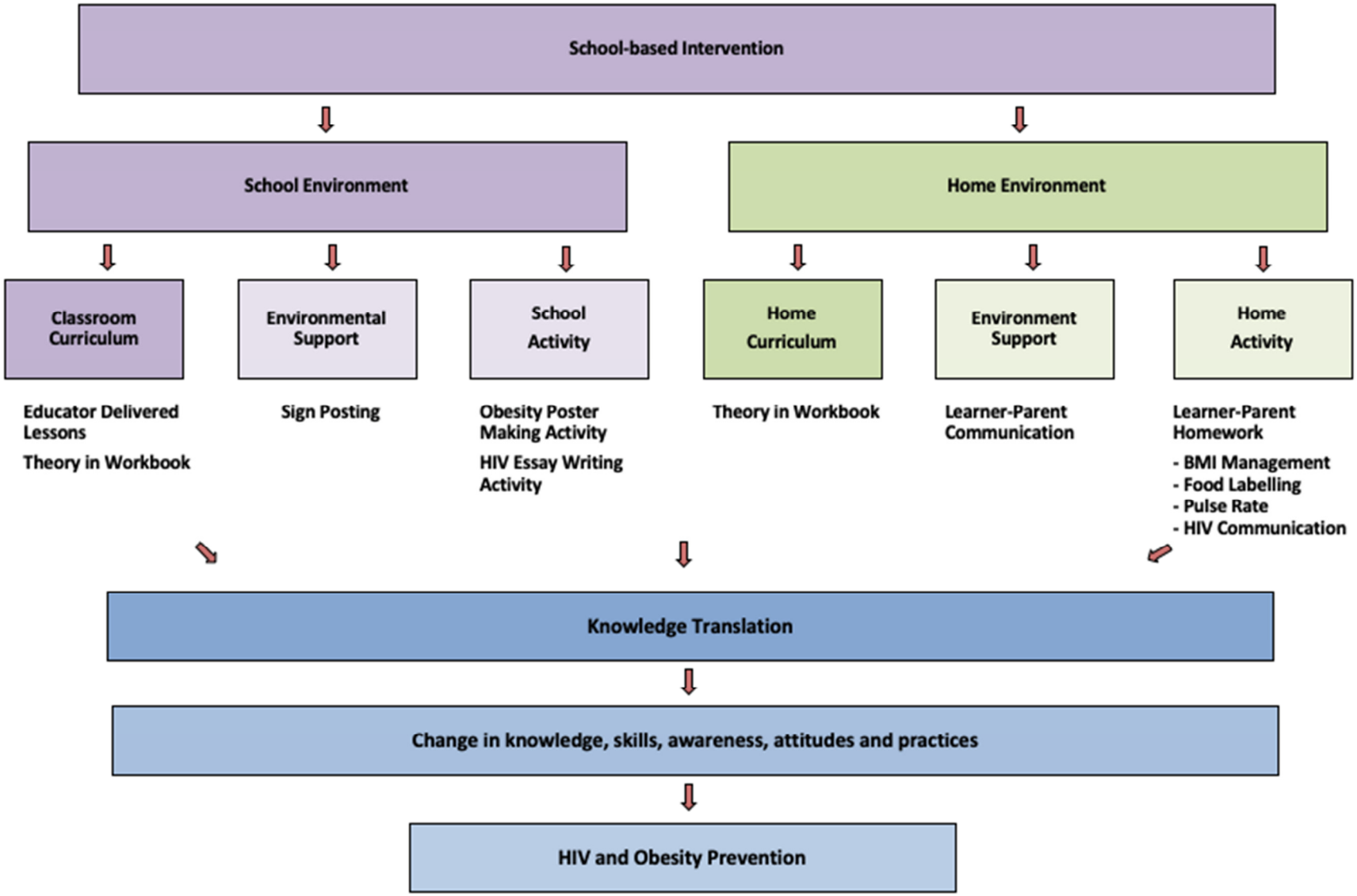


Figure 4-3 The CIrCLE of Life Initiative

The School Environment

Classroom Curriculum: The classroom curriculum for learners requires delivery of 10 30-minute lessons delivered by trained educators. The lesson plan is available in **Table 4-4**.
Environment Support: Posters designed by learners will be displayed at schools.
School Activities: Poster-making and essay-writing activities will engage learners in the development of some of the material with the intent to increase receptiveness and responsiveness.

Home Environment

Home Curriculum: Parents read through and sign a workbook (Appendix 19) after each lesson.
Environment Support: Learners are asked to communicate class lessons and information to their parents.
Home Activity: Learner-parent homework, included in a workbook reinforces the lesson delivered at school and assists in fostering inter-generational knowledge transfer.

Resource Development

Educator training manuals, lesson curricula, and learner-parent workbooks were developed. Educators, learners and parents pre-tested the resources for cultural fit, acceptability, appropriateness, attractiveness, completeness, and relevance.

Table 4-4 Overview of lesson content

Lesson	Content	Skills	Reinforcing Activity	Parent-Learner Homework
One: Obesity	Healthy body image Underweight, Overweight and Obesity Body Mass Index	How to measure weight How to measure height Interpreting BMI	Diary of a healthy kid Crossword puzzle	Measure and Interpret Learner's BMI
Two: Nutrition	Healthy eating Food-based dietary guidelines	How to interpret a food label	Word search puzzle Colouring-in-picture	Interpret a food label at home
Three: Physical Activity	Benefits of physical activity Heart rate (pulse)	Measuring and interpreting pulse	Colouring-in-picture	Measure and Interpret family member's pulse Obesity poster activity
Four: HIV/AIDS	HIV/AIDS Understanding the risks of HIV/AIDS	Reducing the risk of HIV/AIDS	Crossword puzzle	HIV/AIDS story-writing activity
Five: Communicating about HIV/AIDS	Communication Importance of communication Healthy ways of communicating	Dealing with discomfort and support for sexual-specific communication	Communication game	Family communication exercise

4.4.5 Step 5: Adoption and Implementation

Stakeholder engagement informed the content and adaptation requirements. Educators advised on the timing of implementation, and teaching techniques. Their suggestions included increasing parental involvement by using incentives; group work to deal with the problem of too many learners per class; and incorporating fun and enrichment exercises into the lessons. Educators and the Soul City Institute offered input on programme material and resources. Programme content was based on collaboration from health professionals and educators. Representatives from the Department of Education (District level) aligned the objectives, methods and strategies with the curriculum.

4.5 DISCUSSION

Greater transparency regarding intervention development, adaptation processes and evaluation plans better guide the translation of research into practice (Bartholomew et al., 2011). This paper detailed the IM protocol used to develop the combined HIV and obesity intervention that targeted Grade 6 learners, to encourage inter-generational knowledge transmission. Intervention Mapping utilised behavioural change theory, research evidence and service-user perspectives to design *The CIrCLE of Life Initiative*.

The IM approach, typically employed in the development of innovative health interventions, demonstrated its application versatility in combining existing HIV and obesity EBPs, into a single intervention. Even with the non-linearity, the logic model made underlying assumptions about the multi-faceted intervention explicit and assisted with integrating the planning, design, implementation and evaluation. It described the mechanisms through which the implementation strategies would work and guided developmental decisions (Fernandez et al., 2019).

The unique characteristics of HIV and obesity posed a challenge in proposing a combined intervention. Approaches were not mutually exclusive, and ways of combining their respective strengths were explored within the given context (Narain, 2011). Only selected EBP components could be incorporated due to disease diversity. Although aetiology and disease-specific risks were dealt with separately, the intervention included the same modalities that applied to both diseases (Nigatu, 2012). For example, improving self-efficacy in communication was a similar strategy used to address behavioural change for any disease prevention. Furthermore, encouraging nutritional diets and increased physical activity would promote health for any disease.

Often, public health prevention interventions address specific diseases and target distinct populations. This intervention, however, combined two health issues of concern in South Africa, into a holistic prevention intervention. Previous interventions have also primarily focused on adolescent and adult populations. In keeping with suggestions from Scott-Sheldon et al. (2013), the intervention targeted pre-adolescents, an age-group which precedes some risk behaviours or can address knowledge, attitudes and behaviours before they become established. It was implemented in settings of high disease prevalence (Jemmott et al., 2011; Phaswana-Mafuya et al., 2013). This intervention was also theoretically-based, and designed to fit into the school curriculum using participatory activities for both target groups. In addition, the intervention was delivered by educators to minimise costs and resources. Such factors complement existing South African HIV and nutrition-focused interventions.

Implementation lessons from studies conducted in similar contexts were taken into account (Oosthuizen et al., 2011; Steyn et al., 2015). As a result, the intervention was tailored to fit the context, while allowing for flexibility so that educators could further modify to their specific context (Draper et al., 2014). Such factors increased the possibility of a more sustainable intervention. In this way, the intervention could be translated into a real-world setting (Craig et al., 2008). Intervention Mapping advanced the field of implementation by developing, selecting and tailoring the implementation strategies that would increase adoption, implementation, and sustainability. Thus, utilising IM for initial programme design also supported planning for implementation which could potentially reduce the gap between the development of effective programmes and their actual use in different settings (Klesges et al., 2005).

Selected EBP components were adapted and aligned to the specific population, geographic setting and context. A challenge though, was identifying and assessing replicability factors, i.e. components proven effective in other environments may not work in the study context. The core elements of EBP parameters were maintained to maximise the intervention effectiveness. The planned intervention had to suit the targeted populations' needs to ensure that they derived benefit from the intervention, hence the inclusion of malnutrition material that overlapped with obesity content. The task may not have been as straightforward, had it been another unrelated disease.

The needs assessment confirmed that educators understood the causal link between health and learning in the classroom and gave impetus to the relevance and appropriateness of intervention objectives. This gave insight into how the intervention would be accepted at the school, and key stakeholder buy-in (Fernandez et al., 2019). The engagement of implementers often occurs late in the development process, resulting in low levels of implementation (Fernandez et al., 2019). The needs assessment engaged key stakeholders and possible implementers early during the needs assessment, which was beneficial to the intervention development and the implementation strategy.

The intervention's prevention efforts focus on behaviour change, and move beyond individualistic approaches towards engagement with family. The intervention was designed to not only improve knowledge and skills but also to address broader parent-child communication skills. Parenting programmes have shown that parenting communication skills are fundamental to health behaviour and practices (Gerards et al., 2012), especially when it comes to HIV and sex-related health practices (Miller et al., 2013). Learner-parent communication was a key intervention strategy as it has been shown to enhance message sharing. The intervention was structured to encourage a two-way communication support process between parent and child. Communicating healthy lifestyle messages to parents, and seeking their guidance and support, required the learner to develop specific communication skills. Parents also needed to know how to communicate with their children, especially about sensitive topics. The incorporation of the learner-parent homework was a critical aspect to guide communication efforts.

The conventional view is that parents teach their children, inculcating their knowledge, values and beliefs (Damerell et al., 2013). The intervention strategies were designed to encourage inter-generational knowledge transmission. A programme focused on building family relationships may be more attractive to parents than one focused solely on health prevention, thereby promoting the health of both generations.

The linkage between the classroom and home environment was a key mechanism to facilitate inter-generational knowledge transmission. Based on the socio-ecological model, utilising the two environments was necessary to effect change, and an innovative strength of the intervention. The classroom preparation ensured the discussion of topics at home, thus extending the programmes' influence beyond the school setting to secure parental participation. The family environment plays a pivotal role in shaping young people's attitudes and behaviour, as well as influencing a range of both protective and risk factors (Latkin et al., 2010). The intercepting environments also have the potential to address stigmatisation associated with HIV and obesity by focusing parents on the need to protect their children while simultaneously educating them. South African adults are often reluctant to attend HIV prevention programmes held at public venues because of the associated stigma (Bogart et al., 2013).

4.5.1 Strengths and limitations

This study had several strengths. The IM protocol incorporated behavioural change theory specific to pre-adolescents and parents; adaption of EBPs to the context and target groups; and in-depth stakeholder consultation, which resulted in a coherent intervention model with optimised chances of

adoption and implementation. The detailed programme description and developmental lessons learned could facilitate the replication of the intervention in other settings (Santina et al., 2019).
A limitation was the lengthy IM process, similar to other findings (de Villiers et al., 2015; Lloyd et al., 2011). The complexity and effort taken were arduous, particularly when combining HIV and obesity elements, for example, the non-linearity of the logic model. As a result, the many behaviour change approaches were not necessarily coherent or compatible, resulting in only critical behaviours being targeted. Programme material and content from EBP's were limited in description in published literature, necessitating the restructuring of certain intervention elements.

Furthermore, the needs analysis findings prompted changes to the initially proposed HIV and obesity intervention, to include malnutrition. Although the malnutrition component had sufficient content, it was not as detailed and as widely researched as the HIV and obesity components.

4.6 CONCLUSION

The design of a combined HIV and obesity transdisciplinary intervention: *The CIrCLE of Life Initiative* was grounded on behavioural change theory and EBPs. Intervention Mapping was an effective approach, which allowed for a rigorous and systematic development process that also considered implementation and adoption strategies. Adaption of EBPs ensured that the intervention fitted the target population and context. Stakeholder engagement supported the process, with the provision of beneficial parameters that resulted in the preparation of practical strategies for implementation. A process and outcome evaluation will be conducted to increase the evidence-base on *The CIrCLE of Life Initiative*.



Chapter 5: Organisational readiness for intervention implementation

Photo credit: Keshni Arthur, The school playground

Educators' perceptions of organisational readiness for implementation of a pre-adolescent transdisciplinary school health intervention for inter-generational outcomes

5.1 ABSTRACT

Organisational readiness is an implementation pre-requisite to gain its members' appropriate and committed use of the intervention. Implementation climate and organisational readiness for implementing change were evaluated conjointly to assess organisational readiness for an obesity and HIV health intervention that imparts health information directly to Grade 6 learners, and indirectly to their parents/caregivers in their home environment. The study objectives were to assess the level of organisational readiness at schools and to identify organisational factors (facilitators, barriers and contextual factors). A mixed-methods approach collected data from five public schools in Gauteng, South Africa. Forty-six educators and school management answered a self-administered questionnaire and contributed to a focus group discussion at each school. Mean scores with standard deviations, or median scores with interquartile ranges, were calculated to determine levels of organisational readiness. Qualitative data were transcribed and analysed thematically. The overall implementation climate and organisational readiness for implementing change median scores were acceptable, at 3.6 (IQR 3.2 – 4.1) and 4.3 (IQR 3.8 – 4.9), respectively. Results indicated that educators collectively valued the change highly enough to commit to its implementation, and that the motivation for the intervention, associated goals and objectives, the realisation for change, and the benefits thereof were well-comprehended by educators. Thirteen barriers and 13 facilitators were identified. The perceived degree of fit between the significance and values attached to the intervention by educators, and how these would be received by the target group (parents and learners) was also beneficial. Key barriers and facilitators indicated that the intervention needed to be a fit with existing workflows and educational systems. Contextual factors such as intervention appropriateness and acceptability as well as sensitivity to HIV were identified. These findings suggested proactive improvements to further improve the intervention and its implementation strategy.

5.2 BACKGROUND

Organisational readiness (OR) is an implementation strategy that addresses barriers to the introduction of new programmes by providing tools that promote the adoption and offer potential solutions to improve implementation efforts (Scaccia et al., 2015). Organisational readiness of schools refers to the extent to which the organisation is both willing and able to implement an innovation (Weiner, 2009) and is a necessary precursor to its successful implementation. Implementation of any intervention requires refinement to address emerging problems, and yield sustained efforts (Stokols, 2006). Interventions to prevent disease and promote health are being developed and refined as evidence grows on how best to do this.

Globally, the double burden of communicable diseases (CD) and non-communicable diseases (NCD) affects the health of populations, particularly in low- and middle-income countries. South Africa has been tackling the human immunodeficiency virus (HIV) epidemic for decades (Pillay-van Wyk et al., 2016); NCDs, such as diabetes and cardiovascular disease, have garnered attention more recently (Averett et al., 2014; Devanathan et al., 2013). Obesity is a key contributor to the rise in NCDs and, together with HIV, is a cause of early mortality in South Africa (Pillay-van Wyk et al., 2016). Targeting interventions at school learners could potentially carry knowledge learned into adulthood (Damerell et al., 2013), and influence parents' or caregivers' health behaviours (Damerell et al., 2013).

To address the double burden of disease in South Africa, The CIrCLE (Child Influencing paRent Communication for Life Education) of Life Initiative, was developed to address both obesity and HIV through a school health education programme that aims to increase knowledge and enhance skills among learners and their parents/caregivers. The school-based intervention is delivered through trained educators via a learning curriculum that directly targets Grade 6 pre-adolescent learners who, in turn, indirectly communicate knowledge learned to their parents. A comprehensive description of the intervention is reported elsewhere (K Arthur et al., 2020).

The CIrCLE of Life Initiative required active institutional support for its implementation. Implementation research can identify barriers to, and enablers of, effective global health programming, and leverage that knowledge to develop evidence-based innovations in effective delivery approaches (NIH Fogarty International Center, 2017). Implementation efforts that are informed by, and tailored to, potential barriers and facilitators, are more effective and sustainable (Grimshaw et al., 2012). The key factors underlying the successful implementation of a health intervention, such as *The CIrCLE of Life Initiative*, include maximising school engagement and identifying features that influence behaviour change for improved health outcomes, which need to be

understood to ensure that the programme has the potential to reach both learners and parents and for the health benefits to be realised.

The implementation of an intervention requires OR (Scaccia et al., 2015) as well as the targeted organisational members' commitment to use the intervention (Klein and Sorra, 2008). Organisational readiness could be influenced by the characteristics of the educators and/or management, their social norms, and their preparedness for the intervention. When OR is high, educators are more likely to initiate change, exert greater effort, exhibit greater persistence, and display more cooperative behaviour, resulting in effective implementation of the proposed change (Weiner et al., 2009). Conversely, when OR is low, educators would be less likely to view the change as desirable, and resist planning for, and participating in, the process (Weiner et al., 2009).

Implementation effectiveness is influenced by measures of the organisational context, such as OR for change, and implementation climate (Ehrhart et al., 2016). Implementation effectiveness is dependent on the consistency and quality of targeted organisational members' use of an innovation as a function of the fit of the innovation to targeted users' values, and the strength of an organisation's climate for the innovation (Klein and Sorra, 2008).

Implementation climate is defined as ‘employees’ shared perceptions of the extent to which their use of a specific innovation is rewarded, supported and expected within an organisation’ (Klein and Sorra, 2008). It is shaped by an organisation’s policies and practices. Implementers develop a collective sense of the organisation’s priorities and sanctioned means for achieving those priorities through interactions with each other and with implementation strategies (Weiner et al., 2009). Implementation climate in schools can be strengthened by providing educators with access to training, technical assistance; engaging them in decision making; offering incentives and feedback on intervention use; and increasing intervention facilitators and removing barriers (Weiner et al., 2009).

Organisational readiness for change is a shared psychological state in which members feel committed to implementing a change (change commitment) and confident in their collective capability to do so (change efficacy) (Weiner, 2009). Both change commitment and change efficacy are influenced by how favourably educators assess implementation capability of either staff or the organisation, i.e. the task demands, resource availability, and the key features of the environment surrounding the intervention as barriers to, or facilitators for, change. Wiener (2009) states that organisational readiness for change at schools could vary as a function of how much educators value the change (change valance) and how they appraise implementation capability (Weiner, 2009). Researchers have tested both the ORIC (Shea et al., 2014; Storkholm et al., 2018) and the implementation climate (Ehrhart et al., 2014; Lyon et al., 2018) constructs, but have usually only utilised one of the

constructs as an outcome measure (Ehrhart et al., 2014; Hamilton et al., 2007; Lyon et al., 2018; Weiner et al., 2009). To the author's knowledge, this paper will be the first to report the use of both constructs in one study.

Organisational readiness has been assessed in various settings (Ehrhart et al., 2014; Hagedorn and Heideman, 2010; Hamilton et al., 2007), including nursing homes (Nilsen et al., 2018), workplaces (Weiner et al., 2009), welfare institutions (Ehrhart et al., 2016) and schools (Gregory et al., 2007; Gugglberger and Dür, 2011; Lynch et al., 2019; Lyon et al., 2018; Oterkiil and Ertesvåg, 2014). Studies that have conducted OR at schools have focused on capacity building (Gugglberger and Dür, 2011; Oterkiil and Ertesvåg, 2014), organisational implementation context (Lyon et al., 2018) and school climate (Gregory et al., 2007). Factors associated with the implementation of programmes and reforms at schools include time (Naylor et al., 2015; Schaap et al., 2018) and resource availability (Naylor et al., 2015; Schaap et al., 2018). Other implementation issues are unique to specific studies and include supportive school climate (Naylor et al., 2015), the availability of staff (Schaap et al., 2018) and necessary teacher skills (Schaap et al., 2018). This demonstrates that the unique features of programmes implemented in different school contexts may have common barriers and facilitators, but are also likely to have implementation issues specific to different interventions or schools.

The objectives of the present study were to assess the level of OR in schools and to identify organisational facilitators, barriers and contextual factors that might suggest proactive improvements before implementing the intervention: *The CIrCLE of Life Initiative*.

5.3 METHODS

5.3.1 Study design

A mixed-methods approach (Zhang and Creswell, 2013) was employed; quantitative and qualitative data were collected concurrently and integrated during data analysis.

5.3.2 Study setting and participants

South African government-run schools are categorised into five groups or quintiles (The Government Gazette, 2006), based on the relative wealth of their surrounding communities. Schools in the most impoverished communities are classified as Quintile 1 and those serving the wealthiest communities, as Quintile 5. Quintiles 1, 2 and 3 schools do not charge fees. Quintile 1 schools receive the highest

subsidy from the government, and Quintile 5 schools, the lowest (The Government Gazette, 2006). Rural schools in the country have many more shortcomings than urban schools, due to poverty and under-development (Gardiner, 2006). Five primary schools in Gauteng province, South Africa, were purposely selected to represent each of the quintiles. Three were in rural areas and classified as Quintile 1 or 2 schools; two were urban-based Quintile 3 and 4 schools.

Participants were selected through a purposive sampling method. Invited participants included all school management (headmasters, deputy headmasters and heads of department) and all Grade 6 educators, as the intervention was targeted at Grade 6 learners.

5.3.3 Procedures

An information session was held with the school management and Grade 6 educators to inform them about the intervention and to discuss implementation strategies. Data were collected during the session. Forty-six participants answered a self-administered questionnaire that explored OR at their schools. A focus group discussion (FGD) comprising four to 15 participants, followed at each school lasting approximately 45 - 60 minutes. The interview guide had been pilot-tested with a separate group of educators and relevant changes made to the guide. FGDs were conducted privately at the school with only the participants and the researcher. All FGDs were audio-recorded and transcribed verbatim. The transcripts were returned to two participants per school for comment and/or correction. Observations of the general functioning of the school were documented using field notes.

Appendix 20 presents a Standards for Reporting Implementation Studies (StaRI) checklist with details regarding the implementation strategy that was used during the study (Pinnock et al., 2017).

The Human Research Ethics Committee of the University of the Witwatersrand approved the study (clearance certificate no. M180220).

5.3.4 Measures

A 55-item questionnaire was designed to measure the implementation climate and ORIC, and school-related characteristics such as the school quintile and socio-demographic characteristics of the participants.

The Implementation Climate Scale (ICS) (Ehrhart et al., 2014) is a validated tool used to assess the degree of strategic organisational climate supportive of evidence-based practice (EBP) implementation. Measurement dimensions of team function in a school environment were adapted to represent the following scales: focus of the programme; openness of teaching staff; and recognition, educational support, and rewards for implementation of the programme. One scale (the selection for EBP) was excluded as it was irrelevant to this context.

The subscales: focus of the programme, openness of teaching staff, and recognition for implementation of the programme, used a 5-point Likert scale (1 = not at all, to 5 = very great extent). Educational support for implementation of the programme was scored on a five-point scale with anchors of responses Graded across indicators of (1 = not at all, to 5 = extremely confident). Educator perception of impact of the programme was indicated by marking one or more tick boxes. In a previous study, a validity testing model for the ICS (the subscale rewards for EBP), had weaker correlations with the other subscales and exhibited some inconsistency in the aggregation statistic (Ehrhart et al., 2016). This subscale was therefore adapted to be more relevant to this context. Rewards for implementers in this intervention were not financial, and educators were instead asked to select all possible impacts of the programme.

The validated Organisational Readiness for Implementing Change (ORIC) questionnaire (Shea et al., 2014) defined in psychological terms, contained 12 items that measured educators' change commitment and change efficacy to implement the intervention; a 5-point Likert scale (1 = strongly disagree, to 5 = strongly agree) was used. To facilitate analysis, subscales were labelled according to the scale that they addressed. The questions in the tool were adapted to the school context.

Cronbach's alpha was calculated to assess the internal consistency of the subscales and composite scale. The Cronbach's alpha was 0.81 for the overall ICS scale and 0.93 for the overall ORIC scale indicating good internal consistencies.

The questionnaire included open-ended questions about perceived acceptability and feasibility (e.g. "Do you foresee any problems in the implementation of this programme?"), perceived utility and sustainability (e.g. "What do you think will be critical to the success of the programme?" and "What do you think could limit the success of the programme?"), and uptake and penetration (e.g. "How would you recommend that the researcher get the staff involved and motivated to successfully carry out the implementation?" and "What further consultation or communication would you like to have from the researcher?").

5.3.4 Data analysis

Data from the questionnaires were captured using REDCap and exported into Stata 14 for statistical analysis. Educator perceptions of OR were described using proportions, mean scores (for normally distributed scales) or median scores (for non-normally distributed subscales, based on the Shapiro-Wilk test). The Kruskal-Wallis rank test was used to test differences between school, quintile, and fee-paying classifications.

All focus group discussion data were combined with the responses to the open-ended questions in the questionnaires and imported into NVivo Software for content analysis (Erlingsson and Brysiewicz, 2017), where all data were systematically transformed into an organised and concise synthesis of key results. Following thematic analysis reported by Braun and Clarke (Braun and Clarke, 2006), the data were reviewed for familiarity to generate initial coding. KA coded the data. The codes were grouped in themes and subthemes, after which a core category emerged. Data saturation was reached after the third FGD, with the final two FGDs being coded to confirm this. The themes were subsequently revised to ensure that they retained the core meaning evident in the initial data. The trustworthiness of the findings, i.e. the coding strategies and the framework generated by KA, was independently checked by NC. Interpretations were discussed and challenged appropriately to achieve final consensus. No bias issues were identified.

5.4 RESULTS

Forty-six of the 51 eligible educators (90.2%) consented to participate; their demographic characteristics are summarised in **Table 5-1**. The mean age of the educators was 44.8 years; average teaching tenure was 16.5 years. Most were female (71.7%). All had post-high school qualifications: 28.3% had teaching diplomas, and 71.7% had undergraduate or postgraduate degrees. Management positions were occupied by 41.3% of the educators.

Table 5-1 Demographic characteristics of participants and schools

Characteristics	n	%
Sex		
Female	33	71.7
Male	13	28.3
Position		
Educator	27	58.8
Manager	19	41.3
Education		
Diploma	13	28.3
Undergraduate degree	18	39.1
Postgraduate degree	15	32.6
Location of school		
Rural	24	52.2
Urban	22	47.8
School classification (Quintile)		
1	17	37.0
2	7	15.2
3	15	32.6
4	7	15.2

On average, there were nine participants per school (range 7-15), representing four quintiles: 37.0% from Quintile 1, 15.2% from Quintile 2, 32.6% from Quintile 3, and 15.2% from Quintile 4. Both rural and urban schools were represented.

The thematic analysis identified 13 barriers, presented in **Table 5-2** and 13 facilitators, presented in **Table 5-3**, which were further classified into six categories: challenges/facilitators of the educator, learner, parent, system, implementation climate and ORIC.

Table 5-2 Themes identified with illustrative quotations from participants

Challenges as perceived by educators	Educator recommendations to mitigate challenges
Educator Challenges	
Increased educator workload	
"Teachers already have too much workload and responsibilities and I think these factors will limit the success of the program" (Educator, Q1)	*"Tell them more about how the programme will benefit the staff and learners without adding any unnecessary workload to educators."* (Educator, Q2)
Learner Challenges	
Non-participation of learner	
"The response of the learners to programme as they play a critical role. Hope they understand their role, they do activities given to them." (Educator in management, Q1)	
Intervention needs to be culturally sensitive	
"Culture is a big problem (Kids not allowed to question elders about personal matters)" (Educator in management, Q1) *"At the school we have learners and teachers from different cultures."* (Educator in management, Q1)	*"Sensitivity when dealing with learners because some come from families that are directly affected by some of the diseases mentioned in this questionnaire."* (Educator in management, Q3)
Parent Challenges	
Non-participation of parent	
"The only challenge that I see cooperation from parents, in terms of information getting to them. We communicate with parents through the learners, who do not get information to parents on time." (Educator in management, Q1) *"How do you ensure that parents are actively engaged into the programme apart from their kids? How do you ensure that this programme is beneficial to the community at large?"* (Educator, Q4)	*"Engaging parents of the learners. Making all stakeholders aware about the program."* (Educator, Q1)
Intervention not appropriate or acceptable	
"Some parents might not be free to communicate certain aspects of life with their kids at this age." (Educator in management, Q2)	
Lack of knowledge of parents	
"Lack of knowledge. Our community they know little about this illnesses. Most of them are illiterate." (Educator in management, Q1)	*"Maybe there are more different ways of involving the learners as most of them are always absent or won't be interested in the programme and their parents as most of them are ignorant."* (Educator, Q1)
System challenges	
Inappropriate scheduling of implementation	
"Implement this January then pre-planning can assure the CIRCLE becomes part of their resources and daily planning." (Educator in management, Q4)	*"She needs to use life skills periods not after hours"* (Educator in management, Q3) *"The time to implement it (But I suggest that can be part of LO and Life Skills lessons"* (Educator, Q1)
Scarcity of resources	
"As a school we do not have enough resources." (Educator, Q1) *"Resource may impede the programme to an extent."* (Educator in management, Q1)	*"I don't foresee any problems as long as they done in our followed, or if the resources are given to the educators if they are not available."* (Educator in management, Q1)
Sustainability of intervention	
"Is the government going to use the results to better prepare all stakeholders? Will the research find its way into our curricula?" (Educator in management, Q1)	*"If only the results could be incorporated into departmental policies implementation would be smoother and effective. In terms of resources, this is always a challenge."* (Educator in management, Q2) *"I believe any initiative that seeks to improve the lives of learners needs our support. Also, let this not be a 'policy' that will exist on paper but it should be implementable."* (Educator in management, Q1)
Challenges of implementation climate	

Inadequate Implementation strategy	
"A clear understanding of this programme, is it going to be beneficial to them? The community but most importantly the learners." (Educator in management, Q1)	*"If well planned and implemented, due dates adhered, well managed."* (Educator in management, Q1) *"Parents need to understand the objectives of the study and how the study will help them and their children."* (Educator, Q4)
Lack of stakeholder involvement	
"Lack of involvement by learners, teachers and parents." (Educator, Q3)	*"If all stakeholders can have teamwork or working together for the success of the programme."* (Educator, Q1)
Lack of consultation or communication	
"When you don't bring the feedback to the people concerned." (Educator, Q1)	
Challenges of organisational readiness for change	
Non-commitment from educators	
"Lack of commitment by stakeholders." (Educator in management, Q1)	

Table 5-3 Themes identified for facilitators with illustrative quotations from participants

Educator Facilitators
Beneficial value for educators
"Appreciate that the researcher has chosen our school and it will improve our school." (Educator in management, Q3)
"I believe in this programme even though it might not change the school 100% but at least it would have made a huge difference." (Educator, Q3)
"Create a message that will resonate with the ideals of educators in terms of them being agents of change in learner' lives. Encourage them to see this as being beneficial towards them attaining a healthier learning and teaching environment." (Educator in management, Q1)
Learner Facilitators
Beneficial value for learners
"I think this programme is quite inclusive, each and every learner deserves to be part of it, they could learn a lot from the programme." (Educator, Q1)
"I do not see any problems and just see a healthy and a humanity programme." (Educator, Q3)
"People are sick, learners are sick there should be a solution at the end of the day." (Educator in management, Q1)
"Empowering our community will bring change to our environment and what will be more nicer is when our children speak out and address their concerns about what might be trouble to their community." (Educator, Q1)
Parent Facilitators
Cascading knowledge
"Learners need to cascade the information to the parents. As the concerned citizen, I think it is time to empower our citizen/community with knowledge." (Educator, Q1)
System Facilitators
Alignment with curriculum
"By ensuring that the programme is in line with CAPS, curriculum coverage of those learners." (Educator in management, Q2)
Facilitators of implementation climate
Educational support for the intervention
"Elaborating further about sexual ideas." (Educator, Q3)
"Through training because when the staff is well trained they are confident to successfully implement the programme." (Educator in management, Q1)
Increase in communication with stakeholders
"By briefing the staff from time to time about progress made so as to motivate them." (Educator in management, Q3)
"Linking it with wellness programme that are currently government sanctioned. Communicating the results in a manner that does not say:' more work for you, but better working conditions with learners who are better equipped'." (Educator in management, Q1)
Increase in consultation with stakeholders
"Discuss issues/challenges that might rise during the research period." (Educator, Q4)
"If the researcher plans each lesson with at least one member of the staff, more ideas may be shared on how these lessons can be implemented. Also staff members have more knowledge on how to deliver different activities, with experience, more can be done." (Educator, Q1)
Rewards for implementation
"The researcher can bring the rewards to those teachers/staff who are actively involved." (Educator, Q1)
"Small incentives e.g. prizes for the learners." (Educator, Q4)
Presence of researcher during implementation
"To either present the lesson or be with the educator when lesson is given." (Educator in management, Q4)
Facilitators of organisational readiness for change
Motivation for implementation
"The researcher should motivate, encourage the staff to implement the programme and show the positive impact the programme will have to the school." (Educator in management, Q3)
Commitment for implementation
"The commitment of parents and teachers and the learners. Parents need to understand the objectives of the study and how the study will help them and their children." (Educator, Q4)
Determination to implement intervention
"Determination from all that are involved in the programme i.e. parents, children, teachers and the researcher herself." (Educator, Q4)
Encourage teamwork and co-operation
"Teachers to implement the programme 100%."(Educator, Q4)

Table 5-4 shows the overall ICS median score of 3.6 (IQR 3.2 – 4.1), which was considered acceptable for implementation climate, as 3.2 was chosen as the cut-off point for positive implementation climate. The overall median scale scores were all higher than the cut-off of 3.2.

Table 5-4 Summary statistics for the ICS

ICS Scales and Subscales	Median	Interquartile range	Cronbach's alpha α
ICS total	**3.6**	**3.2 – 4.1**	**0.81**
Focus of programme	**3.9**	**3.0 – 4.2**	0.93
C1. Need for health programmes at schools	4.0	4.0 – 5.0	
C2. Communication with staff about programme	4.0	3.0 – 5.0	
C3. Consultation with staff about programme	3.5	3.0 – 4.0	
C4. Understanding of objectives and goals	3.5	3.0 – 4.0	
C5. Achievable objectives and goals	4.0	3.0 – 4.0	
C6. Influence of behaviour change in learners	4.0	3.0 – 5.0	
C7. Influence of behaviour change in parents	4.0	3.0 – 4.0	
C8. Importance of programme	4.0	3.0 – 5.0	
C9. Effective programme implementation	4.0	3.0 – 4.0	
C10. Using the programme is a top priority	4.0	3.0 – 4.0	
Educational support for programme	**4.0**	**3.0 – 4.5**	0.93
D1. Relevant training and support	4.0	3.0 – 5.0	
D2. Relevant training material	4.0	3.0 – 4.0	
Recognition for programme	**3.7**	**2.7 – 4.0**	0.86
E1. Seen as health specialist	4.0	3.0 – 4.0	
E2. Held in high esteem	4.0	3.0 – 4.0	
E3. More likely to be promoted	3.0	2.0 – 4.0	
Openness of staff for programme	**3.6**	**3.2 – 4.2**	0.84
G1. Staff adaptable to change	3.0	3.0 – 4.0	
G2. Staff flexible to change	3.0	3.0 – 4.0	
G3. Staff open to new ideas	3.0	3.0 – 4.0	
G4. Staff concerned about learner health	4.0	4.0 – 5.0	
G5. Staff concerned about community health	3.0	3.0 – 5.0	

Table 5-5 shows the ICS subscales by school characteristic. Statistically significant differences were identified in the focus of the programme, and recognition for the programme, between school, quintile and fee-paying classification. The Quintile 4, fee-paying school was the only school that showed significant differences between the focus of programme (p=0.005) and recognition for programme (p=0.014) subscale. The overall ICS mean score for the Quintile 4 school was below the 3.2 cut-off. There is no empirical evidence indicating what a standard cut-off should be. On the Likert scale, 3 was considered the middle point. The cut-off point was, therefore, set at 0.2 above the middle point.

Table 5-5 The Implementation Climate Scale subscales by characteristics of school

	Focus of programme Mean (SD)	**Focus of programme P-value**	**Educational support for programme** Mean(SD)	**Educational support for programme P-value**	**Recognition for programme** Mean (SD)	**Recognition for programme P-value**	**Openness for staff of programme** Mean (SD)	**ICS score**	**ICS score P-Value**
Overall ICS	**3.7 (0.8)**		**3.7 (0.9)**		**3.5 (0.9)**		**3.7 (0.6)**	**3.7 (0.7)**	
School Code		0.009		0.029		0.024			0.007
I	4.1 (0.6)		4.1 (0.8)		3.9 (0.7)		3.8 (0.7)	4.0 (0.5)	
K	3.6 (0.8)		3.6 (0.8)		3.2 (1.0)		3.7 (0.6)	3.6 (0.7)	
M	3.4 (0.6)		3.0 (0.6)*	0.016	3.5 (0.4)		3.6 (0.5)	3.4 (0.4)	
W	2.8 (0.8)*	0.005	3.4 (1.3)		2.5 (1.1)*	0.014	3.4 (0.7)	3.0 (0.6)*	0.014
Z	4.1 (0.7)		4.2 (0.7)		4.0 (0.9)		4.0 (0.5)	4.1 (0.6)	
Quintile		0.008		0.044		0.034			0.015
1	3.8 (0.8)		3.8 (0.8)		3.5 (1.0)		3.8 (0.6)	3.8 (0.7)	
2	3.4 (0.6)		3.0 (0.6)*	0.016	3.5 (0.4)		3.6 (0.5)	3.4 (0.4)	
3	4.1 (0.6)		4.1 (0.8)		3.9 (0.7)		3.8 (0.7)	4.0 (0.5)	
4	2.8 (0.8)*	0.005	3.4 (1.3)		2.5 (1.1)*	0.014	3.4 (0.7)	3.0 (0.6)*	0.014
Fee paying school		0.005				0.014			0.014
Fee paying	2.8 (0.8)*	0.005	3.4 (1.3)		2.5 (1.1)*	0.014	3.4 (0.7)	3.0 (0.6)*	0.014
Non-fee paying	3.9 (0.7)		3.8 (0.9)		3.7 (0.8)		3.8 (0.6)	3.8 (0.6)	
Location									
Rural	3.7 (0.8)		3.6 (0.8)		3.5 (0.8)		3.8 (0.6)	3.7 (0.6)	
Urban	3.7 (0.9)		3.8 (1.0)		3.5 (1.1)		3.6 (0.7)	3.7 (0.7)	
Position									
Educator	3.7 (0.8)		3.8 (0.8)		3.7 (0.9)		3.8 (0.7)	3.8 (0.7)	
Management	3.6 (0.9)		3.5 (1.0)		3.2 (0.9)		3.6 (0.5)	3.6 (0.7)	

Note: * Statistically significant at 0.05

Most educators believed that they would receive the necessary educational support for the programme, except for the Quintile 2 school where significant differences (p=0.016) were noted. The overall ICS mean score for this school was above the 3.2 cut-off.

Table 5-2 shows three implementation climate needs which, if not addressed, could be barriers related to focus of the programme. These included clear implementation strategy; extensive stakeholder involvement and consultation; and clear communication. Educators required a clear understanding of the programme and its benefits. They recommended that the intervention be clearly planned, managed and implemented, and dates adhered to. They also requested more information about the programme and its implementation and suggested that additional health-specific information be provided to educators. Inadequate consultation and communication with stakeholders and a lack of stakeholder involvement could also impede implementation. A recommendation was to encourage stakeholder involvement by ensuring that study objectives and benefits were clearly understood. Four implementation climate facilitators included: educational support for the intervention; increase in stakeholder communication; increase in stakeholder consultation; and presence of the researcher during implementation.

Although 43% of participants anticipated an increase in workload, 61% indicated that the programme would directly benefit them (**Table 5-6**). Most (74%) participants thought the programme would benefit the learners, 61% thought that it would also benefit the parents, and 57% thought that it would also benefit the community. Other suggestions were '*capacity building'* and '*three parties will benefit if all can participate'*, as additional impacts. Cascading knowledge from learners to their parents was a recognised benefit. Educators believed that when children acquire knowledge, they often pass it on to parents and the community. "*Learners need to cascade the information to the parents. As the concerned citizen, I think it is time to empower our citizen/community with knowledge"* (Quintile 1 educator). Benefits for educators and learners were anticipated, such as better teaching and learning environments. "*Create a message that will resonate with the ideals of educators in terms of them being agents of change in learner' lives. Encourage them to see this as being beneficial towards them attaining a healthier learning and teaching environment"* (Quintile 1 educator) and, "*I think this programme is quite inclusive, each and every learner deserves to be part of it"* (Quintile 1 educator).

Table 5-6 Educator perceptions of how programme may affect participants

Educator perception of impact of the programme	n	%
Increase in workload for teachers	20	43
Increase in monitoring and evaluation for teachers	16	35
Increase in parent interaction	25	54
Reduce in absenteeism at school	16	35
Benefit the learners	34	74
Benefit teachers	28	61
Benefit parents	28	61
Benefit the community	26	57
No impact at all	0	0
Other	2	4

Increased educator workload was a perceived barrier, as were time constraints. Recommendations to facilitate the process were to not have stringent implementation rules and techniques, recruit more educators, have additional support for educators, and make the benefits of the programme known. "*The problem that I foresee is time and workload but if managed properly it will bring out the beauty of diverse cultures*" (Quintile 4 educator).

Rewards for implementation were identified by educators in the Quintile 4, fee-paying school as a necessity. Educators requested to be financially remunerated for the implementation and saw this as a motivation. Rewards were seen as motivators by others too, but this included learner rewards rather than direct remuneration as identified in the Quintile 4 school

Table 5-7 shows the overall ORIC median score of 4.3 (IQR 3.8 – 4.9). Subscale content was evaluated in relation to the two theoretically defined constructs, change commitment and change efficacy (4.2 and 4.3, respectively). The ORIC median score and the individual subscale scores were all higher than the average score of 4 and were considered to be acceptable.

Table 5-7 Summary statistics for the ORIC scales and subscales

	Median	Interquartile range	Cronbach's alpha α
ORIC total	**4.3**	**3.8 – 4.9**	**0.93**
Change Commitment	**4.2**	**3.6 – 5.0**	0.94
H2. Want to implement change	4.0	4.5 – 5.0	
H3. Do whatever it takes to implement programme	4.0	3.0 – 5.0	
H4. Determined to implement programme	4.0	4.0 – 5.0	
H5. Motivated to implement programme	5.0	4.0 – 5.0	
H6. Committed to implement programme	4.0	4.0 – 5.0	
Change Efficacy	**4.3**	**4.0 – 4.9**	0.89
H1. Keep momentum going	5.0	4.0 – 5.0	
H7. Coordinate tasks for smooth implementation	4.5	4.0 – 5.0	
H8. Keep track of progress during implementation	5.0	4.0 – 5.0	
H9. Handle implementation challenges that arise	4.0	4.0 – 5.0	
H10. Get the learners invested in programme	4.0	4.0 – 5.0	
H11. Support learners/parents as they adjust to change	5.0	4.0 – 5.0	
H12. Manage the politics of implementation	4.0	3.0 – 5.0	

As shown in **Table 5-8**, significant differences were noted in the overall ORIC score between schools, quintiles and fee-paying schools. The Quintile 4 fee-paying school had the lowest overall ORIC score of 3.4. Although no significant differences were observed in change efficacy, significant differences were observed in change commitment (p= 0.007), which was again seen at the Quintile 4 fee-paying school.

Table 5-8 Individual-level and team-level ORIC subscale correlation matrix

	Change commitment Mean (SD)	**Change commit-ment P-value**	**Change efficacy** Mean (SD)	**ORIC score** Mean (SD)	**ORIC Score P-value**
Overall ORIC score	**4.2 (0.8)**		**4.3 (0.7)**	**4.2 (0.7)**	
School		0.009			0.018
I	4.4 (0.6)		4.5 (0.5)	4.5 (0.5)	
K	4.1 (0.8)		4.1 (0.7)	4.1 (0.8)	
M	3.9 (0.7)		4.1 (0.5)	4.0 (0.4)	
W	3.2 (1.0)*	0.007	3.7 (1.0)	3.4 (1.1)*	0.019
Z	4.9 (0.2)		4.7 (0.3)	4.8 (0.2)	
Quintile		0.020			0.034
1	4.5 (0.7)		4.4 (0.6)	4.4 (0.7)	
2	3.9 (0.7)		4.1 (0.5)	4.0 (0.6)	
3	4.4 (0.6)		4.5 (0.5)	4.5 (0.5)	
4	3.2 (1.0)*	0.007	3.7 (1.0)	3.4 (1.1)*	0.019
Fee paying					0.019
Fee paying	3.2 (1.0)*	0.007	3.7 (1.0)	3.4 (1.1)*	0.019
Non-fee paying	4.2 (0.7)		4.4 (0.5)	4.4 (0.6)	
Location					
Rural	4.2 (0.8)		4.3 (0.7)	4.3 (0.7)	
Urban	4.0 (0.9)		4.3 (0.7)	4.1 (0.9)	
Position					
Educator	4.2 (0.8)		4.4 (0.6)	4.3 (0.7)	
Management	4.0 (0.9)		4.1 (0.7)	4.1 (0.8)	

Note: * Statistically significant at 0.05

Educators from the Quintile 4 fee-paying school were least receptive to the programme. They saw no benefit in assisting with '*yet more research*' that they perceived did not benefit them directly. The lack of financial incentives for implementing the intervention was seen as a possible barrier by both management and some educators. This lack of interest differed from other schools where staff were welcoming and encouraging. A Quintile 3 educator in management stated, "*Appreciate that the researcher has chosen our school and it will improve our school*" and "*this programme even though it might not change the school 100% but at least it would have made a huge difference*".

