THE SOCIO-ECONOMIC IMPACT ON HEALTH BEHAVIOUR REGARDING BLOOD PRESSURE MANAGEMENT AMONGST YOUNG ADULTS

BY

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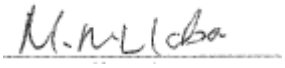
DECLARATION

I **Mimi Mhlaba** declare that this dissertation is my own original, unaided work. The report is being submitted in fulfilment for a Master of Science in Medicine at the University of Witwatersrand, Johannesburg, South Africa. It has not been submitted before for any other degree or examination at this or any other academic institution.

Signature: 

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DEDICATION

I dedicate this research work to my princess and wonderful daughter, Babalwa Mhlaba.

ABSTRACT

BACKGROUND

Hypertension (HTN) is a leading cause of cardiovascular disease (CVD), with hypertension prevalence among young adults (YAs) increasing on a global as well as local scale. In South Africa between 1998 and 2016, Hypertension (HTN) rates in YAs (age 15-34 years) have more than doubled. Research reports that the increasing prevalence of HTN in YAs is largely attributed to unhealthy behaviours, such as unhealthy diet, physical inactivity, smoking, drinking alcohol, and poor sleep, with YAs also perceiving themselves as invulnerable to developing HTN at a young age. Formative research has shown that lack of education, employment, and training (NEET status) presents a significant barrier to healthier behaviours in YAs. Currently, 44.7% of South African youth are NEET, indicating the increased risk of pro-HTN behaviour in this group and the need for urgent intervention. While many learnerships addressing NEET rates in the country have been implemented, few are focused on health. Therefore, this study aimed to investigate if transitioning from a NEET status to employment and health education training changes perceptions of HTN risk and health behaviour intentions.

METHODS

We conducted six focus group discussions (FGDs) comparing HTN-related beliefs and intention for behaviour change between NEET youth (n=20; not in employment, education, or training) and previously NEET youth on a health employment and education training initiative (HETI); n=20). All FGDs were approximately 70 minutes in duration and were recorded and transcribed verbatim. The study utilised the conceptual framework of the Health Belief Model (HBM) to inform the FGD topic guide and a deductive thematic analysis. Frequent debriefing and review sessions with research supervisors were conducted to ensure the quality of the analysis.

RESULTS

All youth were familiar with HTN but for NEET youth, who only knew it as “high-high” or “high blood”, this was mostly through experiences of others in their social network. While all youth viewed HTN as life-threatening if left untreated and expressed fear of lifelong medication use if diagnosed, only HETI youth felt empowered to implement positive health behaviours for disease prevention. Intention for behaviour change was related to personal relevance resulting from the practical application of HTN knowledge in their daily lives. In contrast, NEET youth felt chronic disease was inevitable at an older age and demonstrated no

intention for behaviour change. Past negative experiences in local clinics and the fear of distress in the event of a possible diagnosis were described as major deterrents to blood pressure (BP) screening.

CONCLUSION

Results suggest that engaging NEET (Not in employment, education, or training) youth in similar HETI (Health employment and education training initiative) programs can increase personal relevance of health information, which serves as a motivator to increase intentions toward healthier behaviours for chronic disease prevention. This may also result in double-duty benefits, reducing a NEET status as well as the risk for chronic illness among the YA population.

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LIST OF ABBREVIATIONS

BP	Blood Pressure
BMI	Body Mass Index
CVD	Cardiovascular Disease
DBP	Diastolic Blood Pressure
FGDs	Focus Group Discussions
HBM	Health Belief Model
HETI	Health Employment and Education Training Initiative
HBP	High Blood Pressure
HICs	High Income Countries
HIV	Human Immunodeficiency Virus
HTN	Hypertension
LOC	Locus of Control
LMICs	Low- or Middle-Income Countries
NCD	Non-communicable Diseases
NEET	Not in Employment, Education or Training
PHC	Primary Health Care
SES	Socioeconomic Status
SSA	Sub-Saharan Africa
SBP	Systolic Blood Pressure
US	United States
YAs	Young Adults
YEIs	Youth Employment Initiatives/ Youth Employment and Education Initiatives

CHAPTER 1 - INTRODUCTION

1.1 Brief Background

Hypertension (HTN) is the leading cause of cardiovascular morbidity and mortality, with HTN-related deaths accounting for 10.4 million deaths per year globally[1–5]. However, these numbers have been argued by researchers to be under-reported due to the lack of accurate surveillance nationally, regionally and across the globe[2,4,6], indicating that we may be facing an even bigger public health burden than is currently depicted.

Global epidemiology consistently shows that HTN tends to be a chronic condition, with onset typically occurring around age 45 years[7–10]. However, recent studies show that HTN has begun to also affect young adults (YAs)[1], broadly defined as those between the ages of 15-35 years old[6,11–15]. For example, the 2016 South African Demographic and Health Study, reported that the HTN prevalence in YAs between the ages of 15-34 has more than doubled between 1998 and 2016[16]. In the climate of such a drastic increase in HTN cases among YAs, global studies still show that young people are less likely to be aware of their blood pressure (BP) status compared to older age groups[1,17–20].

This lack of awareness of BP status among YAs has been attributed to several factors. Firstly, YAs, are often referred to as the "young invincibles", perceiving themselves as too young to have HTN[17(p1099),21,22]. Additionally, YAs largely remain asymptomatic, with diagnosis often being received at a screening for an unrelated condition[1,21]. The lack of HTN awareness campaigns for YAs globally is reported as another contributing factor[17,23]. As a result, YAs are less likely to receive information and guidance on lifestyle changes to address HTN[17]. This lack of awareness in YAs leads to lower engagement in health behaviours or accessing healthcare for HTN prevention or management[1,17].

Furthermore, primary health care (PHC) facilities frequently do not have youth-friendly services for YAs[17,24]. This is particularly true in South Africa, where youth report barriers to healthcare accessibility and utilisation including travel costs to clinics, long waiting times in queues, perceived negative attitudes and poor skills of healthcare practitioners[25,26]. Additionally, limited medical equipment and human resources have also been reported as the reason for poor services rendered to YAs[26]. In Low- or middle-income countries (LMICs),

[1] When reading this dissertation, you will notice that there is variability on how the term young adults is defined across different sources, which is predominantly in accordance with the participant criteria for that specific study. Please note however that for this study participants are between 18-34 years old.

PHC often prioritises care for the elderly, as they are understood as being more susceptible to chronic illnesses such as HTN, and thus require more frequent contact with healthcare providers and regular screening[17,24,27].

Furthermore, previous work among YAs in urban South Africa, shows that healthy behaviours are often limited in the absence of secure employment, income and education[28]. Additionally, South African research has further demonstrated that youth that are currently not in any employment, education, or training (NEET) are more prone to engage in pro-HTN risk behaviours such as substance abuse, unhealthy diet and sedentary lifestyles[29]. This is particularly concerning as South Africa has both the highest HTN and NEET rates within the Sub-Saharan region and worldwide[15,30,31].

1.2 Problem Statement

The government, in an attempt to reduce NEET rates and address a broad array of vulnerabilities among NEET youth, has implemented a range of skills development and employment programmes[15]. However, there are few youth employment initiatives within the healthcare sector that are aimed at increasing employability and providing health promotion knowledge. Youth employment initiatives may alter a NEET status by reducing unemployment levels but those that engage youth as health champions and provide health education may create a double benefit, reducing a NEET status and chronic disease risk in YAs[32–35]. Therefore, understanding how such programmes may change the perceptions of youth around their own risk of HTN and subsequent intentions to alter health behaviour is critical.

1.3 Research Aim

Therefore, the aim of this study was to compare HTN-related beliefs and intentions for health behaviour change between NEET youth and previously NEET youth undertaking a health employment and education training initiative (HETI), using the Health Belief Model (HBM) as the theoretical framework. The following question and objectives were set as guidelines to fulfil this aim.

1.4 Research Question

What is the impact of a health employment and education training Initiative (HETI) on YAs' perceptions of HTN?

1.5 Research Objectives

1.5.1 To understand differences between NEET and non-NEET YAs in their perceptions and beliefs associated with HTN risk and health behaviour.

1.5.2 To gain insight on current health behaviours among YAs that may used to prevent HTN.

1.5.3 To examine the intention for health behaviour change to modify HTN risk in NEET and non-NEET YAs and understand facilitators and barriers for changing behaviour.

The rest of this dissertation is presented as follows, Chapter 2: Literature review – this chapter covers the prevalence of HTN among YAs both internationally and regionally. It also looks at the impact of a NEET status on HTN. Furthermore, it goes on to review how YAs perceive HTN risk and its severity, as well as barriers, benefits, and facilitators of health behaviour to prevent HTN, also demonstrating the confidence levels for BP management among this age group. Finally concluding with a detailed explanation of the HBM. Chapter 3: Constitutes the manuscript that emanated from this dissertation research and is currently in submission with the Journal of Public Health in Africa. This paper is titled, "Hypertension perspectives and health behaviours among African youth: the impact of health education and employment". Chapter 4: Is the concluding chapter, which includes a general discussion of the dissertation reflecting on both the paper and the whole research project including study methodology, strengths, and limitations, and makes recommendations for future research.

CHAPTER 2 - LITERATURE REVIEW

2.1 Global Hypertension Prevalence in Young Adults

Hypertension (HTN), otherwise known as high blood pressure, is the leading cause of cardiovascular morbidity and mortality, with HTN-related deaths accounting for 10.8 million deaths in 2019 (19.2%) and 9.3% disability-adjusted life years (DALYs) lost globally[1–5,36]. Research has shown that approximately 1 billion people were living with HTN in the year 2000[2,4,6,37,38], and it is estimated that the burden of HTN will increase to 1.56 billion by the year 2025[2,5,6,38]. The high prevalence of HTN worldwide has largely contributed to the present pandemic of kidney and cardiovascular disease, including ischemic heart disease and cerebrovascular stroke[2,6,37,39].

In the past two decades, HTN has increased among the YA population across the globe, reaching epidemic proportions[1,11,16,39]. In 2000, global estimates of HTN prevalence among YAs (20 to 29 years) were 12.7% and 7.4% in men and women respectively, higher rates were reported in 30-39-year-olds, at 18.4% and 12.6%, respectively[11]. In 2007-2008, 19% of YAs (24-32 years old) had HTN globally[40]. Between 1990 and 2019, there was a 43% increase in HTN-related deaths and an 87% increase in years of living with a disability due to HTN in YAs[41]. Much of this global rise in HTN among YAs is attributed to increasing levels of unhealthy behaviours[1,39]. For example, in 2015, the World Health Organisation (WHO) reported an increase in behavioural risk factors among YAs i.e., tobacco use among >150 million youth, 78% and 84% of adolescent boys and girls who had sedentary lifestyles, and 12% of adolescents who were binge drinkers[42]. These factors suggest an urgent need for preventive measures for HTN [weight loss; reducing sodium intake (including table salt); increased potassium intake and adopting other changes such as increasing fruit and vegetable intake, regularly exercising; managing stress; quitting smoking and drinking][1,3], among YAs on a global scale to avoid a recurrence of the CVD burden.

2.2 The Problem of Hypertension in Africa and African Young Adults

Studies estimate that communities in Sub-Saharan Africa (SSA) have a HTN rate as high as 38% with most HTN cases being in urban areas[36,38]. The burden of HTN, in a region with limited healthcare and financial health resources, impedes healthcare provision for the treatment of a multitude of non-communicable diseases (NCDs) as well as the Human Immunodeficiency Virus (HIV) epidemic that is already overwhelming this region[27,31,43]. Limited PHC resources also mean that the public cannot be reached to promote optimal healthcare-seeking behaviours (i.e., screening), which is crucial for preventing a HTN

diagnosis in cases already presenting with high BP levels[27,43]. Furthermore, a large number of people in the region, live with HTN but go undiagnosed and untreated[27,38,44,45]. For example, in an Ivory Coast study among 1,182 participants, 14% of men and women had severe HTN and 29% of those with severe HTN were either undiagnosed or untreated[44]. In a study conducted in Kenya in 2015 (n=4,500), 28.6% of the participants had HTN, of which less than one-third (29.4%) were aware, and only 6.5% were using antihypertensive medication, and of those, only 12.5% had their BP under control (< 140/90 mmHg)[45]. In young and middle-aged adults in a rural district in Tanzania, HTN prevalence was reported as 29.3%, with only a third (34.3%) of these individuals aware of their status[23]. In the same cohort, of those aware, only one-third were currently on antihypertensive medication of which 29.9% were controlled[23].

Not only are the awareness, treatment and control rates of HTN concerning in SSA but studies also reveal that the onset of CVD is occurring at an earlier age in these countries resulting in the youngest average age of death for CVDs in the world[2,46]. Furthermore, young people who are pre-hypertensive are two to three times more likely to develop HTN in middle age, resulting in increased chances of CVD as well as target end-organ damage[1,11,47]. Incidences of cardiovascular complications among YAs of African descent have been reported. For example, in a local hospital in Mali (2009/2010), of the YAs (18-35 years old) admitted to the cardiology department, 6% had HTN, 19% were observed with heart failure with decreased systolic function, and 5% of YAs presented with a stroke[48]. The young patients were reported to be reluctant to seek treatment for HTN, yet their BP responded well to weight loss and lifestyle changes[48]. While lifestyle modification was demonstrated as effective in this group of YAs, their reluctance to seek treatment, even with existing cardiovascular complications was concerning.