Table 5-2 shows that non-commitment from educators was the only ORIC barrier that was identified. **Table 5-3** presents four ORIC facilitators that were identified: motivation, commitment, determination, and encouraging teamwork and co-operation.

Other barriers and facilitators that did not fit into the implementation climate and ORIC constructs were also identified. Parent non-participation was perceived as a barrier where some parents may have no interest, especially "*younger parents who did not take things seriously*". Additionally, general

school communication with parents was via the learner, which was inefficient. "*The only challenge that I see, about co-operation from parents, in terms of information getting to them. We communicate with parents through the learners who do not get information to parents on time"* (Quintile 1 management). Educators recommended that parents needed to become willing participants and be open to the programme, which could be achieved by engaging them and providing a clear understanding of the programme.

Educators felt that implementation could be impeded if parents and learners believed that the intervention was inappropriate or unacceptable. They believed that the majority of parents would not be willing to participate or involve their children; that parents may not understand and accept the programme; and that it was difficult to talk about your health problems. *"Some parents might not be free to communicate certain aspects of life with their kids at this age"*(Quintile 1 management); and *"Our parents* [some] *can retard the programme as they will be scared that someone will know their* [HIV] *status"* (Quintile 1 educator). A Quintile 1 educator claimed that many learners at that school were orphans and lived at an orphanage or with other family members; and perceived that their parents had lost their lives due to HIV/AIDS. Another Quintile 2 educator said that the daily meals received by learners were sometimes the only meal received, and they often took it home to share with family. It was also recommended that the researcher make home visits to the learners' houses to appreciate the environment in which learners live.

Educators felt that learners are from different cultures and societies and not ensuring that the intervention was culturally suited might limit the intervention. *"Culture is a big problem (kids not allowed to question elders about personal matters)"* (Quintile 1 educator); *"Culturally, parents will not feel free to communicate confidential information to their children"* (Quintile 2 educator); *"If some learners confide to you, how are you going to deal with that?…sensitivity when dealing with learners because some come from families that are directly affected by some of the diseases mentioned."* (Quintile 3 educator).

Consultation and two-way communication were seen as facilitators of implementation. Educators requested feedback at each stage, follow-ups, and results at the end of the study. They said that they were keen on fixing any issues or challenges that might arise during the implementation. "*If the researcher plans each lesson with at least one member of the staff, more ideas may be shared on how these lessons can be implemented. Also, staff members have more knowledge on how to deliver different activities, with experience, more can be done*" (Quintile 2 educator).

Educators perceived that policy implications and reluctance from the government in the application of any positive results would create a barrier in terms of whether the intervention would be recognised and scaled-up. A Quintile 1 educator in management recommended that "*ensuring that the*

programme is in line with CAPS curriculum" would facilitate implementation and sustainability. Educators' recommendations were to incorporate any positive outcomes into departmental policies, taking into consideration that resource availability might be another challenge.

5.5 DISCUSSION

This study aimed to evaluate the level of organisational readiness and the associated barriers and facilitators to the implementation of a *The CIrCLE of Life Initiative* within South African primary schools. The level of OR was based on overall scores from the ORIC and implementation climate constructs. The acceptable results indicate the degree of fit between the significance and values attached to the intervention by educators and how the intervention would be received by the target group (parents and learners). The assessment also identified fundamental facilitating factors, needs, and the role of context, which prompted further planning and improvement to the intervention prior to implementation. The improvements could influence implementation effectiveness.

Acceptable results from the ORIC suggested that educators collectively valued the change highly enough to commit to its implementation. When ORIC is high, educators may more skilfully and persistently action the health intervention and may demonstrate a more consistent, high-quality use of the intervention (Weiner, 2009), indicating that greater readiness may lead to more effective implementation. Educators from four of the five schools saw a need for and welcomed the intervention. Although the overall ORIC scores were acceptable, the Quintile 4, fee-paying school, differed from the other schools, having the lowest score. This indicated an expectation that educators may resist initiating change, put less effort into implementation, persevere less in the face of implementation challenges, and exhibit compliant intervention utilisation (Weiner, 2009).

Change efficacy was high, indicating that educators had a positive assessment of organisational implementation capability and that they could collectively implement the organisational change. Barriers such as non-commitment of educators could result in poor implementation of the programme. Their recommendations to address non-commitment were to increase motivation, determination, and encourage teamwork and co-operation.

The findings show that the two facets of change commitment and change efficacy could be conceptually interrelated. While no significant differences were observed in change efficacy, significant differences were observed in change commitment in the Quintile 4 school. The educators at this school were confident that they could implement the change successfully, yet showed no commitment to do so. Organisational readiness is likely to be highest when organisational members

not only feel confident that they can implement an organisational change, but also want to do so (Weiner, 2009).

The results of the implementation climate subscale focus of the programme demonstrated that the motivation for the health programme, goals and objectives, and realisation for change and the benefits thereof, were well-comprehended by educators. The perceived degree of fit between the significance and values attached to the intervention by educators, and how these would be received by the target group, was also a beneficial finding. When implementation climate is high in the organisation, employees perceive the organisation values the intervention and is supportive in implementing it. It has been proposed that such perceptions lead to increased levels of attention and motivation for intervention implementation, ultimately enhancing intervention outcomes (Ehrhart et al., 2016; Weiner et al., 2011).

Educators believed that their direct involvement in a project of this nature was a way to be recognised, thereby increasing their chances of promotion. Management was not of the same opinion. Stakeholders who are members of the organisation either use an innovation directly (e.g. front-line staff) or support an innovation's use (e.g. management) (Klein and Sorra, 2008). Perceptions of organisational incentives and rewards, which include extrinsic incentives (goal-sharing awards, performance reviews, promotions, and less tangible incentives such as increased stature or respect) varied between educators and management. A sense of respect and professionalism may increase job satisfaction and teamwork, and help teachers feel equipped to undertake new curricula, supported when undertaking new initiatives, and part of a broader mission of change at the school (Gregory et al., 2007).

The overall ICS score for the Quintile 4 fee-paying school was the only score that was below the cut-off, and showed significant differences across two of the subscales: focus of programme and recognition for programme. Perceived barriers related to implementation climate included an inadequate implementation strategy and the lack of involvement, consultation and communication with relevant stakeholders. Recommendations, related to implementation climate, to facilitate implementation included more educational support for the intervention, the presence of the researcher during implementation, rewards/incentives for educators and learners, and additional communication and consultation with all stakeholders. Stakeholder consultation influences the nature and direction of the intervention. Such dialogue not only fosters more commitment but gives implementers a sense of ownership (Mangwaya et al., 2016).

From the identified key barriers and facilitators identified, it became apparent that the health intervention needed to be a fit with existing workflows and educational systems. One of the main

barriers for educators was the increased workload. Their recommendations were to motivate the staff, apply non-stringent implementation rules and techniques, recruit more educators, and provide additional support. Alignment of the intervention with the curricula and syllabus would also facilitate their workflow. One of the identified system challenges was the timing and scheduling of components of the intervention. Educators perceived that the timing and length of the programme might impede implementation if not linked to educators'/schools' specific timelines.

Innovation-values fit, such as intervention appropriateness and acceptability, and sensitivity to HIV were identified. Dealing with personal health-related matters such as HIV is a sensitive issue, more so because of the associated stigma. To address the issue of appropriateness and acceptability, to not hinder implementation, the implementers needed to deal with these contextual issues in a sensitive manner which required incorporation into the educator training modules. Not only did the intervention need to be culturally suited, appropriate and acceptable, but educators needed to be trained on emotional and sensitivity aspects – an area in which educators lacked knowledge and confidence to deliver. Educators believed that both initial and ongoing training was paramount to build self-efficacy for project implementation.

Weiner (2011) (Weiner et al., 2011), suggests that OR measures should be descriptive and not evaluative. However, Klein and Sorra (2008) (Klein et al., 2001) advise that the descriptive-evaluative distinction could be viewed as a continuum rather than a dichotomy, with an inclination towards the descriptive side of the continuum. This study utilised both quantitative and qualitative approaches which had several merits. The qualitative approach helped to measure organisational levels as a useful benchmark on the continuum, and enabled a more precise quantitative estimation of relationships between constructs (Weiner et al., 2009). The qualitative data offered insight into the nuances and influences of the constructs (Weiner et al., 2009). The qualitative data were, therefore, of greater value in advancing implementation, encouraging a proactive approach. The alignment of the quantitative findings with the qualitative theory proved to be valuable. Strategies need to mitigate factors that serve as barriers to support implementation.

This transdisciplinary intervention presents unique challenges as it requires educators to implement a health intervention across geographical boundaries and school settings. The collaboration required between the Departments of Health and Education necessitated that educators be open to diverse viewpoints, mutual deliberation, and problem-solving for the effort to be effective (Harper et al., 2010). Educator training is a planned component of the pre-implementation phase. The findings indicated, however, that the planned training required more in-depth guidance than what was originally planned, not only with training in implementation, health concepts and implementation strategy, but also fundamental health concepts covered in the current school curriculum. This

weakness had to be resolved to ensure that educators were more competent in teaching health and answering questions. Staff development provides the necessary support to update educators' pedagogical and content knowledge, as well as enhances their competence and confidence levels (Mangwaya et al., 2016).

Educators also requested the presence of the researcher during class lessons for reassurance and support. Vicarious learning strategies (e.g. site visits) are useful for supplying organisational members with accurate information about task demands and situational factors affecting implementation, (Weiner, 2009) and had to be incorporated into the implementation. Educators also advised that implementation strategies that were not well-defined and aptly communicated could pose barriers. The implementation process will be more effective if the roles of educators were made more clearer (Mangwaya et al., 2016).

5.5.1 Strengths and limitations

The results of this study add to the limited body of evidence on implementation climate and OR for change. Two diverse OR constructs with differing scales and goals were used in the evaluation; however, their similar design and compatible features permitted a congruent union of the two constructs. Although the ICS and ORIC tools were adapted to suit the study context and design, the high reliability in consistency, shown by the Cronbach alpha scales, was an additional strength of the study.

This study found that although the quantitative evaluations from both constructs were beneficial, the tools still required an additional qualitative assessment. Facilitators and barriers identified through this study were not derived from the original quantitative construct but additional qualitative research. The constructs also lack insight from other IS theories such as culture, appropriateness and acceptability. Such issues, in this study, were identified from the qualitative data. Improvement of the constructs should, therefore, be continued. In addition, certain scales, e.g. the rewards for EBP, merit further theoretical and empirical attention.

Another limitation of the study was the small sample size; although it was large enough to measure OR in the study, it restricted additional statistical analysis.

5.6 CONCLUSION

This study married organisational readiness to implement change and implementation climate constructs to ascertain underlying organisational conditions in schools before the implementation of a transdisciplinary health promotion and prevention intervention: *The CIrCLE of Life Initiative*. The results provided useful insights into potential areas of need and challenges that could hinder effective implementation allowing for further improvements to be made to the intervention and the implementation strategy.

The results demonstrate the necessity for assessing OR prior to any intervention implementation. Effective evaluation of OR could reduce the number of change efforts in the organisation and prevent undesired consequences of the intervention implementation. It is incumbent on researchers who contribute to the process of research and practical application to address organisational factors as a criterion for enhanced implementation success.



Chapter 6: Process evaluation of intervention implementation

Photo credit: Keshni Arthur, The school playground

Process evaluation of a pre-adolescent transdisciplinary health intervention for inter-generational outcomes

6.1 ABSTRACT

Background: *The CIrCLE of Life Initiative* was implemented to 537 Grade 6 learners and their parents, in five Government-run South African primary schools. The transdisciplinary intervention was intended to increase knowledge and skills on HIV and obesity. The study aim was to assess and report on the implementation process.

Methods: Data was collected on an adapted Proctor's taxonomy of implementation outcomes, and to assess participants' experiences. Qualitative and quantitative data were collected through educator logbooks, researcher observations, and learner-parent workbooks.

Results: Differentiations between the various school contexts were observed. The process evaluation revealed high learner penetration (97.2%), but lower learner and parent exposure (44.3% and 55.5%, respectively). All educators thought that the intervention was a fit for both rural and urban schools, different socio-economic groups, and people of different ethnic and cultural backgrounds. The intervention was perceived to be sustainable, and there were recommendations for adoption into the school curriculum and scale-up if found to be effective.

Conclusion: The process evaluation facilitated the assessment of the implementation outcomes, described its processes, and acknowledged fundamental characteristics that could justify variability in the intervention impact and outcomes. The value of process evaluations and their benefit to the science of implementation were demonstrated.

Keywords: transdisciplinary intervention, HIV, obesity, implementation science, process evaluation, pre-adolescent, parent

6.2 INTRODUCTION

South Africa, like many other developing countries, is in the midst of a health transition that is characterised by the double burden of communicable disease (CD) and non-communicable disease (NCD). While the country continues to deal with the challenge of CDs, such as human immunodeficiency virus (HIV), acquired immune deficiency syndrome (AIDS), and tuberculosis (TB) (Naidoo et al., 2017), the upsurge in obesity (Kruger et al., 2005) and accompanying NCDs (Mayosi et al., 2009), such as cardiovascular disease and diabetes, present a novel set of problems.

The double burden of disease is a public health concern that creates a complex environment for intervention delivery, particularly for diseases such as HIV (Jemmott III et al., 2015) and emerging threats such as obesity (Evans et al., 2009). Both HIV and obesity are areas of complex intervention research and often include multiple related components, target various ages of the population, and have a wide range of interconnected outcomes (Adab et al., 2015; Jemmott III et al., 2015; Scott-Sheldon et al., 2013; Xu et al., 2015). While there have been several studies aimed at HIV and obesity prevention, a limitation to the interpretation of the study outcomes is the poor reporting of process measures in such studies (Griffin et al., 2014). A recent Cochrane review of childhood obesity prevention studies (Waters et al., 2014) found that of 39 trials targeting children, around a third did not report process measures. The authors recommended that future studies need to report comprehensive process evaluation data in order to interpret outcomes and to guide future implementation (Waters et al., 2011).

Evidence from other reviews have identified the contribution of health promotion programmes in schools and its benefits in improving the health of children (Bonell et al., 2013; Langford et al., 2011). However, an understanding of how the fundamentals of such interventions can be best implemented remains overlooked (Gugglberger and Inchley, 2014). The reality of implementing programmes in a school environment involves the adaption of programmes to be a fit with the local context (Dusenbury et al., 2003) within a broader educational and health system and the committed engagement of stakeholders (Bartholomew et al., 2011; Hall et al., 2012). The implementation of such programmes is frequently dependent on the behaviour of stakeholders (participants and implementers) within the system (Craig et al., 2008). An understanding of how the effects of such programmes are attained is less common, but essential approach (Jamal et al., 2013).

With the limited success of conventional approaches in addressing the double burden of CD and NCD, health interventions using transdisciplinary approaches to prevent such diseases could provide holistic healthcare solutions across disciplinary boundaries (Kessel and Rosenfield, 2008). Transdisciplinary interventions comprise individuals from different disciplines working jointly to

implement conceptual, theoretical, methodological, and translational programmes that integrate and move beyond discipline-specific areas to address a common problem that could provide holistic, collaborative solutions across disciplinary boundaries (Harper et al., 2010; Kessel and Rosenfield, 2008). The engagement of the education sector as a participant in an integrated transdisciplinary health promotion and prevention intervention offers an ideal strategy to target the complexities of HIV and obesity. The CIrCLE (Child Influencing paRent Communication for Life Education) of Life Initiative was developed as an intervention to target pre-adolescent learners and their parents for short- and long-term benefits (K Arthur et al., 2020).

Implementation science methodology aims to close a gap between research and practice (Bhattacharyya et al., 2009) by identifying and evaluating the processes necessary to ensure successful widespread translation of evidence-based practices (EBP) into real-world settings (NIH Fogarty International Center, 2017). Intervention evaluation studies often focus on their content and immediate effects, with less emphasis on the processes that may explain, sustain or improve these effects. A criticism of outcome evaluations is the difficulty in explaining the processes by which the results of the interventions were attained (Nielsen et al., 2006).

Implementation of *The CIrCLE of Life Initiative*, therefore, underwent both an outcome (intervention effectiveness) and process (implementation effectiveness) evaluation. Intervention effectiveness is a necessary, but not sufficient, condition for achieving positive intervention outcomes (Klein and Sorra, 2008). Intervention effectiveness is differentiated from implementation effectiveness and is a critical and effective approach to delineating between intervention and implementation failure. When implementation efforts of an intervention in a new setting fail, it is important to know if the failure occurred because the intervention was ineffective in the new setting (intervention failure) or if it was deployed incorrectly or weakly (implementation failure) (Proctor et al., 2011). Only through high-quality implementation can anticipated benefits and intervention effectiveness be achieved. Implementation outcomes serve as necessary preconditions for attaining subsequent desired changes in clinical or service outcomes because an intervention will not be effective if it is not implemented well (Nielsen et al., 2006).

For a comprehensive evaluation effort emphasis has also been placed on evaluating intervention processes (Oakley et al., 2006). Process evaluations decipher inconsistencies between expected and observed outcomes and inform future implementation efforts. An essential role for process evaluations is to examine the quantity and quality of what was implemented (Moore et al., 2014). A process evaluation may be used to monitor and report fidelity of intervention implementation (i.e. whether the intervention was delivered as intended) (Castro et al., 2004; Harn et al., 2013), quality of implementation (Craig et al., 2008; Driessen et al., 2010), clarify causal mechanisms and identify

contextual factors (Nielsen et al., 2006) associated with variation in intervention delivery and outcomes. Reliable, valid, and pragmatic evaluation is necessary for monitoring and assessing the success of implementation efforts and comparing the effectiveness of alternative implementation strategies. Studies have shown the value and tools to be used in a comprehensive process evaluation (Griffin et al., 2017; Jäger et al., 2016).

The study aims to assess and report the results of the process evaluation of the implementation of *The CIrCLE of Life Initiative*. The process evaluation will be used to justify any variability in intervention impact and outcomes.

6.3 METHODS

The process evaluation was conducted alongside a pretest posttest outcome evaluation of *The CIrCLE of Life Initiative*. Although both evaluations were done concurrently, the results were analysed separately and reported as such. All process evaluation data were analysed before the outcome evaluation results were available to minimise the risk of bias in interpretation (Craig et al., 2008).

Appendix 20 presents a Standards for Reporting Implementation Studies (StaRI) checklist with details regarding the implementation strategy that was used during the study (Pinnock et al., 2017).

Ethical approval was obtained from the Human Research Ethics Committee of the Health Sciences Faculty, University of the Witwatersrand (clearance certificate no. M180220). The Gauteng Department of Education granted permission to conduct the intervention at schools.

6.3.1 The conceptual framework for implementation outcomes

Five outcomes from the taxonomy of the eight conceptually distinct implementation outcomes (acceptability, adoption, appropriateness, cost, feasibility, fidelity, penetration, and sustainability) proposed by Proctor et al. (2011) (Proctor et al., 2011) formed the basis of the process evaluation. Adoption, cost and feasibility outcomes are not reported in this paper. Acceptability is defined as the perception among implementation stakeholders that a given service, practice, or intervention is satisfactory. Appropriateness is the perceived fit, relevance or compatibility of the intervention or evidence-based practice for a given practice setting, provider or consumer. Penetration is defined as the integration of a practice within a service setting and its sub-systems. Sustainability is the

integration of a given programme within an organisation's culture through policies and practices (Proctor et al., 2011).

Fidelity is repeatedly highlighted as a crucial component of process evaluation efforts in various process evaluation frameworks (Dane and Schneider, 1998; Glasgow R E et al., 1999; Linnan and Steckler, 2002; Proctor et al., 2011). Dane and Schneider (1998) (Dane and Schneider, 1998) further define five dimensions of fidelity: adherence (how well the intervention delivery followed recommended methods), exposure (the amount of intervention received by the participants), quality of delivery of the intervention, participant responsiveness (how the participants responded to the different intervention components) and programme differentiation (identifying whether certain aspects of the intervention were more effective than others) (Dane and Schneider, 1998).

Although not part of the Proctor et al. (Proctor et al., 2011) framework, context (environmental aspects of the intervention setting) is an additional dimension in this report as it has been acknowledged as a key dimension by Linnan and Steckler (2002) (Linnan and Steckler, 2002).

6.3.2 Overview of the intervention

Full details of the intervention design and programme are described elsewhere benefits (K Arthur et al., 2020). In summary, *The CIrCLE of Life Initiative* (**Figure 4-3**) had both a school and home component, each of which comprised a learning curriculum, environmental support, and activity-based constituents that aimed to increase learner knowledge and skills and to engage caregivers. Trained educators delivered lessons about HIV and obesity to all Grade 6 learners at the school. The classroom curriculum for learners required delivery of a five-hour face-to-face intervention delivered weekly through 10 30-minute lessons. Learners were asked to communicate their learnings to their parents/caregivers at home. Parents/caregivers were requested to read through the lesson in a workbook and sign in acknowledgement of reading. The workbook contained shared learner-parent homework activities that would take approximately half an hour per week. The intervention was carried out within one school term equivalent to three months.

Educators were provided with training and resources. Each educator was given a training manual and trained on the implementation strategy and content (**Table 4-4**). Most educators understood the content as these were lessons that they were accustomed to teaching due to the inclusion of such topics in the national school curriculum. Although familiar with some skills that were already in the syllabus, such as food label interpretation, additional time was spent teaching them additional skills such as measuring Body Mass Index (BMI) and pulse rate.

Although the lessons were designed as part of the life skills lesson, the implementers could choose to deliver them during other subject lessons. For example, measuring BMI could be covered during the mathematics lesson to reinforce the calculations, and pulse rate could be taught during the physical education lesson while exercising.

6.3.3 Setting

In South Africa, schools (urban and rural) are categorised into five groups or quintiles (The Government Gazette, 2006), based on the relative wealth of their surrounding communities. Schools in the most impoverished communities are classified as Quintile 1 and schools serving the wealthiest communities, as Quintile 5. Quintiles 1, 2 and 3 schools do not charge fees. The Government subsidises schools accordingly; Quintile 1 schools receive the highest allocation per learner and Quintile 5 schools receive the lowest (The Government Gazette, 2006).

Five government-run primary schools in a district located in Gauteng province, South Africa were purposely selected to represent each of the quintiles and invited to participate. Two schools were classified as Quintile 1, and three as Quintile 2, 3 and 4. The Quintile 4 school was the only fee-paying school and the only school that did not provide a feeding scheme. Three of the schools were in a rural area while two were in an urban area. The sizes of the schools range from 650 – 1100 learners with a teaching complement of 25 – 30 educators. There are approximately 100 Grade six learners in each school.

6.3.4 Participants

Seven educators were recruited and agreed to implement the programme in 12 Grade 6 classes. A total of 537 Grade 6 learners and their parents/caregivers were invited to participate. All learners and their caregivers were exposed to the intervention activities, and the process evaluation, therefore, included all learners and parents.

6.3.5 Data collection

A mixed-methods approach (Zhang and Creswell, 2013) was employed; quantitative and qualitative data were collected concurrently between June and September 2018.

A pragmatic approach to data collection was adopted to maximise response while minimising the impact on intervention delivery and the workload for educators. Data collection methods and tools included: 1) checklists and logbooks completed by intervention providers (educators); 2) interviews with educators; 3) observations of lesson delivery and context; and 4) use of administrative data, such as attendance registers. Tools were selected to ensure that the resulting data would address the defined evaluation dimensions. Multiple methods were used to measure the same evaluation dimension in order to triangulate findings and to ensure that data were available for each dimension.

Logbooks were designed to collect self-reported data about intervention delivery from educators. The logbooks collected information on acceptability, appropriateness, penetration, sustainability, and the fidelity dimensions: adherence; exposure; participant responsiveness; and programme differentiation. The logbooks documented both quantitative (e.g. how many learners attended the lesson) and qualitative data (e.g. details of how the lesson was delivered, problems experienced). Processes were assessed by the completion of an implementation checklist in the logbook. The tool allowed for dichotomous (yes/no) and open-ended responses.

Data from learner-parent workbooks were extracted to document both quantitative data (e.g. how many activities were completed/signed by parents). The results are based on 388 learners who handed in their workbooks at the end of implementation of the intervention. Based on daily observations and the number of stickers that had been handed out, more than 388 learners had completed their homework and attained their parents' signatures, but the balance did not hand in their workbooks.

A single researcher undertook direct observations of intervention delivery at every class. Fieldnotes of implementation experiences were documented. Behavioural observations or field notes were used to provide an assessment of intervention implementation. The quality of delivery (i.e. educator–learner interactivity, educator competence of employing teaching methods, processes, teacher enthusiasm, learning principles, learner engagement, and learner attentiveness) was noted through observations, to determine how well lessons were delivered and received. A comprehensive observation tool was used to document the observations and included a checklist and qualitative descriptions of the implementation of the intervention. All data were captured with the informed consent from the educators.

Data were collected for each intervention component and all implementation outcomes. A reliability cross-check was performed between all data sources to ensure accuracy of reporting. Triangulation of the data was necessary to create an accurate and holistic picture of the intervention implementation and the associated response.

6.3.6 Data analysis

All data were captured using RedCap. The quantitative data were exported into Microsoft Excel, where ratios were calculated to show learner and parent, penetration and exposure rates. Learner penetration was calculated as the ratio of the number of learners who attended a given lesson or participated in an activity to the total number of learners in the Grade. Learner exposure was the ratio of the number of learners who completed the homework activities to the total number of learners in the Grade. Parent exposure was the ratio of the number of parents who signed the workbook to the total number of learners in the Grade. Dose delivered (what the programme delivered) was the function of the efforts of the educators and was calculated by the number of intended lessons of each intervention component delivered.

Qualitative data collected from the educator logbooks and transcribed interviews with educators were analysed. Content analysis (Erlingsson and Brysiewicz, 2017) was conducted, where all data were systematically transformed into an organised and concise summary of key results. The qualitative data were used to better understand how each intervention component was delivered and its influence on various factors during delivery.

6.4 RESULTS

The descriptive information about participating schools, classes and educators are shown in **Table 6-1**. The highest educator-learner ratio per Grade at schools was a Quintile 1, rural school with 54 learners to one educator; the smallest was another Quintile 1, rural school with 39 learners to one educator.

There was 96.7% adherence to lesson delivery where all components were delivered by educators, at each school. The dose of lessons delivered in each class, at every school was 10 lessons. Lessons were delivered during a 30 minute period. The frequency of lessons was twice a week over one school term. One educator missed the delivery of four of her lessons, due to absenteeism without leave and the researcher stepped in at the request of the head of school to deliver the sessions.

Table 6-1 Descriptive information about participating schools, classes and educators

	Quintile 1 Rural school 1 (n)	Quintile 1 Rural school 2 (n)	Quintile 2 Rural school (n)	Quintile 3 Urban school (n)	Quintile 4 Urban school (n)
Grade 6 life skills educators per school	2	1	1	2	1
Grade 6 classes per school	3	2	2	3	2
Grade 6 learners per school	116	107	79	142	93
Educator-learner ratio per Grade	39	54	40	47	47
Lessons delivered per school	30	20	20	30	20

6.4.1 Context of implementation

Differences were observed between the various contexts of implementation. At the Quintile 3 school, the class sizes ranged from 45-50 learners. As a result, classrooms were packed and noisy. Learners at this school shared the small desks, and some sat on buckets instead of chairs. The other four schools had larger classrooms that were well-ventilated. Learners from four of the five schools had to carry around their chairs to different classes for various lessons. The classrooms at these four schools were also very dusty. A train track was located adjacent to the Quintile 2 school, and the learners were distracted whenever a train passed. Classes at this school were always rowdy, and most learners did not pay attention or engage in the lesson.

The headmasters from both Quintile 1 schools stated that many of their learners were affected by HIV and its consequences. Many of their learners came from orphanages or lived with guardians, e.g. grandparents. High-risk behaviour was also common at these schools. "*Drugs, smoking and sex is rife here. Many of the girls are being raped by elders but don't even know what it is*" (Quintile 1, rural educator).

Educators from non-fee paying schools (Quintiles 1, 2, 3) also complained that parents had no interest in their children's schoolwork, and did not attend progress meetings or collect reports from schools (it is compulsory for parents to collect reports).

The availability and provision of food varied by school. Non-fee paying schools had funded feeding schemes for the learners, while learners from the Quintile 4 school brought their own lunch. The school physical activity environments also differed. Only two schools (a Quintile 1 and the Quintile 4) had grassed fields. The other three schools had dusty areas, with hard soil as fields/playgrounds. Only the Quintile 4 school provided sporting facilities and equipment.

Other than the Quintile 4 school, all school management teams were welcoming and excited that their school had been chosen as a study site. The Quintile 4 school's management acted as 'gatekeepers.'

They often cancelled appointments and limited the researcher's interaction with the learners. Learners were also given inaccurate details about the programme which discouraged participation. However, following talks with the life skills educator, the implementation was supported and the initial negative interactions with the school improved to more favourable interactions.

6.4.2 Fidelity and valence of adaptions

The process evaluation revealed strong implementation fidelity and high dose delivered. Implementation fidelity was based on the adherence; exposure; participant responsiveness; and programme differentiation. Observations and logbook analysis showed that there was no programme adaption of any critical components. Adherence indicators were based on the delivery of the programme content, methods and activities (**Table 4-4**). All schools adhered to the intervention protocol and lessons were delivered according to plan, although there were a few positive adaptions.

One educator who taught two classes at the Quintile 3 school reinforced the lesson content by translating it into Setswana and isiXhosa. The learners in the two classes were split according to these home languages. When she did this, many learners stopped what they were doing and give her their undivided attention and nodded their heads in acceptance. This communication technique and understanding was not witnessed at any of the other classes at this school or in the other four schools.

Another adaption, recommended in the manual, was to conduct one of the lessons that incorporated exercise in the open field, instead of the classroom. A Quintile 4 educator did this.

Another manual-recommended adaption made by the Quintile 3 school was to conduct the story-writing component during the English lesson. In preparation for one of the lessons, another Quintile 3 educator taught the 'Macarena' dance to the learners. During the lesson which was conducted in the life skills lesson, she continuously made inferences to the dance and the song.

At the Quintile 3 and 4 schools, one of the lessons required additional time to complete and extended into the break. "*Taking measurements in Lesson 1 became a challenge as more time was needed, especially when taking both weight and height measurements*" (Quintile 4 educator).

6.4.3 Quantitative logistics of implementation

Table 6-2 shows high learner penetration (97.2%), but lower learner exposure (48.0%) and parent exposure (54.4%). Many parents had signed to acknowledge reading through the workbook, however, the homework was not completed. Learner penetration was the highest at the Quintile 4 school (99.1%) and the lowest at a Quintile 1 school (92.3%). Learner exposure was the highest at the first Quintile 4 school (57.8%) and the lowest at a Quintile 1 school (30.3%). Parent exposure was the highest at the Quintile 2 school (62.3%) and the lowest at a Quintile 1 school (35.5%).

Table 6-2 Penetration and exposure by lessons and by school

		Quintile 1 Rural school 1 n (%)	Quintile 1 Rural school 2 n (%)	Quintile 2 Rural school n (%)	Quintile 3 Urban school n (%)	Quintile 4 Urban school n (%)	Total per school %
Lesson 1 Obesity	Learner penetration	116 (100.0)	99 (92.5)	78 (98.7)	140 (98.6)	92 (98.9)	**97.7**
	Learner exposure	69 (59.5)	59 (55.1)	72 (91.1)	99 (69.7)	67 (72.0)	**69.5**
	Parent exposure	70 (60.3)	48 (44.9)	70 (88.6)	96 (67.6)	68 (73.1)	**66.9**
Lesson 2 Nutrition	Learner penetration	115 (99.1)	100 (93.5)	79 (100.0)	139 (97.9)	92 (98.9)	**97.9**
	Learner exposure	64 (55.2)	38 (35.5)	51 (64.6)	91 (64.1)	66 (71.0)	**58.1**
	Parent exposure	66 (56.9)	39 (36.4)	56 (70.9)	96 (67.6)	62 (66.7)	**59.7**
Lesson 3 Physical activity	Learner penetration	112 (96.6)	98 (91.6)	77 (97.5)	140 (98.6)	93 (100.0)	**96.9**
	Learner exposure	53 (45.7)	28 (26.2)	44 (55.7)	68 (47.9)	61 (65.6)	**48.2**
	Parent exposure	61 (52.6)	35 (32.7)	44 (55.7)	89 (62.7)	60 (64.5)	**53.6**
Lesson 4 HIV/AIDS	Learner penetration	113 (97.4)	98 (91.6)	78 (98.7)	138 (7.2)	91 (97.8)	**96.5**
	Learner exposure	24 (20.7)	13 (12.1)	28 (35.4)	48 (33.8)	27 (29.0)	**26.2**
	Parent exposure	57 (49.1)	38 (35.5)	41 (51.9)	82 (57.7)	49 (52.7)	**49.4**
Lesson 5 Communication	Learner penetration	114 (98.3)	99 (92.5)	77 (97.5)	137 (96.5)	93 (100.0)	**97.0**
	Learner exposure	44 (37.9)	24 (22.4)	31 (39.2)	56 (39.4)	48 (51.6)	**38.1**
	Parent exposure	53 (45.7)	30 (28.0)	35 (44.3)	72 (50.7)	41 (44.1)	**42.6**
Total	Learner penetration	**98.3**	**92.3**	**98.5**	**97.8**	**99.1**	**97.2**
	Learner exposure	**43.8**	**30.3**	**57.2**	**51.0**	**57.8**	**48.0**
	Parent exposure	**52.9**	**35.5**	**62.3**	**61.3**	**60.2**	**54.4**

Table 6-3 shows the learner and parent exposure, by school and for the two activity tasks, i.e. the poster-making and the essay-writing activity. Learner exposure was the lowest at a Quintile 1 schools (6.5%) and highest at a Quintile 2 school (53.2%). Parent exposure was the lowest at a Quintile 1 schools (35.5%) and highest at a Quintile 2 school (70.9%). Some learners who submitted homework for the essay-writing activity wrote about their personal experiences of rape, abuse, and living with HIV. Others wrote stories of living without their parents who had died from HIV. The HIV theme provoked feelings of sadness rather than being a fun activity. Unfortunately, these issues could not be probed further as it was a story-writing task. Although there might not have been much truth behind the stories, the storylines were beyond the years of a pre-adolescent.

There were notable differences in the characteristics of the poster submissions from school to school. None of the learners was provided with stationery. Learners from the Quintile 4 urban schools

submitted posters on expensive sheets of paper, used internet researched material and printed posters. Their pictures were drawn with coloured-pens or paints or were printed of the internet. The learners from other the other schools used low-cost lined paper torn from their books. They mostly used crayons and pictures cut from newspapers and magazines. All their information was copied directly from their textbook or the workbook. There was no evidence of additional research.

Table 6-3 Penetration and exposure by reinforcement activities and by school

		Quintile 1 Rural school 1 n (%)	Quintile 1 Rural school 2 n (%)	Quintile 2 Rural school n (%)	Quintile 3 Urban school n (%)	Quintile 4 Urban school n (%)
Poster-making activity	Learner exposure	33 (28.4)	7 (6.5)	42 (53.2)	46 (32.4)	25 (26.9)
	Parent exposure	59 (50.9)	39 (36.4)	56 (70.9)	93 (65.5)	65 (69.9)
Story-writing activity	Learner exposure	24 (20.7)	13 (12.1)	28 (35.4)	48 (33.8)	27 (29.0)
	Parent exposure	57 (49.1)	38 (35.5)	41 (51.9)	82 (57.7)	49 (52.7)

6.4.4 Quality of implementation

Based on researcher observations, programme content was delivered with excellent facilitation skills, enthusiasm, preparedness, attitude, use of relevant examples, interaction style, and respectfulness, which resulted in positive learner participation. Three educators thought that most lessons produced a *"conducive and attentive atmosphere"*, and that *"learners were happy and engaged in the lesson"*. All educators understood and were knowledgeable about concepts being taught in every lesson. Educators stated that having the support of the researcher in the class, even if it were to observe, made them more confident. They answered learners' questions and guided discussions in desired directions. However, when it came to discussions/questions around sexual-related content and behaviour, the educators looked to the researcher for assistance. Even though educators were trained on their health education syllabus and the intervention curricula, some educators showed a lack of confidence in teaching sexual-related content. When later probed, educators responded that discussing sex with young learners was uncomfortable.

Teacher-learner interactivity varied amongst implementers. One Quintile 3 educator used a reading scenario strategy in her classes where learners were asked to read the notes from the workbook out loud to the class. The educator would then entertain a discussion around the subject. Learners' reading was not fluent, and some struggled to pronounce the English words, but the educator used this strategy to reinforce reading skills, and improve English vocabulary. Another educator encouraged participation by directing her questions to learners who did not volunteer to answer questions. *"Children don't answer questions in my class except for the ones that speak excellent English. Other*

children sit quietly and try not to answer because of their lack of confidence to speak English, so when I teach I ask questions to the quieter children" (Quintile 1 educator).

Educators recommended adding teaching aids and charts to lessons as well as scenarios about how families live and actively exercise. Another educator said the combination of the theory and practical skills was useful to teach life skills. Some educators called for more in-depth notes while others said that the amount of notes in the workbook should be decreased.

Even after the training, five educators requested that the researcher be present to assist with the BMI measurements and pulse rate activities. First, some required the help of an additional person to complete the lesson in the given timeframe, and second, three said that they would feel more confident to carry out the activity under the supervision of the researcher, in case they experienced problems.

6.4.5 Participant responsiveness

Aspects of participant responsiveness (the extent of which participants were engaged or involved in the activities and content of the programme) included their level of interest in the programme and perceptions about the relevance and usefulness of the programme.

Learners listened attentively and contributed to the class discussion at all but one school, where learners often tried to 'bunk' (truant) the lessons. At the start of each lesson, the educator would bring several boys back from the bathroom. Although she tried her best to keep their attention and discipline the class with a stick, it was difficult to control the learners. One lesson was rescheduled due to a memorial service for a child who had lost his life 'train surfing'.

Educators thought that the 'Broken Telephone Game' designed to teach communication was *"enjoyable by all"*. A message was whispered from one child to the next to see how it changed over time. At the Quintile 2 school, the message changed to include swear words.

"Learners were eager to ask questions and share information about what they eat and buy from the tuck shop" (Quintile 4 educator). This was not observed in the other schools, where learners were reluctant to share details about what they ate. Nonetheless, there were many 'post-lesson' questions from girls in the Quintile 4 urban school, asked questions about obesity and healthy body image, such as, *"why am I overweight, when I play so much of sport?"*, and *"Why do my parents tease me about*

my weight?" These girls seemed to be in the normal weight category, based on researcher observation rather than BMI calculations. This was also the only school in which learners requested that their weight measures not be read out loud.

In the lessons related to HIV, children in Quintiles 1 and 2 were eager to ask questions and share their home scenarios/stories. The learners in the Quintile 4 school did not engage as fully in these lessons as they had done in those about obesity. *"learners were very interested in the lessons as they know of people who are affected directly by HIV"* (Quintile 1 educator). Although unnoticed by the researcher, an educator in a Quintile 2 school said the HIV-related lessons created *"a tense atmosphere during class"*. However, during one of these lessons, *"learners opened up and shared their ideas and their experiences about HIV"* (Quintile 1 educator). One educator recommended adding more examples or case studies on the HIV topics.

The use of the workbook (extent to which a participant conducted activities specified in the materials) was initially high but decreased over time. The functionality of the workbook (the extent to which a participant continued to do any of the activities) was observed in two ways. First, even though all formal activities were not completed, most learners coloured in all the pictures and completed all the puzzles. Second, most learners were reluctant to hand in their books at the end of the programme, and many said that their books were stolen or lost. Parent participation through the workbook was conducive, with many parents offering positive comments and asking questions related to the topic.

In the Quintile 1, 2 and 3 schools, stickers were offered as incentives, which encouraged and motivated the learners to do their work. They all looked forward to the stickers being be handed out. However, in the Quintile 4 school, *"Children hardly submit their work for stickers"* (Quintile 4 Educator). This was confirmed through observations.

The observing researcher attempted to play an insignificant role during lesson delivery and would only voluntarily participate, if asked directly by the educator to answer a question, which they were unsure of. It must be noted, however, that learners and educators were aware of the presence of the researcher during lesson delivery and would often look to gauge the researcher's reactions to various occurrences. After the lesson, learners would often approach the researcher to have their individual questions related to the lesson delivered, answered privately.

6.4.6 Appropriateness

All participating educators thought that the intervention was a fit for both rural and urban schools, all socio-economic groups, and learners from different ethnic and cultural backgrounds. *"These are the kids who need the information because some are facing the situation at home"* (Quintile 1 educator). Educators reported no language barriers during delivery of the programme. It was observed, however, that educators often reinforced instructions in the learners' home languages. All content was also perceived to be age-appropriate for learners.

6.4.7 Acceptability

The lessons and content met all the educators' approval, and everyone welcomed the lessons into the Grade 6 life skills syllabus. *"The theory and skills were relevant and compatible with the school environment"* (Quintile 2 educator). "*The content was meaningful to the learners and to our communities."* (Quintile 4 educator). All content was perceived to be acceptable to the learner age-group, to different socio-economic groups and to learners from different ethnic and cultural backgrounds. Although there was minimal sexual-related content to be taught, educators perceived that the sexual nature of some of the HIV-related content might be burdensome if learners asked difficult questions.

6.4.8 Perceived sustainability

All educators felt that the programme could be sustained. First, however, educators could not guarantee that they would gain or retain the parents' support if they tried to implement the programme on their own. *"When parents see an outsider doing something different, they might support the program, but on a normal day they don't give us teachers the support"* (Quintile 1 educator). Another educator from the same school suggested that it would be difficult to maintain parent-level relationships or coalitions that were developed during the initial programme, without additional support. *"It would be simple to teach the child and let them relay the messages home to their parents but to get that parent to continue reading and signing for a longer period will be hard"* (Quintile 2 educator).

The second concern that educators voiced was if children would retain the acquired knowledge and be motivated to change behaviour once the intervention ended. *"When you are in front of the children,*

they remember you and what you are asking them to do but when you leave, they forget. I can teach them on HIV today, and when I ask them about it next year, they have forgotten the lesson" (Quintile 1 educator). Another educator agreed that health messages needed to be continuously promoted and reinforced.

Third, they were uncertain if they would be able to teach the programme skills in their lessons or print the workbooks. All educators agreed that they would attempt to deliver the programme lessons of the original intervention, even after the programme ended, but that this would be difficult with the limited resources and equipment. *"The workbook and information in it, that was delivered, speak directly to the syllabus. I will use the workbooks again next year to make things easier to teach"* (Quintile 4 educator). Fourth, educators could also not guarantee that they would be teaching Grade 6 life skills in their schools the following year. Due to limited staff, subject educators often changed on a yearly basis. *"If time permits, I can use the existing resources and incorporate the additional sections into their lessons as enrichment activities, until such time as it can be adopted into the curriculum"* (Quintile 2 educator).

At the end of implementation, all educators felt that the programme should be included in the school curriculum and introduced into other schools. All educators concurred that the programme was beneficial, and two agreed to recommend that it be included into the school curriculum, to curriculum authorities during their school supervision visits. Programme diffusion and scale-up could be made possible through the provision of necessary organisational, political, community and financial support. According to educators, the following themes emerged, which could affect sustainability:

- funding stability (workbooks, equipment, training),
- political support (programme incorporated into curriculum, funding),
- organisational capacity (training, adequate resource allocation for programme),
- community support (parents/caregivers), and
- programme monitoring and evaluation (strategies to measure the differences in behaviour, attitudes, perceptions and health status).

6.5 DISCUSSION

The CIrCLE of Life Initiative, process evaluation findings indicate a high level of implementation fidelity, suggesting that the intervention was generally implemented and received as intended. The intervention was perceived by educators to be acceptable and appropriate to both learners and parents. However, findings show that implementer experiences with, and participant responsiveness to, HIV

and obesity vary and some of the mechanisms that support implementation and how they function between the various health topics, schools, and contexts differ.

The exploration of context-outcome configuration is necessary to go beyond the generic 'one recommendation fits all' theory. Understanding the context of intervention delivery is critical to explain outcome as different interventions may have different causal processes and relationships with its context. Context differed between fee/non-fee paying schools, urban/rural schools, and the diseases, lifestyles, and quality of life experienced by learners in the different schools. Such facets of context need to be evaluated as it is relevant to understand implementation processes. There is no 'one size fits all' approach when it comes to implementation, and while programmes need to offer a degree of flexibility, there is a need to balance schools' autonomy to adapt delivery with the contextual diversity of the different schools (Chalkley et al., 2018; Langford et al., 2015).

Recommendations were made to school management for certain schools to provide more supportive learning environments, not only for the implementation of the intervention but for routine school use. Supportive learning environments included smaller class sizes, clean and well-ventilated classrooms, essential teaching and learning resources, and an atmosphere conducive to concentration and learning. Educators are presented with more complex classrooms because of English as a first language, increasing numbers of learners, and with emotional and behavioural problems (Webster-Stratton et al., 2011). These issues create barriers for educators attempting to provide instruction and manage classroom behaviours among diverse learners (Webster-Stratton et al., 2011). Some of the key mechanisms and contexts identified in the initial implementation may also be important for long-term sustainability or scale-up. This study confirms the importance of such factors for a school-based programme and suggests their critical evaluation when developing/implementing school-based interventions.

Fidelity was a function of the implementers and encompassed both the quality and quantity of delivery (Dusenbury et al., 2003; Rabin et al., 2008). Assessing process skills and training methods were critical to improving the fidelity of the intervention (Webster-Stratton et al., 2011). Other important facets of implementation fidelity were educators' knowledge levels, their inter-personal skills, and coverage of the specific content and processes used during delivery. The programme was flexible enough to allow for minor adaptions for the given contexts of delivery, as well as the skill level and degree of experience of the individual educators. Inter-school variation in delivery of the programme was observed. Educator delivery styles seemingly drove the evident variations in valence of adaption. Although core teaching methods supported the educators to effectively deliver the programme, they also used their own experience to successfully tailor the programme to meet the needs of the learners, while preserving the essential functional components of the programme.