2.3 National Burden of Hypertension in South Africa and South African Young Adults

South Africa has the highest HTN rates in SSA, with the reported rate as high as 60%[30,31,49,50]. HTN in older populations (35 years and older), increased by approximately 19% between 1998 and 2016[27]. Research has also shown a rapid increase in HTN prevalence in YAs (15-34 years old) from 26% to 54% in the same years[27]. Despite the high prevalence of HTN in South Africa, the country still has very low awareness and control rates in hypertensive individuals[27,49,51].

In 2016,among 7830 participants, the average HTN awareness was reported as 10% in YAs and 39% in older adults, while control rates (participants on anti-hypertensive medication with controlled BP of <140/90 mmHg) were 19% in YAs and 38% in older adults[27]. This is

concerning as low rates of awareness and control have the potential to significantly increase both CVD morbidity and mortality, not only in older populations but as previously indicated, in younger populations as well[1,16,27,49,51,52]. In 2000, almost 47,000 deaths in South Africa (approximately 9% of all deaths), occurred as a result of high BP indicating the severe effect of the disease burden on the population[53]. Cerebrovascular diseases and ischemic heart disease, highly associated with HTN or hypertensive diseases, were among the top ten primary causes of mortality in South Africa in 2017[27]. Longer-term outcomes in hypertensive YAs include CVD complications in many patients[16,52]. For example, in hypertensive YAs (15-30 years old) at a tertiary clinic in South Africa, it was found that 68% of the participants had target organ damage[52]. In another South African cohort of 110 YAs (15-30 years old), referred to a HTN clinic, 29 (26.4%) presented with chronic kidney disease, while 56 (50.9%) presented with left ventricular hypertrophy[16]. Furthermore, 72 (65.5%) of the participants had target organ damage[16]. If these HTN rates continue to escalate, South Africa could face a surge in CVD complications in young and middle-aged adults in the coming years.

2.4 Drivers of Hypertension in African and South African Young Adults

As previously mentioned, the rise in HTN prevalence in YAs is to a great extent attributed to lifestyle factors[1,39]. Examining evidence of modifiable (behavioural) risk factors that can potentially reduce the likelihood to develop HTN is crucial for HTN prevention strategies among YAs. Globally recognised modifiable risk factors for HTN include an unhealthy diet (excessive salt consumption, a diet high in saturated fat and trans fats, low intake of fruits and vegetables), physical inactivity, smoking, drinking alcohol, and poor sleep[4]. While the association between these risk factors and HTN in African youth has had limited observation, existing evidence from elsewhere suggests that the prevalence of such modifiable risk factors will lead to adverse effects for this age group in the near future and deserves further attention[54,55].

2.4.1 Unhealthy Diets

In South Africa, rapid urbanisation has increased the accessibility and affordability of unhealthy foods. For example, urban areas such as Soweto, have a wide variety of food vendors and convenience stores that sell energy-dense foods at low prices, promoting unhealthy lifestyles and further contributing to pro-HTN risk behaviours[37,38]. Research has reported an increase in processed and energy-dense foods, high in fat and sugar but low in essential vitamins and minerals among South African children and youth (10-20 years old)[56]. A Sowetan study, measuring fast food items consumed and the recurrence of fast food convenience store

visits in 655 black participants (17-year-olds) found that this youth consumed 5,026 fast food items over an evaluation period of 7 days[57]. This is concerning, particularly in a community with a high prevalence of NCDs (i.e., diabetes cases and mental health issues) that greatly impact the populations' well-being[39]. While the association between an unhealthy diet and HTN in YAs is not widely assessed locally, in Uganda and Tanzania, consumption of fruit and vegetables was highly associated with reduced BP in YAs (15-24 years old)[47]. Additionally, research also shows that refraining from unhealthy behaviours also reduces the risk of developing HTN. In a group of Kenyan YAs (18-35 years old) not drinking alcohol or eating red meat resulted in reducing the risk of HTN by 70% and up to 83% respectively[58].

2.4.2 Physical Inactivity

Compared to other African countries, in South Africa, 43–49% of individuals (15 years and older) are physically inactive[59]. Furthermore, research from other African countries reports that less than 50% of adolescents (13-15 years old) engage in physical activity for a minimum of 60 minutes a day, for three days per week[59]. Notwithstanding the statistics highlighted, research investigating the prevalence of physical inactivity in YAs in African countries as well as the effect of physical activity on BP levels in this age group remains limited. However, existing research highlights that physical inactivity greatly impacts BP even among the youth. For example, a study in Accra, Ghana, assessing risk factors influencing BP levels, found that more than three-quarters (84.1%) of the 201 young (15-24 years old) participants were physically inactive, and had raised BP levels[60]. In a group of young South African women (18-23 years old, n=1,019), urban women reported significantly less physical activity than rural women[61]. The urban group spent more of their time sitting than did their rural counterparts and presented with a significantly higher prevalence of elevated BP (27% vs 9.3%) as well as overweight and obesity (46.5% vs 38.8%)[61]. Studies have attributed the lack of physical activity or sedentary lifestyle as well as poor diet in youth to the rapid rate of urbanisation in the African region, which in turn leads to high overweight and obesity rates[1,56,61].

2.4.3 Overweight and Obesity

The result of overweight and obesity is closely tied to increasing rates of HTN. This has been demonstrated by studies conducted across 13 African countries, which highlight that obese Africans are at least twice as likely to be hypertensive compared to their non-obese counterparts[62]. Currently, South Africa has the highest prevalence of obesity in Africa[28,63]. The high prevalence of obesity was found alongside the prevalence of HTN (68%) in participants from rural and suburban South Africa, with the highest prevalence of obesity among

individuals who were physically inactive and had an unbalanced diet with lots of fast food[64]. In a rural South African village, the high prevalence of obesity in black women (>18 years old) was also associated with elevated BP[63].

The association between obesity and HTN is also observed in young South African populations. For example, in Cape Town, obesity/overweight was found in 57% of young people (15-30 years old) referred to a HTN clinic[16]. Furthermore, research in an urban South African community, found that 77% of participants (aged 24-64 years old) who were obese/overweight had HTN[65]. Indeed, research suggests YAs are gradually becoming the more at-risk group, as the relative risk (RR) of being hypertensive when obese/overweight vs. normal weight was higher in younger (RR 2.69 in adults ≤ 44 years) compared to older adults (RR 1.25 in adults >44 years old)[65]. Therefore, the need to address obesity in YAs is central to addressing the increasing HTN burden in this age group. However, in the absence of adequate health education, being overweight is often perceived as normal and socially acceptable and a healthy diet or being physically active is not recognised as a priority in relation to securing employment and educational opportunities[28,66].

2.4.4 Smoking and Tobacco Use

Reports on tobacco use and smoking prevalence among African YAs are scarce, however, literature is replete with adolescent smoking data[67–71]. Nonetheless, research suggests that tobacco use in adolescent age strongly tracks through to adulthood, indicating a pattern of this health behaviour across young and middle adulthood[72]. A study assessing data between 2014-2017 across nine Sub-Saharan African nations (n=38,313) reported current smoking rates as high as 15.4% among youth (13-15 years old)[67]. Equally problematic is the extensive early smoking onset, with almost 75% of this youth initiating smoking before 15 years of age[67]. While reported to cause an acute increase in BP levels, research also demonstrates the detrimental long-term cardiovascular consequences of early smoking onset[73]. In a South African cohort, the average age at smoking onset was 18 years old, with the likelihood of tobacco use being higher (21.0 vs 20.1) among YAs (aged 20-29 years) compared to older populations, indicating increased cardiac vulnerability in this group[74]. Similarly, among a combined cohort of 1,545 South African young-middle-age and older adults (18-120 years old), an overall 19% (293) reported current use of tobacco products, with the highest prevalence of 22.4% (n=211 of 941) identified among YAs (aged 20-30 years)[75], further demonstrating the urgency for health promotion and cessation efforts in this age group to prevent cardiovascular complications and mortality in later years.

2.4.5 Alcohol Consumption and Poor Sleep

While alcohol intake and poor sleep among YAs have been identified as significantly associated with a greater likelihood of HTN in upper-to-middle-income countries in other regions[76,77,77], evidence on the association of these factors is still scant for populations in the African region. However, there is alcohol use prevalence data. For example, in South Africa, amongst 177 male and 206 female rural high school youth (15-23 years old), 35.5% of male and 29.7% of female youth consumed alcohol[78]. Both male and female youth were reported to occasionally binge drink and alcohol consumption was found to increase in older groups (53.2%; 18-20 years old) compared to younger populations (32.2%; 15-17 years old)[78]. Another South African study, among 15,133 individuals, reported a prevalence of insomnia at 3.5% among 15–24-year-olds[79]. The above evidence indicates the high prevalence of these risk factors of HTN in the YA population in LMICs, including SA, thus increasing the odds for HTN development. It is therefore imperative to further examine HTN and its behavioural determinants among African YAs, while paying close attention to urban and rural differences.

2.4.6 Stress

Research reports stress (a state of distress to an external stimulus) as another risk factor for HTN and CVDs[80,81]. This risk factor has been demonstrated by physiological responses such as increased heart rate and BP levels, indicating its contribution to chronic illness and cardiovascular complications[80,81]. Stress, especially for an extended duration, has been reported to be among the primary causes of increased mental health issues (i.e. anxiety, aggression, and depression) among youth in other regions[80,82]. In Africa, the prevalence of mental health-related issues has been primarily assessed among adolescent youth. For example, among 14,409 adolescents across nine African countries, the median prevalence of depression was reported at 26.9%[83]. In 515 South African adolescents (16-18 years old), anxiety was reported in 61.2% of the participants, with 29% presenting with mild anxiety and 32% with moderate to severe symptoms of anxiety[83]. With such a high prevalence of mental health issues in African youth, stress as a risk factor for HTN has not been adequately assessed among youth in this region. Studies assessing this relationship are more prevalent in high income countries (HICs), with work-related stress being considered a significant risk factor contributing to the development of HTN among youth[81,84,85]. For example, among a total of 3,200 YAs (20-32 years old), it was found that stress as a result of job strain (i.e., increasing work demands, decreasing decision-making agency or low levels of control over work) was associated with an increased likelihood to develop HTN across the entire cohort[84]. This evidence suggests that the

impact of stress (as a result of socioeconomic position) on BP levels and cardiovascular vulnerability in YAs is significant and should be closely monitored. While non-modifiable risk factors (i.e., age or family history of HTN) are significant predictors of HTN in YAs[1,16,52], modifiable risk factors present a strong case for prevention efforts in this age group and should be further analysed. An examination of the relationship between these factors and socioeconomic status (SES) could prove meaningful in implementing health promotion interventions.

2.5 The Relationship between a NEET status and Modifiable (behavioural) Risk Factors for Hypertension

It is well known that a NEET (Not in Employment, Education or Training) status, an indicator of SES, contributes to adverse health outcomes among individuals, including YAs[29,86]. As previously mentioned, recent research among young South African adults shows that healthy behaviours and healthier 'lifestyle choices' are unlikely to occur without secure employment, income, or career prospects[28]. Most studies in Africa have focused on the impact of unemployment on mental health in YAs[29,87]; however, few studies have assessed the broader impact of being NEET on health behaviour, with those that have, being mainly conducted in HICs[88–91]. Studies in the United States (US) and some European countries found that NEET youth more frequently reported worse health status and engaging in poor health behaviours (i.e., unbalanced diet, the use of tobacco products and other substances, and shorter sleep durations on weekends) in comparison to their counterparts in education or employment[88,90]. Furthermore, unemployed YAs (18-24 years old) in the US were reported to frequently engage in excessive alcohol consumption and had little or no engagement in leisure time physical activity[89]. Among young British men (33 years), those who had experienced recent unemployment were more likely to smoke and have a drinking problem[91]. While in young and middle-aged Spanish women, those who were unemployed showed a greater increase in overweight and/or obesity over a ten-year period (2000–2010)[92]. These findings are similar to a study conducted by Gilbert & Soskolne (2003), assessing the association between health and a range of social factors in Soweto, South Africa[86]. Although not focusing on a specific age group, the study found that the health of the unemployed is worse than that of the employed and lower income and lack of education are linked to worse health[86].

Assessing health behaviours among NEET youth in South Africa is critical for public health policy, given the high rates of unemployment and low education and training levels among South African youth as previously mentioned[29,93,94]. South African statistics have reported a

20% increase in NEET YAs (aged 25-34 years) between 2013 and 2020[95]. COVID-19 has further diminished economic prospects for NEET youth in South Africa [95]. In the first quarter of 2020 over 8.5 million out of 20.4 million youth aged 15-34 years (41.8 %) were NEET[96]; in the first quarter of 2021, this increased to 43.6% and then a further 1.1 % in the last quarter of the same year[96]. Most South African NEET youth are black, female and primarily living in urban areas[29]. While research on the impact of a NEET status on health behaviour in South Africa is limited. Evidence suggests that a NEET status, especially for extended periods, in young South African adults results in a higher occurrence of risk behaviours, such as smoking and excessive alcohol intake thereby increasing the risk of HTN[29].