Regarding observations, the initial plan was for researchers to visit schools unannounced. However, this proved impractical due to the frequent changes in school schedules. Observation visits were therefore pre-arranged with schools, which meant schools had prior knowledge that the session would be observed, potentially influencing delivery. As the outcome evaluation was assessing effectiveness of the intervention in a 'real world' setting, the process evaluation was designed to avoid influencing its delivery. However, during observations, the researcher noted that some implementers perceived this as a source of support for intervention delivery. This posed a challenge on intervention delivery, and the researcher had to thus maintain a distance and not offer any specific feedback so as minimise influence.

The implementation of the intervention utilised a combination of delivery modes such as face-to-face delivery of lessons and the workbook. Educators perceived all modes to be acceptable to learners and their parents. The workbook was a means of indirectly involving parents. Not only was the workbook an acceptable mode, but it was also a feasible approach to involve parents. Slightly more than half of the parents were effectively reached in this manner.

Although the dose delivered was high, exposure rates of learners and parents were relatively low. Parent exposure was slightly higher than the learner exposure rate. Learner exposure was based on homework completed while parent exposure was based on signatures attained for reading through material. Homework/workbook activities were similar to traditional school homework and were least enjoyed by learners, which is evident from the low exposure rates. Not many learners completed the formal homework activities, yet most colouring-in activities and puzzles were completed by most. Using activities in the form of play may be a better way to encourage participation of learners (Undiyaundeye, 2013; UNICEF, 2018). The degree of parental involvement in homework varied, but the workbook appeared to be an efficient way of reaching parents. Results relating to learner engagement with the intervention, or dose received, show that the frequency of learner engagement with the intervention was high during the study. Findings indicated that learner interest and engagement in activities decreased toward the end of the study.

As a transdisciplinary intervention, additional training and skills development for educators were necessitated. Even after adequate training, the results of the process evaluation provided an integrated understanding of the relationships between educator characteristics, and their training and experience. Educators' attitudes and confidence influence the quality of implementation and the programme outcome (South African Department of Basic Education, 2012). Educators need to be better equipped to teach sexual-related content and to counsel and help learners deal with various problems. Professional development and training, therefore, become ever-more important to foster good health education practices in schools (Langford et al., 2015; Lister-Sharp et al., 1999). Educators' attitudes

towards the programme and their levels of comfort with it are the most influential factors for quality of implementation. Educator pre-implementation training workshops should focus on strengthening their self-efficacy in communication (Wang et al., 2017) to implement any sexual-related content with high quality. Many learners and their families were affected by HIV. Understanding the plight of some of the participants may add context to how the disease has affected them and how the intervention could improve their health and well-being. Educators/implementers also require a level of sensitivity and skill-training in dealing with such issues (South African Department of Basic Education, 2012).

The criterion for acceptability is personal (Powell et al., 2017). Any two people can view the same programme and form different judgments. Individuals' perceptions of acceptability, and their preferences and expectations, differ. The criterion for appropriateness, however, is technical or social (Powell et al., 2017). A programme can be judged appropriate if it is seen as beneficial, or consistent with people's norms or values. Two issues that influenced acceptability and appropriateness were language barriers and sexual content. South Africa has 11 official languages. With some exceptions, most public schools recently opted to teach using an English medium (The Government Gazette, 1996). This affects the way learners comprehend, decipher and communicate lesson content. Language, as a perceived barrier, could influence acceptability and appropriateness of the intervention. Appropriateness and acceptability of communication about sexual-related topics is also viewed differently by certain cultures. It is a sensitive topic and not all parents find ease in its communication.

Implementation strategies have increased the development and translation of programmes into practice (Proctor et al., 2009); however, less attention is focused on post-implementation occurrences (Ehrhart et al., 2014). A sustainability evaluation determines how best to position a programme to ensure that it can, over time, sustain the salience of its core issues, such as its activities, organisational practices, and benefits to its recipients (Scheirer and Dearing, 2011). However, programmes typically need time to reach a certain level of maturity and allow health benefits to accrue to better understand what factors can promote long-term sustainability (Schell et al., 2013). Sustainability may, therefore, only be observed well into, or even after, the implementation process. It is impossible to address all components of sustainability with any one method of data collection and analysis, as sustainability outcome evaluation requires exploration through longitudinal studies that measure multiple outcomes before, during and after programme implementation.

Taking cognizance of leading and lagging indicators of implementation may assist the sustainability process. While lagging indicators, e.g. sustainability, may reflect delays between when changes happen and when they can be observed, leading indicators, e.g. acceptability, can be useful as they

signal future trends (Proctor et al., 2011). Sustainability, as a lagging indicator, was difficult to measure at this early stage after implementation, and the focus was, therefore, on conceptual development of the capacity for sustainability of the intervention. Sustainability capacity is the existence of structures and processes that allow a programme to leverage resources to effectively implement and maintain evidence-based policies and activities (Schell et al., 2013).

The findings included multiple stakeholder perspectives from those working on the ground and provided valuable insight into potential solutions for improving the sustainability of the programme to enable better support efforts. The sustainability outcome evaluation recognised a set of organisational and contextual factors that could build capacity for maintaining the programme over time.

All educators unanimously concurred that the programme was beneficial, and should be included in the school curriculum and introduced into other schools. Programme diffusion and scale-up could be feasible through the provision of necessary community, organisational, and political support. Maintaining public health programmes that have shown benefit over time is a challenge due to the influence of human, informational, and financial resources (Handler et al., 2001; Hawe et al., 1997), as well as political and community support (Schell et al., 2013). The sustainability of this intervention is very likely to be influenced by the broader policy environment. Not only should the programme be incorporated into the existing education curriculum, but it should also be supported by broader policy. Recently, two new South African policies have come into being, which could support sustainability of this programme. First, antiretroviral therapy are now available free-of-charge to all who are HIV positive; second the Health Promotion Levy on sugary beverages (Department of National Treasury, 2017) has implications for food purchases.

6.5.1 Strengths and limitations

The advantage of using several data collection methods allowed for a comprehensive analysis of intervention delivery in each school. Although the educator self-report logbooks created a risk of social desirability, the process was strengthened by the act of observation. The possible impact of direct observation and its influence on educators must also be acknowledged as it creates a more concerted effort to adhere to the protocol if educators know they are being observed. All logbooks were fully completed and the cross check of data between logbook and observation revealed high consistency. Qualitative questions in the logbook captured specific delivery methods used by educators, as well as their feedback about lessons, and was an added strength.

Learner-parent workbooks did not always correlate with independent evaluation. For example, it appeared as though learners sometimes signed on behalf of their parents. In these instances, the learner received the benefit of doubt, as educators confirmed that a vast majority of parents had low levels of education. Not having direct input such as open expressions of experiences and attitudes from learners and parents was seen as a limitation.

6.5.2 Lessons learned

The findings demonstrate the application and value of various implementation process outcomes, which has beneficial implications for guiding future studies. The collective analysis of multiple data sources presented a rigorous and replicable approach.

The study has also shown benefit to both research and practice in optimising implementation efforts in the science of implementation. Understanding the country and programme context, including the behavioural patterns of the population is necessary for implementing the most effective interventions to reach the target population. The context of implementation is a fluctuating dimension and is a pre-requisite in any process evaluation as it assists the translation of research into real-world settings.

Transdisciplinary interventions require additional professional development to improve, implement, and sustain effective interventions.

6.6 CONCLUSION

The comprehensive process evaluation of the implementation of *The CIrCLE of Life Initiative* was a valuable effort. It facilitated the evaluation of the implementation outcomes, described its processes, and acknowledged the fundamental characteristics that may contribute to the interventions' success or failure. It has shown benefit to both research and practice in optimising future implementation efforts of the intervention.



Chapter 7: Outcome evaluation of intervention

Photo credit: Keshni Arthur, The school playground

Effectiveness of a pre-adolescent inter-generational intervention to address HIV and obesity, using a pretest-posttest design

7.1 ABSTRACT

Background: Providing pre-adolescents with age- and culture-appropriate knowledge and skills could prevent health issues later in life. Pre-adolescence is a critical developmental stage which may influence the trajectory of future risky behaviours, and may influence health behaviours amongst their parents. *The CIrCLE of Life Initiative* was developed to address HIV and obesity. We evaluated whether the combined intervention increased knowledge, enhanced skills, and/or promoted healthy behaviour among pre-adolescent students (9–12 years old) and their parents.

Methods: Trained educators delivered 30-minute lessons over 10 weeks, to 537 Grade 6 students at five government-run schools. Students communicated with parents through shared homework activities. A pretest-posttest study design was used, with a 3-month follow up. Both groups completed self-administered questionnaires. Differences in proportions between the two time points were tested using Chi-square or Fisher's exact tests. Trial Registration: ClinicalTrials.gov Identifier: NCT04307966.

Results: Response rates were high for both students (80.6%) and their parents (83.4%). There were positive changes in outcomes such as HIV knowledge ($p<0.001$), obesity awareness ($p=0.04$), and certain related skills and behaviours in both groups. Changes in the perceptions and attitudes of pre-adolescents were, however, limited. Students had a high intention to share gained knowledge with parents who had a high intention to receive it (89.4% and 89.5%, respectively).

Conclusion: The intervention increased knowledge, enhanced some skills and promoted healthy behaviour in selected outcomes among pre-adolescents and parents. Accurate messages and enhanced communication skills could support inter-generational knowledge transfer.

Keywords: pre-adolescent, parent, nutrition, physical activity, communication

7.2 BACKGROUND

South Africa, like many other developing countries, is in the midst of a health transition that is characterised by the double burden of communicable disease (CD), such as human immunodeficiency virus (HIV) (Pillay-van Wyk et al., 2016), and non-communicable disease (NCD) such as cardiovascular disease and diabetes (Mayosi et al., 2009). Obesity is a key contributor to the rise in the prevalence of NCDs (Averett et al., 2014; Devanathan et al., 2013) and, together with HIV/AIDS, is a cause of early mortality in South Africa (Pillay-van Wyk et al., 2016).

In South Africa, based on the body mass index (BMI) score, 68% of women and 31% of men (15 years and older) are overweight (BMI ≥ 25 kg/m2) or obese (BMI ≥ 30 kg/m2) (Statistics South Africa, 2016). Obesity occurs across the lifespan (HSRC and MRC, 2013). Based on weight-for-height measures, 13% of South African children under the age of five years are overweight; a prevalence of more than twice the global average of 6.1% (Statistics South Africa, 2016).

In 2017, approximately 7.9 million South Africans of all ages were living with HIV (Simbayi et al., 2019). HIV prevalence among adults (15 to 49 years) is 20.6%; 26.3% among females and 14.8% among males. It is estimated that 340 000 of those who are HIV positive are children (0 to 14 years) (Simbayi et al., 2019). The burden of HIV continues to disproportionately affect different geographical regions and high-risk groups, especially adolescent girls and young women (15 to 24 years).

Increasing global obesity rates have resulted in the development of interventions, aimed at adolescents, to stem the epidemic (Adab et al., 2015; Gentile et al., 2009; Gerards et al., 2015; Xu et al., 2015). Many of these evidence-based programmes (EBP) have targeted three practices: physical activity behaviour, dietary behaviour, and positive parenting (Adab et al., 2015; Gentile et al., 2009; Gerards et al., 2015; Grydeland et al., 2014; Kipping et al., 2014; Xu et al., 2015). Such practices have focused on reducing BMI through decreasing sedentary behaviour, influencing dietary behaviour, or combinations of the two, but have yielded mixed results (Adab et al., 2015; Gentile et al., 2009; Gerards et al., 2015; Xu et al., 2015). Some studies have shown improvement in health behaviour (increase in physical activity, healthier diets) as in the 'Switch' intervention (Gentile et al., 2009) and 'Click Obesity' intervention (Xu et al., 2015), while others have shown improvement in obesity-related knowledge (Xu et al., 2015), and good nutrition knowledge (Gentile et al., 2009). Other interventions, such as the 'WAVES' (Adab et al., 2015) and 'Lifestyle Triple P' (Gerards et al., 2015) did not find changes in outcomes such as altering anthropometry. 'Healthkick', an example of a South African nutrition and physical activity intervention, did not significantly improve the quality of

diet in children because the intervention model was not a suitable fit for the low-income setting (Steyn et al., 2015).

In the past decade, HIV programmes have focused on improving access to treatment and adherence; however, on-going prevention efforts to address risk factors remain crucial (Mayosi et al., 2009). Risky sexual behaviours associated with HIV infection among young people include early sexual debut, multiple partners, gender and social norms, forced sex and lack of condom use (Shisana et al., 2014). A systematic review that synthesised factors associated with, and interventions to reduce sexual risk-taking among HIV-positive adolescents and youth in sub-Saharan Africa (SSA) identified that living with a partner, living alone, gender-based violence, food insecurity, and employment were correlated with increased sexual risk-taking, while knowledge of own HIV-positive status and accessing HIV support groups were associated with reduced sexual risk-taking (Toska et al., 2017). Another review on the effectiveness of youth HIV/AIDS prevention interventions in SSA found that school-based, adult-led, curriculum-based interventions were effective in reducing reported risky sexual behaviour (Mavedzenge et al., 2011). A number of existing interventions are not adequately targeted to the sub-populations of young people, who are at highest risk and in highest prevalence settings (Scott-Sheldon et al., 2013).

Various South African HIV prevention initiatives have shown positive outcomes. The 'Lovelife' campaign (Pettifor et al., 2007), offered guidance to prevent HIV through various media platforms and programmes designed for youth. 'Soul City/Soul Buddyz' (Johnson et al., 2018; Peltzer and Promtussananon, 2003), a school-based HIV prevention programme, also leveraged off a mass media television series and demonstrated a positive impact on certain risky sexual behaviours (condom use knowledge, attitudes towards people with HIV/AIDS and delaying sex). 'Stepping Stones' (Jewkes et al., 2008) demonstrated a reduction in sexually transmitted infections, sexual risk-taking and violence perpetration among 16 to 24-year-olds, by transforming gender roles and norms and promoting more gender-equitable relationships between young men and women.

Pre-adolescence, the period of human development between the approximate ages of 9 and 12 years (The free Dictionary, 2017), could serve as an important developmental stage to address knowledge and skills. Prevention efforts, such as shifting attitudes to address stigma and increasing awareness and knowledge about HIV and obesity, at an early age could influence and potentially carry lessons into adulthood (Damerell et al., 2013) by altering the trajectory of future risky behaviours toward safer behaviours and ultimately prevent disease (Zimmer-Gembeck and Helfand, 2008). The success of such interventions could be measured by students' demonstration of practising good health habits and exhibiting socially responsible behaviour. The literature highlights that early interventions can successfully lead to longer-term behaviour change (Chen et al., 2009; Dinaj-Koci et al., 2014; Johnson et al., 2018; Pettifor et al., 2018). For example, a study by Johnson et al. (2018) showed that

a childhood HIV intervention, implemented between 2004 and 2008 was associated with a decrease in young women's HIV risk and suggested an impact on key risky sexual behaviours, approximately ten years later. Implementing prevention and risk reduction programmes as a fixed component of an education curriculum beginning in the pre-adolescent years and, if possible, also during the adolescent years, is useful in the long-term. Young people receive the most protection against risky behaviour with early and repeated exposure to interventions (Dinaj-Koci et al., 2014).

Interventions addressing pre-adolescents could also influence health behaviours amongst their parents/caregivers upon whom they are most dependent for their health needs and well-being (Damerell et al., 2013). In this paper, the term 'parent' also denotes primary caregiver, unless otherwise stated. Such an approach could stimulate interest and encourage engagement between child and parent and, in the process, transfer knowledge, influence attitudes and behaviour, and encourage healthier lifestyles. Parents are uniquely positioned to fulfil the critical role of shaping adolescent behaviour through their parenting practices and parent-child communication. Family is constructed and developed through its generations (Hartman and Laird, 1983), and shaped through mutual interaction and influence that create habitual ways of behaviour and communication (the manner in which problem-solving, arguments or discussions occur) (Becvar and Becvar, 2006). Several EBPs, such as, 'Parents Matter!' (Miller et al., 2011) and 'Let's Talk!' (Bogart et al., 2013) aimed to increase the quality and quantity of parent-adolescent communication, to prevent HIV in adolescents. The communication strategies included communication about sexual risk, HIV prevention and comfort with communication. 'Let's Talk!' significantly increased parents' comfort with talking to their adolescents about sex, and HIV-related topics (Bogart et al., 2013). The 'Parents Matter!' programme increased parents' perceptions of child readiness to learn about sex, and communication in HIV/AIDS and abstinence. The programme helped parents educate children about HIV and prepared children to reduce sexual risk (Miller et al., 2011).

Determining the direction of influence on inter-generational knowledge transfer is a crucial goal of any study (Knafo and Galansky, 2008). The conventional view is that parents teach their children, inculcating their knowledge, values and beliefs (Damerell et al., 2013). The bi-directional influence between parents and children is possible (Knafo and Galansky, 2008); however, studies on the impact of a child's influence on parent's knowledge, attitudes and behaviours remain limited with inconclusive findings. Trends in research on inter-generational knowledge have been demonstrated in qualitative research, however, further evidence supporting this relationship and demonstrating the direction of this relationship is required through quantitative data analysis (Damerell et al., 2013).

Addressing lifestyle and behaviour change for obesity prevention and control could create a supportive environment for prevention of HIV, such as avoiding harmful substances (alcohol), and

following a healthy diet (Temu et al., 2014). Interventions addressing HIV prevention or obesity are often stand-alone initiatives and are infrequently combined. Yet, such interventions are often directed at the same populations and comprise related activities. For example, HIV interventions often address nutrition related to living positively, while interventions directed at reducing over-nutrition to prevent obesity may have similar messages (Adab et al., 2015; Jemmott III et al., 2015; Scott-Sheldon et al., 2013; Xu et al., 2015). Co-morbid HIV and obesity increase the risk of developing metabolic syndrome, hypertension, cardio-vascular disease, and type 2 diabetes (Becofsky et al., 2016; Obry-Roguet et al., 2018), further emphasising the need for a combined HIV and obesity intervention. Addressing potential health risks at an early age, and improving the quality and quantity of communication between parent and child, are ways of approaching a combined intervention to address the overlap between HIV and obesity.

Health programmes are often discipline-specific. Hence, using transdisciplinary approaches to prevent diseases could provide holistic solutions across disciplinary boundaries (Kessel and Rosenfield, 2008). The engagement of the education sector as a participant in a transdisciplinary health intervention offers an ideal strategy to target the complexities of HIV and obesity because of the compulsory attendance of students in schools. Furthermore, engagement with schools offers a dynamic strategy because of existing organisational, social and communication structures (Lloyd et al., 2011).

The CIrCLE of Life Initiative is a combined transdisciplinary intervention that was developed to increase awareness about HIV and obesity risks and prevention (K Arthur et al., 2020). The programme supports knowledge transfer and translation directly to pre-adolescent students, and indirectly to their parents, for immediate- and long-term benefits. The purpose of this study was to evaluate whether the combined HIV and obesity intervention, The CIrCLE of Life Initiative, increased knowledge, enhanced skills and/or promoted healthy behaviour among pre-adolescent students and their parents.

7.3 METHODS

7.3.1 Study design

A pretest-posttest outcome evaluation of The CIrCLE of Life Initiative was conducted. The study was registered with ClinicalTrials.gov (NCT04307966) March 12, 2020. The delay in registration (data inclusion starting May 01, 2018) was due to formalities in the intervention design process. The authors confirm that all on-going and related trials for this intervention are registered.

7.3.2 Participants

The intervention was rolled out to 537 Grade 6 students (and one of each of their parents) at five government-run primary schools in a district located in Gauteng province, South Africa. The outcome evaluation of the study included parents (N=433) and students (N=448) who gave consent/assent to participate in the study. There were more students than parents due to sibling enrolment and orphans that had a shared guardian. The schools were purposively selected based on quintile classification and urban-rural classification, such that each school represented each of these classifications. Urban and rural schools in South Africa are categorised into five quintiles (The Government Gazette, 2006), based on the relative wealth of their surrounding communities. Schools in the most impoverished communities are classified as Quintile 1 schools and those serving the wealthiest communities, as Quintile 5 schools. Quintile 1, 2 and 3 schools do not charge fees. The government subsidises schools financially, with Quintile 1 schools receiving the highest allocation per student and Quintile 5 schools receiving the lowest (The Government Gazette, 2006). Two schools were classified as Quintile 1, and one each as Quintile 2, 3 and 4. The Quintile 4 school was the only fee-paying school and the only school that did not provide a feeding scheme (meals provided and subsidised by the school). Three of the schools were in rural areas while two were in urban areas. The student complement per school ranged from 650 to 1100. There were approximately 100 Grade 6 students in each school. Due to the under-resourced environment, students did not have access to computer technology and the Internet.

Seven educators were recruited to implement the intervention to all 12 Grade 6 classes. The educator complement per school ranged from 25 to 30. The educator-student ratio per grade was highest in a Quintile 1, rural school with 54 students to one educator (54:1); the lowest was the other Quintile 1, rural school with 39 students to one educator (39:1).

7.3.3 Overview of the intervention

Full details of the intervention design and programme are described elsewhere (K Arthur et al., 2020). In summary, *The CIrCLE of Life Initiative* (**Figure 4-3**) had both a school and home component, each comprising a learning curriculum, environmental support, and activity-based constituents that aimed to increase learner knowledge and skills, and to engage parents. The intervention (lesson content and material) was age- and culturally-appropriate and was acceptable to both pre-adolescents and adults (K Arthur et al., 2020). Examples included eating food from different cultures, and talking about sex-related matters to children. Trained educators delivered lessons about HIV and obesity to all Grade 6 learners at the schools. The classroom curriculum for learners required delivery of a five-hour face-to-

face intervention delivered weekly through 10 30-minute lessons. Learners were asked to communicate their learnings to their parents at home. Parents were requested to read through the lesson in a workbook and to sign acknowledgement that they had read the content. The workbook contained shared learner-parent homework activities that took approximately 30 minutes per week.

Most educators were familiar with the content as these were included in the national school curriculum. *The CIrCLE of Life* curriculum was designed to fit in with the national school curriculum, and certain aspects overlapped as depicted in (**Table 7-1**). The communication aspects and the shared homework activities were new approaches.

Although the lessons were designed as part of the life skills lesson, the implementers could choose to deliver them during other subject lessons. For example, measuring BMI could be covered during the mathematics lesson to reinforce calculations, and measuring pulse rate could be taught during the physical education lesson, while exercising.

Table 7-1 Overview of lesson content

Lesson	Content	Skills	Reinforcing Activity	Parent-Student Homework
One: Obesity	Healthy body image * Underweight, overweight and obesity Body Mass Index (BMI)	How to measure weight How to measure height Interpreting BMI	Diary of a healthy kid Crossword puzzle	Measure and interpret student's BMI
Two: Nutrition	Healthy eating * Food-based dietary guidelines *	How to interpret a food label *	Word search puzzle Colouring-in picture	Interpret a food label at home
Three: Physical Activity	Benefits of physical activity Heart rate (pulse)	Measuring and interpreting pulse	Colouring-in picture	Measure and interpret family member's pulse Obesity poster activity
Four: HIV/AIDS	HIV/AIDS * Understanding the risks of HIV/AIDS	Reducing the risk of HIV/AIDS	Crossword puzzle	HIV/AIDS story-writing activity
Five: Communicating about HIV/AIDS	Communication Importance of communication Healthy ways of communicating	Dealing with discomfort and support for sexual-specific communication	Communication game	Family communication exercise

* Already a part of the existing Grade 6 national school curriculum

7.3.4 Procedure

Prior to intervention delivery, several implementation strategies, such as a needs assessment (K Arthur et al., 2020) and an organisational readiness evaluation (Keshni Arthur et al., 2020), were conducted to ensure that the intervention would be well received by the target population and suitably implemented. The needs assessment confirmed that educators understood the relationship between health and learning in the classroom and gave impetus to the relevance and appropriateness of intervention objectives. The needs assessment also identified the need for adaptations to suit the context of implementation. Organisational readiness was evaluated to assess the level of readiness at schools for implementation of the intervention and to identify organisational facilitators, barriers and contextual factors which needed to be addressed during implementation (Keshni Arthur et al., 2020). It was also used to gain educators' support for the intervention, and findings suggested proactive improvements to the intervention and the implementation strategy. Key barriers and facilitators indicated that the intervention needed to be a fit with existing workflows and educational systems.

A process evaluation was conducted alongside the pretest-posttest outcome evaluation. Although both evaluations were done concurrently, the results were analysed and reported separately. All process evaluation data were analysed before the outcome evaluation results were available to minimise the risk of bias in interpretation (Craig et al., 2008). The process evaluation described the implementation process and identified contextual and characteristics of delivery that could have influenced intervention outcomes and impact. The process evaluation showed that the contexts of the different schools varied. All educators, however, were of the opinion that the intervention was a fit for their schools, regardless of location of the school or socio-economic status.

The intervention was implemented during the 2018 school academic year to all Grade 6 students. Data were collected using four different self-administered questionnaires (two for students and two for parents). The student and parent pretest evaluations were conducted in April and May 2018. Implementation of the intervention followed from June to August 2018. The posttests were conducted three months later, in November and December of 2018.

Ethical approval was obtained from the Human Research Ethics Committee of the University of the Witwatersrand (clearance certificate no. M180220). The Gauteng Department of Education provided permission to conduct the study in the selected schools. The school headmasters provided permission to conduct the study at their schools. Informed consent and assent to participate in the study were obtained from the participating parents and students, respectively. A distress protocol was put into place to address any issues associated with sensitivity of the diseases.

7.3.5 Measures

Two outcomes were measured. The primary outcome was the effects and differences between the student, pretest and posttest, and the parent, pretest and posttest. The second outcome determined whether the intervention, delivered to students, could influence knowledge transfer and translation in parents.

The 69-item student pretest questionnaire (Appendix 12) and 67-item student posttest questionnaire elicited students' feedback regarding the following elements: socio-demographic characteristics (6 questions); HIV/AIDS-related knowledge, attitude, behaviour, practices and skills (21 questions); obesity-related awareness, attitude and skills (6 questions); nutrition-related awareness, attitude, behaviour and skills (14 questions); physical activity-related awareness, attitude, behaviour and skills (7 questions); cigarette and alcohol behaviour (4 questions); child-parent communication (8 questions); and general comments (3 questions). Certain replicated questions were excluded from the posttest (e.g. socio-demographic information). Additional questions such as "What did you like/dislike about the programme that was run?" were added. All other questions were the same in the pre- and posttest.

Questionnaire design was informed by the literature and based on various publicly accessible survey tools (Bradley et al., 2011; Nardelli et al., 2019; The Demographic and Health Survey, 2011). The HIV/AIDS section explored HIV/AIDS-related knowledge, attitudes, perceptions, behaviours, practices and skills. All HIV/AIDS knowledge items were combined into one score that measured knowledge about the disease, how it is spread and the associated risk factors. The Cronbach's alpha was calculated to assess the internal consistency of the overall HIV knowledge score and, at 0.73, indicated good internal consistency. An example of the question that assessed attitude to openness about status was, "If a family member has HIV, would you want to keep it a secret?". An example of the question that assessed perception of stigma in the community was, "Do people in your community stay away from people who have HIV?". An example of the question that assessed the exposure to HIV/AIDS education was, "Have you ever been taught about AIDS or HIV infection at school?". Responses were measured in a scale of 1 to 3 (1 = yes, 2 = no, 3= unsure).

Obesity-related awareness, attitude and skills (BMI calculation and interpretation) were also explored. An example of the question that assessed the perceived importance of weight to health was, "How important is what you weigh to your health?". Responses were based on a 5-point Likert scale (1 = not important, to 5 = very important). An example of the question that assessed the awareness about BMI was, "Have you heard of Body Mass Index (BMI) ?". Responses were measured on a scale of 1 to 3, as for the HIV/AIDS education question.

The nutrition questions were based on survey tools such as the South African National Health, Demographic and Behaviour Survey, 2011 (Human Sciences Research Council, 2014) and the South African National Health and Nutrition Examination Survey, 2011/12 (HSRC and MRC, 2013). The nutrition section investigated awareness, attitudes, behaviours and skills (interpreting a food label). Consumption behaviour regarding certain food items was measured, e.g. "In the past week (7 days), how often did you eat fresh fruit and vegetables?". Responses were based on a 5-point Likert scale (1 = never in the past 7 days, to 5 = everyday).

The physical activity section explored awareness, attitudes, behaviours and skills. An example of a question that assessed attitude to the importance of physical activity for health was, "How important is physical activity to your health?". Responses were based on a 5-point Likert scale (1 = not important, to 5 = very important). The physical activity measures were based on the intervention content and were not validated measures.

The child-parent communication section evaluated behaviour and self-efficacy in communication. The tool was adapted from a self-efficacy in communication tool (Parent Literacy, 2013). An example of a question that assessed communication was, "In the past week (7 days), how often did you talk to your parents/guardian about school and your lessons?". Responses were based on a 5-point Likert scale (1 = never, to 5 = everyday).The responses to behaviour in communicating about adolescent issues section were combined into one score. The Cronbach's alpha was calculated to assess the internal consistency of the overall score and, at 0.73, indicated good internal consistency.

A final section, containing general questions, enquired if the students had any intention to transfer knowledge to their parents or to change their own behaviours.

The 76-item parent pretest (Appendix 14) and 66-item posttest questionnaires elicited parents' feedback. Questions were similar to those in the student questionnaire, with eight additional questions on socio-demographics. The Cronbach's alpha was 0.78 for the HIV knowledge score and 0.77 for the communication score in the parent pretest, indicating good internal consistencies.

The questionnaires were piloted in a group of 40 participants (20 students and 20 parents) from the sample population, and were subsequently amended as required. These participants were excluded from the final analysis.

7.3.6 Data analysis

Data from the questionnaires were captured using REDCap 9.3.1 - a secure web platform for building and managing databases (Harris et al., 2009). Data were imported into Stata 14 for statistical analysis. All data were recoded to categorical variables based on the distribution of the data. The tables present data classified as positive (e.g. low stigma), neutral/moderate (e.g. moderate stigma), or negative (e.g. high stigma) behaviours. A targeted aim of the intervention was to shift from a negative to a more positive behaviour. Demographic characteristics were described using frequencies and proportions. The analysis adjusted for the cluster sampling (schools), using the *svy* Stata command. Pre- and posttest categorical variables for students and parents were compared. Chi-square tests were conducted to determine if there were any significant differences between the variables pre- and posttest. Where sample sizes were small (<10), Fisher's exact test was used. In all analyses, differences were considered to be statistically significant at the 95% level.

7.4 RESULTS

7.4.1 Baseline characteristics of participants

The response rates were high: 433 of the 537 students (80.6%) and 448 of the 537 parents (83.4%) participated. For the analysis, however, only data from students and parents who completed both pre- and posttest questionnaires were included, i.e. 425 students and 427 parents (**Figure 7-1**).

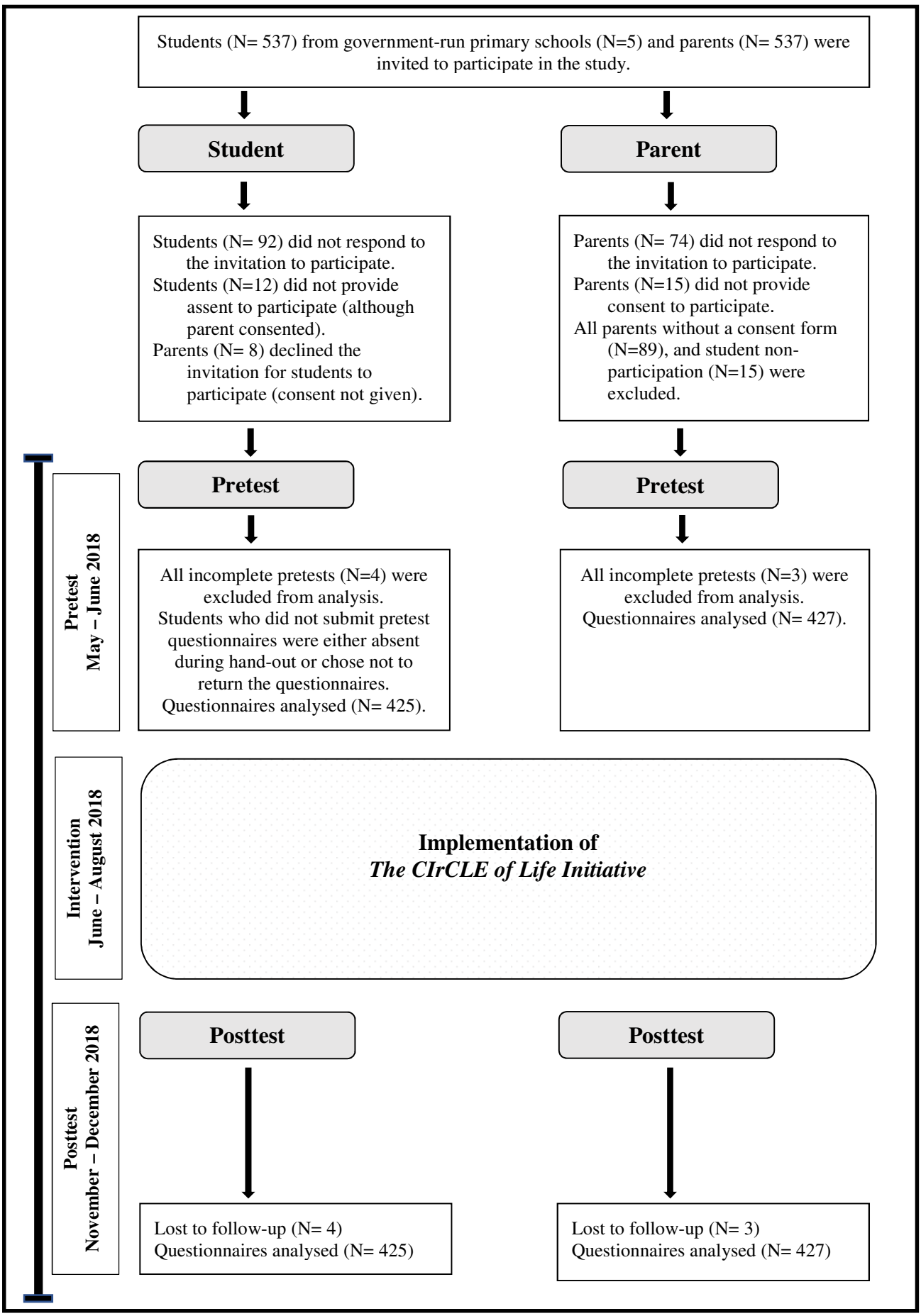


Figure 7-1 Flow diagram illustrating learner and parent participation, with timelines

The baseline characteristics and risk behaviours of the study participants (students and parents) who completed both the pre- and posttests are shown in **Table 7-2**. The mean age of students was 11.9 years (SD 0.8); 230 (54.1%) were female. The mean age of the parents was 40.7 years (SD 10.3); 85.5% were female. Students that reported living with both parents was 44.2% compared to 42.1% that lived with a single parent. Although only 13.7% of students reported that they lived with caregivers, e.g. in an orphanage or with a grandparent/extended family member, the parents responded that this figure was higher, at 19.9%.

A little more than half (57.7%) of the parents stated that they were formally employed, while others, including some in formal employment, relied on government grants to support their families. Overall, 65.6% of parents depended on government child social grants, 4.7% on foster grants, and 5.2% on old age grants. While 57.2% of parents had not completed formal schooling up to Grade 12, 19.5% of parents had a post-school qualification.

Less than half of the 192 students walked to school (45.2%), taking an average time of 5 – 20 minutes, indicating some physical activity behaviour. In the pretest survey, most participants (84.2% of students and 74.9% of parents) indicated that they were happy with their weight.

Concerning social lifestyle behaviours, 55 (12.9%) of the students and 49 (11.5%) of the parents reported smoking cigarettes in the past month, while 97 (22.9%) of students and 159 (37.2%) of parents reported consuming alcohol in the past month.

Many more parents than students had reported being tested for HIV, with 298 (69.8%) parents and 131 (30.8%) students.

Table 7-2 Baseline characteristics and risk behaviours of learners and parents

	Variable	n	%
Learner	Sex		
	Male	195	45.9
	Female	230	54.1
	School		
	A	94	22.1
	B	73	17.2
	C	69	16.2
	D	115	27.1
	E	74	17.4
	School quintile		
	1	167	39.3
	2	70	16.5
	3	114	26.8
	4	74	17.4
	School location		
	Rural	236	55.5
	Urban	189	44.5
	Lives with		
	Both parents	188	44.2
	Mother only	157	36.9
	Father only	22	5.2
	Caregiver	58	13.7
	Transportation mode to school		
	Walk	192	45.2
	Bus	116	27.3
	Taxi	77	18.1
	Car	38	8.9
	Other	2	0.5
	Travel time to school (minutes)		
	5 – 20	188	44.2
	21 – 40	80	18.8
	41 – 60	17	4.0
	> 60	18	4.2
	Uncertain	122	28.7
	Cigarette smoking behaviour		
	Everyday	23	5.4
	A few times every week	5	1.2
	A few times during the entire month	15	3.5
	Only once in the past month	12	2.8
	Never	370	87.1
	Alcohol consumption behaviour		
	Everyday	15	3.5
	A few times every week	16	3.8
	A few times during the entire month	22	5.2
	Only once in the past month	44	10.4
	Never	328	77.2
	HIV testing behaviour		
	Not tested/uncertain	294	69.2
	Tested	131	30.8
	Attitude about weight		
	Unhappy with current weight	67	15.8
	Happy with current weight	358	84.2
Parent	Parent	342	80.1
	Caregiver	85	19.9
	Sex		
	Male	62	14.5
	Female	365	85.5

Level of education		
Did not complete Grade 12	225	53.2
Grade 12	126	29.8
Post-Grade 12 qualification	72	17.0
Level of education (spouse)		
Did not complete matric	135	57.2
Matric	55	23.3
Post-matric qualification	46	19.5
Employment status		
Currently employed	137	32.9
Spouse currently employed	106	24.8
Government Social Grant dependent		
Child Grant	280	65.6
Old Age Pension Grant	22	5.2
Foster Child Grant	20	4.7
Disability Grant	6	1.4
Unemployment Income Fund	1	0.2
Cigarette smoking behaviour		
Everyday	32	7.5
A few times every week	7	1.6
A few times during the entire month	1	0.2
Only once in the past month	9	2.1
Never	378	88.5
Alcohol consumption behaviour		
Everyday	14	3.3
A few times every week	31	7.3
A few times during the entire month	50	11.7
Only once in the past month	64	15.0
Never	268	62.8
HIV testing behaviour		
Not tested	129	30.2
Tested	298	69.8
Attitude about weight		
Unhappy with current weight	107	25.1
Happy with current weight	320	74.9

7.4.2 Pretest-posttest HIV results

Student responses in the various HIV subscales and their movement between the categories from pre- to posttest are presented in **Table 7-3**. In the knowledge about HIV/AIDS subscale, the number of students in the high-knowledge category increased from 52 to 163, a 26.1% change within the population. Posttest analysis indicates that 51.5% of students shifted from the moderate-knowledge category, 26.4% from the low-knowledge category and 22.1% maintained their pretest high-knowledge score ($p<0.001$). In the perceived risk about contracting HIV subscale, the number of students in the high-risk category increased slightly from 161 to 173, a 2.8% change within the population ($p<0.001$).

The attitude to openness about HIV status subscale increased by 2.8%, from 164 to 176 ($p<0.001$). Almost half (49.2%) of students stated that they would still be somewhat apprehensive about publicly

declaring their HIV status. The perception of stigma associated with HIV in the community subscale decreased by 6.6% in the high-stigma category, moving from 117 to 89 in the posttest.

Table 7-3 Pretest-posttest HIV subscales showing movement of students between categories (N=425)

Subscale							**P-value**
Knowledge about HIV/AIDS	**Posttest**						<0.001†
	Low knowledge score (N=70)		Moderate knowledge score (N=192)		High knowledge score (N=163)		
Pretest	n	%	n	%	n	%	
Low knowledge score (N=165)	40	57.1	82	42.7	43	26.4	
Moderate knowledge score (N=208)	26	37.1	98	51.0	84	51.5	
High knowledge score (N=52)	4	5.7	12	6.3	36	22.1	
Attitude to openness about status	**Posttest**						<0.001†
	Against openness (N=209)		Attitude neutral (N=40)		Attitude to openness (N=176)		
Pretest	n	%	n	%	n	%	
Against openness (N=226)	139	66.5	20	50.0	67	38.1	
Attitude neutral (N=35)	11	5.3	11	27.5	13	7.4	
Attitude to openness (N=164)	59	28.2	9	22.5	96	54.6	
Perception of stigma in community	**Posttest**						0.01*
	High stigma (N=89)		Moderate stigma (N=121)		Low stigma (N=215)		
Pretest	n	%	n	%	n	%	
High stigma (N=117)	46	51.7	27	22.3	44	20.5	
Moderate stigma (N=125)	19	21.4	58	47.9	48	22.3	
Low stigma (N=183)	24	27.0	36	29.8	123	57.2	
Perceived risk about contracting HIV	**Posttest**						<0.001*
	High risk (N=173)		Moderate risk (N=108)		Low risk (N=144)		
Pretest	n	%	n	%	n	%	
High risk (N=161)	93	53.8	29	26.9	39	27.1	
Moderate risk (N=110)	35	20.2	46	42.6	29	20.1	
Low risk (N=154)	45	26.0	33	30.6	76	52.8	
Exposure to HIV/AIDS education	**Posttest**						0.02*
	Low exposure (N=42)				High exposure (N=383)		
Pretest	n		%		n	%	
Low exposure (N=160)	29		69.1		131	34.2	
High exposure (N=265)	13		31.0		252	65.8	

* Chi-square test
† Fisher's exact test

Table 7-4 shows the results for parents in the various HIV subscales and their movement between the categories from pre- to posttest. Similar to the students, differences in pre- and posttest results were statistically significant ($p<0.05$) for all parent HIV subscales. In the knowledge about HIV/AIDS subscale, the number of parents in the high-knowledge category increased from 176 in the pretest to 236 in the posttest, a change of 14.1% within the population ($p<0.001$).

For the attitude to openness about HIV status subscale, the number of parents increased from 173 to 197, a 5.6% change within the population ($p=0.01$). In the posttest questionnaire, 42.9% of parents stated that they would still be somewhat apprehensive about publicly declaring their HIV status. In the perception of stigma associated with HIV in the community subscale, 18.3% of parents moved from the moderate-stigma category, 47.6% from the low-stigma category and 34.2% maintained their pretest high-stigma scores.

In the subscale, perceived risk about contracting HIV, no change was seen from the parent pretest to posttest responses. In the posttest, 53.2% of parents perceived themselves to be in the high-risk category of contracting HIV. Although 19.7% stated that they had no intention of testing for HIV after the intervention, this figure dropped from 23% in the pretest. If these parents followed through with their intention to test for HIV, the number of parents that would be aware of their HIV status would increase from 77.1% to 80.3%.

Table 7-4 Pretest-posttest HIV subscales showing movement of parents between categories (N=427)

Subscale							**P-value**
Knowledge about HIV/AIDS	**Posttest**						<0.001†
	Low knowledge score (N=38)		Moderate knowledge score (N=153)		High knowledge score (N=236)		
Pretest	n	%	n	n	%	n	
Low knowledge score (N=64)	16	42.1	25	16	42.1	25	
Moderate knowledge score (N=187)	14	36.8	80	14	36.8	80	
High knowledge score (N=176)	8	21.1	48	8	21.1	48	
Attitude to openness about status	**Posttest**						0.01*
	Against openness (N=183)		Attitude neutral (N=47)		Attitude to openness (N=197)		
Pretest	n	%	n	n	%	n	
Against openness (N=198)	109	59.6	18	109	59.6	18	
Attitude neutral (N=56)	21	11.5	19	21	11.5	19	
Attitude to openness (N=173)	53	29.0	10	53	29.0	10	
Perception of stigma in community	**Posttest**						0.01*
	High stigma (N=82)		Moderate stigma (N=79)		Low stigma (N=266)		
Pretest	n	%	n	n	%	n	
High stigma (N=76)	28	34.2	11	28	34.2	11	
Moderate stigma (N=83)	15	18.3	36	15	18.3	36	
Low stigma (N=268)	39	47.6	32	39	47.6	32	
Perceived risk about contracting HIV	**Posttest**						<0.001*
	High risk (N=227)		Moderate risk (N=84)		Low risk (N=116)		
Pretest	n	%	n	n	%	n	
High risk (N=229)	157	69.2	31	157	69.2	31	
Moderate risk (N=81)	35	15.4	26	35	15.4	26	
Low risk (N=117)	35	15.4	27	35	15.4	27	
Behavioural intention to test for HIV/AIDS	**Posttest**						0.02*
	Will not test (N=84)			Will test (N=343)			
Pretest	n		%	n		%	
Will not test (N=98)	32		38.1	32		38.1	
Will test (N=329)	52		61.9	52		61.9	

* Chi-square test
† Fisher's exact test

7.4.3 Pretest-posttest obesity, nutrition and physical activity results

Student data related to obesity, nutrition and physical activity are presented in **Table 7-5**. The number of students in the awareness about obesity subscale increased from 169 to 363, a 45.6% change in the population (p=0.04).

In the nutrition subscales, most students ranked the perceived importance of nutrition on health as high in both the pretest (88.9%) and posttest (87.5%) questionnaires. Fruit and vegetable intake nutritional behaviour increased by 5.4%, from 243 to 266 in the 4-7 day category (p=0.01). The proportion of students reporting on awareness about food labels increased post the intervention, with 35.3% (p=0.05) moving into the high-awareness category. Despite this increase, there were no statistically significant differences in reading and interpreting food labels, in the pre- and posttest results.

In the physical activity subscales, students' attitudes towards the importance of physical activity for health did not change from the pre- to posttest survey (87.1%). Students' sedentary behaviour decreased by 10.1% in the more than three-hour physical activity category from 239 to 196 (p=0.02); active behaviour in the same category increased by 8.5% from 213 to 249 (p=0.01). The number of students that were aware about pulse rate increased from 93 to 321, a 53.6% change within the population (p=0.03). The number of students in the skill to measure and interpret pulse rate subscale increased from 51 to 271, a 51.8% change within the population (p<0.001).