Furthermore, there is limited data on the direct impact of education on young people's health status in South Africa, though recent research shows that there is a high association between low levels of education and an increased probability of being NEET[29]. Higher levels of education are associated with better chances of access to employment[29]. Research demonstrates that youth who have tertiary education are significantly less likely (with a difference of 14 percentage points) to be NEET than youths with a matric or lower level of education[29], in South Africa, the latter are the majority[29]. For example, between 2013-2018, just over half of South African youth (15-29 years old) did not achieve a high school certificate[29]. Furthermore, poor health is associated with a higher likelihood of being NEET; young people presenting with poor health are 43.1 percentage points more likely to be NEET compared to youth with good health[29]. The highlighted research shows that NEET impacts health status and behavioural outcomes in YAs through SES-related risk factors as well as other modifiable factors. It also suggests health inequalities between the health of NEET and non-NEET YAs.

2.5.1 The Relationship between a NEET status and Hypertension

South African research has to a greater extent reported on the relationship between broader SES (Individual, family, or household income; household assets) and BP[61,97], with very little research focusing on employment status or educational level in YAs. Furthermore, research suggests conflicting evidence regarding the association between SES and BP levels in YAs in urban and rural South Africa[61,97]. For example, in urban Soweto, Johannesburg, among 838 black participants aged 18 years, upward change in asset-based household SES score (based on ownership of assets such as a television, car and refrigerator) between infancy and adolescence was highly associated with lower systolic blood pressure (SBP) at the age of 18 years[97]. Contrary to these findings, among young black South African women aged 18-23 years, household SES (based on ownership of assets such as a television, car and refrigerator, phone,

radio, microwave, DSTV (satellite television) and elevated BP were higher in urban women (n=510) compared to a rural group (n=509)[61]. Furthermore, in a black rural South African population (≥18 years), income levels were reported as having a positive association with HTN prevalence while education and employment were not significant predictors[5]. Authors argue that these findings can be attributed to the fact that higher SES may lead to high consumption of processed foods and a more sedentary lifestyle further progressing cardiovascular disease[5]. However, it is critical to note that this suggestion is to a large extent context-dependent, as research has reported differences in socio-economic disparities in health behaviour between HICs and LMICs[98]. Such evidence is necessary to ensure contextually relevant prevention interventions for HTN and other NCDs.

Similar to the South African context, very little research exists globally regarding the relationship between unemployment and BP levels and there is a lack of agreement regarding a positive association between the two variables across age groups[99–101]. However, a Swedish study assessing whether HTN at middle age was associated with unemployment at a young age (16-21 years old), found that there was no association between these variables at the age of 21 for both men and women[102]. Interestingly, unemployment at age 21 was, however, associated with HTN in women at 43 years of age[102], controlling for HTN at an earlier age, unemployment in adult life, risk factors and confounders for HTN[102]. Authors suggested that stress as a result of unemployment at a young age resulted in HTN at an older age, indicating that unemployment in youth increases stress, with delayed negative health outcomes[102]. In contrast to these findings, however, in a cohort of YAs (17-35 years old) in the US, unemployment rates as a result of a recession were associated to lower BP levels[103]. The authors also reported decreased rates of smoking, increased rates of physical activity and increased rates of depression in study participants[103], suggesting mediating effects between the variables. Assessing the impact of employment status and/or educational level on HTN is important and this relationship needs further investigation.

2.6 Modifiable Risk Factors as Mediators of Socioeconomic Status and Blood Pressure

There are very few studies that have assessed modifiable risk factors as mediators of SES and BP. However, those that have, report on education and employment levels, rather than a NEET status. For example, among 5,941 French participants (30-79 years of age), recruited for a Residential Environment and Coronary Heart Disease study, of the specific risk factors of HTN (physical inactivity, smoking, alcohol intake, body mass index (BMI), waist circumference, and resting heart rate) assessed, it was found that only the latter three factors significantly

mediated the relationship between education and BP[104]. Authors suggested that this result may be interpreted by considering the effects of several environmental dimensions (i.e., infrastructure and safety considerations; activity-friendly communities; access to affordable and healthy food) on physical activity and dietary behaviour[104]. Similarly, in a group of 14,299 YAs examined from grade 7 through to grade 12 and again through to early adulthood between 1995 and 2008, it was found that higher educational levels were associated with an overall lower SBP as a result of lower BMI, lower resting heart rate and smaller waist circumference[105]. Higher educational levels also resulted in greater alcohol intake, slightly increasing SBP[105].

In South Africa, among more than 15,000 adults, alcohol use, physical exercise, smoking, resting heart rate and BMI contributed considerably to mediating SES (educational and income levels) and BP levels[106]. Such findings strengthen the argument that health behaviour plays a significant role as a mediator for SES and HTN. Important to note, however, is that these studies were either conducted in HICs or, in the case of the South African study, among older populations[104–106]. Further research is needed in the African region, especially in countries with high unemployment rates and low education levels among YAs, such as South Africa[29,93,96].

2.7 Youth Employment Initiatives to Address a NEET status

Strategies to reduce unemployment and lack of skills in South African youth include government learnerships and training initiatives which help to place and connect thousands of young, disadvantaged South Africans into employment opportunities each year[93,107]. However, few of these initiatives exist in the health sector, and as such are limited in their capacity to address health issues as well as employment in YAs. A report of youth employment initiatives (YEIs) in four African countries showed that of the forty-seven initiatives, only one considered health, facilitating young people's access to sexual and reproductive health services[63].

While research suggests that health education interventions may increase awareness of HTN and reduce poor health behaviours in YAs[108], evidence is still scant on how impactful these programmes can be for the youth of South Africa. The few studies that have reported successful health education interventions for health behaviour change to prevent or manage HTN are mainly among older populations[32–34]. Furthermore, these studies are outside of the South African context in which youth may face unique challenges to health behaviour alongside high unemployment levels[15]. Leveraging YEIs to further engage YAs in healthy behaviour involves identifying YAs' HTN awareness and knowledge levels as well as barriers and perceptions of HTN risk and of the value of health behaviours to prevent HTN.

2.8 Young Adults' Knowledge and Awareness of Hypertension

Research highlights that HTN knowledge among youth is limited, pointing to a lack of knowledge regarding cardiovascular risk factors[109–111]. For example, among 250 youth, levels of HTN knowledge were reported as unsatisfactory, especially concerning HTN symptoms[109]. Interestingly, those youth who had their BP measured had more than twice the HTN knowledge (medium knowledge score of 40.7%) in comparison to their peers who had not done so (medium knowledge score of 16.0%), suggesting the importance of practically applying theory to promote knowledge levels[109]. Education level was also identified as an indicator of increasing HTN knowledge in this age group, where increasing years of education related to higher levels of HTN knowledge[109].

A study examining the beliefs and health education experiences of 58 young African American adults (aged 17-20), demonstrated limited knowledge of the risks of developing HTN[110]. For example, while they were able to link HTN to a high-fat diet, increased stress levels and having a family history of HTN, only a minority acknowledged risk factors such as obesity or overweight, smoking, advancing age, sex, and race as significant contributors[110]. High-risk males and females also lacked knowledge regarding prevention strategies for HTN, although high-risk female participants had an overall higher level of knowledge and awareness concerning HTN[110]. This demonstrates that youth are for the most part unaware of the risk of developing HTN. Among 302 Ghanaian participants, the majority of whom (53%) were YAs (20-29 years old), less than half (43% of 302) were able to correctly define and explain what HTN is, which may be indicative of limited knowledge regarding the causes, risk factors and consequences of HTN[111]. Neither of these studies were able to report on the current health behaviour of participants; however, according to Savoca and colleagues (2009), even though participants (the 58 young African American adults) were aware of the seriousness of HTN and its consequences, a few were aware of the necessity for BP screening[110]. Research advocates for health education and health literacy interventions that are tailored for the youth, to promote HTN awareness, knowledge, and necessary lifestyle changes[109,110].

As previously mentioned, low knowledge and awareness levels have a ripple effect on HTN prevention, treatment, and control among YAs, increasing the likelihood of CVD[17,49]. Studies worldwide indicate that there are low levels of HTN awareness, treatment and control among YAs, and detection of HTN is often delayed[17,23,112]. For example, in 2007–2008 among 13,512 young American adults, 3,303 had HTN, of which 2,531 (76 %) were uncontrolled, and 1,893 (75 %) of those with uncontrolled HTN were unaware they had HTN[17].YAs who perceived

their health to be excellent vs. those who thought their health was less than excellent, were 64% less likely to be aware that they were hypertensive[17]. Among 34,149 YAs (18-39 years old) in Malaysia, awareness, treatment and control rates between 2006-2015 were inadequate: 15% were aware of their HTN; of which less than half who were aware were on antihypertensive medication; and less than 40% who were on medication had their BP controlled[112]. This further strengthens the argument that YAs for the large part are unaware of their HTN status and when they do become aware they struggle to engage with health behaviour to manage their HTN.

In the US, YAs were far less likely to be aware of their HTN status, to be on treatment and to manage their BP, compared to older and middle-aged adults[18]. Similar findings have also been reported in South Africa[27,113]. As previously mentioned in 2016, a South African national study also revealed lower awareness, treatment, and control rates in YAs compared to older populations (10% vs. 39%; 49% vs. 85%; and 19% vs. 38% respectively)[27]. Contrasting results were obtained among Iranian participants (20-69 years old), which revealed that younger age groups had higher levels of controlled HTN compared to older populations, this, however, was due to underlying illness in this older age group[19]. This evidence suggests that lower levels of HTN awareness, treatment and control are experienced by YAs worldwide, including LMICs such as South Africa. As such, research to investigate the barriers to HTN awareness and health behaviour in South Africa is vital.

2.9 Young Adults' Barriers and Attitudes to Hypertension Health Behaviour

Qualitative research plays a vital role in assessing the experiences and understanding the barriers that YAs face in relation to HTN health behaviour, to ensure better intervention measures. Research suggests the need to distinguish between patient barriers and provider barriers that contribute to low HTN awareness, treatment, and control among YAs[17,22]. In the South African case, YAs were less likely to be in contact with PHC facilities compared to older adults[24,27], they highlight long distances to healthcare facilities, transportation costs, time spent waiting in long clinic queues, and inconvenient facility operating hours for schoolgoers as barriers to HTN health behaviour[26,114]. Whereas studies that look at barriers for YAs in the US indicate that youth perceive engaging with HTN treatment and control to be challenging their young self-identity, perceiving it as an "older person's illness"[17,21]. As previously mentioned, research also shows that most young people with HTN are asymptomatic and only become aware of their illness by coincidence (i.e., upon diagnosis of an unrelated condition)[1,21]. This has resulted in delayed or lower diagnosis and treatment rates for YAs globally[11,22]. HTN awareness, treatment, and control are therefore unlikely to be optimal in this age group.

Qualitative studies from 16 countries found that YA patients reported barriers to treatment adherence as disliking HTN treatment and deliberately stopping treatment as a result of financial and time constraints[21]. Furthermore, YAs often defaulted on medication, finding it burdensome to balance other life responsibilities, remember to take medication and attend follow-up appointments with their healthcare provider[21]. Interestingly, YAs may also weigh their options in deciding if it is beneficial or costly to adhere to HTN medication[21]. Medication side effects and remembering to take medication were the most frequently cited barriers to continued use, with medication adherence perceived as more costly than beneficial among this age group[21]. To date, there is little data on treatment hesitancies among YAs in South Africa. Health professionals suggest that effective medication makes HTN one of the most reducible risk factors for CVD and mortality[11,53], and proper management can significantly reduce the risk of coronary heart disease, heart failure, stroke, and transient ischemic attacks in middle age[11,53]. Interventions to promote the treatment of HTN among YAs are crucial in this regard.

YAs also experience psychosocial barriers to engaging with a HTN diagnosis or taking treatment, including a change in self-identity, feelings of shame and blame upon receiving a HTN diagnosis and increasing concerns of peers being aware of their diagnosis[21]. Medication non-adherence among YAs may also be influenced by fears about the long-term harmful effects of taking medication[11,22]. As such, healthcare teams need to understand and mitigate the emotional and mental health effects that a HTN diagnosis or that engaging in treatment can have in this age group[21]. Kretchy et al. (2014) suggest that for HTN health behaviour to be adhered to, health workers need to also become aware of their role in encouraging treatment behaviour and reducing levels of anxiety and stress associated with being hypertensive[115]. In South Africa, research has mostly identified mental health effects of a diagnosis in young people in relation to other chronic illnesses such as HIV[116,117]. Such considerations need to be explored for HTN diagnosis in young South African adults.