Table 7-5 Pretest-posttest obesity, nutrition, physical activity subscales showing movement of students between categories (N=425)

Subscales					P-value
Obesity					
Awareness about obesity	**Posttest**				0.04*
	Not aware (N=62)		Aware (N=363)		
Pretest	n	%	n	%	
Not aware (N=256)	46	74.2	210	57.9	
Aware (N=169)	16	25.8	153	42.2	
Awareness about BMI	**Posttest**				0.19*
	Low awareness (N=11)		High awareness (N=307)		
Pretest	n	%	n	%	
Low awareness (N=379)	108	91.5	271	88.3	
High awareness (N=46)	10	8.5	36	11.7	
Skill (Measuring and interpreting BMI)	**Posttest**				0.31*
	No confidence in application (N=177)		Confidence in application (N=248)		
Pretest	n	%	n	%	
No confidence in application (N=382)	163	92.1	219	88.3	
Confidence in application (N=43)	14	7.9	29	11.7	
Nutrition					
Perceived importance of nutrition to health	**Posttest**				0.02†
	Low importance (N=31)		Moderate importance (N=22)		High importance (N=372)	
Pretest	n	%	n	%	n	%
Low importance (N=34)	4	12.9	4	18.2	26	7.0
Moderate importance (N=13)	2	6.5	2	9.1	9	2.4
High importance (N=378)	25	80.7	16	72.7	337	90.6
Behaviour (salt consumption) per week	**Posttest**						0.30*
	On 4-7 days (N=176)		On 2-3 days (N=121)		On 0-1 day (N=128)	
Pretest	n	%	n	%	n	%
On 4-7 days (N=162)	75	42.6	42	34.7	45	35.2
On 2-3 days (n-114)	43	24.4	41	33.9	30	23.4
On 0-1 day (N=149)	58	33.0	38	31.4	53	41.1

Behaviour (sugar consumption) per week	**Posttest**						0.05*
	On 4-7 days (N=225)		On 2-3 days (N=121)		On 0-1 day (N=79)		
Pretest	n	%	n	%	n	%	
On 4-7 days (N=224)	138	61.3	60	49.6	26	32.9	
On 2-3 days (N=111)	51	22.7	33	27.3	27	34.2	
On 0-1 day (N=90)	36	16.0	28	23.1	26	32.9	
Behaviour (fruit and vegetable consumption) per week	**Posttest**						0.01*
	On 4-7 days (N=266)		On 2-3 days (N=81)		On 0-1 day (N=78)		
Pretest	n	%	n	%	n	%	
On 4-7 days (N=243)	171	64.3	36	44.4	36	46.2	
On 2-3 days (N=106)	58	21.8	32	39.5	16	20.5	
On 0-1 day (N=76)	37	13.9	13	16.1	26	33.3	
Behaviour (water consumption) per day	**Posttest**						<0.001†
	None/uncertain (N=26)		1-4 glasses (N=122)		5 or more glasses (N=277)		
Pretest	n	%	n	%	n	%	
None/uncertain (N=25)	6	23.1	7	5.7	12	4.3	
1-4 glasses (N=173)	11	42.3	72	59.0	90	32.5	
5 or more glasses (N=227)	9	34.6	43	35.3	175	63.2	
Awareness about food labels	**Posttest**						0.05*
	Low awareness (N=50)			High awareness (N=375)			
Pretest	n		%	n		%	
Low awareness (N=200)	16		32.0	184		49.1	
High awareness (N=225)	34		68.0	191		50.9	
Skill (Interpreting a food label)	**Posttest**						0.06*
	No confidence in application (N=66)			Confidence in application (N=359)			
Pretest	n		%	n		%	
No confidence in application (N=250)	45		68.2	205		57.1	
Confidence in application (N=175)	21		31.8	154		42.9	
Physical Activity							
Attitude to importance of physical activity for health	**Posttest**						<0.001†
	Not important (N=39)		Moderately important (N=16)		Very important (N=370)		
Pretest	n	%	n	%	n	%	
Not important (N=41)	12	30.8	4	25.0	25	6.8	
Moderately important (n =13)	5	12.8	1	6.3	7	1.9	
Very important (N= 371)	22	56.4	11	68.8	338	91.4	

Sedentary behaviour in a day	**Posttest**						0.02*
	3 or more hours (N=196)		1-2 hours (N=133)		Less than 1 hour (N=96)		
Pretest	n	%	n	%	n	%	
3 or more hours (N=239)	132	67.4	70	52.6	37	38.5	
1-2 hours (N=94)	35	17.9	35	26.3	24	25.0	
Less than 1 hour (N=92)	29	14.8	28	21.1	35	36.5	
Active behaviour in a day	**Posttest**						0.01*
	3 or more hours (N=249)		1-2 hours (N=92)		Less than 1 hour (N=84)		
Pretest	n	%	n	%	n	%	
3 or more hours (N=213)	154	61.9	32	34.8	27	32.1	
1-2 hours (N=107)	52	20.9	32	34.8	23	27.4	
Less than 1 hour (N=105)	43	17.3	28	30.4	34	40.1	
Awareness about pulse rate	**Posttest**						0.03*
	Low awareness (N=104)				High awareness (N=321)		
Pretest	n		%		n	%	
Low awareness (N=332)	90		86.5		242	75.4	
High awareness (N=93)	14		13.5		79	24.6	
Skill (Measuring pulse rate)	**Posttest**						<0.001†
	No confidence in application (N=154)				Confidence in application (N=271)		
Pretest	n		%		n	%	
No confidence in application (N=374)	145		94.2		229	84.5	
Confidence in application (N=51)	9		5.8		42	15.5	

* Chi-square test
† Fisher's exact test

Table 7-6 presents the parent data related to obesity, nutrition and physical activity. Parents' awareness about obesity and BMI increased by 19.9% from 293 to 378 (p=0.01), and by 39.6% from 152 to 321 (p=0.01), respectively. Parents' skills to measure and interpret BMI increased by 34.2% from 119 to 265 (p=0.04).

In the nutrition subscales, most parents ranked the perceived importance of nutrition on health as high in both the pretest (92.5%) and posttests (91.3%) questionnaires. Fruit and vegetable intake increased in parents (p=0.02) in the four or more days category. In the subscale, awareness about food labels, 32.8% of parents moved into the high-awareness category (p<0.001). Despite this increase, reading and interpreting food labels showed no statistically significant differences in the pre- and posttest results.

In the physical activity subscales, parents' attitudes to the importance of physical activity for health improved from the pre- to the posttest survey by 2.6% (p<0.001). In the more than three-hour category, their sedentary and active behaviour decreased by 9.8% from 270 to 228 (p<0.001) and by 21.8% from 257 to 164 (p=0.01), respectively. The number of parents in the high-awareness category regarding pulse rate increased by 32.1% from 219 to 356 (p=0.02), while skill to measure and interpret pulse rate increased by 31.1% from 139 to 272 (p=0.02).

Table 7-6 Pretest-posttest obesity, nutrition, physical activity subscales showing movement of parents between categories (N=427)

Subscales					**P-value**
Obesity					
Awareness about obesity	**Posttest**				0.01*
	Not aware (N=49)		Aware (N=378)		
Pretest	n	%	n	%	
Not aware (N=134)	36	73.5	98	25.9	
Aware (N=293)	13	26.5	280	74.1	
Awareness about BMI	**Posttest**				0.01*
	Low awareness (N=106)		High awareness (N=321)		
Pretest	n	%	n	%	
Low awareness (N=275)	86	81.1	189	58.9	
High awareness (N=152)	20	18.9	132	41.1	
Skill (Measuring and interpreting BMI)	**Posttest**				0.04*
	No confidence in application (N=162)		Confidence in application (N=265)		
Pretest	n	%	n	%	
No confidence in application (N=308)	138	85.2	170	64.2	
Confidence in application (N=119)	24	14.8	95	35.9	
Nutrition					
Perceived importance of nutrition to health	**Posttest**				<0.001†
	Low importance (N=27)		Moderate importance (N=10)		High importance (N=390)	
Pretest	n	%	n	%	n	%
Low importance (N=21)	5	18.5	0	0	16	4.1
Moderate importance (N=11)	4	14.8	0	0	7	1.8
High importance (N=395)	18	66.7	10	100.0	367	94.1
Behaviour (salt consumption) per week	**Posttest**						0.05*
	On 4-7 days (N=169)		On 2-3 days (N=93)		On 0-1 day (N=165)	
Pretest	n	%	n	%	n	%
On 4-7 days (N=147)	72	42.6	25	26.9	50	30.3
On 2-3 days (n-99)	43	25.4	29	31.2	27	16.4
On 0-1 day (N=181)	54	32.0	39	41.9	88	53.3

Behaviour (sugar consumption) per week	**Posttest**						0.04*
	On 4-7 days (N=172)		On 2-3 days (N=107)		On 0-1 day (N=148)		
Pretest	n	%	n	%	n	%	
On 4-7 days (N=160)	83	48.3	37	34.6	40	27.0	
On 2-3 days (N=101)	37	21.5	32	29.9	32	21.6	
On 0-1 day (N=166)	52	30.2	38	35.5	76	51.4	
Behaviour (fruit and vegetable consumption) per week	**Posttest**						0.02*
	On 4-7 days (N=60)		On 2-3 days (N=110)		On 0-1 day (N=256)		
Pretest	n	%	n	%	n	%	
On 4-7 days (N=47)	14	23.3	15	13.6	18	7.0	
On 2-3 days (N=125)	20	33.3	48	43.6	57	22.3	
On 0-1 day (N=254)	26	43.3	47	42.7	181	70.7	
Behaviour (water consumption) per day	**Posttest**						<0.001†
	None/uncertain (N=18)		1-4 glasses (N=83)		5 or more glasses (N=326)		
Pretest	n	%	n	%	n	%	
None/uncertain (N=19)	4	22.2	4	22.2	11	3.4	
1-4 glasses (N=152)	4	22.2	43	51.8	105	32.2	
5 or more glasses (N=256)	10	55.6	36	43.4	210	64.4	
Awareness about food labels	**Posttest**						<0.001*
	Low awareness (N=56)				High awareness (N=371)		
Pretest	n		%		n	%	
Low awareness (N=196)	40		71.4		156	42.1	
High awareness (N=231)	16		28.6		215	58.0	
Skill (Interpreting a food label)	**Posttest**						0.12*
	No confidence in application (N=69)				Confidence in application (N=358)		
Pretest	n		%		n	%	
No confidence in application (N=48)	45		65.2		160	44.7	
Confidence in application (N=52)	24		34.8		198	55.3	
Physical Activity							
Attitude to importance of physical activity for health	**Posttest**						<0.001†
	Not important (N=34)		Moderately important (N=21)		Very important (N=372)		
Pretest	n	%	n	%	n	%	
Not important (N=45)	7	20.6	5	23.8	33	8.9	
Moderately important (n =21)	4	11.8	4	19.1	13	3.5	
Very important (N= 361)	23	67.7	12	57.1	326	87.6	

Sedentary behaviour in a day	**Posttest**						<0.001*
	3 or more hours (N=228)		1-2 hours (N=127)		Less than 1 hour (N=72)		
Pretest	n	%	n	%	n	%	
3 or more hours (N=270)	168	62.2	71	26.3	31	11.5	
1-2 hours (N=93)	37	39.8	39	41.9	17	18.3	
Less than 1 hour (N=64)	23	35.9	17	26.6	24	37.5	
Active behaviour in a day	**Posttest**						0.01*#
	3 or more hours (N=164)		1-2 hours (N=109)		Less than 1 hour (N=154)		
Pretest	n	%	n	%	n	%	
3 or more hours (N=257)	122	74.4	57	52.3	78	50.7	
1-2 hours (N=84)	21	12.8	37	33.9	26	16.9	
Less than 1 hour (N=86)	21	12.8	15	13.8	50	32.5	
Awareness about pulse rate	**Posttest**						0.02*
	Low awareness (N=71)			High awareness (N=356)			
Pretest	n	%		n	%		
Low awareness (N=208)	55	77.5		153	43.0		
High awareness (N=219)	16	22.6		203	57.0		
Skill (Measuring pulse rate)	**Posttest**						0.02*
	No confidence in application (N=155)			Confidence in application (N=272)			
Pretest	n	%		n	%		
No confidence in application (N=288)	126	81.3		162	59.6		
Confidence in application (N=139)	29	18.7		110	40.4		

* Chi-square test
† Fisher's exact test

7.4.4 Pretest-posttest communication results

Table 7-7 presents the communication results for students and their movements between the categories from pre- to posttest for each subscale. In identifying how often students communicated with parents on school-related matters, although the 4-7 day category was considered optimal, there was a decrease in this category, from 72.2% in the pretest to 70.1%, in the posttest ($p<0.001$).

In the subscale, behaviour in communicating about adolescent issues, the proportion of students in the positive behaviour category increased from 41.2% in the pretest to 43.5% in the posttest survey ($p<0.001$). In the subscale, perception of comfort in communicating about HIV, 60.0% of the students maintained high comfort in the pre- and posttest, with the remaining students decreasing from high to neutral or low comfort.

In the posttest survey, 89.4% students indicated that they had a high intention of sharing the knowledge gained from the programme with their parents. In response to whether participants would change behaviour post the intervention, marginal increases were observed, from 74.6% to 78.6% ($p<0.001$).

Table 7-7 Pretest-posttest communication subscales showing movement of students between categories (N=425)

Subscale							**P-value**
Behaviour in daily communication about school	**Posttest**						<0.001*
	On 0-1 days (N=67)		On 2-3 days (N=60)		On 4-7 days (N=298)		
Pretest	n	%	n	%	n	%	
On 0-1 days (N=67)	21	31.3	11	18.3	35	11.7	
On 2-3 days (N=51)	13	19.4	12	20.0	26	8.7	
On 4-7 days (N=307)	33	49.3	37	61.7	237	72.2	
Behaviour in seeking help with school homework	**Posttest**						0.021*
	On 0-1 days (N=107)		On 2-3 days (N=84)		On 4-7 days (N=234)		
Pretest	n	%	n	%	n	%	
On 0-1 days (N=102)	46	43.0	19	22.6	37	15.8	
On 2-3 days (N=74)	24	22.4	20	23.8	30	12.8	
On 4-7 days (N=249)	37	34.6	45	53.6	167	71.4	
Behaviour in communicating about adolescent issues	**Posttest**						<0.001†
	Negative behaviour (N=18)		Neutral behaviour (N=222)		Positive behaviour (N=185)		
Pretest	n	%	n	%	n	%	
Negative behaviour (N= 23)	7	38.9	10	4.5	6	3.2	
Neutral behaviour (N= 227)	7	38.9	152	68.5	68	26.8	
Positive behaviour (N= 175)	4	22.2	60	27.0	111	60.0	
Perception of comfort in communicating about HIV	**Posttest**						<0.001*
	Low comfort (N=188)		Neutral (N=52)		High comfort (N=185)		
Pretest	n	%	n	%	n	%	
Low comfort (N=193)	110	58.5	21	40.4	62	33.5	
Neutral (N=38)	18	9,6	8	15.4	12	6.5	
High comfort (N=194)	60	31.9	23	44.2	111	60.0	
Student intention to transfer knowledge to parent	**Posttest**						0.011†
	Low intention (N=21)		Moderate intention (N=24)		High intention (N=380)		
Pretest	n	%	n	%	n	%	
Low intention (N=15)	2	9.5	1	4.2	12	3.5	
Moderate intent (N=23)	2	9.5	5	20.8	16	5.4	
High intention (N=387)	17	81.0	18	75.0	352	91.1	
Student intention to change their behaviour	**Posttest**						<0.001†
	Low intention (N=40)		Moderate intention (N=51)		High intention (N=334)		
Pretest	n	%	n	%	n	%	
Low intention (N=29)	7	17.5	7	13.7	15	4.5	

Moderate intent (N=79)	9	22.5	13	25.5	57	17.1	
High intention (N=317)	24	60.0	31	60.7	262	78.6	

* Chi-square test
† Fisher's exact test

Table 7-8 shows the communication results for parents and their movements between the categories from pre- to posttest for each subscale. In the subscale, behaviour in daily communication about school, parents results corroborated the student communication trends, with a decrease in the proportion of parents in the 4-7 day category from 73.3% to 71.9%, and an increase in the 2-3 day category from 14.6% to 15.2% (p=<0.02). Parents reporting of students' behaviour in the subscale, seeking help with homework, displayed similar trends to that reported by students, decreasing from 60.7% to 59.5% at posttest (p=<0.001).

In the subscale, behaviour in communicating about adolescent issues, the number of parents in the positive score group increased from 188 to 202, a 3.3% change within the population (p<0.001). In the subscale, perception of comfort in communicating about HIV, parents in the high-comfort category increased by 1.4% from 244 to 250 (p=0.04).

In the posttest, 89.5% parents indicated that they had a high intention to receive the knowledge gained from students in the programme. Marginal increases from 79.2% to 81.7% were observed in response to their intentions to change their behaviour (p=0.05).

Table 7-8 Pretest-posttest communication subscales showing movement of parents between categories (N=427)

Subscale							**P-value**
Behaviour in daily communication about school	**Posttest**						0.02*
	On 0-1 days (N=55)		On 2-3 days (N=65)		On 4-7 days (N=307)		
Pretest	n	%	n	%	n	%	
On 0-1 days (N=52)	12	21.8	11	16.9	29	9.5	
On 2-3 days (N=62)	14	25.5	16	24.6	32	10.4	
On 4-7 days (N=313)	29	52.7	38	58.5	246	80.1	
Student behaviour in seeking help with school homework	**Posttest**						<0.001*
	On 0-1 days (N=82)		On 2-3 days (N=91)		On 4-7 days (N=254)		
Pretest	n	%	n	%	n	%	
On 0-1 days (N=85)	36	43.9	11	12.1	38	15.0	
On 2-3 days (N=83)	17	20.7	33	36.3	33	13.0	
On 4-7 days (N=259)	29	35.4	47	51.7	183	72.1	
Behaviour in communicating about adolescent issues	**Posttest**						<0.001*
	Negative behaviour (N=25)		Neutral behaviour (N=200)		Positive behaviour (N=202)		
Pretest	n	%	n	%	n	%	
Negative behaviour (N= 21)	5	20.0	11	5.5	5	2.5	
Neutral behaviour (N= 218)	12	48.0	133	66.5	73	36.1	
Positive behaviour (N= 188)	8	32.0	56	28.0	124	61.4	
Perception of comfort in communicating about HIV	**Posttest**						0.04*
	Low comfort (N=136)		Neutral (N=41)		High comfort (N=250)		
Pretest	n	%	n	%	n	%	
Low comfort (N=124)	51	37.5	14	34.2	59	23.6	
Neutral (N=59)	18	13.2	12	29.3	29	11.6	
High comfort (N=244)	67	49.3	15	36.6	162	64.8	
Parent intention to receive student transferred knowledge	**Posttest**						<0.001†
	Low intention (N=21)		Moderate intention (N=23)		High intention (N=382)		
Pretest	n	%	n	%	n	%	
Low intention (N=10)	2	9.5	1	4.4	7	1.8	
Moderate intent (N=23)	2	9.5	5	21.7	16	4.2	
High intention (N=393)	17	81.0	17	73.9	359	94.0	
Parent intention to change their behaviour	**Posttest**						0.05†
	Low intention (N=30)		Moderate intention (N=47)		High intention (N=349)		
Pretest	n	%	n	%	n	%	
Low intention (N=36)	4	13.3	7	14.9	25	7.2	

Moderate intent (N=52)	5	16.7	9	19.2	38	10.9	
High intention (N=338)	21	70.0	31	66.0	286	81.9	

* Chi-square test
† Fisher's exact test

7.5 DISCUSSION

A school-based health promotion and prevention intervention, *The CIrCLE of Life Initiative,* aimed to increase the knowledge, improve perceptions and attitudes and shift behaviours related to HIV and obesity among Grade 6 students and to transfer HIV- and obesity-related information from students to parents through shared activities. The statistically significant differences between specific pre- and posttest scores suggest that there were changes over the here months in knowledge and behaviours among both students and parents. Positive changes in outcomes were observed across various subscales, such as HIV-related knowledge, obesity-related awareness, sedentary behaviour, self-efficacy in communication about puberty issues, and skills to measure and interpret pulse rate. Other subscales, such as HIV-related attitudes, and skills to read and interpret a food label, showed limited or no improvements. Differences were also observed in the changes that occurred among students and their parents. Positive changes in outcomes that were observed only in the student subscales included perceptions of stigma and active behaviour, while positive outcomes observed only in the parent subscales included awareness of BMI, self-efficacy in communication about HIV issues, and skills to measure and interpret BMI.

7.5.1 Knowledge and awareness

The statistically significant pretest-posttest improvements suggest that the intervention was effective in increasing HIV-related knowledge and obesity-related awareness in both students and their parents. Through interactions and observations with the students, we were acutely aware that there was a heightened awareness of HIV/AIDS in the communities prior to the implementation of the intervention (Arthur et al., n.d.). Furthermore, according to the educational syllabus, students are exposed to the HIV/AIDS topic, annually, from grade 4; however, only 37.7% claimed to have been exposed. Both students and parents had reported testing for HIV, and in all HIV testing procedures, pretest and posttest counselling is a requisite. There was, therefore, an assumption that students and parents would be highly knowledgeable about HIV/AIDS, but the pretest findings indicated otherwise. The statistically significant increase in HIV-related knowledge in both students' and parents' posttests, suggested that *The Circle of Life Initiative* might have been a catalyst in improving knowledge. Obesity awareness, which is a topic not currently covered in the syllabus, also increased in both groups, indicating that the change was probably caused by the intervention.

7.5.2 Attitudes and perceptions

Although the intervention showed positive outcomes in knowledge and awareness in both groups, change in attitudes and perceptions proved more of a challenge. The programme may have reinforced or validated their concerns, but it did not change their thinking (Rothwell and Segrott, 2011). There were only small shifts in the numbers of participants that moved between the attitude subscales in both the openness about HIV status and the importance of physical activity for health. The intervention had a positive effect, with regard to the subscale, perception of stigma in the community, on students, but no effect on parents. One can appreciate how attitudes and perceptions influence behaviour as depicted in the posttest, where parents indicated that they would still be apprehensive about openly declaring their HIV status. It appears that the intervention did not immediately influence attitudes or perceptions and might require a phase-in approach. *The CIrCLE of Life Initiative* is built on the premise that equipping young minds with knowledge and enhancing skills will encourage an intention to change risky behaviour, resulting in a long and healthy life. There is, however, a need for early interventions (grade six or earlier) to reduce stigma and discrimination among children, especially in schools in rural and impoverished areas (Maughan-Brown and Spaull, 2014). Although the intervention was not designed to shift attitudes and perceptions, it was envisaged that the knowledge gained would assist such shifts as students grow into adults.

The findings of this study reiterate that influencing attitude and perception change is shaped by society. Influencing attitudes and perceptions components of the intervention need to be revised and improved upon to shift perceptions and attitudes in different contexts. Stigmatisation and discrimination are complex social processes that are influenced by local contexts and, therefore, vary widely by school location and socio-economic status (Maughan-Brown and Spaull, 2014). Results from one setting may not translate to others, which highlights the importance of context-specific research and programming. It is crucial to understand the local community and context to ensure that the intervention components are specifically adapted (Pallan et al., 2013). For example the intervention curriculum can be adapted to include more content and shared homework activities between student and parent, addressing attitudes and perceptions about HIV-related stigma, and self-image and -perception about weight disorders.

7.5.3 Intention to change behaviour

As it is not always possible to measure behaviour change over a short time, the intention to change behaviour was measured. Parents showed positive shifts in behavioural intention to change. It is

possible that students who received lessons conveyed this information to their parents, having the probable effect on parents' intended behaviour change. For example, after the intervention, the proportion of parents who stated that they intended to get tested, increased. Reported sedentary behaviour also decreased in both groups.

Even with well-designed and executed school-based nutrition programs, changing dietary behaviour in pre-adolescents is difficult. Students reported different patterns of diet to their parents, which can be attributed to the fact that four of the five schools had feeding schemes for students. Furthermore, parents' dietary behaviour and cooking practices greatly influence nutrition and diet (Savage et al., 2007). Pre-adolescent students were capable of instituting certain practices that were within their control. For example, they reported an increase in water consumption. However, the results indicated that students were not totally in control of their diets. The intervention did not substantially influence students' short-term nutrition behaviour. Pre-adolescents often struggle with future decision-making due to immature neuro-development (Hartley and Somerville, 2015), thus the results attained could be expected for their age. *The CIrCLE of Life Initiative* curriculum is based on the premise that pre-adolescent students can impact their future health by instituting and maintaining healthy nutritional habits. The intervention curriculum was focused on the Food Pyramid (already included in the school curriculum) to make healthy food decisions that included a variety of foods in appropriate quantities. It remains to be seen whether the knowledge and awareness acquired about nutrition will be maintained in the longer term.

Although both students (87.5%) and parents (91.3%) had a high perception of the importance of nutrition to health, this was not demonstrated in their daily diets. It is not that parents are unaware of what their families should be eating and what constitutes a healthy diet, but there is a host of issues in life that prevent their positive decision making (Kelly and Barker, 2016). Giving people information does not make them change (Kelly and Barker, 2016). A families' nutritional diet is influenced by social, economic and physical environmental factors (Evans et al., 2009) such as a small disposable income, spending disposable income on other priorities, inconvenience of eating healthy foods such as vegetables, and child-parent food preferences for junk and fast food (Evans et al., 2009). Fast and junk foods are also readily accessible, and their social marketing and advertising are also more common in urban areas.

Behaviour occurs in social and physical environments, and behaviour change must, therefore, take into account the social context and the political and economic forces that influence people's health regardless of their choices about their own conduct (Kelly and Barker, 2016). The study sample comprised 42.3% unemployed parents, which was high in comparison to the South African national unemployment rate of 27.6% (Statistics South Africa, 2019); 77% of these parents were dependent

on social grants. Even if they wanted to change behaviour, their personal circumstances were an impediment. Knowledge about the relationships, the mechanisms operating between individual actions, and societal patterns is limited and, therefore, offers little on the association with intervention outcomes (Kelly and Barker, 2016).

7.5.4 Inter-generational outcomes

Although there were several significant changes between pre- and post-tests, this study cannot state that changes in student or parent pretest-posttest scores were the result of the intervention, as the data from students and parents were analysed separately and it was therefore, not possible to link the results of the parents and the students. While changes were observed in both the student group and the parents, any conclusions about inter-generational knowledge transfer resulting from the intervention are tenuous. However, inter-generational transfer from student to parent is possible given the extent of the parent engagements with activities that the students completed at home (Arthur et al., n.d.).

An inter-generational outcome can be achieved if learning is constructed on knowledge-sharing and communication processes within a family structure. Findings reveal that about 70% of parents conversed with students about their school day, and about 50% of students sought help with their homework on 4-7 days of the week, presenting an ideal opportunity for inter-generational information transfer. In the posttest, students (89.4%) indicated that they had a high intention to share the knowledge gained from the programme with their parents. Similarly, parents (89.6%) stated that there was a high intention to receive information from students.

The strong link between the classroom and home environments provides a potential mechanism through which information could be transferred. The classroom preparation was a crucial mechanism in ensuring that the topics could be discussed at home, thus extending the influence of the programme beyond the school setting and securing parental participation. The intervention engaged a large number of parents – something that many comparable interventions have found challenging (Gerards et al., 2015). Students adhered to the concept that the knowledge was intended for them to pass on to parents and family. Messages were indirectly communicated to parents by either word of mouth or a presentation of information and activities in the workbook. The school-based intervention facilitated both the acquisition of knowledge and awareness of how knowledge could be applied to prevent or address health-related issues. The process was also supported by the enhancement of existing and new skills. While the intervention was not designed to address health problems, there was evidence that it

could reach families with such problems and raise awareness of the need for changes in the ways that students found easy to learn, comprehend and transfer.

Student internalisation of study messages was increased through the use of positive, pre-adolescent-oriented messages and images, that involved message delivery both directly and indirectly, as well as formally and informally to their parents. The interactive activities were designed for students and parents to complete activities at home, together. For example, students were asked to measure their parents' BMIs or their pulse rates. By illustrating the capacity of health directed at children to modify parental knowledge and behaviour, this study also provides evidence that student and adult education need not be mutually exclusive (Damerell et al., 2013).

Stickers were used as a reward system for all students who had completed their activities. Although this was seen as a motivator, the compensation was not seen as an incentive in all schools. For example the Quintile 4 school were not motivated by this reward system (Arthur et al., n.d.). It is therefore, likely, that activities will still continue even without a reward system.

Contrary to the conventional view that parents impart knowledge, values and beliefs to their children (Damerell et al., 2013), the findings from this study indicate a possibility that the reverse could also be likely, i.e. that parents could learn from their children. The CIrCLE of Life Initiative has potential to enhance communication within the family. The statistically significant differences between specific pre- and post-test scores in both student and parent groups suggest that it could be possible and that children were 'effective agents' in the change process by engaging in communication with parents.

7.5.5 Enhancing skills

Given the tentative but promising study findings, parents will talk to their children about sexuality if given the appropriate support and skills. The lesson learnt is that parents are in a unique position to educate their children about HIV, but it is not sufficient to simply instruct parents to talk to their children. While parental involvement in sex education is important and necessary, it also requires a nuanced understanding of communication skills (Silk and Romero, 2014). Programmes should encourage parents to communicate clear and consistent messages to their children: about sexual risk-taking (e.g. abstinence and contraceptive use), and to emphasize healthy decision-making (Silk and Romero, 2014). A parent-child bond could also be developed, which can facilitate the reinforcement of children's behaviour patterns by parental sanctions or encouragement (Rothwell and Segrott, 2011).

The programme targeted pre-adolescents in the primary school phase, and thus initiated family communication at a stage when parents are still a primary point of attachment (Catalano and Hawkins, 1996). Young people typically begin to experiment with risky behaviour in early adolescence (Shortt et al., 2007; Spoth et al., 2001), so prevention measures may be more effective when targeted in the pre-adolescent phase (Rothwell and Segrott, 2011). There is supporting evidence that parents who talk to their child about sexuality can receive favourable reactions (Scott-Sheldon et al., 2013). Early communication - particularly that which occurs before sexual debut - reduces risky sexual behaviour (Miller et al., 1998), potentially preventing the spread of HIV/AIDS (Miller et al., 2011).

Improving parents' self-efficacy in communication skills proved to be a promising and valuable effort to support both the quality and quantity of parent pre-adolescent communication (Villarruel et al., 2008). The communication findings revealed an increase in student-perceived comfort in communication about adolescent matters, but not HIV-related issues. Possible reasons why student HIV-related communication did not improve include embarrassment when discussing sexual topics; non-conducive environment for open discussions of sexual and reproductive health matters; and cultural and religious beliefs (Motsomi et al., 2016). Parents, however, showed an increased comfort in both communication subscales. The intervention activities created a platform for student-parent interactions resulting in a possible two-way engagement process. Not only was information communicated to the parent, but the parent was also able to communicate specific issues to the student. The activities were a channel through which this could be accomplished. These mutual interactions are advantageous because parents can reinforce positive behaviour, which encourages children to adopt parents' beliefs and norms (Rothwell and Segrott, 2011).

The role of parents in children's sexual decision-making, family influences, and positive parenting, significantly influence children's lives (Mmari and Blum, 2009; Roche et al., 2008; Wamoyi et al., 2014). There is, however, a reluctance from parents to initiate conversations related to HIV/AIDS and sexuality due to perceptions that children are not ready to receive such information (Rosenthal et al., 1998). Parents have also expressed a lack of knowledge, skills, comfort and confidence to have such discussions with their children (Diiorio et al., 2000; Kirkman et al., 2002). The intervention skill-based activities offered students and their parents an opportunity for them to talk about adolescent- and HIV-related issues, and to practice communication skills.

The positive outcomes in several of the skills subscales illustrated that practical hands-on interactions and application of skills play important roles in enhancing theoretical learning. Learning is heightened when practical and integrated activities take place, be it inside or outside the classroom (Kusmawan, 2009). Application of skills enabled students to have direct practices and were integral features of reinforcement activities (Damerell et al., 2013). Skills to measure and interpret pulse rate were not

previously taught to students, and both groups reported increased skill sets. Parent knowledge may benefit from children undertaking interactive activities as they are more likely to discuss new or exciting skills with parents, than written tasks (Damerell et al., 2013). Although reading and interpreting food labels is a skill set taught to students in the current education syllabus, there were no significant differences between the pretest and posttest in either students or parents.

7.5.6 Health education in school settings

Schools are critical settings for health education initiatives, and efforts to foster change from within the school setting have the potential to reach a substantial number of students (Xu et al., 2015). The classroom preparation ensured that students absorbed quickly through positive reinforcement, discussion, fun activities and games, and practical applications, which were different from their conventional lessons. Students were engaged in all aspects of the intervention with varied learning methods through the use of multiple modalities and repeated exposures to the core study themes and targeted behaviours. Classroom education is often comprised of audio and visual communication. The hands-on nature of the intervention, however, was designed to directly and individually involve students in a variety of approaches. The first approach was to encourage student creativity, e.g. the obesity poster-making and the HIV story-writing activities. The second approach was skill enhancement, such as measuring and interpreting BMI and pulse rate. The third approach was to elicit enjoyment and incorporate entertainment through the interactive activities and delivery techniques. In addition to widely-used classroom curricula, the intervention activities were designed to be attractive and interesting to students and readily incorporated into their academic schedules (Xu et al., 2015). The multi-component intervention derived its outcomes from the interaction of several components rather than each component fulfilling a separate function. Repetition of themes delivered in a variety of modalities, and interrelated messaging, improved receptivity and reach (DeBar et al., 2009; McKenna et al., 2000).

Implementation of the intervention, is not a ‘plug and play’. The implementation needs to be robust before application. For example, educators need to be appropriately up-skilled to teach health education and transfer health skills. In addition, they need to be able to deal with the psychological aspects of dealing with HIV and obesity. The school and home environments also need to be more conducive to hosting and accepting such interventions. Such changes will only be possible through transdisciplinary approaches from Governmental departments that work together to provide resources and support.

The effective components of this study have the potential to influence school curriculum reform, not only for students but for their parents. The content needs to be appropriately focused so that activities engage parents. Traditional homework does not include or endorse parental engagement. Parental engagement is a better involvement technique than the conventional approach of asking parents to sign off on completed homework.

Students acquired and retained health-specific information in the short-term, but further evaluations are required to assess whether such effects are sustainable and beneficial in the long-term. Changes were observed in some aspects of parent's knowledge and behaviour from pretest and posttest. Parents' exposure to material on the topics through their children is one mechanism that could be linked to these changes. Students and parents confirmed that the intention to convey and receive information, respectively, was high. Students and parents also confirmed that such a programme could greatly influence their intentions to change to healthier lifestyle behaviours, although it remains to be seen whether this would result in behaviour change and disease prevention.

7.5.7 Strengths and limitations

A strength of the study was the high follow-up rate (98% in students and 95% in parents), which was noteworthy, considering that parents are often a challenging group to reach (Gerards et al., 2015). Furthermore, positive support was received from educators, students and parents from the participating schools. We also recruited students from schools located in a wide-spread district area, representing various rural and urban locations, and school quintiles.

The results of the study should be interpreted in light of several limitations. First, there was no control group with which to compare the pre- and post-test findings. It is possible that the observed improvements in the outcome measures were not a direct result of the intervention and that other factors might have played a role. Such factors include: (1) time/history effects: the school curriculum itself included certain intervention components, e.g. HIV education; and (2) regression to the mean effects (particularly for those with high/low values at pretest). A randomised controlled trial would be required to measure the impact of the intervention. Furthermore, the data from students and parents were analysed separately and it was therefore, not possible to link the results of the parents and the students.

Second, the questionnaires elicited self-reported reports which could be subject to information bias, including social desirability and recall biases. The possibility that students and parents answered in a

socially desirable manner threatens the internal validity of the findings. The use of more objective measures, e.g. children's and parent's BMI measurements and HIV status, is recommended in future studies.

Third, only one parent was recruited per student. Ideally, evaluation should have included both parents or the entire household. Although we included caregivers, the scope of the analysis did not examine the complexities of specific family structures and their associated dynamics.

Fourth, only the short-term posttest responses (i.e. three months after implementation) were analysed. Longer-term studies need to be conducted to determine whether students and parents can maintain their positive improvements in knowledge, awareness, skills and behaviour. Longitudinal studies assessing the long-term benefits to the health of the study population should build on the findings in this study.

7.6 CONCLUSION

The implementation of *The CIrCLE of Life Initiative* delivered to pre-adolescent students, with parent participation, demonstrated changes from pretest to posttest scores specific self-assessed knowledge and awareness, skills and behaviour. However, the intervention had little to no influence on some attitudes and perceptions. The study findings are an important contribution to the limited literature regarding child-influencing inter-generational health outcomes. With accurate messages to convey and with appropriate communication skills, students could possibly, indirectly, influence the knowledge and practices of their parents, supporting inter-generational knowledge and skills transfer and translation. It is hoped that the positive health effort will contribute to sustained effects over time, and benefit pre-adolescents and their parents in the long-term.



Chapter 8: Discussion

Photo credit: Keshni Arthur, A lesson being delivered in the classroom

The aim of my PhD was to develop, implement and evaluate a transdisciplinary intervention that addressed HIV and obesity prevention, aimed directly at pre-adolescent learners and, indirectly, at their parents, to promote knowledge transfer. This chapter discusses the overall findings presented in preceding chapters and also highlights the lessons learned.

The chapter begins with a discussion on the design and development of the intervention and how the IM protocol, together with the application of IS strategies, were used to guide the development of the intervention and implementation strategies. It also outlines the benefits of early stakeholder engagement and how the success of such an intervention can be shaped through it. The advantages of evaluating OR in pre-implementation phases are also presented, followed by the process and outcome evaluations themselves. A section on the research linkage and associations within the conceptual framework model precedes the strengths and limitations, which concludes the chapter. All planned processes and unintended consequences that emerged during intervention development and implementation are discussed within the chapter.

8.1. INTERVENTION DESIGN AND DEVELOPMENT

8.1.1 Combining Intervention Mapping with implementation science strategies

Chapter 4 (Design and development of the intervention) outlined how the IM protocol and IS principles were applied to develop *The CIrCLE of Life Initiative*. The study identified the linkages and commonalities between IM and IS, and demonstrated how a combined application of strategies from both could advance intervention design and its implementation. The existing linkages included development of an adoption and implementation plan, as well as an evaluation plan. Commonalities included stakeholder engagement, transparency of intervention development, and the use of EBPs. These linkages and commonalities between IM and IS helped advance intervention development in four distinct yet interrelated ways.

The IM protocol already included implementation strategies such as the development of an adoption and implementation plan, and an evaluation plan. The IM protocol also supported planning for implementation, to potentially reduce the gap between the development of effective programmes and their use in diverse settings (Klesges et al., 2005). Even though this overlap between the two steps (adoption and implementation plan, evaluation plan) existed, the findings from this study support the linking of IS throughout the remaining four steps of the IM protocol. In other words, IS strategies (e.g. adaption, OR) should be included from the inception of intervention development as intervention design was influenced by several IS contributions throughout the IM process, by elucidating

mechanisms of change (i.e. how implementation strategies influence outcomes through change), better guiding the use of implementation models and frameworks during the planning process, and improving the impact of implementation strategies on outcomes (Fernandez et al., 2019).

The implementation process usually has distinct stages of development: the exploratory stage (stage 1); the planning stage (stage 2); the intervention implementation (stage 3); and the intervention is scaled-up and evaluated (stage 4) (Burke et al., 2012; Fixen et al., 2005). Findings from this study showed that all activities from the exploratory stage were compatible with the IM protocol. Activities in the exploratory stage commonly assess the needs of those affected by the intervention, the fit and feasibility of the intervention, and the readiness for implementing it. The exploratory stage ensures a supportive climate for implementation, and secures buy-in through stakeholder consultation; to identify implementers who will guide the implementation process; to detail a delivery model, outlining the inputs, outputs and outcomes; and to plan preparatory activities that ensure that the necessary structural changes (e.g. securing funding and resources, training staff) are in place to support intervention delivery (Burke et al., 2012; Fixen et al., 2005). Hence the suggestion to align IM and IS strategies. This linkage will contribute to not only intervention design, but also implementation design. The linkages will help "to design for dissemination" (Brownson et al., 2013), a concept that considers implementation from the start of intervention development.

Implementation science adaption strategies tailored the EBPs selected during the IM process, and aligned them with the target populations, geographic areas and contexts. Adaptions were made to the original programme's content, delivery, training and evaluation (Brown et al., 2017; Stirman et al., 2012). Adaption of EBPs were made by understanding its application in practice. Common types of modifications included adding, substituting, removing or re-ordering programme components; and integrating another approach or intervention (Stirman et al., 2012). The adaption process in real-world settings ensured that the EBPs were tailored in the best way while preserving the main elements (Carvalho et al., 2013). The intervention had to be tailored to the diverse range of settings, yet allow for flexibility (Draper et al., 2014); thus utilising EBPs that were backed by theory and empirical evidence that increased the likelihood that they would be effective, acceptable and implementable (Jones et al., 2015).

Transparency regarding intervention development, its adaption processes and evaluation plans were detailed to better guide and enhance the translation of research into practice (Bartholomew et al., 2011). The methodological transparency allowed the identification of areas that required change, as well as the most appropriate and acceptable methods to achieve this (Dalum et al., 2012).

Stakeholder collaboration is a central element of IS and IM. In this study, adopters and users were identified early, which allowed for a comprehensive assessment that not only evaluated the needs of the target population, but also created awareness about the intervention, fostered a supportive climate for implementation, and secured buy-in (Burke et al., 2012; Fixen et al., 2005).

Intervention Mapping and IS are both pragmatic approaches that contributed significantly to the field of intervention development by filling the conceptual and practical gaps. The approaches identified implementation barriers and facilitators and developed or selected the implementation strategy. Intervention Mapping is already a recognised approach to intervention development. Implementation science, however, is commonly used to identify bottlenecks and optimal approaches to implementation at later stages of intervention development rather than earlier in the process (Bauer et al., 2015). There is a need, therefore, to link strategies to barriers. This not only describes the desired outcomes but also the processes through which implementation strategies are effective (Lewis et al., 2018). Closing the research-to-practice gap may require more concerted efforts and strategies to target the multi-level barriers and utilise the facilitators for intervention delivery improvement. This type of guidance for intervention development and their implementation is pivotal from intervention conception. A significant contribution of this PhD to the body of knowledge is that it strongly recognises the need for IS earlier in the intervention design stages rather than later in the pre-implementation stage, mitigating some of the risks of stakeholder awareness and buy-in, programme adaption, and trust and transparency; it also increases the likelihood of programme sustainability.

8.1.2 Stronger forms of stakeholder participation and engagement throughout the process

The needs assessment described in Chapter 4 (Design and development of the intervention) emphasise the necessity to target stakeholders (adopters and implementers) early within an implementation setting. The identification and engagement of implementers often occur late in the pre-implementation phase of intervention delivery and the resulting outcome is often low levels of implementation (Fernandez et al., 2019). Early, consistent stakeholder engagement permits a participatory approach to planning. High-quality implementation is the joint responsibility of multiple stakeholders and requires active collaboration (Durlak, 2013). These collaborative processes select and match strategies that fit implementation needs and contexts. Engaging participants throughout the study process was important to better understand the needs of the participants and the realities of the environments where the research was implemented; realities of which the researcher was not fully aware. Utilising the bottom-up approach, stakeholder inclusion in the planning process increased user-perspective and

the possibility of intervention sustainability. It also created a sense of ownership during intervention development.

Stakeholder engagement also helped refine the focus areas of the study by providing parameters of the target population, culture and context fit. This alignment between stakeholder-acknowledged parameters and the intervention could either hinder or facilitate implementation. The implementation of programmes is frequently dependent on the behaviour of stakeholders (participants and implementers) within the system (Craig et al., 2008). Stakeholders emphasised the need for further tailoring of the intervention in order to attain higher engagement among the participants.

Stakeholder collaboration at multiple levels of the socio-ecological model was important in the planning of the intervention and implementation strategies. The components from the EBPs identified in the scoping review also required adaption to enhance parents' skills and co-operation, and to improve the interaction between the home and school environments (Bartholomew et al., 2011; Dusenbury et al., 2003; Hall et al., 2012). Consultation was also critical to identify, acknowledge and address any resistance towards the intervention being implemented.

Arnstein's Ladder of Citizen Participation proposes that 'organisational outcomes improve when stakeholders are included in setting priories and making decisions with increasing levels of engagement, or typologies of participation' (Arnstein, 1969). The ladder is used as a model for positioning contemporary methods of stakeholder dialogue and has eight rungs of participation, ranging from non-participation and tokenistic to genuine engagement. The rungs represent increasingly higher levels of stakeholder participation and engagement. Specifically, levels of engagement span from one-way information sharing (lower rungs) to shared decision-making and stakeholder empowerment (higher rungs). This study was based on the stronger forms of participation at the higher rungs, namely, *the Partnership rung*. *The Partnership rung* involves shared planning and decision-making responsibilities through agreed structures and ground rules that are not subject to unilateral change. Although stakeholders were not involved in the initial intervention design process, they were consulted immediately after, from a point where their input became invaluable.

A further contribution to the body of knowledge by this PhD is establishing the stronger forms of stakeholder participation from the initial needs assessment through to implementation of the intervention. Findings highlighted the importance of engaging stakeholders at higher rungs on the Ladder of Citizen Participation (Arnstein, 1969), in order to support effective intervention development and implementation.

8.1.3 The value of a needs assessment in interpreting context

Contrary to data showing that obesity is an increasing problem in children (Statistics South Africa, 2016), the needs assessment informed that this was not the case in the study setting, with malnutrition rather than obesity being the major challenge. Had the needs assessment not been conducted, the intervention would have been designed for obesity and HIV prevention only. This might have diminished effectiveness of the programme.

The needs assessment prompted modifications to the original intervention, which focussed mainly on addressing obesity, to also include malnutrition concepts such as diet. The study team felt that, even though the obesity interventions, targeting pre-adolescents and parents, addressed similar theoretical constructs and behavioural determinants, broader adaptions were needed to ensure that intervention content was relevant and appropriate for malnutrition.