Healthcare provider-related barriers have also contributed to low rates of engaging in HTN health behaviour among YAs. As previously mentioned, inadequate health resources in South African PHC facilities, hinder the provision of sufficient and friendly youth health service delivery[26,114,118,119]. Similar research also suggests that PHC facilities do not adequately cater for the provision of prevention, rehabilitation, and health promotion services[26]. This means that YAs often receive lifestyle modification advice only after a HTN diagnosis. Similarly, within the US, YAs with incident (new) HTN experienced frequent delays in receiving combined

lifestyle modification strategies with their initial antihypertensive medication[22], thereby reducing the chances of early and adequate HTN control in this age group. As a result, youth with less PHC interaction and inadequate health service provision, are also less likely to be aware of their BP status as well as receive support for HTN prevention or management[17].

SES itself can also act as a barrier to HTN care. For example, a study in America, assessing the barriers to HTN care and control in 309 young urban black men, revealed that lifestyle risk behaviour and SES were significant predictors of medication compliance behaviour in those with high BP[120]. The study reported that 49% of the respondents had no current high BP care, 62% were screened with high-risk alcoholism, 45% with the use of illicit drugs, 47% with social isolation, 40% were unemployed, and 51% with no health insurance[120]. In a South African study, the worst level of HTN control was observed in poorer participants, younger men without insurance, whereas improved HTN control, was found in wealthier individuals and those with medical insurance[113]. This suggests that increasing awareness, treatment, and control in YAs requires consideration of broader socio-economic factors. Social cognitive theories may be useful to understand the perspectives of the individual as located within these broader systems.

2.10 The Health Belief Model

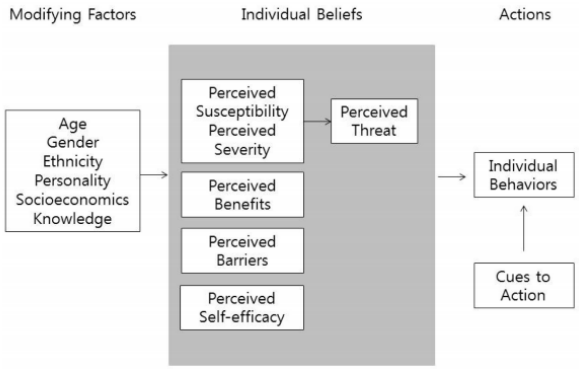

Figure 1.Health Belief Model (Ghorbani-Dehbalaei et al. BMC Women's Health. 2021. pg 3.)

The aforementioned literature has demonstrated that changing individual health behaviour and lifestyle is a complex process[121]. The Health Belief Model (HBM), as illustrated in Figure 1., is one of the most widely used conceptual theories in health behaviour research[122–124]. It was initially developed by social psychologists (Irwin M. Rosenstock, Godfrey M. Hochbaum, S. Stephen Kegeles, and Howard Leventhal) in the 1950s, in trying to explain the indifferences

and hesitations of individuals to take part in programs to prevent and detect diseases[122,123]. The model developed over the years to examine people's response to a diagnosis or the symptoms of an illness and assess adherence to medical treatment plans[122,123,125]. Furthermore, the HBM has been used to guide interventions in promoting the maintenance or change of positive health behaviour among individuals by attempting to understand, explain and predict an individual's attitudes, beliefs and intentions in relation to health action[122].

2.10.1 Constructs of the Health Belief Model

The HBM comprises six constructs that can be used to understand, explain, and predict why YAs will or will not take necessary action to prevent, screen for, treat or control HTN. These constructs are namely, perceived susceptibility, perceived severity, perceived benefits and barriers to a behaviour, cues to action, and most recently, the HBM has added the self-efficacy construct[122,123,125]. These all determine an individual's intention to change health behaviour as predicted by the constructs[122,123,125].

2.10.1.1 Perceived Susceptibility

This construct defines how an individual perceives the likelihood of developing an illness or disease or their vulnerability to a certain health condition[122,126]. For example, the higher the perceived likelihood of developing HTN, the more likely an individual will engage in behaviour to prevent the risk of developing HTN[122,125].

2.10.1.2 Perceived Severity

This construct assesses the individual's behaviour based on the belief that the occurrence of the condition has serious consequences as well as on the implications if the illness is left untreated[122,123]. For example, if an individual does not perceive HTN to have serious negative consequences, they are unlikely to partake in preventive health action to avoid getting the condition as they do not perceive the illness as a threat, however, this needs to be coupled with their level of vulnerability to developing the illness[123]. The theory suggests consequences considered are either medical, including death, disability or pain or social such, as the effects on family life, social relations and professional life[122,123].

2.10.1.3 Perceived Benefits

This refers to the individual's subjective beliefs regarding the usefulness of engaging in a recommended health action to prevent or manage a disease or illness and thus offset the perceived threat[122,123]. Therefore, if an individual thinks that they are prone to develop HTN and consequences will be unfavourable or lead to adverse outcomes (e.g., the burden of taking medication or poor health if the condition goes untreated), they are more likely to enact behaviour change[122,123,125].

2.10.1.4 Perceived Barriers

This construct examines an individual's subjective evaluation of hindrances or factors that may prevent a recommended health action[122,123,125]. For example, an individual identifies the need and is willing to engage in the suggested health behaviour but is limited or prevented to do so by certain barriers (i.e., structural and psychological)[122,123].

2.10.1.5 Cues to action

This includes exposure to internal (i.e., symptoms of an illness) and external factors (media, health campaigns) that prompt healthy behaviour[122,123]. Although an important determinant of health behaviour, studies have suggested this construct to be the weaker of the HBM constructs[123]. Unlike the other constructs, cues to action are not always specific to the individual's perception or the way they experience or would prefer to experience engaging with a recommended health action. For instance, studies have reported cues to action to have a small positive correlation with behavioural intentions, more specifically for external prompts[122,123].

2.10.1.6 Self-efficacy

Self-efficacy is the most recently added construct to the model as suggested by Rosenstock, Strecher, and Becker in 1988[122,123], and is defined as the confidence or self-assurance an individual has in their ability to succeed in the suggested healthy behaviour[122,123,125]. In numerous studies, self-efficacy has been reported as a major predictor of positive health behaviour or self-care behaviours[30,74,75]. An individual must therefore feel competent enough to overcome perceived barriers in engaging in suggested healthy behaviour[123].