The process of adaption was initially considered to be a passive act occurring during the implementation phase of the innovation-decision process rather than adopters being active modifiers (Rogers, 1995). However, adaption was found to be an active process that was initiated during intervention development and integrated in all processes thereafter. This active adaption attempted to better tailor prevention practices to the health problems associated with the target population. Hence, adapted changes were carefully planned and well justified.

All of the assessment findings were compared to the context, to confirm the appropriateness and goodness of fit between the target population, the intervention, and the organisations implementing the intervention, i.e. the intervention had to address the same risk factors, behavioural determinants, and risk behaviours that were identified in the target population. As suggested by Mckleroy et al. (2006), there may not be an exact match between the target population and an intervention. *Healthkick*, a school-based nutrition and physical activity intervention, aimed at reducing diabetes risk factors did not significantly improve the quality of diet in children because the model was not a suitable fit for the low-income setting (Steyn et al., 2015). When compared to the *Healthkick* intervention *The CIrCLE of Life Initiative* showed better outcomes in a similar setting. Hence, adapting the intervention to address the community-specific needs may be the most efficient and effective method to fulfil unmet prevention needs (Lyles et al., 2006; Mckleroy et al., 2006).

A key learning from the study was the value in conducting a needs assessment; an understanding of the real-world setting better informs intervention design. Intervention participants may have needs

besides those targeted by the intervention and it can be beneficial to evaluate those needs (Mckleroy et al., 2006; Rogers, 1995). Even with an intervention that is closely applicable to the community of interest, there may still exist various social, cultural, or contextual factors within that community that are not appropriately addressed by the programme (Lyles et al., 2006).

8.1.4 Limitations of developing the logic model

A foundational principle of IM is the development of a logic model that illustrates the causal pathway between the intervention strategy, the methods it operationalises (mechanisms), the determinants of implementation affected, and the proximal and distal outcomes (Jones et al., 2015). Proximal (e.g. increase in knowledge and skills in a learner) and distal (e.g. acquired knowledge and skills in a learner who has grown into an adult) outcomes include changes in behavioural and contextual factors, intervention and implementation outcomes, and the crucial impact on health and quality of life. The logic model approach was beneficial in the planning phase as it explicitly defined the intended links between the intervention resources (inputs), strategies (process), the immediate results of the intervention activities (outputs), and the desired proximal and distal accomplishments (outcomes). The logic model made underlying assumptions about the intervention explicit, guided developmental decisions and described the mechanisms through which the implementation strategies were to work (Fernandez et al., 2019; Frechtling, 2007).

Similar to the finding of Frechtling et al. (2007), a benefit of using the logic model approach in intervention development, implementation and evaluation was that it conceptualised the relationships between the intervention components, the components' relationships and the intervention's context. The model, however, is premised on a linear relationship between inputs, outputs and impact (Patton, 2011). The proposed outcomes resulted in a non-linear model because of the multifaceted system. The reason for this was the inclusion of HIV and obesity into one combined intervention; in its least complicated form, i.e. it oversimplified the intervention design and implementation processes, in considering multiple diseases. With careful attention to building in separate pathways, and to the possibility of interactions between intervention elements, however, the logic model offered a better structure that combined HIV and obesity. Due to the complex multi-activity programmes, a more elaborate model was developed to meet the needs of the intervention.

The use of logic models of change that delineate the hypothesised relationships between causal factors (implementation barriers, contextual factors, behaviour and organisational change methods) and outcomes guide the development of the intervention and implementation strategies to have the best

potential impact on health outcomes (Fernandez et al., 2019). It is also suggested that an intervention's logic model be built on strategies that are most likely to result in the desired outcomes (changes), and on a hypothesis of how the change would work in the intervention (Frye and Hemmer, 2012). The logic model's structure, therefore, focused on the change process and the system within which the intervention was embedded. The model was carefully referenced to the intervention's context (elements of the environment in which the programme would take place, including social, cultural and political features) and its impacts.

8.1.5 The use of transdisciplinary approaches

Although attempts have been made to include health education in school curricula, many South African schools fail to offer health education programmes of sufficient quantity or quality (Deventer, 2009). This is a consequence of the interdependent relationship and functioning between the health and education departments (Basch, 2011; Kolbe, 2019). Schools are often supportive of health improvements, but there are substantial challenges to implementing interventions in the school setting (Langford et al., 2017). For example, there has been a failure to integrate academic, policy, practice and public communities to co-produce school health improvement research and build in processes to understand intervention congruence with existing systems and structures, affecting their sustainability (Murphy et al., 2018). Hence, there is a need for better integration efforts between the health and education sectors (Birch and Auld, 2019). In this study, the application of a transdisciplinary research approach was seen as a possible solution to integrate health prevention in the education sector. The engagement between the two disciplines (health and education) identified, developed, and evaluated potential solutions and implementation strategies by combining concepts, theories, methods and measures into a new, transdisciplinary intervention.

Chapter 4 (Design and development of the intervention) describes how a transdisciplinary approach was applied in this study. Several stakeholders, representing the two societal sectors, were consulted. The central role of stakeholder engagement and participation in all steps of the study, was a critical factor for a functional transdisciplinary approach. The stakeholders were actively engaged, and moved beyond the limitations of any single disciplinary focus, thereby creating new synergistic ways of conducting research and evaluation to address the critical public health issues of HIV and obesity.

The transdisciplinary approach provided stakeholders with collaborative opportunities, thereby potentially integrating efforts between the two disciplines. Consultations informed the content and influenced the tailoring of the intervention to fit local needs, resources and competencies. Partnerships

were required to ensure that the interventions were relevant to the priority population, meaningful to the community, and culturally appropriate. For example, educators advised on the timing of implementation, teaching techniques, and programme material. Their suggestions included increasing parental involvement by using incentives; group work to deal with the problem of too many learners per class; and incorporating fun and enrichment exercises into the lessons. Representatives from the Department of Education aligned the objectives, methods and strategies with the curriculum.

Similar to other findings, stakeholder collaboration in a transdisciplinary approach required more than professional knowledge, but also self-reflection and experienced leadership (Narain, 2011) (Abrams, 2006; Stokols, 2006)(Angelstam et al., 2013). For transdisciplinary efforts to succeed, team members had to be open to diverse viewpoints, tolerant of alternative perspectives, and respectful of other disciplines. They had to be willing to engage in the exchange of ideas, mutual deliberation and problem solving, and conflict negotiation related to contrasting viewpoints and values. Developing and maintaining co-operation from professionals representing various fields and disciplines was not an easy task, as conflicts and tensions that could impede successful collaboration, often arose. For example, as shown in Chapter 5 (Organisational readiness for intervention implementation), health personal advised that additional health concepts be included in the existing syllabus. However, educators disagreed, stating that adding work into their already over-packed syllabus was going to be problematic for them. The transdisciplinary approach also saw other challenges as identified in Chapter 5, and careful planning was required to maximise synergies. These challenges included a shortage of educators, educators lacking basic skills and expertise, and training of professionals (educators) in other disciplines (health). The transdisciplinary approach used in this study was both a time- and labour-intensive endeavour and, where conflicts and tensions arose, these challenges had to be resolved for the collaboration to accomplish its purpose.

Although such challenges were experienced, the transdisciplinary approach also saw several potential benefits. Health organisations that spend their resources on more holistic health promotion and prevention efforts benefit with healthier communities (Nigatu, 2012; Temu et al., 2014) and effective use of limited resources (Juma et al., 2018; Wand and Ramjee, 2013). Targeting diseases in a more integrated approach has fewer repercussions on the health systems. The education organisations also stand to benefit—a consequence of healthier learners in the classroom is fewer sick children resulting in less truancy (Kesztyüs et al., 2016), and increased concentration and productivity (Higgins, 2008). A review by Higgins (2008) showed how education influenced health through a range of interconnected pathways (social, economic and cultural) impacted on the experience of and outcomes from education with subsequent implications for health, confirming a bi-directional link between education and health.

Durlak and DuPre (2008) explain how interventions targeted at the different socio-ecological levels necessitates the use of a transdisciplinary framework. A socio-ecological framework is useful to appreciate the multiple levels of influence on operations. For example, certain factors are presented at the community level (e.g. current educational content and health prevention not reaching certain populations), some include characteristics of the intended programme (e.g. its complexity and its compatibility with the host institution and staff), some relate to characteristics of programme providers (e.g. their perceived need for the programme, general skill proficiency, and sense of self-efficacy) and others to the organisational capacity of the host system (e.g. work climate, shared vision and the ways that decisions, communication and problem-solving are enacted within the organisation) (Durlak and DuPre, 2008). The transdisciplinary approach brought stakeholders from all relevant spheres to address the above factors. It was important to study multi-dimensional aspects of intervention development and implementation and to understand how the different factors hindered or enhanced the processes.

A transdisciplinary approach was required for *The CIrCLE of Life Initiative* that targeted three levels in the socio-ecological model (i.e. the individual person (pre-adolescent); their inter-personal level (parent) and community (school and health organisations). The transdisciplinary approach required adaptive governance that embraced the inherent complexity of socio-ecological systems, as described by Angelstam et al. (2013). The socio-ecological model, however, illustrates a need to improve both what happens among those directly involved as well as to target other organisations. The HIV and obesity prevention strategies, therefore, integrated multi-sectoral action. This fundamental integration was considered to be the critical point in the transdisciplinary approach and evaluation.

This PhD further contributed to the body of knowledge by establishing a need for transdisciplinary research, especially when targeting multiple levels of the socio-ecological model. This assists in the alignment of the intervention design and its implementation as it impacts on the various socio-ecological levels.

8.1.6 The benefit of using a socio-ecological model

A variety of school-based interventions has been evaluated. Their overall effectiveness on health-related outcomes in pre-adolescents has been weak because many have not built in the needed support from families to allow behaviour change to be maintained over time (Eisenmann et al., 2008). While behaviour in pre-adolescents is partly determined by themselves, they are highly dependent on both direct intervention by parents (e.g. the food provided, opportunities for physical activity) and patterns

of behaviour within the family, school and peer groups (Lloyd et al., 2011). As children grow older, the relative importance of self-directed as opposed to family-directed behaviour increases (Lloyd et al., 2011). This is also influenced by broader social factors such as the school environment and peers. An important approach in this study was using the socio-ecological model that considered both the proximal risk elements for the pre-adolescent, including their parents and distal influences such as the health and education organisations.

Chapter 4 (Design and development of the intervention) shows how an application of the socio-ecological approach aimed to influence healthy lifestyle behaviours at the pre-adolescent, parent, home and school levels, while Chapter 8 (Outcome evaluation of the intervention) presents how this approach proved valuable. The chapters outlined how the socio-ecological model was used as a foundation for the design and implementation of the intervention. Based on the model, the intervention was designed to foster communication and cohesiveness within the family. By way of the participatory learning format, parents acquired skills for communicating with and supporting their children. Furthermore, simultaneous intervention into multiple levels of context (i.e. the home and school environment) encouraged integrated participation. The provision of integrated programming at multiple levels of the socio-ecological model, achieved greater impact than one targeted level. This evidence is consistent with the findings from other studies (Coughlin and Smith, 2017; Eisenmann et al., 2008; Gerards et al., 2015; Kesten et al., 2013; MacLean et al., 2010; Willard et al., 2015).

8.2 ORGANISATIONAL READINESS

Generic implementation theory and research have identified core implementation elements, however, the field of implementation in organisations has identified specific elements that require consideration (Samdal and Rowling, 2011). Many pre-packaged intervention programmes aimed at changing learner-level behaviour have been implemented at schools (Fixen et al., 2005; Stith et al., 2006). This approach alone, however, is insufficient as further organisational and contextual change is also required (Weiner et al., 2009). Phase two of the study, therefore, aimed to evaluate the level of OR and the associated barriers and facilitators to the implementation of *The CIrCLE of Life Initiative*. Additional details of this study phase and outputs are found in Chapter 5 (Organisational readiness for intervention implementation).

8.2.1 Combining the ORIC and implementation climates constructs

The level of OR was based on overall scores from the ORIC and IC constructs. The acceptable results indicated the degree of fit between the significance and values attached to the intervention by educators, and how the intervention would be received by the target group (parents and learners). The OR assessment also identified fundamental facilitators and needs, which prompted further planning and improvement to the intervention prior to implementation in the specific context.

Combining the two constructs of ORIC and ICS added to the limited body of evidence on OR. The diverse IC and ORIC constructs with differing scales and goals were used in the evaluation; however, their similar design and compatible features permitted a congruent union of the two constructs. As shown in Chapter 5 (Organisational readiness for intervention implementation), this study found that, although the quantitative evaluations from both constructs were beneficial, both the ORIC and ICS tools required an additional qualitative aspect. Facilitators and barriers identified through this study were not derived from the original quantitative construct but from additional qualitative research. The constructs also lacked insight from other implementation science theories, such as culture, appropriateness and acceptability. Such issues, in this study, were identified from the qualitative aspects that were added. The quantitative approach helped to measure organisational levels as a useful benchmark on the continuum, and enabled a more precise quantitative estimation of relationships between constructs, but the qualitative data offered insight into the nuances and influences of the constructs. The qualitative data were, in this instance, of greater value in advancing implementation with a proactive approach.

As shown in Chapter 5 (Organisational readiness for intervention implementation), early stakeholder engagement and acquiring their buy-in from study inception worked in 4 out of 5 schools. Based on the ORIC and IC scores, educators from four of the five schools saw a need for and welcomed the intervention. However, the Quintile 4, fee-paying school, differed from the other schools, having the lowest ORIC and ICS score. Initial interactions with the school management and educators also confirmed the schools' disinterest in the intervention and its implementation. The OR evaluation indicated a need for additional researcher engagement in the Quintile 4 school. Educators' perceptions at this school had to be modified as they were the gateway to the target population. This was accomplished by further meetings and presentations, which showed the benefit of the programme, and research outcomes of other programmes. After the additional engagement, and only when educators' outlook seemed more positive, and when the implementers saw value in the intervention and committed to its implementation, did the next study phase begin.

The transdisciplinary approach presented unique challenges as it required educators to implement a health intervention across geographical boundaries and school settings. The collaboration required between the Departments of Health and Education necessitated that educators be open to diverse viewpoints, mutual deliberation, and problem-solving for the effort to be effective. From the identified key barriers and facilitators, it became apparent that the health intervention needed to be a fit with existing workflows and educational systems. One of the main barriers for educators was the increased workload. Their recommendations were to motivate the staff, apply non-stringent implementation rules and techniques, recruit more educators, and provide additional support. Alignment of the intervention with the curricula and syllabus would also facilitate their workflow. For example, an identified system challenge was the timing and scheduling of components of the intervention. Educators perceived that the timing and length of the programme might impede implementation if not linked to educators'/schools' specific timelines.

By evaluating OR and by addressing recognised concerns, it was possible to understand and implement transdisciplinary solutions. The research consolidated and refined existing applications to evaluate schools to specify key context-mechanism-outcome configurations. These configurations used educators' and public health practitioners' knowledge about health and local contexts to determine problems and solutions. This strategy moved beyond implementation principles (Greenberg et al., 2001; Samdal and Rowling, 2011) and towards an in-depth understanding of the complexity of implementation within the educational, public health, and social systems. Through the transdisciplinary research approach, mechanisms that would have affected the successful implementation of health prevention programmes in schools were identified. At the preparatory stage, implementation was dependent on negotiation concerning programme delivery and the acceptability of the programme to implementers. Addressing fears about programme novelty, contentious subject matter, and the extent of support for delivery was important (Samdal and Rowling, 2011). Programme implementation was greatly enhanced by a supportive, problem-solving atmosphere that allowed for the discussion of difficulties.

Similar to the Realist Evaluation by Pawson and Tilley (1997), the study showed that social contexts are relatively enduring and are what make or break social interventions. The aim of social interventions are to transform (rather than reproduce) by activating various structural, cultural and relational mechanisms to produce better outcomes. In order to comprehend the effects of social interventions and to explain change, a deeper understanding of pre-existing contexts and the mechanisms in operation are required, prior to the implementation of any intervention (Pawson and Tilley, 1997).

Another contribution of this PhD to the body of knowledge was to highlight the importance of OR and its proactive implications in preparation for implementation. Combining the two constructs of ORIC and ICS also added to the limited body of evidence on OR.

8.2.2 Implementation strategies that affect organisational change in schools

Daft (1999) identified three core implementation strategies that affect organisational change in schools. The first strategy determined the extent to which the values of the intervention were aligned with the overall values and aims of the school (Daft, 1999). This strategy was either a prerequisite or confounder to successful implementation (Weiner et al., 2009). Educators who held favourable attitudes towards the intervention perceived the importance of disease prevention in schools, and were, thus, more likely to implement the intervention without significantly modifying the activity (Wang et al., 2017). The intervention was evaluated for its suitability to the existing needs of the school and learners and the goals, philosophy, and organisational capacity of the school. Some of the barriers that the educators identified were that the implementation would be time-consuming and would create an increased workload for them. Educators, however, recommended that if the intervention were aligned with the curriculum it could be implemented during lesson time.

The second strategy relates to the concept of readiness, i.e. to prepare an organisation and the participants for their participation in implementation action (Daft, 1999). This planning ensured that participants' awareness and understanding of the change process, as well as their motivation and commitment, achieved its aims (Weiner et al., 2009). The study findings identified key transferable mechanisms (e.g. reciprocity) that impact on implementation and which apply to both educators and learners. An accepted principle of implementation, such as congruence between existing school activities and proposed health promotion activities, was developed to operate differently, yet beneficially according to context; for example, by addressing unmet needs and complementing existing activities. The synthesis provided greater specificity in preparation for implementation.

The third strategy specifically addresses policies and practices for the school change process, in terms of financial and human resources, development of individual and organisational capacity and competence to participate in and conduct the change process (Daft, 1999). Due to the transdisciplinary intervention, educator training was a planned component of the pre-implementation phase. The findings of the OR, however, indicated that the planned training required more in-depth guidance than what was originally intended, not only with training in the intervention content, but also with fundamental health concepts covered in the current school curriculum. This weakness had to be resolved to ensure that educators were competent and confident in teaching the content. Professional

development is required to support and upskill educators' pedagogical and content knowledge, as well as enhance their competence and confidence (Mangwaya et al., 2016).

Chapter 5 (Organisational readiness for intervention implementation) describes many shortcomings that were identified in educators' professional training to deliver health promotion and prevention. Educators identified a need to improve their professional development, particularly in disease-specific information and skills. All implementers who were chosen to deliver lessons were trained life skills educators that should have had both the knowledge and skills to educate learners on health-related topics, however, they lacked the confidence to deliver the health programme. Educators requested the presence of the researcher during class lessons for reassurance and support. Educators' attitudes towards a prevention programme, self-efficacy in teaching intervention curriculum and skills in interactive teaching are potentially modifiable factors related to programme delivery (Dusenbury et al., 2003), and extra attention must be paid to this aspect if future health endeavours are to be implemented in schools.

Before implementation, implementers received comprehensive training to ensure that they were knowledgeable and confident in their skills. Educators believed that both initial and ongoing professional development was necessary to build self-efficacy for implementation of the intervention. This study provided an understanding of the relationships between educator characteristics and training experience and built on the complex ways in which educators' attitudes and confidence were influenced by their training and teaching experience. This, in turn, also influenced implementation quality and programme outcome.

8.3 PROCESS EVALUATION

8.3.1 An intervention implemented with quality

Chapter 4 (Design and development of the intervention) specified *The CIrCLE of Life Initiative's* essential theoretical components, i.e. the necessary conditions to implement the programme, and the manner in which these components were to encourage change in learners and parents. Evaluation of these components and their effect on programme implementation examined whether the change process functioned as hypothesised when the intervention was designed (Cook et al., 2000). This evaluation was vital because the effective use of any health intervention does not occur in a vacuum. A broad range of factors outside of the programme theory may influence intervention quality and the programme outcomes (Eccles and Appleton, 2002). For example, in this study, the content, duration, and dose of lessons delivered differed, due to the time-constraints of implementing during lesson time and alignment with the existing Grade 6 curriculum. These factors, however, did not affect the quality of the intervention and facilitated implementation because they were assessed early. A detailed description of the process evaluation is available in Chapter 6 (Process evaluation of intervention development).

The CIrCLE of Life Initiative, process evaluation findings indicated a high level of implementation fidelity, suggesting that the intervention was implemented and received as intended. The intervention was perceived by educators to be acceptable and appropriate to both learners and parents. However, findings showed that implementer experiences with, and participant responsiveness to, HIV and obesity varied and some of the mechanisms that supported implementation and how they functioned between the various health topics, schools and contexts differed.

8.3.2 Costing

The costs of the intervention were not formally examined, as the intervention components were being modified and tested. Nevertheless, certain resource requirements are detailed to offer an understanding of some of the resources that were required for sustainability and public health relevance. To ensure sustainability, most intervention components were adapted from existing interventions and aligned with the current school curriculum. Expenses incurred include resources such as the workbooks (R15.00 each) and measurement equipment (weight scale, tape measure, clock) required to measure BMI (R150.00 per class) for each of the classes at the different schools. Educators were not remunerated for lessons conducted as this was done during the life orientation

lesson time. Ten lessons were negotiated with each Grade 6 class in all schools. Educators were given training to deliver the structured sessions. The resources for educator training were compiled by the researcher.

8.3.3 Researcher's position

The characteristics of the researcher could possibly have influenced many occurrences in the research. The researcher was a 40-year-old, Indian female and conducting research within schools that had majority Black educators and learners resulted in mostly compliant educators and learners. The researcher was present during delivery of all lessons, at all schools, which had several implications for the study. The researcher's presence may have influenced the quality of implementation, which could have accounted for the successful implementation efforts. Had the researcher not observed the implementation of the intervention, the implementers may not have put in the added effort. Although this played a positive role in the study, it could also pose limitations for the intervention's sustainability. There were also other consequences resulting from the researcher's presence. First, in the absence of an implementer, the researcher had to step out of the researcher role and into the implementing educator role at one school, resulting in four lessons being delivered by the researcher.

Second, although educators were trained, educators requested that the researcher be present to assist with the activities, and for reassurance and support. All implementers were trained life skills educators that should have had both the knowledge and skills to educate learners on health-related topics, however, they lacked the confidence to deliver the lessons.

Third the OR evaluation indicated a need for additional researcher engagement in the Quintile 4 school. Educators' perceptions at this school were modified with further meetings and presentations, which showed the benefit of the programme, and research outcomes of other programmes. The additional engagement resulted in a more positive educator outlook.

8.3.4 Limitations of the taxonomy of eight conceptually distinct implementation outcomes model

This research used five dimensions from the taxonomy of eight conceptually distinct implementation outcomes (Proctor et al., 2011). However, Proctor et al.'s (2011), framework lacked the dimension of context. As discussed in Chapter 6 (Process evaluation of intervention development), the dimension

of context is immensely significant in a process evaluation. Understanding the context of intervention delivery is critical to explain outcome as different interventions may have dissimilar causal processes and relationships within its context. The exploration of context-outcome configuration is necessary to go beyond the generic 'one recommendation fits all' theory (Arthur et al., unpublished). There is no 'one size fits all' approach to implementation. While interventions need to offer some flexibility, there is a need to balance implementers' autonomy to adapt delivery with the contextual diversity of schools (Chalkley et al., 2018; Langford et al., 2015).

8.4 OUTCOME EVALUATION

The CIrCLE of Life Initiative aimed to transfer HIV- and obesity-related information directly to learners and indirectly to parents. A novel aspect of this study was that the combined intervention was to target three socio-ecological levels (the individual, inter-personal and organisational level). Furthermore, the intervention was designed to increase knowledge, enhance skills and increase intention to change behaviour. These novel aspects were included in the design of the intervention based on recommendations from other similar EBPs (Adab et al., 2015; Gentile et al., 2009; Kelly and Barker, 2016; Kipping et al., 2014; Polacek et al., 2008; Visser et al., 2004; Xu et al., 2015). Chapter 7 (Outcome evaluation of the intervention) details the discussion of results for the outcome evaluation further.

8.4.1 A combined prevention intervention to address HIV and obesity

This study initially set out to integrate HIV and obesity into a comprehensive, holistic, prevention intervention. However, full integration was not possible, resulting in a combined intervention instead. Chapter 4 (Design and development of the intervention) presents how aetiology and disease-specific risks were dealt with separately. However, the intervention included modalities that applied to both diseases, and some of these could be integrated – for example, improving self-efficacy in communication. This modality encouraged parent-child communication, which not only enhanced parenting practices but communication about any disease. This was similar to the findings of other studies (Adab et al., 2015; Bogart et al., 2013; Gerards et al., 2015; Villarruel et al., 2008).

The positive results seen in the HIV-related knowledge and obesity-related awareness subscales in the posttest, suggest that the intervention was effective in increasing knowledge in learners, and in conveying knowledge to parents. This is an important development in research, demonstrating that

although an intervention involving the prevention of two diseases cannot be fully integrated, it can be combined. A combination of HIV and obesity prevention into one intervention, involves complexity, with many strategies interacting with non-linear effects (Brown et al., 2015). Such combined strategies are required to re-structure prevention programmes by incorporating healthy nutrition and lifestyle messages to target those at highest risk not just for HIV infection but also for NCDs (Wand and Ramjee, 2013).

As shown by other studies (Airhihenbuwa et al., 2014; Biggs and Spooner, 2017; Lake, 2017), there are several advantages in implementing a combined intervention. Interventions targeted against one of the diseases will impact the other and will result in the effective utilisation of limited resources, for both individuals and organisations. Also, individuals who are enlightened on holistic promotion and prevention strategies to make appropriate health decisions may live longer. There is, however, little development of EBPs on how interventions in combination should achieve this strategic advantage and synergy (Brown et al., 2015).

Disease prevention continues to consider one intervention at a time in isolation from its interactions with other interventions, the community and the socio-ecological context of its implementation (Brown et al., 2015). The role of combined or integrated interventions, its mechanisms, the circumstances that it was surrounded by, the inter-play of the diseases and their relationships with each other, and emergent effects of any resulting synergies, can advance disease prevention. The findings of this PhD indicate that such approaches, applied in public health contexts, could expand the database and tools for these interactions, relationships and emergent effects. The current linear but disconnected approaches to health prevention, provides a missed opportunity to understand combined synergies.

8.4.2 Pre-adolescents as agents of change for inter-generational transmission

The conventional view is that parents impart knowledge, values and beliefs on their children (Damerell et al., 2013). However, the reverse is also possible, where children could teach their parents. The findings from this study suggest that *The CIrCLE of Life Initiative* has potential as a prevention intervention, by enhancing knowledge and communication processes within the family. The study used quantitative data to demonstrate a causal link from health-induced knowledge acquisition in learners through to a desired, behavioural intention to change by means of inter-generational transmission. The statistically significant differences between specific pre- and post-test scores corroborated such an impact, suggesting that the transfer of information from learner to parent, is possible and that children could be ‘effective agents’ in the change process. Specifically, *The*

CIrCLE of Life Initiative demonstrated strengths in relation to four important features likely to increase inter-generational knowledge transmission.

First, the programme targeted pre-adolescent learners in primary school and thus initiated family communication and engagement. During the pre-adolescent stage, parents are still at a primary point of attachment (Catalano and Hawkins, 1996). Many of the learning strategies were dependent on the sharing of knowledge and skills between pre-adolescents and their parents. For example, communication between child and parent could influence nutrition and meal plans at home, as well as physical activity and sedentary behaviour.

Second, the strong linkage between the classroom and home environments was instrumental in facilitating discussion at home. The classroom preparation was a crucial mechanism in ensuring that the topics could be discussed at home, thus extending the influence of the programme beyond the school setting and securing parental participation. Learners adhered to the concept that the knowledge was intended to be passed on to their parents. Messages were indirectly communicated to parents either by word of mouth or a presentation of information and activities in t learner-parent workbook.

Third, repetition of themes delivered in a variety of modalities and interrelated messaging improved receptivity and reach in both pre-adolescents and parents. This finding was similar to other studies (DeBar et al., 2009; McKenna et al., 2000). The classroom preparation ensured that learners easily absorbed through positive reinforcement, discussion, fun activities and games and practical applications. In addition, the intervention activities were designed to be attractive and interesting for learners to take home messages and/or to discuss with their parents and family.

Fourth, the incorporation of information and activities in a learner-parent workbook was a critical feature of the school-based prevention intervention. The workbook facilitated both the acquisition of knowledge and awareness and its application to prevent or deal with health-related issues. A description of existing and new skills also facilitated engagement in joint practical activities between the learner and the parent. Workbooks have also shown value in other research (Vermund and Hayes, 2013).

The CIrCLE of Life Initiative was able to communicate messages to parents in an indirect way, either by communication from the learners about what they were learning in school, or presenting the information in the workbook, or the learner-parent homework activities. While the intervention was not designed to deal with health problems, there was evidence that it could reach families with such problems and raise awareness of the need for change, in ways which learners found easy to learn, comprehend and transfer.

The outcome evaluation demonstrated some positive findings when directed at pre-adolescents, which was similar to other studies (Airhihenbuwa et al., 2014; Dinaj-Koci et al., 2014; Pettifor et al., 2018). HIV and obesity prevention may be pertinent to the pre-adolescent age group. They engaged well with all lessons delivered and demonstrated positive outcomes. The study also demonstrated that it was possible to use pre-adolescents to communicate detailed health messages, delivered at school to their parents. It must be noted that all information delivered were both age- and culture-appropriate. Interventions targeting pre-adolescents needs further rigorous testing.

Furthermore, parents are not usually an easy group to target in health interventions (Gerards et al., 2015). This study, however, demonstrated that a high number of parents participated, engaged in the activities and contributed to the many positive outcomes. The intergenerational-knowledge transmission outcomes were similar to the findings of other studies. These studies, however, used different health-related knowledge (Christensen, 2004; Evans et al., 2001; Mosavel, 2009; Sedighi et al., 2012) and environmental knowledge (Damerell et al., 2013). Inter-generational knowledge transmission from child to parent may benefit parents in special circumstances (e.g. parents with low levels of education, parents in rural areas, parents afraid of attending prevention programmes due to stigmatisation), and therefore, warrants further investigation.

Firstly, targeting pre-adolescents in this specific life stage and secondly, using pre-adolescents as agents of change for inter-generational knowledge transmission are two factors that present a way forward in HIV and obesity prevention. These findings contributed to the body of knowledge for this PhD.

8.5 RESEARCH LINKAGE AND ASSOCIATIONS WITHIN THE CONCEPTUAL FRAMEWORK

8.5.1 The link between intervention strategies and organisational readiness

As presented in the Proctor et al. (2009) conceptual model of implementation research (**Figure 1-1**), there is a mutually supporting feedback loop between intervention and implementation strategies. The loop between intervention strategies (intervention development) and implementation strategies (OR) assisted in the development of the school-based health intervention and its preparation for implementation. This study demonstrated the feedback loops' plausibility between Chapter 4, which showed the development of the intervention and Chapter 5, which presented the OR evaluation. The

linkage between the two components guided further proactive improvements for both the intervention development and its implementation.

Intervention development and OR support each other and cannot be viewed as independent processes. An organisation's success at implementation is dependent on intervention characteristics (Durlak and DuPre, 2008). An intervention characteristic consistently related to implementation is compatibility with the organisation (contextual appropriateness, fit, match, congruence) (Durlak and DuPre, 2008; Mihalic and Irwin, 2004). During intervention development, the study considered the impact of the intervention on the organisation (school). With the reverse feedback loop, all barriers and facilitators advised by educators during the OR evaluation were considered as potential problem indicators or enablers and together with recommendations made by educators themselves, the intervention and implementation strategies were redrafted. For example, additional items were added to the educator training.

Oetting et al. (1995), suggested seven system factors to be considered in the pre-planning of any school-based preventive intervention that influences an organisation's overall readiness for implementation. These factors include: (a) need for change; (b) readiness for change; (c) capacity to effect change; (d) awareness of the need for change; (e) commitment or engagement in the change process; (f) incentive for change; and (g) history of successful change (Oetting et al., 1995). This study also found these factors to be critical to intervention design and organisational readiness.

To implement a preventive school-based intervention, educators must have an awareness of a need (a discrepancy between a desired state and an actual condition) that affects the learners, and a detailed assessment of the contexts in which the need exists (Greenberg et al., 2001). Both these criteria were established in the needs assessment presented in Chapter 4 (Design and development of the intervention). Once the need is established, educators should be aware of the programme theory and show commitment to implement the intervention. Educators are more likely to be successful at programme implementation if they are committed and take ownership of the intervention (Bachman and Duckworth, 2003; Bierman et al., 2002), and commitment is only possible if educators played an active role in intervention development (Bachman and Duckworth, 2003; Bierman et al., 2002). At the school level, commitment is undermined when the goals of a preventive intervention are not congruent with school goals (Oetting et al., 1995). As a result, the programme will not be supported or seen as a priority. Hence, the need for stakeholder engagement.

An important factor in the development of *The CIrCLE of Life Initiative* was that a transdisciplinary research approach was used. This approach resulted in more involvement and support from the health and education organisations. By combining a structural approach for intervention development with

EBPs and stakeholder collaboration, the study aimed to develop an intervention that was relevant and appealing to the target group and thereby more effective than a top-down approach (Arnstein, 1969).

8.5.2 The link between organisational readiness and outcomes

Another mutually supporting feedback loop, between the implementation strategies (OR) and the outcomes (implementation and service), is established in the conceptual model of implementation research (**Figure 1-1**). The evaluation of OR (Chapter 5) was a beneficial strategy employed in the study, possibly leading to the positive outcomes seen in both the process (Chapter 6) and outcome (Chapter 7) evaluation.

Planning for implementation before intervention execution can have a significant impact on programme outcomes. Although several studies exist, there is limited research demonstrating ways to improve the readiness of a context for an intervention, or the ways in which readiness assessments may predict the quality of intervention implementation (Greenberg et al., 2001). While the developers of the various OR scales have assessed the reliability and construct validity of their measures of readiness (Ehrhart et al., 2016; Shea et al., 2014), so far there has been no assessment of predictive validity. Hence, the link between OR and implementation success is still not established. The predictive link between OR and outcomes was not established in this study, however, the OR proved to be a valuable effort, that did influence improvements before implementation of the intervention. This resulted in positive implementation and intervention outcomes.

Schools as an organisation require educators, with the necessary skills, working on agreed goals, if they are to create desired outcomes within reasonable time frames (Lynch et al., 2019). An important aspect of the implementation is the provision of technical support, which includes the structure, content and timing of pre-intervention training and professional development, and any ongoing support required to successfully deliver the programme (Lynch et al., 2019. Technical support also includes the implementation monitoring system or additional programme resources. Stemming from Chapter 5 (Organisational readiness for intervention implementation), professional development of the educator, who was also the implementer, was a necessity. Training was comprehensive and prepared the implementers to conduct the programme. It was crucial to develop high levels of educator readiness in terms of alignment, capability and engagement. Professional development resulted in enhanced teaching and implementation quality, as shown in Chapter 6 (Process evaluation of intervention development).

The findings of this study suggested that high levels of OR were associated with effective implementation (implementation outcomes) and improvement in certain learner and parent outcomes (service outcomes). This could also be interpreted as the internal organisation of a school that had important effects on learner achievement (Lynch et al., 2019). The education system, therefore, needs to consider the impact of a school OR evaluation and its direct impact to guide improvements in schools. This study has demonstrated how an OR evaluation, could lead to more positive outcomes, not only health-related but in relation to education as well.

Indicators of OR include whether the implementers have adequate skills to deliver the intervention and adequate knowledge about the theoretical basis of the intervention, feel positive about the programme, value its contribution to the educational setting, and are committed to the programme goals. If an educator did not see the value of a specific aspect or conducting lessons about particular topics, he or she might probably skip the lessons, even if it is a core component of the programme (Lynch et al., 2019). Educators perceived professional development as a facilitator and indicated that increasing educator confidence in the intervention and in their own knowledge and skills could affect implementation. Consistent with previous research (Mihalic et al., 2008; Rijsdijk et al., 2014; Sarma and Oliveras, 2013), several educator-level factors were related to educators' implementation of interventions. Factors such as educators' attitudes towards the intervention, their comfort level with the content, and educators' attendance at training were strong predictors of the implementers' quality of implementation (Mihalic et al., 2008; Rijsdijk et al., 2014; Sarma and Oliveras, 2013).

Educators who hold favourable attitudes towards an intervention perceive the importance of the intervention, and are thus more likely to implement it without significantly adapting the activity (Wang et al., 2017). The training workshops helped educators to familiarise themselves with the content of the intervention curriculum and acquired interactive teaching and health-related skills. Therefore, pre-implementation educator training should enhance educators' competency in teaching the content, influencing teachers' belief about the importance of HIV and obesity prevention, and demonstrating and reinforcing the use of interactive methods. A study by Wang et al. (2017) showed how educators' attitudes and confidence were influenced by their training and teaching experience, and in turn, influenced the quality of implementation and programme outcome (Wang et al., 2017). Similarly, this study provided an appreciative understanding of the relationships between educator characteristics and professional development with quality of implementation and intervention outcomes in learners and parents.

8.5.3 The link between the process evaluation and outcome evaluation

The findings from a review of research on the influence of implementation on programme outcomes and the factors affecting implementation offered strong support for the premise that effective implementation is associated with better outcomes (Durlak and DuPre, 2008). Research linking implementation quality with outcomes suggests that positive results are more probably replicated when there is a high quality of implementation (Durlak and DuPre, 2008). Although research suggests a link between process and outcome evaluations (Clarke et al., 2015; Nielsen et al., 2006; Storey et al., 2016), conceptual model of implementation research, only hints at it, without a distinct linkage (**Figure 1-1**). Most qualitative evidence to prove this linkage is only hypothesised, based on linked process and outcome evaluation studies (Clarke et al., 2015; Griffin et al., 2017). This study established a similar theorised link, i.e. the positive effectiveness outcome (Chapter 7) was influenced by a successful process outcome (Chapter 6).

In the study, many process indicators, such as fidelity, quality of implementation, causal mechanisms and contextual factors were measured qualitatively and/or quantitatively to gauge possible variation in evaluation outcomes, however, no conclusive association between process and outcome evaluation could be made. The only inference is that all appropriate implementation strategies were applied to ensure quality implementation of the intervention, which resulted in a positive process and outcome evaluation.

Linking implementation quality to programme outcomes establishes the internal validity of the programme and strengthens conclusions about the programme (Durlak, 1998). Furthermore, it protects against a "Type III error", where the effects of an intervention are assumed to be significant, when, in reality, the intervention may have been delivered so inadequately that it invalidated the outcome altogether (Dobson and Cook, 1980). For example, a lack of implementation quality measures, may incorrectly conclude that a programme is ineffective when, in reality, the poor outcomes were the result of an unsuccessful implementation process. Implementation evaluation helped explain the anticipated and unanticipated consequences of the intervention (Greenberg et al., 2001). The process evaluation explored the manner in which the intervention was implemented, and provided valuable insight into unexpected consequences, or why certain elements that were successful worked, and how such facilitators could be optimised (Craig et al., 2008). The links between certain process outcome measures and the outcome evaluation are discussed below.

8.5.3.1 The adherence to lesson delivery

Chapter 6 (Process evaluation of intervention development) showed that high quality of implementation (characterised by high levels of implementation and fidelity of implementation) was probably related to certain positive learner and parent outcomes shown in and Chapter 7 (Outcome evaluation of the intervention) - for example, HIV/AIDS knowledge and obesity awareness improved in both target groups.

Interventions should consider the training requirements or necessary support that is needed before implementation, to ensure implementer commitment and participation. Implementer 'buy-in' was one of the main enablers for successful implementation (Bachman and Duckworth, 2003; Bierman et al., 2002). Educators played a significant and influential role in the implementation of the programme in schools. Educators' attitudes regarding the intervention, i.e. whether it is worthwhile, appropriate and acceptable or not, are associated with the level of adherence to health prevention programmes in schools (Campbell et al., 2015).

8.5.3.2 Context of implementation

Examining factors related to the implementation of a school-based intervention (e.g. a supportive school climate) is necessary and can influence outcomes (Durlak and DuPre, 2008). This study similarly confirmed the importance of these context-related factors and also showed that schools differ considerably; the characteristics of some support change more readily than others (Greenberg et al., 2001). Chapter 6 (Process evaluation of intervention development) illustrated the difference in schools' classroom climate, which differed between fee/non-fee paying schools, urban/rural schools, and the diseases, lifestyles, and quality of life experienced by learners in the different schools. Such facets of context were relevant to understand implementation processes.

Classroom climate refers to the many social and psychological aspects of the classroom environment. These include shared goals, co-operation and respect among peers, and the relationships between and among educator and learners. Classroom climate can either positively influence implementation or be a barrier. A positive classroom climate is promoted by using effective classroom management techniques, empowering learners to participate in responsible decision-making, and by serving as models of appropriate social and emotional competencies (Greenberg et al., 2001). It is posited that educators who are effective in teaching academic skills will also be effective implementers of health prevention programmes because of their general teaching and inter-personal competencies. However,

educators must see the value in the intervention and must have the necessary health background and competency to do so (Herlitz et al., 2020; Pearson et al., 2015).

The influence of learners' relationships with one another was not overlooked and was considered during strategy development and implemented during classroom activities. The peer group is an important aspect of the inter-personal level in which children demonstrate social and emotional competencies (Newcomb et al., 1993).

The findings indicate that successful implementation of a school-based learner and parent intervention was dependent on co-operation between home and school environments. The contextual factors of school and home settings described in the study strongly influenced implementation quality. Such factors, may, in and of themselves, lead to improvements for both learners, parents and educators. Targeting changes in the socio-ecological system with alignment and linkages is necessary (Greenberg et al., 2001). The external environment was divided into different socio-ecological systems and sanction for a school-based pre-adolescent programme within each of these systems, based on the study results is highly recommended.

8.5.3.3 Fidelity and valence of adaption

Adaptions are made quite often in real-world practice, and, therefore, a need exists to anticipate how and when educators will modify programmes (Chalkley et al., 2018). Variability in implementation of complex intervention studies are often poorly reported (Craig et al., 2008).

The debate on the role of adaption versus fidelity is on-going. Whereas some researchers feel that adaption undermines fidelity and must be evaded, others recommend a combination of fidelity and adaption. A balance between the two in most real-world settings can have positive benefits (Carvalho et al., 2013). Furthermore, research indicates that flexible interventions are more likely to be acceptable in different settings (Durlak and DuPre, 2008). Allowing implementers such flexibility increased the probability that educators would implement the new programme (Escoffery et al., 2019; Galbraith et al., 2009), and adaptions made, possibly played a role in the programme outcomes (Escoffery et al., 2019). Educators suggestions to improve the intervention were based on the fact that they knew their classroom and their students.

Rigidity in implementation has been identified as a characteristic of an ineffective implementer within schools (Forman et al., 2009), therefore, local adaptions made by educators during delivery may be necessary as shown in this study. Each school community had its own unique assets, strengths and

needs. It was apparent that a 'one size fits all' approach was not possible for implementation. While the intervention offered some flexibility, there was a need to balance the schools' autonomy to adapt implementation with the contextual diversity of the schools.

Although the study involved a small number of educators, the implementation process varied considerably. In the process evaluation educators were encouraged to use a standardised process to develop strategies which suited their context rather than adopt the fixed curriculum. This resulted in widely varied practices between schools (Arthur et al., unpublished). Clarity about how much change or adaption and recording of these variations was key to assess fidelity. Such modifications were assessed to determine whether the modifications strengthened the intervention outcomes or undermined its aims and participant experience (Chalkley et al., 2018).

8.5.3.4 Learner and parent responsiveness

A core component of the intervention had been identified as learner and parent engagement. The study showed that learners were advocates at extending the intervention beyond the school environment, and were the possible agents of change in the home environment. While this occurrence has been considered (Clarke et al., 2015), this study added further support to this practice. Learners were instrumental in communicating health-related messages to their families and were instrumental in potentially changing parents' behaviour in communication, physical activity and certain skills.

8.5.4 The link between intervention design and outcome evaluation

Outcome evaluations of new programmes often assess interventions as a total package. It should instead compare the impact of the different programme components (Durlak, 2011). It is necessary to know precisely which parts of the intervention are important, the time-frame and intensity of implementation, and what can be modified to fit a particular context.

The intervention development phase used a taxonomy of behavioural change theory (Kok et al., 2015). The design and development of the intervention presented the matrix of change objectives and the practical strategies for the intervention that were developed as part of the IM protocol. The pretest-posttest outcome evaluation showed significant results in certain elements, as shown in Chapter 7 (Outcome evaluation of the intervention). The links between the outcome evaluation and the behavioural theory are discussed further.

8.5.4.1 Knowledge

Change objective 1 was to increase health knowledge and to prevent obesity and HIV infection, in the short- and long-term.[2] The behavioural outcome was an intention to change through the application of knowledge to avoid risky behaviour that could result in obesity and HIV infection. The theoretical method to accomplish this was Advanced Organisers (Theories of information processing) (Kools et al., 2006). Information processing presents an overview of the material that enables a learner to activate relevant schemas so that new material can be associated (Kok et al., 2015). The programme materials were visually appealing, user-friendly, age-appropriate and culture-sensitive. The intervention strategy was parent-assisted homework, which was conducted in the home environment encouraging learning, reinforcement and engagement in both target groups. Although knowledge was only assessed in the short-term, it showed significant differences in both learner and parent pre- and post-tests. In both learners and parents, positive outcomes were observed in HIV-related knowledge and obesity-related awareness. A positive outcome that was observed in the parent subscales only was awareness of BMI. These positive results were achieved in two possible ways, either through the learner-parent workbook or through information conveyed from child to parent. It was likely that the positive results seen in the parents resulted from the intervention.

The CIrCLE of Life Initiative was based on the *Click-Obesity* framework (Xu et al., 2015). Although this study included an additional HIV prevention component, the findings were similar to the findings of the Xu et al. (2015) study with significant changes in improving HIV-related knowledge and obesity-related awareness. The strategy of parent-child homework was similarly used in *The Lifestyle Triple P* (Gerards et al., 2015) and The *Active for Life Year 5* (Kipping et al., 2014) interventions. The outcomes of this study, however, were similar to that of *The Lifestyle Triple P* intervention with positive effects seen in parent measures – an indication that the parent-child homework modality was an effective contribution to change in knowledge.

8.5.4.2 Skills

The second change objective was to increase knowledge and application of change skills to prevent obesity/underweight and HIV infection in the short- and long-term. The theoretical method used was Guided practice (social cognitive theory and theories of self-regulation) (Kelder et al., 2015). This method prompted learners to learn and practice the skill at school, to discuss the experience with their parents, and to repeat the demonstration at home. The learners conveyed skills to parents in the home

[2] The long-term effects cannot be considered at this point in time.

environment and practised with parents as reinforcement, as a part of the learner-parent assisted homework. There were changes in some of the skills in the pre- and post-test. In both learners and parents, positive outcomes were observed in the two subscales: self-efficacy in communication about adolescent issues and skills to measure and interpret pulse rate. Positive outcomes that were only observed in the parent subscales included self-efficacy in communication about HIV issues, and skills to measure and interpret BMI. Polacek et al. (2008) indicated that theoretically-based programmes, combining knowledge and skills components, were more likely to show positive outcomes for behaviour change than those based on knowledge alone. The positive outcomes were, therefore, most likely due to the influence of the intervention and the inclusion of skills components.

8.5.4.3 Communication

Change objective 3 was to strengthen autonomous support and self-efficacy of learners and their parents through the dissemination of knowledge and change skills for improved communication. The theoretical method used was through Discussion (theories of information processing) (Kok et al., 2015; Petty et al., 2002). The strategy encouraged an informal discussion between parent and child about HIV/AIDS. In both learners and parents, positive outcomes were observed in the subscale self-efficacy in communication about adolescent issues, however, positive outcomes were only observed in the parent subscale of self-efficacy in communication about HIV issues.

The intervention was developed to enhance the quality and quantity of parent-child communication. Parents play a critical role in shaping behaviour through their positive parenting practices and parent-child communication (Miller et al., 2011). The communication component was based on two outcomes. First, it attempted to increase parents' risk awareness regarding healthy nutrition, physical activity and HIV threats that face pre-adolescents. By raising risk awareness, parents were more likely to communicate about such information. Second, the intervention enhanced parents' ability to effectively communicate with their child. No matter how frequently parents talk to their children about health topics, if they do not communicate in such a way that children receive the messages, the communication is ineffective (Miller et al., 2011). Parents are uniquely positioned to educate their children about risks, but it is not sufficient to simply tell them to talk to their children about risk prevention. The positive outcomes seen with the intervention likely resulted from the multiple teaching strategies employed, particularly the inclusion of skills-building exercises and communication practice.

8.5.4.4 Behaviour change

The intervention yielded encouraging results despite the relatively short duration of the intervention. The causal chain in the study was over a short period. Although changing behaviour was an integral part of the intervention, one of the restrictions of the intervention was that it could not measure behaviour change over a short period of time, therefore, 'behavioural intention to change' was measured instead.

Social-ecological models that target multiple levels of influence are a recommended strategy for prevention efforts because the home and school environments interact to influence health behaviour (Katz et al., 2005; Koplan et al., 2005). The multi-level intervention to prevent HIV and obesity in pre-adolescents extended from the home environment to the broader school level. Family components were important for pre-adolescent prevention programmes because parents, directly and indirectly, influenced behaviour at home, while educators and peers influenced behaviour at school. For example, parental modelling of nutritional eating and physical activity practices were recommended to reinforce behaviour.

There was an increase in knowledge about HIV and awareness of obesity. However, some of the behavioural intention to change variables remained unchanged. This is in keeping with the findings of Kelly and Barker (2016), who showed that giving people information does not make them change behaviour. It is not that parents are unaware of what their families should be eating and what constitutes a healthy diet, but there is a host of issues in life that prevent their positive decision-making.

Behaviour change must take into account the social context, and the political and economic forces, that play a role in the health of people irrespective of their choices about their own conduct (Kelly and Barker, 2016). The outcome evaluation of the intervention showed that just less than half of the parents were unemployed, and a little more than two-thirds were dependent on social grants. Even if they wanted to change behaviour, their personal circumstances were an impediment. Knowledge about the relationships, the mechanisms operating between individual actions, and societal patterns is limited and, therefore, offers little on the association with intervention outcomes (Kelly and Barker, 2016).

8.5.5 Lessons from the conceptual model

Proctor et al.'s (2009) conceptual model of implementation research was a well-organised and logical approach to the development and implementation of an intervention. The model brought together the four phases of intervention design, implementation strategy, and process and outcome evaluation in a coherent manner that allowed for an efficient process. Each phase had the potential to reveal barriers or facilitators to be overcome before proceeding to the next phase. The feedback loops, between phases, proved beneficial in this study. Problems that may have been encountered later on were prevented with different solutions that were actioned in the earlier phases. It allowed for strategy adjustments based on feedback and experience in an ongoing iterative process.

Implementation is a process, not an event (Fixen et al., 2005). A few issues are acknowledged regarding the use of this conceptual model. Planning for implementation must ideally begin during the intervention development stage. A need for an intervention must be identified, taking into consideration the available information from the existing context and environment. Information is acquired by interactions and collaboration with stakeholders. The need for stakeholder collaboration should never be underestimated. The fit between the intervention and the context and environment must be assessed. The organisation, staff and resources must be prepared by mobilising information and support for the intervention. Implementation involves complexity in every aspect.

8.6 LIMITATIONS AND STRENGTHS

Limitations

The results of the study should be interpreted in light of several limitations. There was no control or comparison group in the pretest-posttest evaluation. The pretest-posttest study design is often criticised as a weak research design because it may be susceptible to several biases. Observed improvements in the outcome measures may not be ascribed to the intervention in a causal relationship. Any evaluative approach that uses this design provides weak information about the counterfactual inference (Shadish et al., 2002).

A dyadic analysis was also not performed, and limited further interpretation of the data. The findings presented could have, therefore, been more comprehensive than what was presented.

There was a short follow-up period between the end of the intervention and the posttest evaluation. This was necessary due to the curriculum change over different Grades, the study had to be

implemented and evaluated within the same year. The time between pretest and posttest was thus kept to a minimum of three months. The longer-term effects of knowledge, skills and behaviour change could, therefore, not be adequately tested.

The pretest-posttest questionnaires elicited self-reported reports which could be subject to information bias, including social desirability and recall biases. The possibility that students and parents answered in a socially desirable manner threatens the internal validity of the findings. The use of more objective measures, e.g. children's and parent's BMI measurements and HIV status, is recommended in future studies.

Case studies are often criticised for their robustness as a research method. For example, data collected in the needs assessment or its actual findings may not necessarily be generalised to the wider population. There was, however, benefit in conducting the needs assessment as it was conducted within the context of its use and enabled a closer assessment of the specific context. The assessment highlighted that HIV, along with malnutrition, were the two most significant health issues in the schools. Although obesity was prevalent, malnutrition was a greater challenge amongst learners. Such findings prompted changes to the originally proposed intervention that focussed on addressing obesity, to include nutrition concepts. However, although the malnutrition component had sufficient content, it was not as detailed and as widely researched as the HIV and obesity components.

A limitation of the OR study was the small sample size; although it was large enough to measure OR in the study, it restricted additional statistical analysis. The evaluation also posed a possible risk of social desirability from educators' responses in interviews and questionnaires.

A limitation of the process evaluation was not having the direct input, such as open expressions of experiences and attitudes, from learners and parents. The acceptability discussed in this thesis was based on initial intervention design that was piloted with a few parents and their children. Although some data were collected through the posttest questionnaires, they were not fully analysed. The sample size of seven educators used for the process evaluation was also small. A larger sample would have possibly resulted in a more comprehensive set of qualitative data.

Another limitation was the sustainability of the intervention. The researcher was present during delivery of all lessons, at all schools, which had several implications for the study. The researcher's presence influenced the quality of implementation. This could have accounted for the successful implementation efforts. Had the researcher not been observing the implementation of the intervention and monitoring fidelity, the implementers may not have put in the added effort. Although this played a positive role in the study, it could also pose limitations for the intervention's sustainability. There

were also other consequences resulting from the researcher's presence. For example, in the absence of an implementer, the researcher was asked to deliver the lesson, which could have affected the outcomes and learner exposure.

Quintile 5 schools were not assessed as none existed within the study site. The implications of this, was that the intervention was not evaluated in wealthier communities, who contributed more towards basic education.

Strengths

One of the main strengths of this study was the engagement of stakeholders throughout the study. Stakeholders were consulted, and all recommendations were taken into consideration.

Another strength was that implementation of the intervention was tested in a real-world setting to accurately ascertain implementation factors. Educators saw a need for this type of intervention and thought that all learners could benefit from it. Implementation of the intervention was also subject to pressures from educational stakeholders to "offer the experimental intervention to everyone in the Grade". In this way, everyone would benefit, and it could be incorporated into lesson time without the burden of additional lessons. The intervention was, therefore, implemented to all learners and was included in daily lessons.

The combination of IM and IS strategies throughout intervention design benefitted intervention development and implementation strategies. Another strength of the study was using a socio-ecological model that targeted multiple levels (individual, inter-personal and organisational levels). A transdisciplinary research approach was used to engage stakeholders (school and health organisations) at the different socio-ecological levels.

The results of this study add to the limited body of evidence on OR. Two diverse OR constructs with differing scales and goals were used in the evaluation; however, their similar design and compatible features permitted a congruent union of the two constructs. Although the ICS and ORIC tools were adapted to suit the study context and design, the high reliability in consistency, shown by the Cronbach alpha scales, was an additional strength of the study. Facilitators and barriers identified in the OR evaluation benefitted the study by providing proactive improvements to the intervention and the implementation strategy.

Several data collection methods allowed for triangulation of data where date could be verified from different data sources. Although the educator self-report logbooks created a risk of social desirability,

the process was strengthened through the observation of sessions. The possible impact of direct observation and its influence on educators must also be acknowledged as it created a more concerted effort to adhere to the protocol. All logbooks were fully completed, and the cross-check of data between logbook and observation revealed high consistency. Qualitative questions in the logbook captured specific delivery methods used by educators, as well as their feedback about lessons.

A strength of the evaluation was the high follow-up rate (98% in learners and 95% in parents), considering that parents are often a challenging group to reach. The high follow-up rate is likely an influence from the initial engagement efforts. For example, the invitation letter to parents that sought to gain buy-in, explained the benefit of the programme in great detail. Furthermore, positive support was received from educators from the participating schools, who were engaged throughout the study.



Chapter 9: Conclusion and Recommendations

Photo credit: Keshni Arthur, Enhancing skills in learners

This chapter provides the conclusion to the thesis, where key learnings are highlighted and the contributions to public health are defined. The conclusion is followed by the recommendations for conceptual and empirical studies, from the pre-planning of interventions through to the programme implementation stage. Key factors that influence design strategies and quality of implementation are identified, and the importance of monitoring, evaluation and documenting the quality of the implementation of initiatives are delineated. The recommendations are derived from the study which demonstrated the association between implementation quality and its positive influence on programme outcome, and are organised according to the advancement of programme development and effective programme practices and implementation.

9.1 CONCLUSION

This PhD thesis presented the development of a combined HIV and obesity prevention intervention, its implementation and evaluation. The *CIrCLE of Life* intervention, a school-based health intervention, aimed directly at pre-adolescent learners and indirectly at their parents, targeted three levels in the socio-ecological model (individual, inter-personal and organisational) to improve knowledge, enhance skills and influence intention to change behaviour.

A transdisciplinary research approach was used to facilitate initial design and development. Inter-sectoral collaboration between the health and education organisations, moved beyond the limitations of any single disciplinary focus to create a new synergistic way of addressing current public health concerns. Even with the complexities of a multi-level intervention, the study showed that through early stakeholder engagement, organisational readiness assessments and needs analysis that the transdisciplinary approach can promote stronger forms of involvement and support in the processes needed for effective programme delivery and implementation.

The statistically significant differences between pre- and post-test scores in the outcome evaluation confirmed the effectiveness of the intervention in increasing self-assessed HIV-related knowledge and obesity-related awareness, showing positive results in outcomes such as knowledge, obesity awareness and certain related skills and behaviours in both groups. As opposed to the conventional view that parents transfer knowledge to children, the study also provided promising findings that an inter-generational transfer of knowledge from pre-adolescent to parent is possible.

The high response rate of both learners and parents in the study indicates the involvement of parents in the lives of pre-adolescents and that parent-pre-adolescent communication does create a platform

for inter-generational knowledge transmission. Pre-adolescents could therefore be used as agents of change to increase HIV- and obesity-related knowledge and awareness, and influence health behaviours amongst their parents.

The conceptual model of implementation research which brought together the four phases of intervention design, implementation strategy, and process and outcome evaluation also included other frameworks, that functioned within this model, to strengthen the overall outcome. The combination of IM and IS strategies not only strengthened the intervention and implementation development process but demonstrated the benefits of using IS in the early stages of intervention development. Although other models, such as the taxonomy of eight conceptually distinct implementation outcomes proved to be a valuable tool to assess the process evaluation, it lacked the dimension of context. The study also uniquely married ORIC and IC constructs to ascertain underlying OR levels and the associated barriers and facilitators. Overall the study also demonstrated how feedback loops between intervention development, IS strategies (OR and adaption) and process and outcome evaluation function to enhance design and implementation.

The CIrCLE of Life Initiative has the potential to create an immense impact through the synergy of its combined HIV and obesity health prevention components. Moreover, as it presents new findings in an area of limited research, it broadens the scope of research, particularly in the field of transdisciplinary approaches, targeting pre-adolescents in prevention programmes, and using pre-adolescents as agents of change in inter-generational knowledge transfer mechanisms.

9.2 RECOMMENDATIONS

9.2.1 Programme development

- Utilising the IM protocol together with IS methodology not only facilitates a systematic approach that conceptualises fundamental foundations in the design but the longer-term implementation, adoption and sustainability factors.

- Engaging key stakeholders from project conceptualisation in the decision-making processes are fundamental to acquire buy-in, as well as to establish facilitating factors and barriers, up-front. Stakeholder collaboration informs intervention design and development with insightful

societal factors such as context, culture and other associated contextual factors (acceptability, appropriateness).

- Employing transdisciplinary research approaches and consultation further facilitate and contribute to intervention design and development. Participants must, however, possess sufficient background knowledge about their own, and other disciplines to propose well-informed ideas and make educated decisions. Transdisciplinary approaches have value in combined resources and holistic, comprehensive outputs. However, such initiatives require in-depth facilitation strategies to advance group discussions.

- The use of EBPs, whether they have proved to be effective or not, assists the intervention development process. Evidence-based practices that have been deemed ineffective offer a wealth of detailed transparency that offers information on possible modification or adaption.

- Strategies that target multiple levels of the socio-ecological model could have a better impact. All socio-ecological levels are inter-connected and have existing relationships and associations. Targeting multiple levels allows for reinforcement and support for strategies. For example, targeting children alone might be beneficial, but a more significant effect might be realised if both children and their parents are targeted. Providing parents with information and activities enable them to reinforce the skills that their children are learning.

- The research findings have implications for future implementation efforts in school settings. Schools are a viable setting for health education; however, if educators are to be used as the implementers, various issues require attention. Educators' attitudes towards the prevention programme and their levels of comfort with the curriculum influence the quality of implementation, and it is of utmost importance that educator pre-implementation training workshops focus on strengthening educators' self-efficacy to implement the intervention with high quality.

- This study has shown that the current school curriculum requires reform. The inclusion of CDs and NCDs into the curriculum is highly recommended. Although most topics are covered in the curriculum, content appears to be neither in-depth nor taught/conveyed for a long-term effect. Educators require extensive professional development to be more confident in their delivery and response to specific health issues. Traditional homework does not include or endorse parental engagement. The content needs to be appropriately focused so that activities engage parents, rather than using the conventional approach of asking parents to sign off on completed homework.

9.2.2 Programme delivery

A range of strategies can be used by researchers and programme implementers to improve implementation. This can be done in the pre-implementation phase, the implementation phase, and at the post-implementation phase. The recommendations to support effective practices are organised accordingly.

9.2.2.1 Recommendations for pre-implementation phase

- Inform all stakeholders involved in programme implementation, including decision-makers, timeously about the programme. This ensures that issues such as time-frames, content, resources and training can be planned early.

- Assess the programmes' fit to the current needs and readiness, available resources, and capacity and capability within the organisation of implementation. Stakeholder consultation is vital to identify the crucial elements of the programme, as well as the components that require adaption to fit local needs and contexts.

- An OR evaluation is highly recommended to establish a supportive, organisational climate that promotes the discussion and resolution of implementation difficulties. An evaluation of the match between programme goals and the organisations' beliefs, values, policies, practices and philosophies should also be established. Organisational constructs that measure different variables can be used collectively on either an individual or collective effort; however, there should always be a qualitative aspect that collects additional data on facilitators and barriers.

- Ensure that implementers are equipped with adequate training so that they are knowledgeable, skilled, and confident in their ability to effectively implement the programme. Relevant training and up-skilling can be presented on professional development platforms.

9.2.2.2 Recommendations for the implementation phase

- Maintain a positive organisational atmosphere during implementation. For example, quality and quantity of communication, exchange of ideas, and professional growth. Regular engagement and consultation with implementers on an ongoing basis is vital to mend or

improve implementation issues immediately (e.g. time and scheduling constraints, and resources). This can be achieved by the provision of emotional and practical support to programme implementers.

- Evaluate both the intervention (outcomes) and the implementation system (processes), using comprehensive measures that are based on theoretical aspects of the programme. A process evaluation should be performed in conjunction with an outcome evaluation to ensure that research efforts are thoroughly assessed. This allows researchers to evaluate how best to optimise implementation quality in a real-world setting. As described in this thesis, quantitative and qualitative evaluation methods are both beneficial to monitor implementation quality.

- The programme's theory can be used to guide implementers' adaptions to local changes during implementation. Although implementers are encouraged to tailor programmes to the needs of the target population, these adaptions may unintentionally change critical aspects of the intervention, resulting in poor implementation and outcomes. For these reasons, implementers should detail changes made and the reasoning behind them. Evaluations should then link the implementation programme changes and outcomes to the programme theory. It is important for implementers to understand which intervention components are to be delivered exactly as developed, which can be adapted, and the different ways to adapt the programme.

9.2.2.3 Recommendations for post-implementation phase

- Information derived from the process and outcome evaluation can be utilised to inform decisions about the intervention and ways to improve its general quality and output. For example, implementer characteristics that affect the quality of programme delivery need to be examined. Implementer characteristics can be influenced by supervision and delivery formats.

- Provide feedback to researchers and implementers on the intervention and its implementation, barriers and facilitators that influence implementation quality, and requirements for future scaling-up efforts. Programme developers and implementers need to communicate and share problems and solutions encountered, which could be used to modify intervention material/content or to inform future evaluations.

9.3 FUTURE RESEARCH

- Longer-term studies are required to determine whether students and parents can maintain their positive improvements in knowledge, awareness, skills and behaviour. Longitudinal studies assessing the long-term benefits to the health of the study population are also required to build on the findings in this study to address various issues, such as sustainability. Furthermore, a more in-depth, qualitative study, evaluating acceptability of parents and their children that participated in the programme should also be explored.

- A combined CD and NCD prevention strategy requires further investigation. This research has shown that, although disease aetiologies differ, the overarching modalities used in addressing certain diseases can be overlapped. A combined strategy could reach more people in a holistic approach, benefitting service resources and reducing costs.

- Targeting the pre-adolescent age group shows promise, as knowledge is transferred and skills enhanced at a stage where they can comprehend information that could be relevant to their decision-making in the future.

- Inter-generational knowledge transfer from child to parent shows potential. Not only does this require further investigation, but it also necessitates the transformation of the current CAPS curriculum. The current syllabus can be strengthened by fostering parent engagement in textbooks and online syllabi. A comprehensive syllabus that requires parental participation has the potential for parents to reinforce learners' knowledge and learning, but it could also foster inter-generational knowledge transmission from child to parent. However, encouraging learner-parent engagement is, in itself, not enough. Another aspect worthy of inclusion in the curriculum is enhancing learner-parent communication skills.

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Appendices

Appendix 1: Plagiarism declaration form

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I KESHNI ARTHUR (Student number: 9703301R) am a student registered for the degree of DOCTOR OF PHILOSOPHY in the academic year 2020.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature: _____ Date: 18/04/2020

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Appendix 2: Scoping review - An example of the search terms of MEDLINE (via PubMed)

Example of search strategy in Pubmed

adolescent and parent school-based obesity intervention

(("adolescent"[MeSH Terms] OR "adolescent"[All Fields]) AND ("parents"[MeSH Terms] OR "parents"[All Fields] OR "parent"[All Fields]) AND school-based[All Fields] AND ("obesity"[MeSH Terms] OR "obesity"[All Fields]) AND ("methods"[MeSH Terms] OR "methods"[All Fields] OR "intervention"[All Fields])) AND ("loattrfull text"[sb] AND ("2007/01/01"[PDAT] : "2017/12/31"[PDAT]) AND "humans"[MeSH Terms] AND English[lang])

adolescent and parent school-based HIV intervention

(("adolescent"[MeSH Terms] OR "adolescent"[All Fields]) AND ("parents"[MeSH Terms] OR "parents"[All Fields] OR "parent"[All Fields]) AND school-based[All Fields] AND ("hiv"[MeSH Terms] OR "hiv"[All Fields]) AND ("methods"[MeSH Terms] OR "methods"[All Fields] OR "intervention"[All Fields])) AND ("loattrfull text"[sb] AND ("2007/01/01"[PDAT] : "2017/12/31"[PDAT]) AND "humans"[MeSH Terms] AND English[lang])

pre-adolescent HIV intervention

(pre-adolescent[All Fields] AND ("hiv"[MeSH Terms] OR "hiv"[All Fields]) AND ("methods"[MeSH Terms] OR "methods"[All Fields] OR "intervention"[All Fields])) AND ("loattrfull text"[sb] AND ("2007/01/01"[PDAT] : "2017/12/31"[PDAT]) AND "humans"[MeSH Terms] AND English[lang])

pre-adolescent obesity intervention

(pre-adolescent[All Fields] AND ("obesity"[MeSH Terms] OR "obesity"[All Fields]) AND ("methods"[MeSH Terms] OR "methods"[All Fields] OR "intervention"[All Fields])) AND ("loattrfull text"[sb] AND ("2007/01/01"[PDAT] : "2017/12/31"[PDAT]) AND "humans"[MeSH Terms] AND English[lang])

pre-adolescent HIV intervention

(pre-adolescent[All Fields] AND ("hiv"[MeSH Terms] OR "hiv"[All Fields]) AND ("methods"[MeSH Terms] OR "methods"[All Fields] OR "intervention"[All Fields])) AND ("loattrfull text"[sb] AND ("2007/01/01"[PDAT] : "2017/12/31"[PDAT]) AND "humans"[MeSH Terms] AND English[lang])

Appendix 3: Scoping review - PRISMA-ScR Checklist

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	05
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	05-06
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	05-06
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	05-06
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	05-06
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	05-06
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	05-06
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	05-06
Data charting process	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	05-06
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Click here to enter text. 05-06

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	N/A
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	7-9
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	7-9
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	7-9
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	7-9
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	7-9
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	7-9
Limitations	20	Discuss the limitations of the scoping review process.	N/A
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	7-9
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	N/A

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

Appendix 4: Information sheet for educator

INFORMATION SHEET FOR EDUCATORS

Addressing the double burden of disease through a pre-adolescent transdisciplinary intervention for inter-generational outcomes

I am Keshni Arthur from the Department of Public Health at the University of the Witwatersrand. I am doing research on informing pre-adolescents and their parent/s about the health risks of HIV and obesity. Research is just the process to learn the answer to a question. In this study, I want to learn about a transdisciplinary intervention targeted at Grade 6 learners and their parent/s and how this can be used to decrease the risk of communicable and non-communicable disease. I hope to assist both learners and their parent/s in improving the current health situations. The study will require implementation of the health education intervention at schools. It is, therefore, necessary to assess whether there is organisational readiness at the selected schools prior to implementation and that is why I would like to get your views.

This requires a 15-minute interview process. You will be expected to answer questions about the readiness of the school and the team that works here. There are no right or wrong answers. I will not judge you or tell you that you are wrong. I am just interested in your opinions about certain issues.

There are no risks of being involved in the study. There are also no benefits or consequences of you participating in this study. You will be given important information on the study while involved in the research and after the results are available.

Participation is voluntary. If you refuse to participate there will be no problems for you at school. You may also discontinue participation at any time.

There will be strict confidentiality and the information obtained in the study will be used for research purposes only. I will not use your name anywhere in the research. Efforts will be made to keep personal information confidential.

For further information or reporting of study related problems please contact:

The Principal Researcher:
Keshni Arthur
Student
083 337 7668
kesh@karthurhmc.co.za

Supervisors of the Research:
Prof. Gill Nelson
Lecturer at Wits University
011-7172138
Gill.nelson@wits.ac.za

Prof. Nicola Christofides
Lecturer at Wits University
011-7171566
Nicola.christofides@wits.ac.za

The Human Research Ethics Committee are:
Prof. C. Penny
Chair of Human Research Ethics Committee
011-7171252
HREC-medical.researchoffice@wits.ac.za

Appendix 5: Consent form for educator

CONSENT FORM FOR EDUCATOR ORGANISATIONAL READINESS SURVEY

Title of project: Addressing the double burden of disease through a pre-adolescent transdisciplinary intervention for inter-generational outcomes

Name of researcher: Keshni Arthur

I (Your name) _____ agree to participate in this research project. The research has been explained to me and I understand what my participation will involve.

(PLEASE TICK THE CORRECT BOX.)

I agree that my participation will remain anonymous.

YES	NO

I agree that the researcher may use anonymous quotes in her research report.

YES	NO

_____
Signature

_____
Name of participant

_____
Date

Appendix 6: Consent form for observation at school

Information Sheet to conduct observations at the school

Dear Sir/Madam

I am Keshni Arthur from the Department of Public Health at the University of the Witwatersrand. I am conducting research a transdisciplinary intervention targeted at Grade 6 learners and their parent/s and how this can be used to decrease the risk of communicable and non-communicable disease. I hope to assist both learners and their parent/s in improving the current health situations. The study will require implementation of the health education intervention at schools. I will, therefore, be visiting your school over the next two terms for the purpose of learning more about the intervention targeted at Grade 6 learners and their parent/s.

I hereby seek permission to be present during the Grade 6 Life Skills lessons being taught at school. I will not interfere with the lesson being taught and will informally interview the teacher/s after the lessons. I will be present during the lesson and will be making written notes on my observations. All observations will only note the educators or children by codes to guard their confidentiality. The lesson and informal interviews with teachers will be audio recorded.

Please note that:
1. Participation is strictly voluntary. Educators can refuse to answer any questions that he/she does not wish to answer
2. The information gathered will not affect grades or any other evaluations made by the teacher of this course.
3. The information gathered will be confidential. Student and teacher names or any other identifying factors will be removed from any report or publication of the data or results.
4. You may opt out of the project at any time and for any reason that you deem necessary with no repercussions if you give written notice to the researcher.

For further information or reporting of study related problems please contact:

The Principal Researcher:
Keshni Arthur
Student
083 337 7668
kesh@karthurhmc.co.za

Supervisors of the Research:
Prof. Gill Nelson
Lecturer at Wits University
011-7172138
Gill.nelson@wits.ac.za

Prof. Nicola Christofides
Lecturer at Wits University
011-7171566
Nicola.christofides@wits.ac.za

The Human Research Ethics Committee
Prof. C. Penny
Chair of Human Research Ethics Committee
011-7171252
HREC-medical.researchoffice@wits.ac.za

CONSENT FORM FOR OBSERVATIONS AT THE SCHOOL

Title of project: Addressing the double burden of disease through a pre-adolescent transdisciplinary intervention for inter-generational outcomes

Name of researcher: Keshni Arthur

I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree for my school to participate in this study. I have been given a copy of this consent form. Please sign below to grant permission for the educators and Grade 6 learners at your school to participate in the research. The researcher will be allowed into the lessons as an observer and is allowed to take notes. The researcher is also allowed to audio tape conversations with selected participants.

I (Your name) _____ agree, for my school to participate in this research project.

(PLEASE TICK THE CORRECT BOX.)

I agree that the researcher will observe and conduct informal discussions with educators and Grade 6 learners.

YES	NO

I agree that the researcher may use anonymous quotes in her research report.

YES	NO

_____
Signature of Principal

_____
Name of Principal

_____
Date

Appendix 7: Consent form for educators to be audio-recorded

CONSENT FORM FOR EDUCATORS TO BE AUDIO-RECORDED

Title of project : Addressing the double burden of disease through a pre-adolescent transdisciplinary intervention for inter-generational outcomes

Name of researcher : Keshni Arthur

I_____ agree to participate in this research project. The research has been explained to me and I understand what my participation will involve.

(PLEASE CIRCLE)

I agree that my participation will remain anonymous

YES NO

I agree that the researcher may use anonymous quotes in her research report

YES NO

I agree that the interview may be audio-recorded

YES NO

_____

Signature

_____

Name of participant

_____

Date

Appendix 8: Organisational readiness questionnaire for educator

INSTRUCTIONS

- This is a questionnaire to measure the organisational readiness of your school to implement the CIRCLE of Life Program.
- Please note that there are no right or wrong answers. Please be honest. All answers will remain confidential.
- Tick the correct boxes. Please also add in your comments when asked to elaborate.
- If you would like to change an answer, please put a strike through the incorrect answer and re-tick the correct answer.
- This questionnaire should take you about 10 minutes to complete.
- Please answer all questions.

A. Demographic Profile This section is about yourself and your teaching history.		
A1	Interviewee Code	
A2	Date of Interview	
A3	School	
A4	Your position at this school:	
A5	How long have you been teaching at this school?	
A6	How long have you been teaching?	
A7	Your highest level of education:	
A8	Your age:	
A9	Your sex:	

B. Health Status of School
The following questions are about the general health of learners at this school.

B1	In your opinion to what extent does the health and lifestyle of a child affect learning in the classroom? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all
B2	To what extent are disease-related problems seen at this school? *(disease-related means HIV, TB, asthma, diabetes, obesity, malnutrition etc.)* ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all
B3	Please list some of the disease-related problems (e.g. HIV, obesity, malnutrition, diabetes, etc.) that the learners at this school possibly present with?

B4	Your response to B3 above, is based on (choose all appropriate): ☐ Medical sick notes ☐ Parents notifying you ☐ Absenteeism rates in classes ☐ Your own, family and teaching experiences ☐ Performance in classes, tests and exams ☐ Other (please state): _____
B5	To what extent is high-risk behaviour (e.g. smoking, alcohol, drugs, etc.) a problem among learners at this school? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all
B6	To what extent is obesity a problem among learners at this school? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all
B7	In your opinion, to what extent are learners physically active at this school? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all

C. Focus of the Program

These questions are about the CIRCLE of Life Initiative.

C1	In your opinion to what extent are health programs such as the CIRCLE of Life needed at schools? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____
C2	To what extent was there **communication** with staff regarding the CIRCLE of Life Initiative? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all

C3	To what extent was there **consultation** with staff about the CIRCLE of Life Initiative? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all
C4	In your opinion to what extent do all staff understand the objectives and goals of the program? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____
C5	In your opinion to what extent are these objectives and goals achievable? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____
C6	In your opinion to what extent will the CIRCLE of Life Initiative influence behaviour change in **learners**? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____
C7	In your opinion to what extent will the CIRCLE of Life Initiative influence behaviour change in **parents**? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____
C8	In your opinion to what extent will other staff members at this school think that the CIRCLE of Life Initiative is important? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____

C9	In your opinion to what extent will this school implement the CIRCLE of Life Initiative effectively? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____
C10	In your opinion to what extent will the CIRCLE of Life Initiative be a top priority at this school? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____

D. Educational Support for Implementation of the Program

These questions are about training for the CIRCLE of Life Initiative.

D1	How confident are you that teachers will receive the relevant training and support to enable them to fulfil the activities of the CIRCLE of Life Initiative? ☐ Extremely confident ☐ Very confident ☐ Moderately confident ☐ Slightly confident ☐ Not at all
D2	How confident are you that teachers will receive the relevant training material and notes to enable them to fulfil any of the activities with the CIRCLE of Life Initiative? ☐ Extremely confident ☐ Very confident ☐ Moderately confident ☐ Slightly confident ☐ Not at all

E. Recognition for Implementation of Program

These questions are about recognition for implementing the CIRCLE of Life Initiative.

E1	In your opinion to what extent will the staff that implement the program be seen as health specialists? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all

E2	In your opinion to what extent will the staff that implement the program be held in high esteem in this school? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all
E3	In your opinion to what extent will the staff that implement the program be more likely promoted in rank? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all

F. Rewards for Implementation of the Program

These questions are about being rewarded for implementing the CIRCLE of Life Initiative.

F1	How would this program impact on you and the school (choose all relevant responses)? ☐ Increase work load for teachers ☐ Increase monitoring and evaluation for teachers ☐ Increase parent interaction ☐ Reduce absenteeism at school ☐ Benefit the learners ☐ Benefit teachers ☐ Benefit parents ☐ Benefit the community ☐ No impact at all ☐ Other: (State)_____

G. Openness of Teaching Staff

These questions are about the openness of teaching staff.

G1	In your opinion to what extent are staff at this school adaptable to change? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____

G2	In your opinion to what extent are staff at this school flexible to change? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____
G3	In your opinion to what extent are staff at this school open to new ideas? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all (State why)_____
G4	In your opinion to what extent are staff at this school concerned about the health of learners? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all
G5	In your opinion to what extent are staff at this school concerned about the health of the community? ☐ To a very great extent ☐ To a great extent ☐ To a moderate extent ☐ To a slight extent ☐ Not at all

H. Preparation for Change

These questions are about the openness of teaching staff to change. Please read the following statements and indicate whether you agree, somewhat agree, neither agree nor disagree, somewhat disagree or disagree with them.

H1	The CIRCLE of Life Initiative program is well planned for the school environment. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____

H2	The staff will want to implement such a change. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____
H3	The staff will do whatever it takes to implement this program. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____
H4	The staff will be determined to implement this program. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____
H5	The staff in this school will be motivated to implement this program. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____
H6	The teachers who work here will be committed to implementing the program. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____
H7	The staff will coordinate tasks so that implementation goes smoothly. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____
H8	The staff will keep track of progress when implementing this program. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____

H9	The staff can handle the challenges that might arise from implementing this change. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____
H10	The teachers who work here feel confident that the school can get the learners invested in implementing this program. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____
H11	The staff can support learners and parents as they adjust to the change in this program. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____
H12	The staff can manage the politics of implementing this change. ☐ Agree ☐ Somewhat Agree ☐ Neither Agree nor Disagree ☐ Somewhat Disagree ☐ Disagree (State why)_____

I. General

Please give me your opinion on the questions that follow.

I1	How would you recommend that the researcher get the staff involved and motivated to successfully carry out the implementation? Please elaborate.
I2	Do you foresee any problems (such as culture, policy, procedures, resources and structure) in the implementation of this program? Please elaborate.

I3	What do you think will be critical to the success of the program? Please elaborate.
I4	What do you think could limit the success of the program? Please elaborate.
I5	What further consultation or communication would you like to have from the researcher?
I6	Do you have any other comments, questions or concerns?

Thank you.

Appendix 9: Organisational readiness interview schedule (educator focus groups)

ORGANISATIONAL READINESS INTERVIEW SCHEDULE (FOCUS GROUPS)

A. Demographic Profile

Interviewee Code	
School	
Relationship with School	
Occupation	
Gender	
Age	

B. Health Status of School and Community

a. What in your opinion is the state of diseases impacting: -

i. Learners in this school;
ii. Parents and guardians;
iii. The community.

(Probe – why do participants say so, how do they know this)

b. What are some of the problems/issues facing this school environment with regards to disease?

C. Health Programme Intervention (Vision for Change)

a. To what extent is change to the life orientation curriculum needed?
b. What are the reasons why this change to the life orientation curriculum is needed?

We are planning to implement an intervention called Vision for Change to the Grade 6 Life Orientation Curriculum. The content of the curriculum will include enhancing learners understanding of common health issues in South Africa such as HIV, TB, and obesity.

b. What contribution/s could the new programme make to learners?

c. What contribution/s could the new programme bring to the parents of learners?

D. Organizational Design

a. How will the change affect the teachers in this school, if at all?

E. Preparation for Change

a. How confident are you that the people who work at this school will be able to implement the programme and achieve the desired outcomes?

b. What barriers might there be to implementation of this intervention?
(Probe: culture, policies, procedures, resources and structure)

F. Internal/external events

a. To what extent have previous change initiatives achieved their objectives? (Probe further)

G. Additional Questions

a. What has helped change projects to be successful at this school?

b. What has limited the success of change projects Implemented in this school?

c. What do you think will be critical to the success of the planned health promotion intervention?

d. What do you think could limit the success of the planned health promotion intervention?

Appendix 10: Checklist and logbook for educator

1. Adherence			
	Yes	**No**	**Comments/Observations**
a. Program delivered as planned			
b. Program Content			
Knowledge			
Attitudes			
Values			

Norms			
Skills			
Program Activities			
2. Program Pedagogy			
Facilitators skills			

Credentials			
Preparedness			
Enthusiasm			
Attitude			
3. Implementation			
Program exposure			

Program dosage			
Amount material received			
Participant responsiveness			
Program differentiation			
Valence of adaptation			

4. General

Appendix 11: Observation form for researcher

1. Adherence			
	Yes	**No**	**Comments/Observations**
a. Program delivered as planned			
b. Program Content			
Knowledge			
Attitudes			
Values			

Norms			
Skills			
Program Activities			
2. Program Pedagogy			
Facilitators skills			

Credentials			
Preparedness			
Enthusiasm			
Attitude			
3. Implementation			
Program exposure			

Program dosage			
Amount material received			
Participant responsiveness			
Program differentiation			
Valence of adaptation			

4. General			

Appendix 12: Pre-test questionnaire for grade 6 learner

GRADE 6 QUESTIONNAIRE
INSTRUCTIONS

- This is a questionnaire about you and your family and must be answered only if you are in grade 6.
- Please note that there are no right or wrong answers. Please be honest. All answers will remain confidential.
- Tick the correct boxes. Please also add in your comments when asked.
- If you would like to change an answer, please cross out the incorrect answer and tick the correct answer.
- This questionnaire should take you about 15 minutes to complete.
- Please answer all questions.

P1	Interviewee Code	
P2	Date of Interview	
P3	School of Learner	



A. About You

These questions are about you.



A1	Are you a boy or girl? ☐ Boy ☐ Girl
A2	How old are you? ☐ 10 years or younger ☐ 11 years ☐ 12 years ☐ 13 years ☐ 14 years or older
A3	Who do you live with? *(You can tick more than one answer)* ☐ Mother ☐ Father ☐ Brothers/sisters ☐ Grandparents ☐ Aunt/uncle ☐ Orphanage ☐ If any other guardian, please state: _____
A4	Where do you live? ☐ Westonaria ☐ Simunye ☐ Bekkersdal ☐ Waterpan ☐ Libanon ☐ Venterspost ☐ Hillshaven ☐ Glenharvie ☐ If any other place, please state: _____

A5	On most days, how do you get to school? ☐ Walk ☐ Car ☐ Taxi ☐ Bus ☐ Any other way, please state: _____
A6	On most days, how long does it take you to get to school? ☐ 5 - 20 minutes ☐ 21 - 40 minutes ☐ 41 - 60 minutes ☐ More than one hour ☐ Don't know



B. HIV/AIDS

These questions are about HIV/AIDS.

B1	Do you know what HIV is? ☐ Yes ☐ No ☐ Unsure
B2	Do you know what AIDS is? ☐ Yes ☐ No ☐ Unsure
B3	Is HIV and AIDS the same thing? ☐ Yes ☐ No ☐ Unsure
B4	Does a germ cause HIV? ☐ Yes ☐ No ☐ Unsure
B5	Can a person get HIV from touching the body fluids (e.g. blood) of a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B6	Can a person get HIV from shaking the hand of a person who has HIV? ☐ Yes ☐ No ☐ Unsure

B7	Can someone get HIV from sharing a glass of water with a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B8	Can HIV be transmitted from a pregnant mother to her unborn baby during pregnancy? ☐ Yes ☐ No ☐ Unsure
B9	Can HIV be transmitted from a mother to her baby whom she breast-feeds? ☐ Yes ☐ No ☐ Unsure
B10	Does HIV affect people of all ages? ☐ Yes ☐ No ☐ Unsure
B11	Is it possible for a healthy looking person to be HIV-positive? ☐ Yes ☐ No ☐ Unsure
B12	Is there medication to treat HIV? ☐ Yes ☐ No ☐ Unsure
B13	Can medication completely heal a person with HIV? ☐ Yes ☐ No ☐ Unsure
B14	Can HIV be prevented? ☐ Yes ☐ No ☐ Unsure
B15	Do you think that you could get HIV? ☐ Yes ☐ No ☐ Unsure

B16	If a family member has HIV would you want to keep it a secret? ☐ Yes ☐ No ☐ Unsure
B17	If a family member has HIV would you be willing to care for them in your home? ☐ Yes ☐ No ☐ Unsure
B18	Do people in your community stay away from people who have HIV? ☐ Yes ☐ No ☐ Unsure
B19	Do you know where a person can go to get tested for HIV? ☐ Yes ☐ No ☐ Unsure
B20	Have you ever had a test done to check if you have HIV? ☐ Yes ☐ No ☐ Unsure
B21	Have you ever been taught about AIDS or HIV infection at school? ☐ Yes ☐ No ☐ Unsure

C. Obesity

These questions are about how you feel about your weight.



C1	Do you know what obesity is? ☐ Yes ☐ No ☐ Unsure
C2	How would you describe your weight? ☐ Underweight ☐ Slightly underweight ☐ About the right weight ☐ Slightly overweight ☐ Overweight

C3	Are you happy with your weight? ☐ Yes ☐ No ☐ Unsure
C4	How important is **<u>what you weigh</u>** to your health? ☐ Very important ☐ Important ☐ Neutral ☐ Slightly important ☐ Not important
C5	Do you know what a Body Mass Index (BMI) is? ☐ Yes ☐ No ☐ Unsure
C6	Do you know how to calculate your Body Mass Index (BMI)? ☐ Yes ☐ No ☐ Unsure



D. Nutrition

These questions are about the food that you eat.

D1	Is the type of foods that you eat good for your body and wellness? ☐ Yes ☐ No ☐ Unsure
D2	In the past week (7 days), how often did you eat salt or salty foods, such as fried chips? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D3	In the past week (7 days), how often did you eat sugar or sugary foods, such as sweets and cakes? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure

D4	In the past week (7 days), how often did you eat fresh fruit and vegetables? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D5	In the past week (7 days), how often did you eat fast foods like KFC or Vetkoek from the street vendors? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D6	In the past week (7 days), how many glasses of fizzy drinks (e.g. Coke) did you drink? ☐ 8 glasses or more ☐ 5 - 7 glasses ☐ 1 - 4 glasses ☐ None ☐ Unsure
D7	In the past week (7 days), how many glasses of fruit juice did you drink? ☐ 8 glasses or more ☐ 5 - 7 glasses ☐ 1 - 4 glasses ☐ None ☐ Unsure
D8	In the past week (7 days), how often did your family sit down and eat a meal together? ☐ Every day ☐ 4-6 days ☐ 2-3 days ☐ Once in the past 7 days ☐ Never in the past 7 days
D9	How many glasses of water do you usually **drink in a day**? ☐ 8 glasses or more ☐ 5 - 7 glasses ☐ 1 - 4 glasses ☐ None ☐ Unsure

D10	How important is **<u>what you eat</u>** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D11	How important is **<u>how much you eat</u>** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D12	Do you know what a food label is? ☐ Yes ☐ No ☐ Unsure
D13	Do you understand food labels? ☐ Yes ☐ No ☐ Unsure
D 14	Have you ever been taught about healthy eating at school? ☐ Yes ☐ No ☐ Unsure

E. Physical Activity

These questions are about exercise in your life.



E1	In the past week (7 days), how many hours in total did you spend watching TV? ☐ 5 or more hours in a day ☐ 3-4 hours in a day ☐ 1-2 hours in a day ☐ Less than 1 hour, in a day ☐ None ☐ Unsure
E2	In the past week (7 days), how much time did you spend doing exercise such as running and playing sport? ☐ 5 or more hours ☐ 3-4 hours ☐ 1-2 hours ☐ Less than 1 hour ☐ None ☐ Unsure

E3	How important is **how much you exercise** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
E4	How many hours of exercise do you think an **ADULT** should get in a week? ☐ 6 or more hours in a week ☐ 4-5 hours in a week ☐ 2-3 hours in a week ☐ 1 hour in a week ☐ Unsure
E5	How many hours of exercise do you think a **CHILD** should get in a week? ☐ 6 or more hours in a week ☐ 4-5 hours in a week ☐ 2-3 hours in a week ☐ 1 hour in a week ☐ Unsure
E6	Do you know what a pulse rate is? ☐ Yes ☐ No ☐ Unsure
E7	Do you know how to measure your pulse rate? ☐ Yes ☐ No ☐ Unsure



F. Lifestyle

These questions are about alcohol and cigarette smoking.

F1	Does anyone that you live with, drink alcohol? *(You can tick more than one answer)* ☐ None of them drink alcohol ☐ Mother ☐ Father ☐ Sister/Brother ☐ Grandparent ☐ Aunt/uncle ☐ Guardian ☐ If any other person, please state: _____

F2	During the past month (30 days), how many times have **you** tasted or drunk alcohol? ☐ Every day ☐ A few times every week ☐ Only a few times during the entire month ☐ Only once in the past month ☐ Never
F3	Does anyone that you live with, smoke cigarettes? *(You can tick more than one answer)* ☐ None of them smoke cigarettes ☐ Mother ☐ Father ☐ Sister/Brother ☐ Grandparent ☐ Aunt/uncle ☐ Guardian ☐ If any other person, please state: _____
F4	During the past month (30 days), how many times have **you** smoked cigarettes? ☐ Every day ☐ A few times every week ☐ Only a few times during the entire month ☐ Only once in the past month ☐ Never

G. Communication

These questions are about communication between you and your parent/guardian.

G1	In the past week (7 days), how often did you talk to your parents/guardian about school and your lessons? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once ☐ Never
G2	In the past week (7 days), how often did you ask your parents/guardian for help with your school homework? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once ☐ Never

G3	How often do you tell your parents/guardian the truth, if they ask about what you did in your free time? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G4	How often do you tell your parents/guardians the truth, if they ask about your relationships with friends or boyfriends and girlfriends? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G5	How often do you go to your parents/guardians for advice on any issues about growing up? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G6	How often do you ask your parents/guardians questions about your body? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G7	How often do you feel that you can talk to your parents/guardians about your problems? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G8	How easy is it to talk to your parents/guardian about HIV and AIDS? ☐ Very easy ☐ Easy ☐ Neutral ☐ Difficult ☐ Very difficult

H. General

These questions are about health information and its use.

H1	If you learnt about good health at school, would you share this information with your parents? ☐ Yes ☐ No ☐ Unsure
H2	If you learnt about health issues at school, would you use this information to change the way you live and do things? ☐ Yes ☐ No ☐ Unsure
H3	Is there anything that you would like to add about any of the topics or questions that were asked?

Thank you for your time. Some of these questions may have been difficult for you to answer, but we have to ask them if we are to understand factors that influence one's intention to lead a healthy life. By sharing this personal information with me you are helping me with my research and that will in the end help many other people. ***Thank you.***



Appendix 13: Post-test questionnaire for grade 6 learner

GRADE 6 POST- QUESTIONNAIRE
INSTRUCTIONS

- This is a questionnaire about you and your family and must be answered only if you are in grade 6.
- Please note that there are no right or wrong answers. Please be honest. All answers will remain confidential.
- Tick the correct boxes. Please also add in your comments when asked.
- If you would like to change an answer, please cross out the incorrect answer and tick the correct answer.
- This questionnaire should take you about 15 minutes to complete.
- Please answer all questions.

P1	Interviewee Code	
P2	Date of Interview	
P3	School of Learner	

A. About You

These questions are about you.

A1	Are you a boy or girl? ☐ Boy ☐ Girl
A3	Who do you live with? *(You can tick more than one answer)* ☐ Mother ☐ Father ☐ Brothers/sisters ☐ Grandparents ☐ Aunt/uncle ☐ Orphanage ☐ If any other guardian, please state: _____



B. HIV/AIDS

These questions are about HIV/AIDS.

B1	Do you know what HIV is? ☐ Yes ☐ No ☐ Unsure
B2	Do you know what AIDS is? ☐ Yes ☐ No ☐ Unsure

B3	Is HIV and AIDS the same thing? ☐ Yes ☐ No ☐ Unsure
B4	Does a germ cause HIV? ☐ Yes ☐ No ☐ Unsure
B5	Can a person get HIV from touching the body fluids (e.g. blood) of a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B6	Can a person get HIV from shaking the hand of a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B7	Can someone get HIV from sharing a glass of water with a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B8	Can HIV be transmitted from a pregnant mother to her unborn baby during pregnancy? ☐ Yes ☐ No ☐ Unsure
B9	Can HIV be transmitted from a mother to her baby whom she breast-feeds? ☐ Yes ☐ No ☐ Unsure
B10	Does HIV affect people of all ages? ☐ Yes ☐ No ☐ Unsure
B11	Is it possible for a healthy looking person to be HIV-positive? ☐ Yes ☐ No ☐ Unsure

B12	Is there medication to treat HIV? ☐ Yes ☐ No ☐ Unsure
B13	Can medication completely heal a person with HIV? ☐ Yes ☐ No ☐ Unsure
B14	Can HIV be prevented? ☐ Yes ☐ No ☐ Unsure
B15	Do you think that you could get HIV? ☐ Yes ☐ No ☐ Unsure
B16	If a family member has HIV would you want to keep it a secret? ☐ Yes ☐ No ☐ Unsure
B17	If a family member has HIV would you be willing to care for them in your home? ☐ Yes ☐ No ☐ Unsure
B18	Do people in your community stay away from people who have HIV? ☐ Yes ☐ No ☐ Unsure
B19	Do you know where a person can go to get tested for HIV? ☐ Yes ☐ No ☐ Unsure
B20	Have you ever had a test done to check if you have HIV? ☐ Yes ☐ No ☐ Unsure

B21	Have you ever been taught about AIDS or HIV infection at school? ☐ Yes ☐ No ☐ Unsure

C. Obesity

These questions are about how you feel about your weight.

C1	Do you know what obesity is? ☐ Yes ☐ No ☐ Unsure
C2	How would you describe your weight? ☐ Underweight ☐ Slightly underweight ☐ About the right weight ☐ Slightly overweight ☐ Overweight
C3	Are you happy with your weight? ☐ Yes ☐ No ☐ Unsure
C4	How important is **<u>what you weigh</u>** to your health? ☐ Very important ☐ Important ☐ Neutral ☐ Slightly important ☐ Not important
C5	Do you know what a Body Mass Index (BMI) is? ☐ Yes ☐ No ☐ Unsure
C6	Do you know how to calculate your Body Mass Index (BMI)? ☐ Yes ☐ No ☐ Unsure

D. Nutrition

These questions are about the food that you eat.

D1	Is the type of foods that you eat good for your body and wellness? ☐ Yes ☐ No ☐ Unsure
D2	In the past week (7 days), how often did you eat salt or salty foods, such as fried chips? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D3	In the past week (7 days), how often did you eat sugar or sugary foods, such as sweets and cakes? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D4	In the past week (7 days), how often did you eat fresh fruit and vegetables? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D5	In the past week (7 days), how often did you eat fast foods like KFC or Vetkoek from the street vendors? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D6	In the past week (7 days), how many glasses of fizzy drinks (e.g. Coke) did you drink? ☐ 8 glasses or more ☐ 5 - 7 glasses ☐ 1 - 4 glasses ☐ None ☐ Unsure

D7	In the past week (7 days), how many glasses of fruit juice did you drink? ☐ 8 glasses or more ☐ 5 - 7 glasses ☐ 1 - 4 glasses ☐ None ☐ Unsure
D8	In the past week (7 days), how often did your family sit down and eat a meal together? ☐ Every day ☐ 4-6 days ☐ 2-3 days ☐ Once in the past 7 days ☐ Never in the past 7 days
D9	How many glasses of water do you usually **drink in a day**? ☐ 8 glasses or more ☐ 5 - 7 glasses ☐ 1 - 4 glasses ☐ None ☐ Unsure
D10	How important is **what you eat** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D11	How important is **how much you eat** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D12	Do you know what a food label is? ☐ Yes ☐ No ☐ Unsure
D13	Do you understand food labels? ☐ Yes ☐ No ☐ Unsure
D 14	Have you ever been taught about healthy eating at school? ☐ Yes ☐ No ☐ Unsure

E. Physical Activity

These questions are about exercise in your life.

E1	In the past week (7 days), how many hours in total did you spend watching TV? ☐ 5 or more hours in a day ☐ 3-4 hours in a day ☐ 1-2 hours in a day ☐ Less than 1 hour, in a day ☐ None ☐ Unsure
E2	In the past week (7 days), how much time did you spend doing exercise such as running and playing sport? ☐ 5 or more hours ☐ 3-4 hours ☐ 1-2 hours ☐ Less than 1 hour ☐ None ☐ Unsure
E3	How important is **how much you exercise** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
E4	How many hours of exercise do you think an **ADULT** should get in a week? ☐ 6 or more hours in a week ☐ 4-5 hours in a week ☐ 2-3 hours in a week ☐ 1 hour in a week ☐ Unsure
E5	How many hours of exercise do you think a **CHILD** should get in a week? ☐ 6 or more hours in a week ☐ 4-5 hours in a week ☐ 2-3 hours in a week ☐ 1 hour in a week ☐ Unsure
E6	Do you know what a pulse rate is? ☐ Yes ☐ No ☐ Unsure
E7	Do you know how to measure your pulse rate? ☐ Yes ☐ No ☐ Unsure

F. Lifestyle

These questions are about alcohol and cigarette smoking.

F1	Does anyone that you live with, drink alcohol? *(You can tick more than one answer)* ☐ None of them drink alcohol ☐ Mother ☐ Father ☐ Sister/Brother ☐ Grandparent ☐ Aunt/uncle ☐ Guardian ☐ If any other person, please state: _____
F2	During the past month (30 days), how many times have **you** tasted or drunk alcohol? ☐ Every day ☐ A few times every week ☐ Only a few times during the entire month ☐ Only once in the past month ☐ Never
F3	Does anyone that you live with, smoke cigarettes? *(You can tick more than one answer)* ☐ None of them smoke cigarettes ☐ Mother ☐ Father ☐ Sister/Brother ☐ Grandparent ☐ Aunt/uncle ☐ Guardian ☐ If any other person, please state: _____
F4	During the past month (30 days), how many times have **you** smoked cigarettes? ☐ Every day ☐ A few times every week ☐ Only a few times during the entire month ☐ Only once in the past month ☐ Never

G. Communication

These questions are about communication between you and your parent/guardian.

G1	In the past week (7 days), how often did you talk to your parents/guardian about school and your lessons? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once ☐ Never

G2	In the past week (7 days), how often did you ask your parents/guardian for help with your school homework? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once ☐ Never
G3	How often do you tell your parents/guardian the truth, if they ask about what you did in your free time? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G4	How often do you tell your parents/guardians the truth, if they ask about your relationships with friends or boyfriends and girlfriends? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G5	How often do you go to your parents/guardians for advice on any issues about growing up? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G6	How often do you ask your parents/guardians questions about your body? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G7	How often do you feel that you can talk to your parents/guardians about your problems? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never

G8	How easy is it to talk to your parents/guardian about HIV and AIDS? ☐ Very easy ☐ Easy ☐ Neutral ☐ Difficult ☐ Very difficult

H. General

These questions are about health information and its use.

H1	If you learnt about good health at school, would you share this information with your parents? ☐ Yes ☐ No ☐ Unsure
H2	If you learnt about health issues at school, would you use this information to change the way you live and do things? ☐ Yes ☐ No ☐ Unsure
H3	Is there anything that you would like to add about any of the topics or questions that were asked?
H4	What did you like about the Circle of Life Program that was run at your school?

H5	What did you not like about the Circle of Life Program that was run at your school?
H6	Is there anything else that you would like to see in the Circle of Life Program?

Thank you for your time. Some of these questions may have been difficult for you to answer, but we have to ask them if we are to understand factors that influence one's intention to lead a healthy life. By sharing this personal information with me you are helping me with my research and that will in the end help many other people. ***Thank you.***

Appendix 14: Pre-test questionnaire for parent

PARENT QUESTIONNAIRE
INSTRUCTIONS

- This is a questionnaire about you and your family and must be answered only if you are the parent or guardian of a grade 6 child.
- Please note that there are no right or wrong answers. Please be honest. All answers will remain confidential.
- Tick the correct boxes. Please also add in your comments when asked.
- If you would like to change an answer, please cross out the incorrect answer and tick the correct answer.
- This questionnaire should take you about 15 minutes to complete.
- Please answer all questions.

P1	Interviewee Code	
P2	Date	
P3	School of Learner	

A. About You
These questions are about you and your partner.



A1	What is your relationship to the Grade 6 child? ☐ Mother ☐ Father ☐ Grandparent ☐ Aunt/uncle ☐ Sister/brother ☐ Any other Guardian relationship, please state: _____
A2	How old are you? _____
A3	Are you male or female? _____
A4	Where do you live? ☐ Westonaria ☐ Simunye ☐ Bekkersdal ☐ Waterpan ☐ Libanon ☐ Venterspost ☐ Hillshaven ☐ Glenharvie ☐ Any other place, please state: _____

A5	What is your highest level of education? ☐ Primary school ☐ High school ☐ Matric ☐ Diploma ☐ University degree ☐ Any other qualification, please state: _____
A6	What is your spouse's highest level of education? *(Ignore this question if you are a single parent/guardian)* ☐ Primary school ☐ High school ☐ Matric ☐ Diploma ☐ University degree ☐ Any other qualification, please state: _____
A7	Are you currently employed? ☐ Yes ☐ No
A8	If you are employed, please state your occupation: _____
A9	If you are unemployed, how have you been earning money in the past 6 months, to support your family and yourself? _____ _____
A10	Is your spouse currently employed? *(Ignore this question if you are a single parent/guardian)* ☐ Yes ☐ No
A11	If your spouse is employed, please state their occupation: _____
A12	Do you receive any of the following grants? *(Please tick all that apply to you)* ☐ Child grant ☐ Foster child grant ☐ Disability grant ☐ Old age pension ☐ Any other grant, please state: _____
A13	Do you own a cellphone? ☐ Yes ☐ No

A14	If you would like to receive **free** health messages on your cell phone please provide your cell number/s. **Cell No:** _____



B. HIV/AIDS

These questions are about HIV/AIDS.

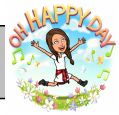
B1	Do you know what HIV is? ☐ Yes ☐ No ☐ Unsure
B2	Do you know what AIDS is? ☐ Yes ☐ No ☐ Unsure
B3	Is HIV and AIDS the same thing? ☐ Yes ☐ No ☐ Unsure
B4	Does a germ cause HIV? ☐ Yes ☐ No ☐ Unsure
B5	Can a person get HIV from touching the body fluids (e.g. blood) of a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B6	Can a person get HIV from shaking the hand of a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B7	Can someone get HIV from sharing a glass of water with a person who has HIV? ☐ Yes ☐ No ☐ Unsure

B8	Can HIV be transmitted from a pregnant mother to her unborn baby during pregnancy? ☐ Yes ☐ No ☐ Unsure
B9	Can HIV be transmitted from a mother to her baby whom she breast-feeds? ☐ Yes ☐ No ☐ Unsure
B10	Does HIV affect people of all ages? ☐ Yes ☐ No ☐ Unsure
B11	Is it possible for a healthy looking person to be HIV-positive? ☐ Yes ☐ No ☐ Unsure
B12	Is there medication to treat HIV? ☐ Yes ☐ No ☐ Unsure
B13	Can medication completely heal a person with HIV? ☐ Yes ☐ No ☐ Unsure
B14	Can HIV be prevented? ☐ Yes ☐ No ☐ Unsure
B15	Do you think that you could get HIV? ☐ Yes ☐ No ☐ Unsure
B16	If a family member has HIV would you want to keep it a secret? ☐ Yes ☐ No ☐ Unsure

B17	If a family member has HIV would you be willing to care for them in your home? ☐ Yes ☐ No ☐ Unsure
B18	Do people in your community stay away from people who have HIV? ☐ Yes ☐ No ☐ Unsure
B19	Do you know where a person can go to get tested for HIV? ☐ Yes ☐ No ☐ Unsure
B20	Have you had an HIV test done in the past 12 months? ☐ Yes ☐ No ☐ Unsure
B21	Do you think that you will have yourself tested for HIV in the next 12 months? ☐ Yes ☐ No ☐ Unsure

C. Obesity

These questions are about how you feel about your weight.



C1	Do you know what obesity is? ☐ Yes ☐ No ☐ Unsure
C2	How would you describe your weight? ☐ Underweight ☐ Slightly underweight ☐ About the right weight ☐ Slightly overweight ☐ Overweight
C3	Are you happy with your weight? ☐ Yes ☐ No ☐ Unsure

C4	How important is **<u>what you weigh</u>** to your health? ☐ Very important ☐ Somewhat Important ☐ Neutral ☐ Slightly important ☐ Not important
C5	Do you know what a Body Mass Index (BMI) is? ☐ Yes ☐ No ☐ Unsure
C6	Do you know how to calculate your Body Mass Index (BMI)? ☐ Yes ☐ No ☐ Unsure



D. Nutrition

These questions are about the food that you eat.

D1	Is the type of foods that you eat good for your body and wellness? ☐ Yes ☐ No ☐ Unsure
D2	In the past week (7 days), how often did you eat salt or salty foods, such as fried chips? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D3	In the past week (7 days), how often did you eat sugar or sugary foods, such as sweets and cake? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure

D4	In the past week (7 days), how often did you eat fresh fruit and vegetables? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D5	In the past week (7 days), how often did you eat fast foods like KFC or Vetkoek from the street vendors? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D6	In the past week (7 days), how many glasses of fizzy drinks (e.g. Coke) did you drink? ☐ 8 glasses or more in a day ☐ 5 - 7 glasses in a day ☐ 1 - 4 glasses in a day ☐ None ☐ Unsure
D7	In the past week (7 days), how many glasses of fruit juice did you drink? ☐ 8 glasses or more in a day ☐ 5 - 7 glasses in a day ☐ 1 - 4 glasses in a day ☐ None ☐ Unsure
D8	In the past week (7 days), how often did your family sit down and eat a meal together? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never in the past 7 days ☐ Unsure
D9	How many glasses of water do you **drink in a day**? ☐ 8 glasses or more in a day ☐ 5 - 7 glasses in a day ☐ 1 - 4 glasses in a day ☐ None ☐ Unsure

D10	How important is **what you eat** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D11	How important is **how much you eat** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D12	Do you know what a food label is? ☐ Yes ☐ No ☐ Unsure
D13	Do you understand food labels? ☐ Yes ☐ No ☐ Unsure
D14	When you buy food, how important is how **safe the food** is to eat? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D15	When you buy food, how important is **nutrition** (how healthy the food is)? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D16	When you buy food, how important is the **price**? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important

D17	When you buy food, how important, is **how well the food keeps**? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D18	When you buy food, how important does the **ease to prepare the food** influence your decision to buy it? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D19	When you buy food, how important is the **taste of the food**? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important



E. Physical Activity

These questions are about exercise in your life.

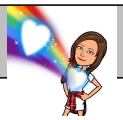


E1	In the past week (7 days), how many hours in total did you spend watching TV? ☐ 5 or more hours in a day ☐ 3-4 hours in a day ☐ 1-2 hours in a day ☐ Less than 1 hour, in a day ☐ None ☐ Unsure
E2	In the past week (7 days), how much time did you spend doing exercise such as running and playing sport? ☐ 5 or more hours in a day ☐ 3-4 hours in a day ☐ 1-2 hours in a day ☐ Less than 1 hour, in a day ☐ None ☐ Unsure

E3	How important is **how much you exercise** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
E4	How many hours of exercise do you think an **ADULT** should get in a week? ☐ 6 or more hours in a week ☐ 4-5 hours in a week ☐ 2-3 hours in a week ☐ 1 hour in a week ☐ Unsure
E5	How many hours of exercise do you think a **CHILD** should get in a week? ☐ 6 or more hours in a week ☐ 4-5 hours in a week ☐ 2-3 hours in a week ☐ 1 hour in a week ☐ Unsure
E6	Do you know what a pulse rate is? ☐ Yes ☐ No ☐ Unsure
E7	Do you know how to measure your pulse rate? ☐ Yes ☐ No ☐ Unsure

F. Lifestyle

These questions are about alcohol and cigarette smoking.



F1	During the past month (30 days), how many times have you drunk alcohol? ☐ Every day ☐ A few times every week ☐ Only a few times during the entire month ☐ Only once in the past month ☐ Never
F2	Do you know the health effects of alcohol? ☐ Yes ☐ No ☐ Unsure

F3	During the past month (30 days), how many times have you smoked cigarettes? ☐ Every day ☐ A few times every week ☐ Only a few times during the entire month ☐ Only once in the past month ☐ Never
F4	Do you know the health effects of cigarette smoking? ☐ Yes ☐ No ☐ Unsure

G. Communication

These questions are about communication between you and your child/ward.

G1	In the past week (7 days), how often did your child/ward talk to you about school and their lessons? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once ☐ Never
G2	In the past week (7 days), how often did your child/ward ask for your help with their school homework? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once ☐ Never
G3	How often does your child/ward tell you the truth, if you ask about what they did in their free time? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G4	How often does your child/ward tell you the truth, if you ask about their relationships with friends or boyfriends and girlfriends? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never

G5	How often does your child/ward ask you for advice on any issues about growing up? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G6	How often does your child/ward ask you questions about their body? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G7	How often do you feel that you can talk to your child/ward about their problems? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G8	How easy is it to talk to your child/ward about HIV and AIDS? ☐ Very easy ☐ Easy ☐ Neutral ☐ Difficult ☐ Very difficult

H. General

These questions are about health information and its use.

H1	If your child knew facts about health, would you like them to share this knowledge with you? ☐ Yes ☐ No ☐ Unsure
H2	If you thought that this shared health information was useful to you, would you use it to change the way you live and do things? ☐ Yes ☐ No ☐ Unsure

H3	Is there anything that you would like to add about any of the topics or questions that were asked?

Thank you for your time. Some of these questions may have been difficult for you to answer, but we have to ask them if we are to understand factors that influence one's intention to lead a healthy life. By sharing this personal information with me you are helping me with my research and that will in the end help many other people. ***Thank you.***

Appendix 15: Post-test questionnaire for parent

PARENT POST- QUESTIONNAIRE INSTRUCTIONS

- This is a questionnaire about you and your family and must be answered, only if you ANSWERED THIS QUESTIONNAIRE BEFORE.
- I know that you have already answered these questions but please answer them again for the purpose of this research.
- Please note that there are no right or wrong answers. Please be honest. All answers will remain confidential.
- Tick the correct boxes. Please also add in your comments when asked.
- If you would like to change an answer, please cross out the incorrect answer and tick the correct answer.
- This questionnaire should take you about 15 minutes to complete.
- Please answer all questions.

P1	Interviewee Code	
P2	Date	
P3	School of Learner	

A. About You

These questions are about you and your partner.

A1	What is your relationship to the Grade 6 child? ☐ Mother ☐ Father ☐ Grandparent ☐ Aunt/uncle ☐ Sister/brother ☐ Any other Guardian relationship, please state: _____

B. HIV/AIDS

These questions are about HIV/AIDS.

B1	Do you know what HIV is? ☐ Yes ☐ No ☐ Unsure
B2	Do you know what AIDS is? ☐ Yes ☐ No ☐ Unsure

B3	Is HIV and AIDS the same thing? ☐ Yes ☐ No ☐ Unsure
B4	Does a germ cause HIV? ☐ Yes ☐ No ☐ Unsure
B5	Can a person get HIV from touching the body fluids (e.g. blood) of a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B6	Can a person get HIV from shaking the hand of a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B7	Can someone get HIV from sharing a glass of water with a person who has HIV? ☐ Yes ☐ No ☐ Unsure
B8	Can HIV be transmitted from a pregnant mother to her unborn baby during pregnancy? ☐ Yes ☐ No ☐ Unsure
B9	Can HIV be transmitted from a mother to her baby whom she breast-feeds? ☐ Yes ☐ No ☐ Unsure
B10	Does HIV affect people of all ages? ☐ Yes ☐ No ☐ Unsure
B11	Is it possible for a healthy looking person to be HIV-positive? ☐ Yes ☐ No ☐ Unsure

B12	Is there medication to treat HIV? ☐ Yes ☐ No ☐ Unsure
B13	Can medication completely heal a person with HIV? ☐ Yes ☐ No ☐ Unsure
B14	Can HIV be prevented? ☐ Yes ☐ No ☐ Unsure
B15	Do you think that you could get HIV? ☐ Yes ☐ No ☐ Unsure
B16	If a family member has HIV would you want to keep it a secret? ☐ Yes ☐ No ☐ Unsure
B17	If a family member has HIV would you be willing to care for them in your home? ☐ Yes ☐ No ☐ Unsure
B18	Do people in your community stay away from people who have HIV? ☐ Yes ☐ No ☐ Unsure
B19	Do you know where a person can go to get tested for HIV? ☐ Yes ☐ No ☐ Unsure
B20	Have you had an HIV test done in the past 12 months? ☐ Yes ☐ No ☐ Unsure

B21	Do you think that you will have yourself tested for HIV in the next 12 months? ☐ Yes ☐ No ☐ Unsure

C. Obesity

These questions are about how you feel about your weight.

C1	Do you know what obesity is? ☐ Yes ☐ No ☐ Unsure
C2	How would you describe your weight? ☐ Underweight ☐ Slightly underweight ☐ About the right weight ☐ Slightly overweight ☐ Overweight
C3	Are you happy with your weight? ☐ Yes ☐ No ☐ Unsure
C4	How important is **<u>what you weigh</u>** to your health? ☐ Very important ☐ Somewhat Important ☐ Neutral ☐ Slightly important ☐ Not important
C5	Do you know what a Body Mass Index (BMI) is? ☐ Yes ☐ No ☐ Unsure
C6	Do you know how to calculate your Body Mass Index (BMI)? ☐ Yes ☐ No ☐ Unsure

D. Nutrition

These questions are about the food that you eat.

D1	Is the type of foods that you eat good for your body and wellness? ☐ Yes ☐ No ☐ Unsure
D2	In the past week (7 days), how often did you eat salt or salty foods, such as fried chips? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D3	In the past week (7 days), how often did you eat sugar or sugary foods, such as sweets and cake? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D4	In the past week (7 days), how often did you eat fresh fruit and vegetables? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D5	In the past week (7 days), how often did you eat fast foods like KFC or Vetkoek from the street vendors? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never ate these foods in the past 7 days ☐ Unsure
D6	In the past week (7 days), how many glasses of fizzy drinks (e.g. Coke) did you drink? ☐ 8 glasses or more in a day ☐ 5 - 7 glasses in a day ☐ 1 - 4 glasses in a day ☐ None ☐ Unsure

D7	In the past week (7 days), how many glasses of fruit juice did you drink? ☐ 8 glasses or more in a day ☐ 5 - 7 glasses in a day ☐ 1 - 4 glasses in a day ☐ None ☐ Unsure
D8	In the past week (7 days), how often did your family sit down and eat a meal together? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once in the past 7 days ☐ Never in the past 7 days ☐ Unsure
D9	How many glasses of water do you **drink in a day**? ☐ 8 glasses or more in a day ☐ 5 - 7 glasses in a day ☐ 1 - 4 glasses in a day ☐ None ☐ Unsure
D10	How important is **what you eat** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D11	How important is **how much you eat** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D12	Do you know what a food label is? ☐ Yes ☐ No ☐ Unsure
D13	Do you understand food labels? ☐ Yes ☐ No ☐ Unsure

D14	When you buy food, how important is how **safe the food** is to eat? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D15	When you buy food, how important is **nutrition** (how healthy the food is)? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D16	When you buy food, how important is the **price**? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D17	When you buy food, how important, is **how well the food keeps**? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D18	When you buy food, how important does the **ease to prepare the food** influence your decision to buy it? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
D19	When you buy food, how important is the **taste of the food**? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important



E. Physical Activity

These questions are about exercise in your life.

E1	In the past week (7 days), how many hours in total did you spend watching TV? ☐ 5 or more hours in a day ☐ 3-4 hours in a day ☐ 1-2 hours in a day ☐ Less than 1 hour, in a day ☐ None ☐ Unsure
E2	In the past week (7 days), how much time did you spend doing exercise such as running and playing sport? ☐ 5 or more hours in a day ☐ 3-4 hours in a day ☐ 1-2 hours in a day ☐ Less than 1 hour, in a day ☐ None ☐ Unsure
E3	How important is **how much you exercise** to your health? ☐ Very important ☐ Important ☐ Slightly important ☐ Neutral ☐ Not important
E4	How many hours of exercise do you think an **ADULT** should get in a week? ☐ 6 or more hours in a week ☐ 4-5 hours in a week ☐ 2-3 hours in a week ☐ 1 hour in a week ☐ Unsure
E5	How many hours of exercise do you think a **CHILD** should get in a week? ☐ 6 or more hours in a week ☐ 4-5 hours in a week ☐ 2-3 hours in a week ☐ 1 hour in a week ☐ Unsure
E6	Do you know what a pulse rate is? ☐ Yes ☐ No ☐ Unsure

E7	Do you know how to measure your pulse rate? ☐ Yes ☐ No ☐ Unsure

F. Lifestyle

These questions are about alcohol and cigarette smoking.

F1	During the past month (30 days), how many times have you drunk alcohol? ☐ Every day ☐ A few times every week ☐ Only a few times during the entire month ☐ Only once in the past month ☐ Never
F2	Do you know the health effects of alcohol? ☐ Yes ☐ No ☐ Unsure
F3	During the past month (30 days), how many times have you smoked cigarettes? ☐ Every day ☐ A few times every week ☐ Only a few times during the entire month ☐ Only once in the past month ☐ Never
F4	Do you know the health effects of cigarette smoking? ☐ Yes ☐ No ☐ Unsure

G. Communication

These questions are about communication between you and your child/ward.

G1	In the past week (7 days), how often did your child/ward talk to you about school and their lessons? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once ☐ Never

G2	In the past week (7 days), how often did your child/ward ask for your help with their school homework? ☐ Every day ☐ On 4-6 days ☐ On 2-3 days ☐ Once ☐ Never
G3	How often does your child/ward tell you the truth, if you ask about what they did in their free time? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G4	How often does your child/ward tell you the truth, if you ask about their relationships with friends or boyfriends and girlfriends? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G5	How often does your child/ward ask you for advice on any issues about growing up? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G6	How often does your child/ward ask you questions about their body? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G7	How often do you feel that you can talk to your child/ward about their problems? ☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never
G8	How easy is it to talk to your child/ward about HIV and AIDS? ☐ Very easy ☐ Easy ☐ Neutral ☐ Difficult ☐ Very difficult

H. General

These questions are about health information and its use.

H1	If your child knew facts about health, would you like them to share this knowledge with you? ☐ Yes ☐ No ☐ Unsure
H2	If you thought that this shared health information was useful to you, would you use it to change the way you live and do things? ☐ Yes ☐ No ☐ Unsure
H3	Is there anything that you would like to add about any of the topics or questions that were asked?
H4	What did you like about the Circle of Life Program?
H5	What did you not like about the Circle of Life Program?
H6	Is there anything that you would like to see in the Circle of Life Program?

Thank you for your time. Some of these questions may have been difficult for you to answer, but we have to ask them if we are to understand factors that influence one's intention to lead a healthy life. By sharing this personal information with me you are helping me with my research and that will in the end help many other people. ***Thank you.***

Appendix 16: Ethical clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Ms Keshni Arthur

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M180220

NAME: (Principal Investigator)	Ms Keshni Arthur
DEPARTMENT:	School of Public Health Westonaria Primary School Seatile Primary School Maputle Primary ScoolWestonaria Mine School
PROJECT TITLE:	Addressing the double burden of diseases through a pre-adolescent transdisciplinary intervention for inter-generational outcomes
DATE CONSIDERED:	23/02/2018
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Gill Nelson and Nicola Christofides
APPROVED BY:	Prof C Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	30/04/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in February and will therefore be due in the month of February each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature — Date: 30/04/2018

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix 17: Gauteng Department of Education research approval

GAUTENG PROVINCE
Department: Education
REPUBLIC OF SOUTH AFRICA

8/4/4/1/2

GDE RESEARCH APPROVAL LETTER

Date:	**05 February 2018**
Validity of Research Approval:	**05 February 2018 – 28 September 2018** **2018/11**
Name of Researcher:	**Arthur K**
Address of Researcher:	**27 Karee Street**
	Randpark Ridge
	Randburg 2194
Telephone Number:	**011 791 5673 083 337 7668**
Email address:	**kesh@karthurhmc.co.za**
Research Topic:	**Addressing the Double Burden of Disease trough a Pre-adolescent Transdisciplinary Intervention for Inter-generational Outcome**
Type of Degree:	**Doctor of Philosophy (Public Health)**
Number and type of schools:	**Four Primary Schools**
District/s/HO	**Johannesburg West**

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

05/02/2018

The following conditions apply to GDE research. The researcher may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted:

Office of the Director: Education Research and Knowledge Management
7th Floor, 17 Simmonds Street, Johannesburg, 2001
Tel: (011) 355 0488
Email: Faith.Tshabalala@gauteng.gov.za
Website: www.education.gpg.gov.za

Appendix 18: Consent form for parent/guardian

Dear Parent/Guardian

My name is Keshni Arthur and I am from the University of the Witwatersrand. I am doing a research called: Addressing the double burden of disease through a pre-adolescent transdisciplinary intervention for inter-generational outcomes. Research is trying to learn the answer to a question. This research is about me trying to find a new way for children and their parents to learn about the health risks of HIV and obesity and how to prevent these diseases.

I am inviting you and your Grade 6 child to take part in this research study. You may participate, whether you are the parent or guardian of the child.

In this research I will ask you and your child some questions in a questionnaire. The questionnaire contains information on your knowledge, attitudes, beliefs and practices about nutrition, physical activity, HIV and obesity. The questionnaires will be sent to you on request, if you would like to see it before you make a decision about the study.

Your child's teacher will teach their whole class five lessons about HIV and obesity and how to prevent these diseases to live a healthy life. These lessons will be done during the Life Orientation lessons at school and will be taught to all children, whether they are a part of the study or not. I will then give the child some homework to complete with you at home. At the end of the study, I will ask you and your child some of the questions again in another questionnaire.

There are no risks of being involved in the study. There will be no expenses or costs for you, during the study. There will be no testing for diseases and you will not have to tell me if you or your child has any diseases. This is a fun program and you and your child will learn a lot of important information and skills.

You and your child will be given important information on the study while involved in the research and after the results are available.

Participation is voluntary. If you refuse to participate there will be no problems for you at school or with your child's teachers. You may stop participation at any time. There will be strict confidentiality and the information obtained in the study will be used for research purposes only. I will not use your name or your child's name anywhere in the research.

For further information or reporting of study related problems please contact:

The Principal Researcher:
Keshni Arthur
Student
083 337 7668
kesh@karthurhmc.co.za

Supervisors of the Research:
Prof. Gill Nelson
Lecturer at Wits University
011-7172138
Gill.nelson@wits.ac.za

Prof. Nicola Christofides
Lecturer at Wits University
011-7171566
Nicola.christofides@wits.ac.za

The Human Research Ethics Committee are:
Prof. C. Penny
Chair of Human Research Ethics Committee
011-7171252
HREC-medical.researchoffice@wits.ac.za

Please return this form to school whether you agree or disagree to be a part of the research.

CONSENT FORM FOR PARENTS/GUARDIANS TO SIGN

Title of project: Addressing the double burden of disease through a pre-adolescent transdisciplinary intervention for inter-generational outcomes

Name of researcher: Keshni Arthur

I have read the information sheet and understand what this research is about. I also understand what my participation and my child's/ward's participation will involve.

(PLEASE TICK THE CORRECT BOX.)

I give consent for my child to participate in the study.

YES	NO

I also agree to participate in the study.

YES	NO

_____ _____

Signature of Parent **Date**

_____

Name of Parent

_____

Name of Learner

Please return this form to school whether you agree or disagree to be a part of the research.

ASSENT FORM FOR GRADE 6 LEARNER TO SIGN

Please let me know if you will participate or not by putting a tick in the correct box below.

Do you understand the research and do you want to take part in it?

YES	NO

Have I answered all your questions?

YES	NO

Do you understand that you can stop at any time?

YES	NO

Please fill in the details below and sign.

_____

Child's Signature

_____

Child's Name

_____

Date

Appendix 19: Grade 6 Learner-Parent Workbook

CIRCLE OF LIFE INITIATIVE

IMPROVING HEALTH, GENERATIONS AT A TIME



CONTENTS

CHAPTER 1 Obesity

CHAPTER 2 Nutrition

CHAPTER 3 Physical Activity

CHAPTER 4 HIV/AIDS

CHAPTER 5 Communicating About HIV/AIDS



Name: _____

School: _____

Grade: _____



Chapter 1: Obesity

A. Healthy Body

Body image is the way you think and feel about your body. All people look different. Everyone likes to look like others so that they will 'fit in'. But you should be YOURSELF! Just be the kind of person that others want to know. If you feel good about yourself you will look your best.

Some of the things that make you feel and look good are:

- Eating the right food.
- Getting enough of exercise.
- Getting enough of sleep.
- Keeping yourself clean.
- Wearing clean clothes and shoes.
- Having fun.
- Working hard at school.
- Sharing and caring.
- Keeping yourself safe from cigarettes, alcohol and drugs.
- Being positive and happy.

B. Underweight, Overweight and Obesity

Some people are too thin, while others are overweight. Overweight is having extra body weight. Obesity is having a high amount of extra body fat.

Being overweight or obese causes a risk for health problems such as heart disease and diabetes.

Causes of obesity:

- If parents are overweight, children can often be overweight too, due to family genes and and the family's pattern of eating and exercising.
- An unhealthy diet can lead to obesity.
- Not getting enough of exercise can also lead to obesity.

C. Body Mass Index (BMI)

Body mass index (BMI) is used to measure overweight and obesity.

D. Measuring and Interpreting BMI

To measure your BMI, you need to measure your weight (kilograms) and your height (meters). The formula below is then used to calculate your BMI.

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m) x Height (m)}}$$

In adults a BMI between 25 to 30 is considered overweight and a BMI of 30 or above is considered obese.

It is more complicated with children because they are still growing. So you have to consider the child's age and sex. The BMI percentile is used to check a child's weight based on the norms seen in other children.

Once you have worked out your BMI, you can see which percentile, you fall within, in the expected range. The different weight categories are defined as:

- **Underweight** - having a BMI less than the 5th percentile.
- **Normal weight** - having a BMI from the 5th percentile to below the 85th percentile.
- **Overweight** - having a BMI above the 85th percentile to below the 95th percentile.
- **Obese** - having a BMI equal to or greater than the 95th.

Activity 1: Measuring BMI

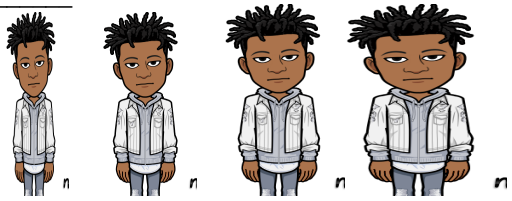
$$BMI = \frac{\text{Weight (kg)}}{\text{Height (m)} \times \text{Height (m)}}$$

1. In class, measure your weight on the scale.
2. Then measure your height with the tape measure.
3. Now calculate your BMI using the formula.
4. Plot your BMI on the pink graph if you are a girl or on the blue graph if you are a boy.

Your Height: _____m

Your Weight: _____kg

Your BMI = _____



In which percentile are you?
_____

Are you:

- ☐ Underweight
- ☐ Normal Weight
- ☐ Overweight
- ☐ Obese

Parent/Guardian Signature: _____

Any comments from you or your parent/guardian:

_____

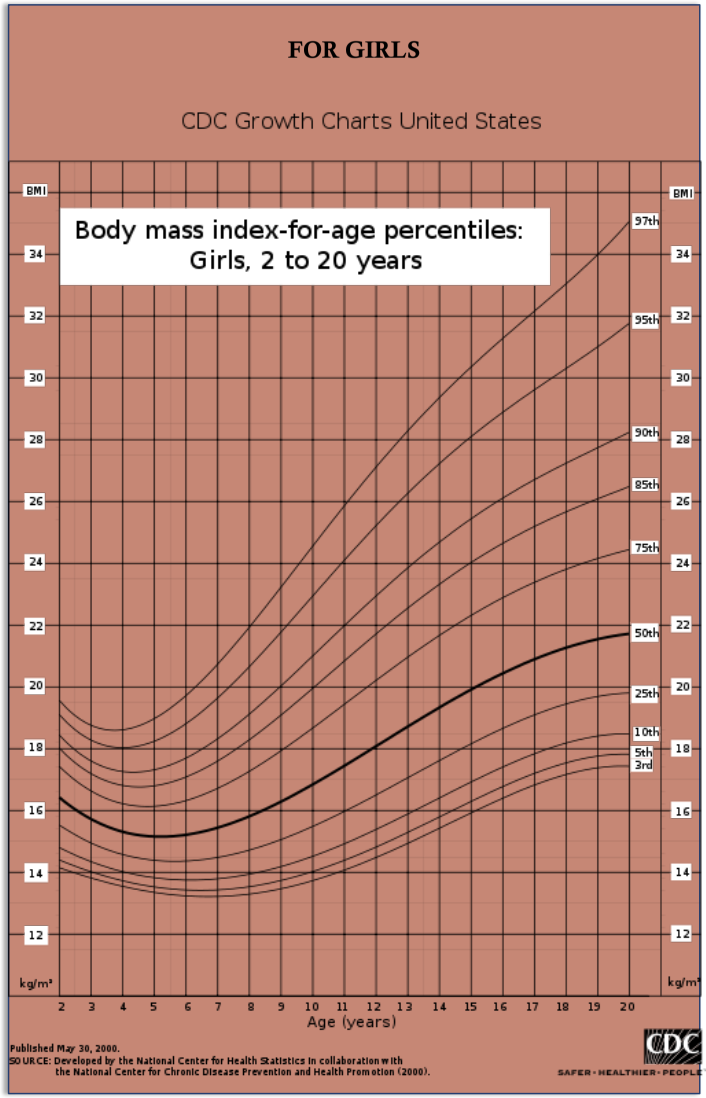
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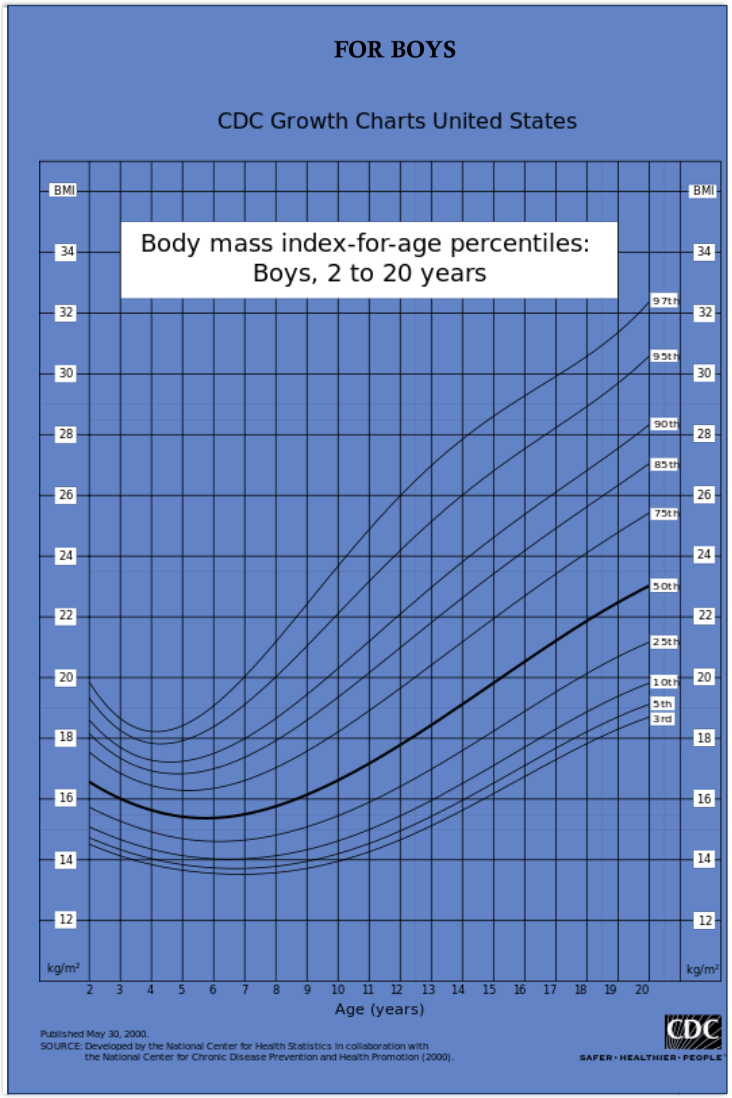
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Collect your sticker when your parent signs.

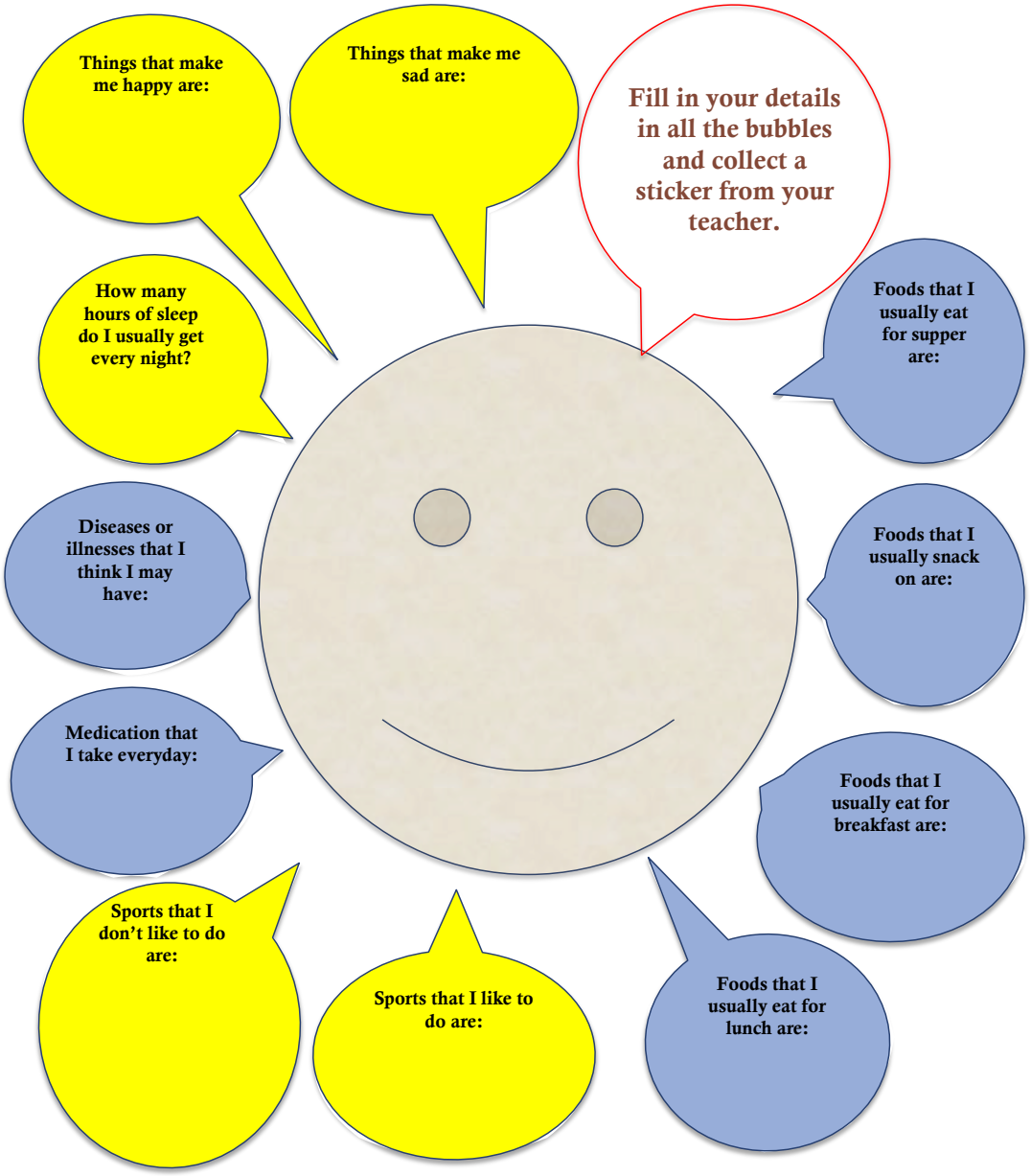


3


FOR GIRLS
CDC Growth Charts United States
Body mass index-for-age percentiles:
Girls, 2 to 20 years
BMI
97th
95th
90th
85th
75th
50th
25th
10th
5th
3rd
kg/m²
Age (years)
Published May 30, 2000.
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
CDC
SAFER · HEALTHIER · PEOPLE


FOR BOYS
CDC Growth Charts United States
Body mass index-for-age percentiles:
Boys, 2 to 20 years
BMI
97th
95th
90th
85th
75th
50th
25th
10th
5th
3rd
kg/m²
Age (years)
Published May 30, 2000.
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
CDC
SAFER · HEALTHIER · PEOPLE

Diary of a Healthy Kid



5

Crossword Fun



Spelling List

fruit

water

moderation

milk

label

variety

eggs

sugar

salt

vegetables

fat

cholesterol

CLUES ACROSS

1. High in vitamins and can be eaten as a snack.

2. Gives us energy but can be fattening.

3. _____ means eating not too much or too little of any food.

4. Eating too much of animal fats lead to high _____, which could lead to heart attacks.

5. _____ are high in fibre and should be eaten with at least one or two meals a day.

6. _____ or sodium is bad for your body and could lead to high blood pressure.

CLUES DOWN

3. _____ has calcium and is good for strong teeth and bones.

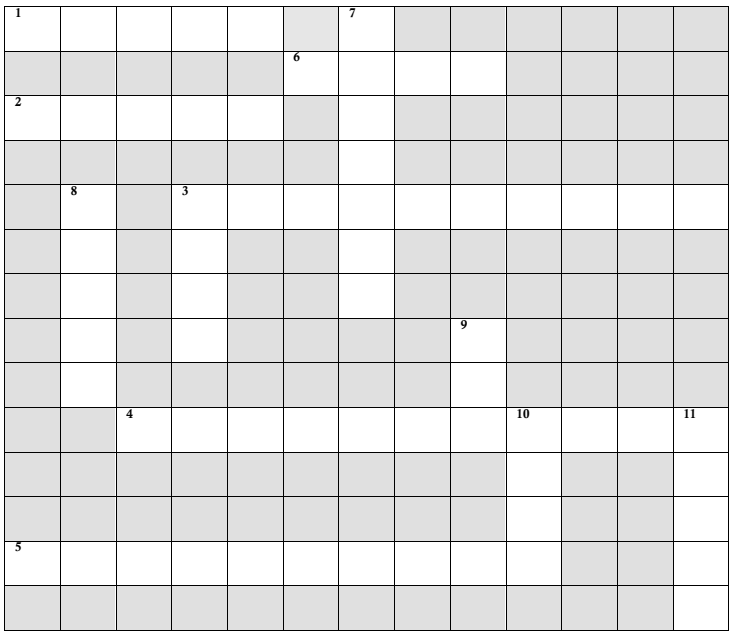
7. _____ is eating different foods, at different meals, on different days and in different, healthy ways.

8. _____ keeps you hydrated and you need to drink about 6 – 8 glasses a day.

9. Too much of unhealthy _____ could lead to obesity.

10. _____ are a good source of protein.

11. A food _____ tells us about how healthy that type of food is.





Chapter 2: Nutrition

Food is a mixture of nutrients. It provides energy for activity, helps the body to grow and maintains and repairs itself. Food contains macronutrients (proteins, carbohydrates and fat), micronutrients (vitamins and minerals), water and many other substances that help the body to work normally.

A. Healthy Eating

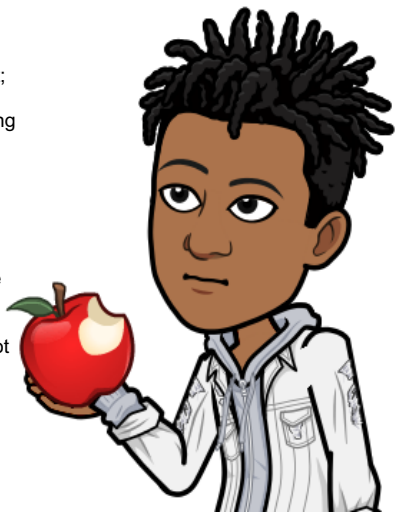
The Right Amount of Food
Moderation means not eating too much or too little of any food. Eating too much can lead to weight gain. Being overweight can lead to obesity. Eating too little food can also lead to weight loss and your body not having enough nutrients.

Variety
Variety means eating different foods during a meal and on different days, as well as preparing food in different, healthy ways. Variety allows out body to get different nutrients, and that it is enjoyable. A diet of many different foods is more interesting and enjoyable than a diet of the same foods all the time.

Enjoyment
Eating is not just for nourishment; it's one of life's great pleasures. Sitting down to a meal and sharing it with family and friends makes eating more enjoyable.

Safe and Harmful Eating
Every packet, box or tin of food tells you what nurtients the food inside contains. This is called the nutritional information. This information on the label is for a single serving of that food and not for the whole container.

Food labels have to tell you the name of the food product, who made the product (the manufacturer's name), and the address of the manufacturer. They must also tell you how much of that food is in the package in grams (g) for solid foods, or millilitres (ml) for liquids.



These are some names you might find mentioned on the packaging:

Carbohydrate is the body's main source of energy. The more active you are, the more carbohydrates you need. Examples are bread, rice and mealie meal.

Protein is used to build musle, to keep organs strong, and to fight off disease. Examples are beans, meat and eggs.

Fat is needed for fuel, as well as for growth and development. Although, too much of fat can lead to obesity.

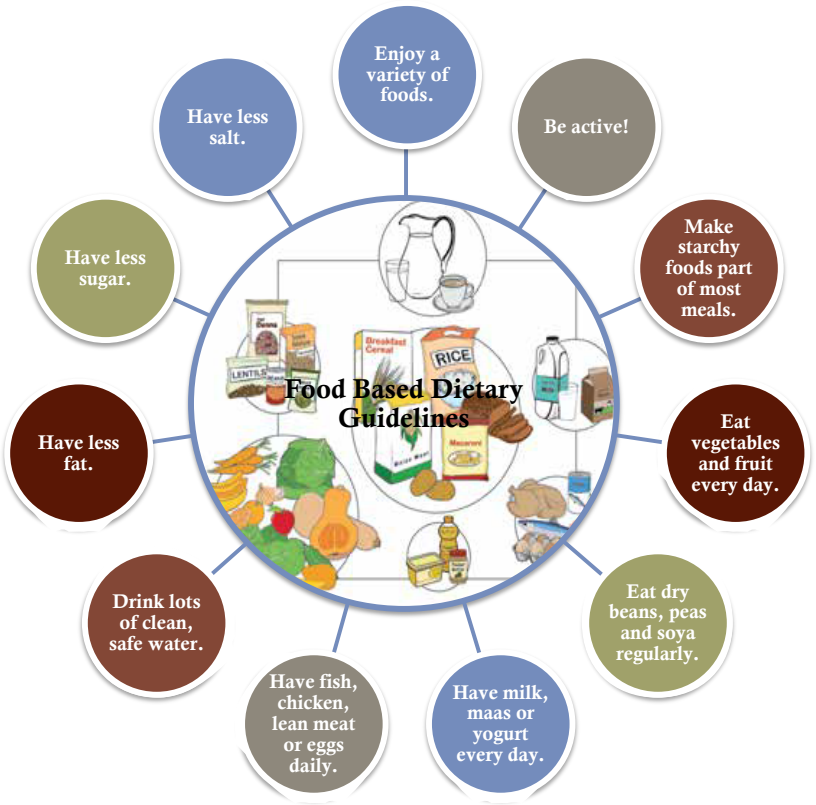
Sugar gives us energy. Sugar is fattening and can cause tooth decay. Eat fewer sweets and cooldrinks if you want to be healthy.

Sodium is salt. Too much is unhealthy.

Cholesterol can lead to heart problems and people need to eat less animal fats such as butter, cheese and meat, which contain high cholesterol.

Flavourants, Coulourants and Preservatives
Flavourants adds to the taste of a food and make people want more. Colourants give food a brighter colour. Preservatives make food last longer. By law these need to be labelled clearly because they are unhealthy.

The food-based dietary guidelines for South Africa



B. The food-based dietary guidelines for South Africa

The Department of Health has put together a set of Food-Based Dietary Guidelines (FBDGs) for South Africans older than six years. These guidelines are dietary recommendation messages that are used to tell people how to choose food and drinks that will lead to a diet that is adequate and nutritious.

- Regular physical activity is good for your body.
- Starchy foods (maize meal, cereals, samp, bread, rice, potatoes) are rich in carbohydrates and should be eaten at every meal.
- Eat legumes two to three times a week. They are high in protein and fibre, and low in fat.
- Vegetables and fruits are high in vitamins, minerals, fibre and water. Eat vegetables in at least one or two meals per day or eat fruits as snacks between meals.
- Limit your fat intake. Animal-based foods are higher in fat (saturated fat). Include more fatty fish (snoek, sardines, pilchards, mackerel and salmon) in your diet, and eat less fatty meat.
- Drink at least six to eight glasses of water per day.
- Dairy products (milk, maas and yoghurt) are good sources of calcium.
- Use less salt in food preparation, and avoid the use of extra salt at the table.

How to read a food label

When you pick up a packaged food at the supermarket there are usually a lot of messages on the packaging.
What should you look for to help you make a better choice?

STEP 1

READ THE INGREDIENTS LIST TO LEARN WHAT HAS BEEN PUT INTO THE FOOD AND HOW MUCH

Ingredients are listed in order from the **BIGGEST** to the SMALLEST amount.

If fat or sugar are listed as the first or second ingredient the food is likely to be HIGH in fat or sugar and is recommended to only be eaten sometimes.

PLAY DETECTIVE

SOMETIMES SUGAR AND FAT ARE LISTED USING OTHER NAMES. LOOK OUT FOR THESE CULPRITS:

Other names for FAT: oil, vegetable/animal oil/fat, coconut oil, palm oil, shortening, lard, milk solids. .

Other names for SUGAR: sucrose, maltose, lactose, dextrose, fructose, glucose, glucose syrup, corn syrup, molasses, malt, maltodextrin, fruit juice concentrate

How to read a food label

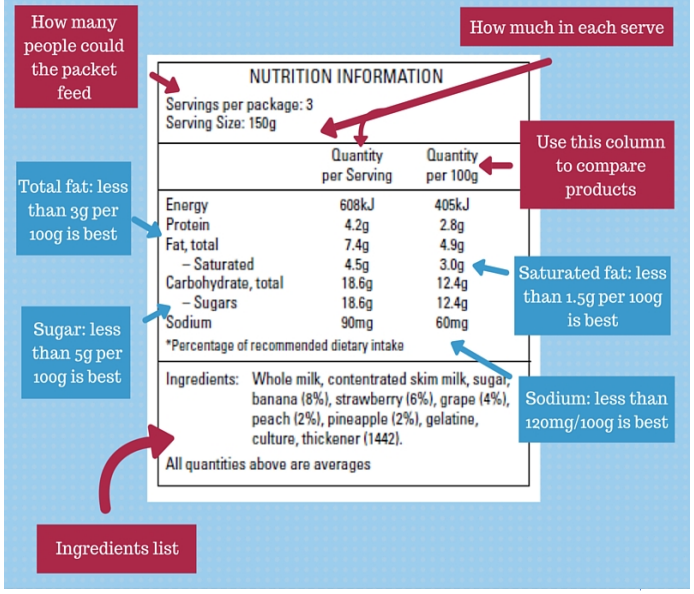
STEP 2

LOOK AT THE NUTRITION INFORMATION PANEL (NIP) TO FIND OUT WHAT NUTRIENTS THE FOOD CONTAINS KEY THINGS TO LOOK OUT FOR ARE THE AMOUNTS OF TOTAL FAT, SATURATED FAT, SUGAR AND SODIUM/SALT

HERE'S A GUIDE:

Per 100g

	BEST	OKAY	SOMETIMES
TOTAL FAT	0 - 3g	3.1 - 20g	20g+
SATURATED FAT	0 -1.5g	1.6 - 5g	5g+
SUGAR	0 - 5g	5.1 - 15g	15g+
SODIUM	0 - 120mg	121 - 600mg	600mg+



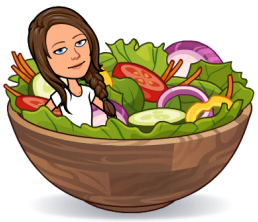
Word Search Fun

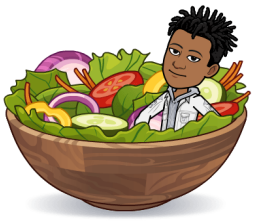
R E M E M B E R T O S P O T T H E B L O C K ! !
E Q C F I N U T R I E N T S S L Y V Y J G S H E
I R A T J E T J P D W U D A A Y V X L Z T P S H
U I L E I F C R O L V Y C O I J H T Y N N T U S
N T O W Q S A T U R A T E D F A T O E W E Q L W
S X R V C H D S E Y R S W P W M Z I F W T F J M
A B I D H Y W O V U C N H Y N F D B U I P H T B
T Z E P S Y B D S D X N L I B E M O I K E K F E
U O S T O M G I T P A B Z V R E A K W Y R O Q E
R N D P Y E D U M R O O Y G U U M P I A C V S D
A S X E T T K M E V F H N W V X A J B R E J E H
T U X Y K X S B F J H I P L E T F B Z A N U R K
E W C T S X I Q U I T L R D H O B S L V T Z V W
D C Q K I F L R C H O L E S T E R O L J D L I S
G X Q I Q I F I C Q C P H F W Y G O L D V P N I
F G U P R L Y E F E D L A B E L V O T D C W G E
H M G W V N V T V L F Y B P F J J U A W A Q S H
M F A C T S C Z K S U G A R X P G D L K L K I Z
I S J V F E O A P V Y Q K D B V Z E S R C L Z U
N S X R I D U V C A R B O H Y D R A T E I P E H
E V H Q Q M U G O J E O C O R D M Q H E U K U Y
R E S R M X O I N X F W N X J H D Z S H M O U Y
A H P R O T E I N A K T R A N S F A T A H Q M E
L Q Q W H F T X N I U U F J R Q Q W R L E F F E
S P O T A S S I U M N V I T A M I N S H Q P R G



CALCIUM
CALORIES
CARBOHYDRATE
CHOLESTEROL
FACTS
FIBRE
INGREDIENTS
LABEL
MINERALS
NUTRIENTS
POTASSIUM
PROTEIN
SATURATED FAT
SERVING SIZE
SUGAR
UNSATURATED
VITAMINS
SODIUM
TRANS FAT

Activity 2: Reading a Food Label





1. You are now a detective. At home, find two food items that have food labels on them.
2. With the help of your parent/guardian, investigate which food item is more nutritious.
3. Answer the questions that follow.

1. What is product 1? _____

2. What is product 2? _____

3. Is product 1 healthy or unhealthy? _____

   State why?

_____

4. Is product 2 healthy or unhealthy? _____

   State why?

_____

5. In the future, will your parent/guardian read food labels in the shops, when buying groceries?

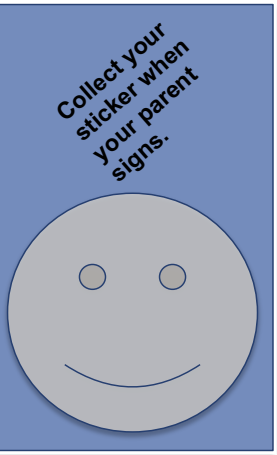
Parent/Guardian Signature: _____

Any comments from you or your parent/guardian:

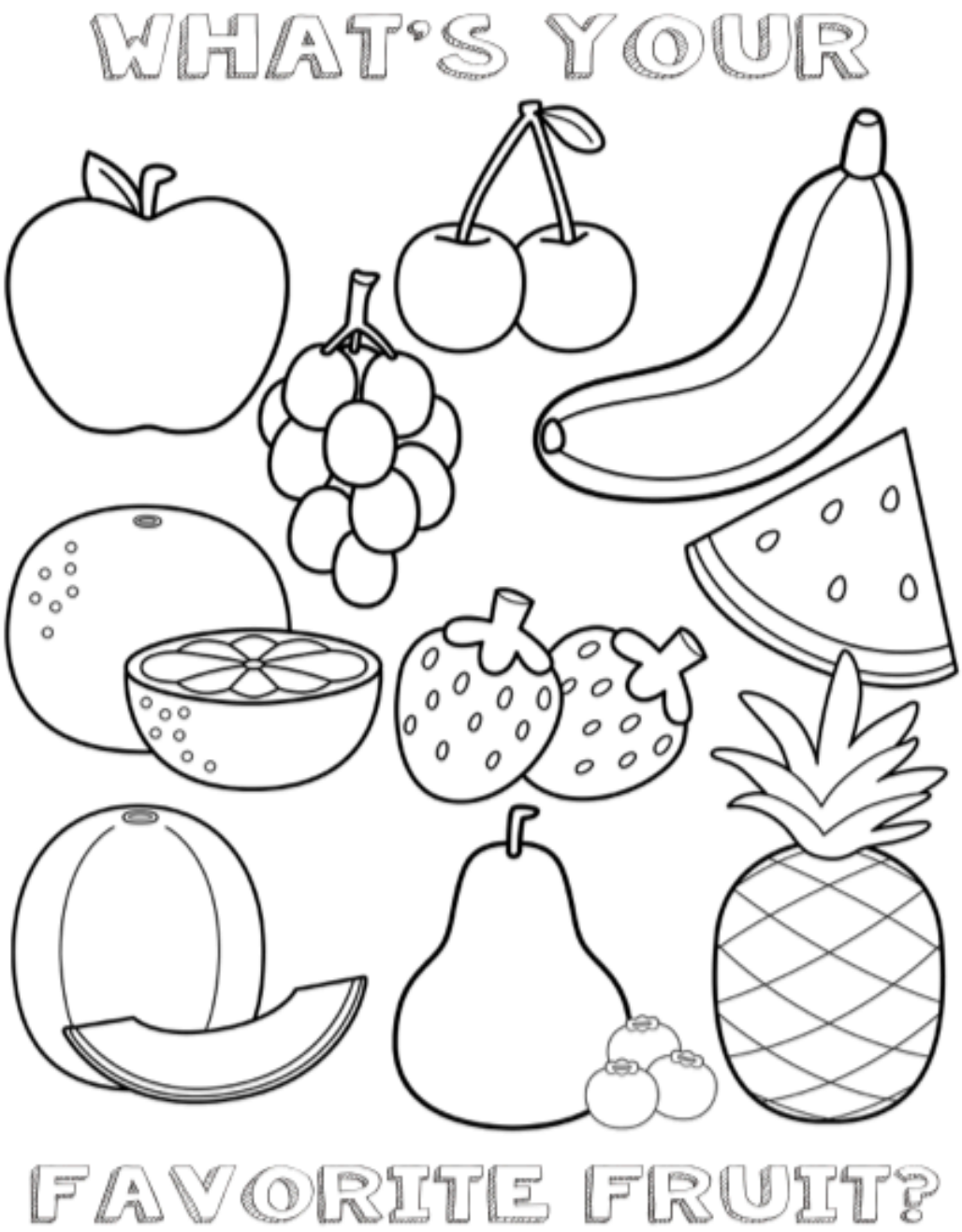
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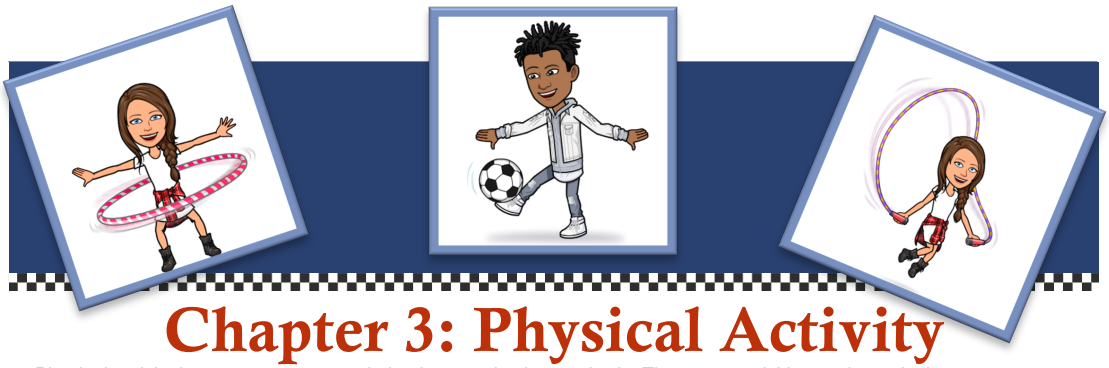
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COLOUR IN THE PICTURE



12



Chapter 3: Physical Activity

Physical activity is any movement made by the muscles in your body. These are activities such as playing sport, household chores, walking, working and fun activities. Regular physical activity helps to keep your body healthy and to prevent further illness. You should limit the time that your spend watching television or playing video games.

A: Benefits of Physical Activity

- Strengthens bones and muscles as children grow
- Improves good posture and balance
- Develops movement and coordination
- Helps the lungs and heart to grow and work properly as children grow
- Increases relaxation
- Can prevent diseases such as obesity, diabetes, hypertension and high cholesterol in later life
- Keeps the body in better working condition when you already have a disease such as HIV/AIDS or diabetes.

B. How much of physical activity?

- Children aged between 5 - 17 years should do 60 minutes of physical activity a day.
- Adults aged 18 years and above should do 150 minutes of physical activity a week.

C. Heart Rate (Pulse)

The heart is a muscle that moves the blood around your body. Nutrients and oxygen are transported to different parts of the body and waste products are taken away. Your heart rate or pulse, is the number of times your heart beats per minute. Normal heart rate is different for different people. The heart usually beats about 60 to 100 times a minute and can beat even faster when more energy is needed, like when you run. When the heart beats faster, your pulse is higher.

D. Why do you need to monitor your pulse rate?

Knowing your heart rate during exercise is helpful because it measures your fitness level and how your body is responding to exercise. Heart rate can be an important gauge for how your heart is working because it can also help you spot health problems that are just beginning. As you get older, high pulse rates may tell you that there may be a problem with the way your heart is working or other health problems that need to be checked.

Range of Heart Rates per Minute and Average Heart Rate for Various Ages

Age (Years)	Range (beats per minute)	Average Rate (beats per minute)
1-3	80-160	130
4-5	80-120	100
6-8	70-115	100
9-11	60-110	88
12-16	60-110	80
16 and over	50-90	70

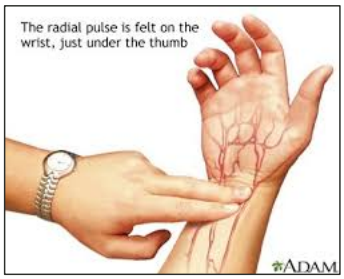
Measuring and Interpreting pulse rate

You can feel your pulse on your wrist or on the side of your neck. Put three fingers of your left hand onto your Adam's apple on your throat (that's the bit that sticks out and goes up and down when you swallow.) Push gently down on one side of it, and you will find your pulse beating. Using a watch or a timer, count the beats for 1 minute or 60 seconds.





To find your pulse in your wrist, hold your hand in front of you. Stick your thumb of this hand up in the air and turn the palm towards you. With the first two fingers of your other hand, stroke from the top of your thumb down along the side of your hand until your fingers reach the end of your forearm nearest to your wrist. Let your fingers slide downwards onto the inside of your forearm until you feel a tendon - which feels like a cord which is going from a muscle to a bone in your hand, and gently feel for your pulse on the thumb side of this tendon. Using a watch or a timer, count the beats for 1 minute or 60 seconds.



Activity 3: Design a poster on Obesity

Design a poster on obesity. The winning poster will be printed and displayed around the school.

Tips for your poster:

- Your poster needs to include words and pictures.
- You can draw the pictures or cut them out of old magazines.
- Write the words on a piece of paper first and then get your parent to check them. Make sure that your spelling and language is correct.
- Then plan how the words will fit on the poster with the pictures.
- Make a smaller version of your poster before you make the final version to see what design looks best.

Parent/Guardian Signature: _____

Any comments from you or your parent/guardian:

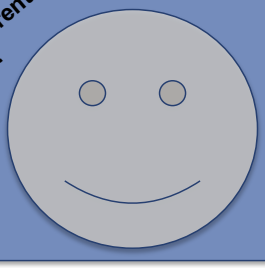
_____

_____

_____

_____

Collect your sticker when your parent signs.



Activity 4: Measuring Pulse Rate



Now measure your own pulse rate and record your answers.

Name	Your pulse on your neck	Your pulse on your wrist	Are you within the normal range?

1. Pretend that you are now a doctor or a nurse. At home, measure the pulse rate of your parent or guardian.
2. Compare it with the table.
3. Answer the questions that follow.

Person you are checking	The pulse on their neck	The pulse on their wrist	Are they within the normal range?

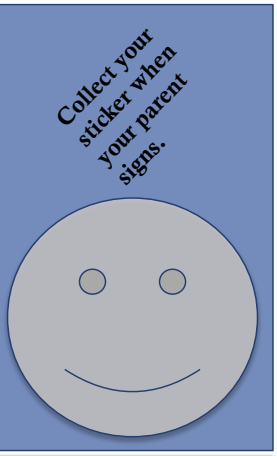
Parent/Guardian Signature: _____

Any comments from you or your parent/guardian:

_____

_____

_____



Colour in the picture



16



Chapter 4: HIV/AIDS

A. What is HIV and AIDS?

HIV stands for Human Immunodeficiency Virus.
HIV weakens the immune system by destroying important cells that fight disease and infection. Over time, HIV can destroy so many cells that the body can no longer fight infections and diseases. When that happens, **HIV infection leads to AIDS (Acquired Immunodeficiency Syndrome)**. It is at this stage that a person starts becoming sick through different infections that attack the body. Once a person has HIV it is there for life.
There is no cure for HIV. With proper treatment, called Antiretroviral Therapy (ART), levels of HIV can be kept low. This involves taking HIV medicines every day to live a longer, healthier life and reduce the risk of transmitting HIV to others.

B. How does a person get HIV?

Certain body fluids from an HIV-infected person can transmit HIV. These include blood, semen, vaginal fluids and breast milk. Entry through an open wound, or by being directly injected into the bloodstream (by a needle or syringe) will also lead to infection.
It is important to know that **HIV is not spread through air, water, insects (including mosquitoes or ticks), saliva, tears, or sweat, casual contact (shaking hands, hugging or sharing dishes/drinking glasses), or toilet seats.**

C. What to do if you think that you might have

The only way to be certain is to be tested. A doctor, clinic, health care provider or community health centre can do testing. This test will tell you if you have HIV or not, and may have to be repeated after a period of 3 to 6 months to ensure that the window period is covered.

D. How to reduce the risk of HIV?

- **Avoid contact with blood:** Always use gloves, if these are available, if you have to make contact with the blood of an injured person.
- **Get tested for HIV regularly:** People who think that they are at risk of HIV should be tested for HIV every 3-6 months.
- **Abstinence:** Sex is the main way that HIV is transmitted. Wait until you are married to have sex.
- **Have only one partner:** A person should be in a sexual relationship with only one person.
- **Get tested and know your partner's status:** Knowing one's own status is important for the health of both partners. Talking about HIV status can be difficult but it is important to start the discussion before people in a new relationship consider engaging in sexual activity.
- **Use condoms consistently and correctly:** To reduce the risk of getting HIV, a new condom should be used with every time.

E. Understanding the Risks of HIV

Avoiding Risky Situations
Sex is a normal, healthy part of the human experience. Sex is different for everyone and there are many ways to engage in this activity with your partner. However, there are risks involved in exposing yourself in such an intimate way such as sexually transmitted diseases (STDs), unwanted pregnancies, and unhealthy relationships.

There are many factors that put people at risk for high-risk sexual behaviour, or any sexual act that could likely result in harm to the people involved. Anything that impairs judgement, such as drugs, alcohol, and even lack of education around healthy sexual behaviour can lead to this type of risk.

The most important way to avoid high-risk sexual encounters is to be informed. One of the biggest risks during sex is the transmission of STDs. Human immunodeficiency virus (HIV) is one of the most dangerous STDs.

Recreational drugs, such as ecstasy, and alcohol impair judgement in all choices. Abstaining will allow you to make the best judgement call when considering a sexual encounter. Unfortunately, drugs and alcohol also increase the risk of sexual assault. Being unaware of one's surroundings, or even unconscious, can open opportunities for unsavoury characters to take advantage of you.

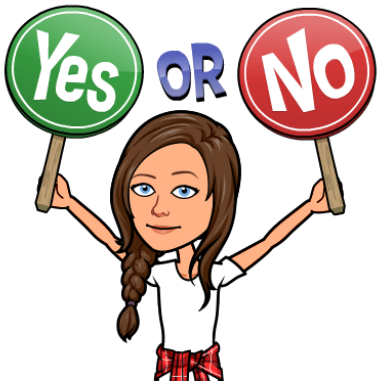
Personalizing the Risks
Any type of sexual contact or activity involves some risk. These risks could be physical, social or emotional. To make sexual activity as safe as possible, make sure you know how to plan ahead by: -

- Talking about and understand your partners views around sexual activity
- Using condoms correctly to prevent pregnancy and HIV
- Limiting sexual partners

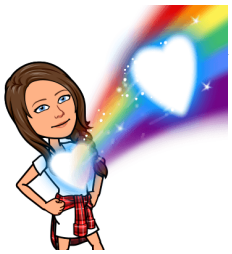
Understand your value and worth

- Appreciate your body and understand changes that happen during puberty
- Take responsibility for your own behaviour and consequences of your actions
- Know about sexual health issues and understand peer and cultural pressure to become sexually involved
- Communicate effectively with family members about issues, including sexuality. Ask parents and other trusted adults questions about sexual health issues and accept their guidance.
- Show love and intimacy in a way that's appropriate for your age: you can say 'no' and accept when a partner says 'no'





Activity 5: Write a story about HIV/AIDS



Pretend that you are a journalist or a famous novel writer. Write a short story on HIV/AIDS. It should be no longer than 300 words. **The best story will win a prize.**

Here are some ideas about what you can base your story on. Remember your story does not have to be a true story. You can make up a story.

- A friend that had HIV.
- A family member that had HIV.
- How HIV affects me.
- HIV in the community that I live in.

Tips for writing a great story: -

- Think about your story before you start to write, so you know what you are going to write.
- You can create your own characters from your imagination. You can even write about characters based on people that you know, but don't forget to change their names.
- Write the story down.
- Read your story aloud to your parent or guardian. Make any changes that they might think will make the story better.
- Write out your story neatly on pages. You can even make it into a book.
- Draw or cut out pictures to illustrate your story.

Parent/Guardian Signature: _____

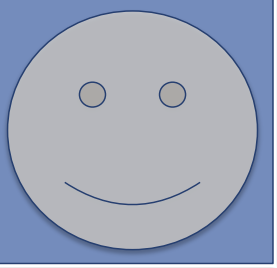
Any comments from you or your parent/guardian:

_____

_____

_____

Collect your sticker when your parent signs.



Crossword Fun



Spelling List

saliva

cure

needle

bites

breastfeeding

deficiency

STD

immune

weight

immunodeficiency

fever

sexual

CLUES ACROSS

1. _____ from the mouth does not transmit HIV

2. There is no _____ for HIV/AIDS.

3. HIV may be spread if this is contaminated with blood when piercing ears, other body parts, or injecting drugs.

4. _____ is one of the symptoms of AIDS.

5. HIV-infected women who have just given birth to a baby can infect their babies through this.

6. AIDS stands for Acquired Immune _____ Syndrome.

CLUES DOWN

1. An acronym for any of the many diseases transmitted by sex.

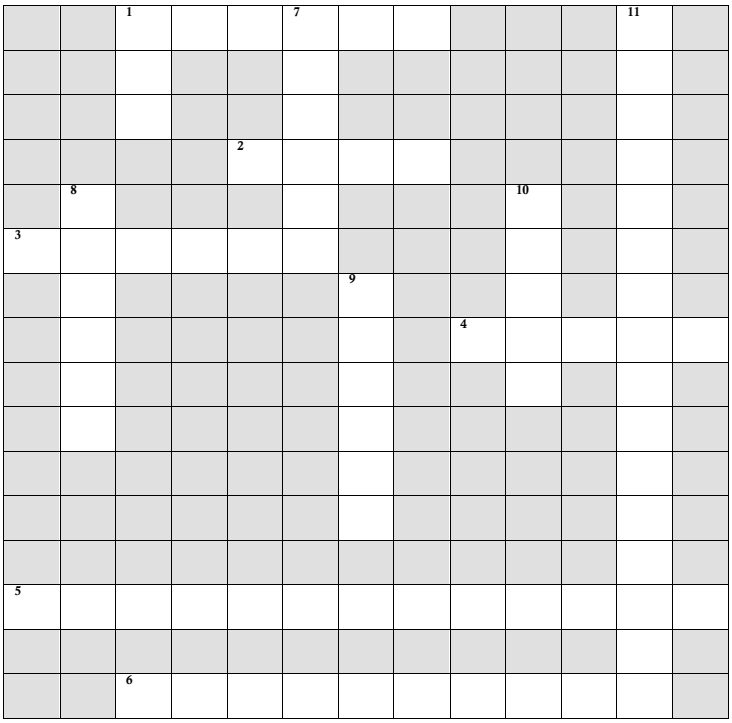
7. The _____ system acts as the body's defense against foreign substances.

8. AIDS symptoms can include rapid _____ loss.

9. HIV can be transferred through _____ contact.

10. Insect _____ do not spread HIV.

11. HIV stands for Human _____ Virus.





Chapter 5: Communicating about HIV/AIDS

A. What is communication?

Communication is a means of sending or receiving information by speaking, facial or bodily expressions, writing or using other gestures through various mediums.

B. The Importance of Family Communication

Communication is important because it helps to: -

- Improve the quality of family relationships,
- Build confidence,
- Promotes responsibility and
- Creates a sense of safety and security.

C. Healthy ways for parent/guardian and child to communicate:

a. Supportive Language:
Through the effective use of words, parents can create a climate of love, acceptance, hope and support that can inspire their child to reach their potential. Messages are communicated verbally through your words, as well as non-verbally through your body language, facial expressions, and tone of voice. The more children feel good about themselves, the more likely they are to be motivated to learn and make good changes into their life. Families can send healthy messages to one another through listening, teaching, praising, and problem solving. There is no right technique to use in any particular situation. You can use any of these methods in healthy ways that will improve your family relationships, either in one–on-one communications, family conversations, or during more formal family meetings.

b. Teaching
Parents act as teachers, mentors, and models. When parents use a respectful approach, children are better able to understand and learn from them. The goal is to work together as a team, as a family.

c. Listening
Parents should listen to their children and children should listen to their parents. Listening involves really hearing what is going on for the other person. By listening, you allow the opportunity for someone to vent their feelings and you send a message of caring.

d. Problem Exploration
If you have a problem you should go to your parents and discuss it with them. Tell them all the possible solutions that you might have to solve this problem.

e. Sharing
Spend time with your parent and share information with them e.g. about your day, your friends, what you are learning at school.

d. Dealing with Discomfort and Support for Sexual-specific Communication

Do not feel embarrassed to communicate with your family. It is awkward and uncomfortable to talk about sex but it is important and must be done. Parents and children who talk about sex openly have a greater impact on behaviour.

Some ways to help you and your parents talk about sexuality include: -

a. **Talk about sexuality in everyday life:** The media is overflowing with sexuality and parents can use movies, television and magazines for educating children about sexually related topics such as puberty, sexual violations, dating, HIV/AIDS and pregnancy.
b. **Be open and honest about sexuality:** Children should know that they are going to have to make responsible choices about sexuality. Open communication allows a forum for discussion around partners, condoms, contraceptives and when to have sexual activity.
c. **Parents can learn by listening to what their children have to say:** The more parents can hear their children's thoughts, the more they're going to be able to guide them appropriately regarding sex with sexual discussions, non-judgmental, reflective listening and clarification. When discussing sexuality with children, parents should ask children to repeat back what they think they've heard. If parents are unclear about what is being asked, they too should get further clarification from their children.



Activity 1

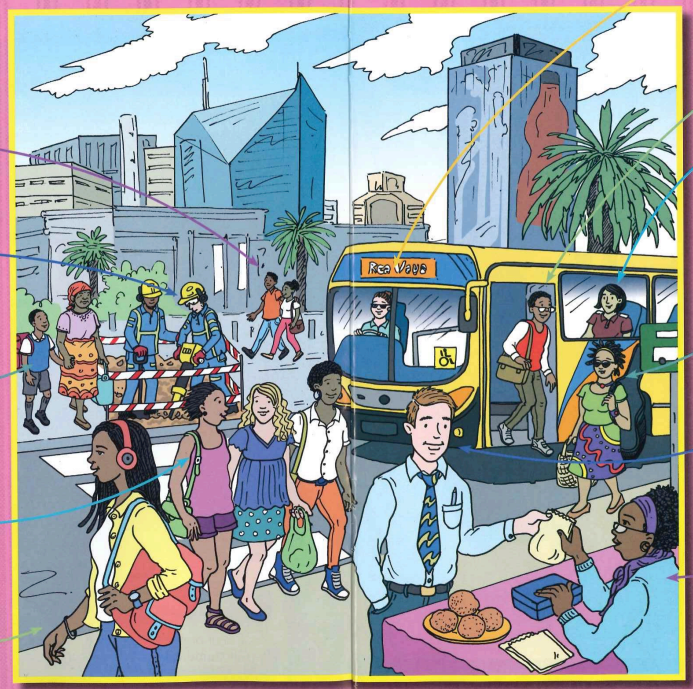
We are all affected by HIV and AIDS

Goal
To find out how we are all affected by HIV and AIDS.

Who leads and reads
Work in small groups for this activity.

We all know about HIV and AIDS and sometimes we get a little tired of hearing about it, but we must never forget that we are all affected by it and we all need to be aware of it.

Look at this picture and read the labels. Talk about what you are reading.



This young man and woman have decided to have sex as they are serious about their relationship – they are going to have an HIV test at the local clinic .

This man is HIV-positive, he takes ARVs. His friend and colleague is supportive and reminds him to take his pills every day.

This boy is living with his granny because his mother and father died of AIDS. He was born HIV-positive. He is going to the clinic to get his ARVs.

These girls know that it is best not to have sex until they are older and have left school. They support each other and always go out together in a group.

This young woman is a radio DJ. She presents a programme on the radio about living with HIV.

This woman has been to the clinic to check if she has HIV. She was negative and now she makes sure she will stay that way.

This young man is a counsellor at a testing clinic for HIV.

This nurse works at an HIV clinic – she runs a support group for children who are HIV-positive.

This girl is a musician. She sings songs about how we are all special and need to look after ourselves in a time of HIV.

This young man always uses a condom when he has sex with his new girlfriend – he knows how to keep safe.

This mother talks to her children about sex and HIV and AIDS because she knows they need knowledge to be safe.

In this Unit Guide we will look at how HIV and AIDS affects all of us and how important it is for us as Soul Buddyz to have knowledge about them.

Source: Soul City

Activity 6: HIV Communication



Pretend that you are a talk show host on television. At home, interview and discuss the picture of HIV/AIDS on the previous page with your parent/guardian. Make use of the communication skills that you were taught in the previous pages. Then answer the questions that follow.

1. What did you and your parent/guardian discuss about the picture?

_____

_____

2. Did your parent/guardian offer you any advice about the picture or the topic of HIV/AIDS?

_____

_____

3. Did you offer your parents any advice about the picture or HIV/AIDS?

_____

_____

Parent/Guardian Signature: _____

Any comments from you or your parent/guardian:

_____

_____

_____



The CIRCLE of Life Initiative is designed to transfer knowledge and skills to children and their parents about nutrition, physical activity and HIV/AIDS to foster socially responsible behaviour. It is hoped that lessons learnt early in life will be carried forward into adulthood.

This workbook is to be completed by children together with their parents. The workbook is designed to help parents and children understand HIV and obesity related health problems and learn skills to prevent such disease, with the ultimate goal of encouraging good health.

For more information contact:

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Appendix 20: STARI checklist

Standards for Reporting Implementation Studies: the StaRI checklist for completion

The StaRI standard should be referenced as: Pinnock H, Barwick M, Carpenter C, Eldridge S, Grandes G, Griffiths CJ, Rycroft-Malone J, Meissner P, Murray E, Patel A, Sheikh A, Taylor SJC for the StaRI Group. Standards for Reporting Implementation Studies (StaRI) statement. *BMJ* 2017;356:i6795

The detailed Explanation and Elaboration document, which provides the rationale and exemplar text for all these items is: Pinnock H, Barwick M, Carpenter C, Eldridge S, Grandes G, Griffiths C, Rycroft-Malone J, Meissner P, Murray E, Patel A, Sheikh A, Taylor S, for the StaRI group. Standards for Reporting Implementation Studies (StaRI). Explanation and Elaboration document. *BMJ Open* 2017 2017;7:e013318

Notes: A key concept of the StaRI standards is the dual strands of describing, on the one hand, the implementation strategy and, on the other, the clinical, healthcare, or public health intervention that is being implemented. These strands are represented as two columns in the checklist.

The primary focus of implementation science is the implementation strategy (column 1) and the expectation is that this will always be completed.	The evidence about the impact of the intervention on the targeted population should always be considered (column 2) and either health outcomes reported or robust evidence cited to support a known beneficial effect of the intervention on the health of individuals or populations.

The StaRI standards refers to the broad range of study designs employed in implementation science. Authors should refer to other reporting standards for advice on reporting specific methodological features. Conversely, whilst all items are worthy of consideration, not all items will be applicable to, or feasible within every study.

Checklist item		Reported on page #	Implementation Strategy	Reported on page #	Intervention
			"Implementation strategy" refers to how the intervention was implemented		"Intervention" refers to the healthcare or public health intervention that is being implemented.
Title and abstract					
Title	**1**	1	Identification as an implementation study, and description of the methodology in the title and/or keywords		
Abstract	**2**	2	Identification as an implementation study, including a description of the implementation strategy to be tested, the evidence-based intervention being implemented, and defining the key implementation and health outcomes.		
Introduction					
Introduction	**3**	3-5	Description of the problem, challenge or deficiency in healthcare or public health that the intervention being implemented aims to address.		

Rationale	**4**		The scientific background and rationale for the implementation strategy (including any underpinning theory/framework/model, how it is expected to achieve its effects and any pilot work).	3-5	The scientific background and rationale for the intervention being implemented (including evidence about its effectiveness and how it is expected to achieve its effects).
Aims and objectives	**5**	5	The aims of the study, differentiating between implementation objectives and any intervention objectives.		
Methods: description					
Design	**6**	5	The design and key features of the evaluation, (cross referencing to any appropriate methodology reporting standards) and any changes to study protocol, with reasons		
Context	**7**	7	The context in which the intervention was implemented. (Consider social, economic, policy, healthcare, organisational barriers and facilitators that might influence implementation elsewhere).		
Targeted 'sites'	**8**		The characteristics of the targeted 'site(s)' (e.g. locations/personnel/resources etc.) for implementation and any eligibility criteria.	7	The population targeted by the intervention and any eligibility criteria.
Description	**9**		A description of the implementation strategy	6-7	A description of the intervention
Sub-groups	**10**	n/a	Any sub-groups recruited for additional research tasks, and/or nested studies are described		
Methods: evaluation					
Outcomes	**11**		Defined pre-specified primary and other outcome(s) of the implementation strategy, and how they were assessed. Document any pre-determined targets	5-7	Defined pre-specified primary and other outcome(s) of the intervention (if assessed), and how they were assessed. Document any pre-determined targets
Process evaluation	**12**	5-7	Process evaluation objectives and outcomes related to the mechanism by which the strategy is expected to work		
Economic evaluation	**13**	N/A	Methods for resource use, costs, economic outcomes and analysis for the implementation strategy	N/A	Methods for resource use, costs, economic outcomes and analysis for the intervention
Sample size	**14**	7	Rationale for sample sizes (including sample size calculations, budgetary constraints, practical considerations, data saturation, as appropriate)		
Analysis	**15**	9	Methods of analysis (with reasons for that choice)		

Results					
Characteristics	**17**		Proportion recruited and characteristics of the recipient population for the implementation strategy	7	Proportion recruited and characteristics (if appropriate) of the recipient population for the intervention
Outcomes	**18**		Primary and other outcome(s) of the implementation strategy	10-18	Primary and other outcome(s) of the Intervention (if assessed)
Process outcomes	**19**		Process data related to the implementation strategy mapped to the mechanism by which the strategy is expected to work		
Economic evaluation	**20**	N/A	Resource use, costs, economic outcomes and analysis for the implementation strategy	N/A	Resource use, costs, economic outcomes and analysis for the intervention
Sub-group analyses	**21**		Representativeness and outcomes of subgroups including those recruited to specific research tasks		
Fidelity/ adaptation	**22**		Fidelity to implementation strategy as planned and adaptation to suit context and preferences	11-12	Fidelity to delivering the core components of intervention (where measured)
Contextual changes	**23**	10-11	Contextual changes (if any) which may have affected outcomes		
Harms	**24**	N/A	All-important harms or unintended effects in each group		
Discussion					
Structured discussion	**25**	19-24	Summary of findings, strengths and limitations, comparisons with other studies, conclusions and implications		
Implications	**26**		Discussion of policy, practice and/or research implications of the implementation strategy (specifically including scalability)	23-24	Discussion of policy, practice and/or research implications of the intervention (specifically including sustainability)
General					
Statements	**27**	25	Include statement(s) on regulatory approvals (including, as appropriate, ethical approval, confidential use of routine data, governance approval), trial/study registration (availability of protocol), funding and conflicts of interest		