2.10.2 Non-communicable Disease Studies and the Health Belief Model

The HBM model has also been applied to studies evaluating risk perceptions regarding NCDs in YAs in comparison to older adults in similar contexts[125,127]. For example, a study conducted in Diepsloot township, Johannesburg, found that YAs had poorer risk perceptions regarding susceptibility and consequences of getting NCDs compared to older adults[125]. Perceived benefits of the usefulness of engaging in physical activity, weight management, not smoking and routine health check-ups were higher in the older population compared to young and middle-aged adults[125]. Authors reported that YAs more often perceived health check-ups as time-consuming, thus perceiving a potential barrier to preventing risks of NCDs[125]. Confidence in the respondent's ability to understand NCD risks and prevention and to actively adopt healthy behaviours to prevent NCDs was also lower in YAs due to a lack of NCD-related information[125]. Another study investigating factors that influence self-care behaviours in young and middle-aged adults with HTN found that patients over 40 years of age showed better HTN self-care behaviour[127]. This was particularly in relation to self-efficacy of BP monitoring, medication adherence and physical activity[127].

2.10.3 Alternative Theories of Behaviour Change

The above evidence suggests the HBM constructs are useful for predicting YAs' intention for behaviour change within the South African context. In contrast, theories such as the Theory of Reasoned Action (TRA) and The Transtheoretical Model (TTM) may have less applicability in a context where a lack of awareness of the risk of developing an illness applies as an individual cannot have intentions to change behaviour without awareness of their risk to develop an illness[128]. For example, the TRA states that individual behaviour is determined by the intention to engage in the behaviour and thus intention precedes behaviour change and is a better prediction of health behaviour[122]. While this may be true, behavioural intention (the individual's perception of the likelihood that they will continue to engage in unhealthy behaviour or stop)[122], as an initial construct of this theory, neglects awareness and risk perceptions as the starting point for intention behaviour. The Transtheoretical Model (TTM) also presents a similar case in that it considers contemplation and intentional change, thus focusing on the decision-making stage of the individual[122], again neglecting awareness and risk perception. Furthermore, this theory does not take into consideration the socio-economic context in which change occurs, such as socio-economic status and income[122]. This presents a problem in analysing and understanding the experiences of individuals and the impact of such

variables on intentions to change health behaviour. Hence, the motivation for the application of the HBM in this regard. The next chapter presents the paper submitted for publication to the Journal of Public Health in Africa.

Chapter 3 – Paper submitted for Publication

This paper was submitted for publication to the Journal of Public Health in Africa on the 17/06/2022 and is currently under review.

Hypertension perspectives and health behaviours among African youth: the impact of health education and employment.

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Declaration of interests

No conflicts of interest.

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Author's contributions

MM, FM, and LJW conceptualized and designed the study. MM was responsible for data collection, data analysis and wrote the original draft. MM, FM and LJW contributed to the interpretation of data and critical review of manuscript. All authors gave final approval of the version to be submitted.

3.1 Abstract

Background: In South Africa between 1998 and 2016, hypertension rates in young adults (15-34 years) more than doubled calling for preventive interventions. However, with many youths not in employment, education, or training (NEET), young adults struggle to prioritise health or implement healthy behaviours. It is not clear if changing a NEET status changes behavioural intentions.

Objective: This study aimed to explore young adults' intention to change behaviour by comparing hypertension-related risk perceptions and beliefs between NEET (n=20) and previously NEET youth (n=20) on a health education training initiative (HETI).

Methods: A cross-sectional study was performed. Data were collected through six focus group discussions from August to October 2021, utilising the Health Belief Model (HBM) as the conceptual framework.

Results: While all youth viewed hypertension as life-threatening leading to cardiovascular disease or death, especially if left untreated, only youth undertaking health education felt empowered to implement healthy behaviours for disease prevention. These youth reported BP self-checks and the practical application of their knowledge as motivating factors for preventive behaviour, making it personally important for them. In contrast, NEET youth felt hypertension was inevitable and described negative experiences at clinics and fear of being diagnosed with hypertension as reasons not to be screened. The fear of lifelong medication use was expressed by all youth.

Conclusion: Our results suggest that personal relevance is key for youth to engage in preventive health behaviour for chronic diseases. Health education programmes with practical self-testing may be useful to aid such efforts.

3.2 Introduction

Hypertension (HTN) is a leading cause of cardiovascular disease (CVD) mortality; an estimated 17.9 million people died from CVDs in 2019 accounting for a third of all global deaths.[1–3] Over three-quarters of these deaths take place in low-to-middle income countries (LMICs),[4–6] strongly suggesting a need for urgent health promotion and prevention programs. Sub-Saharan Africa (SSA) has some of the highest rates of HTN globally,[6–10] particularly among individuals living in urban areas.[7–10] A recent study including West, East, and Southern African countries reported that adults in Soweto, South Africa were among those who had the highest prevalence of HTN (54.1%).[11]

Additionally, the prevalence of HTN among younger adults is increasing.[1,12,13] In 2016, the national South African Demographic and Health Study showed that 24% of young adults (aged 15-34 years) were diagnosed with HTN compared with only 9% in 1998.[12] Despite the prevalence doubling in young adults, there remains a general lack of awareness. As HTN often remains asymptomatic,[1,14] frequently young adults only get diagnosed when being examined for unrelated conditions.[1] Studies also show that young adults perceive themselves as too "young" to have HTN and therefore generally do not readily go for HTN screening.[14]

Globally young adults have been reported as less integrated into healthcare, less likely to be insured and receive information about lifestyle changes to address HTN.[15–18] In LMICs, though primary healthcare services are free, they often prioritize older populations who are considered more vulnerable to illness.[15,18,19] Thus, young adults in both high-income countries (HIC) and LMICs infrequently get screened for HTN compared to older age groups.[17,18] Additionally, the realities of under-resourced health facilities in Sub-Saharan Africa further exacerbate this situation, widening the service gap for young adults and leading to a lack of engagement in preventive HTN health behaviours in this age group.[16,17,20]

Understanding young adults' perceptions of risk factors and their own susceptibility is important to design appropriate health promotion and prevention tools, and to know which attitudes and behaviours to target.[6,15] Previous research in South Africa showed that young adults have poor risk perceptions regarding the likelihood and consequences of getting NCDs as well as the usefulness of NCD preventive measures.[21,22] Understanding the drivers of such beliefs is also crucial for designing effective interventions to prevent or manage HTN.

Socioeconomic status during childhood and adolescence has been shown to impact HTN rates in young adults in the region.[23] However, there are many young adults not in employment,

education or training (NEET; i.e. unemployed or not enrolled in any formal education or training, regardless of prior employment or level of education attained).[24,25] South Africa currently has one of the highest rates of NEET youth globally (44.7% in quarter 4 of 2021), in part related to a lack of skills.[24,26] Notably, NEET youth are also those most likely to engage in unhealthy behaviours such as substance abuse, poor diet and sedentary lifestyles,[25,27] as well as have worse mental and physical health.[25]

The South African government has initiated a range of youth training learnerships to address the surge of unemployment and lack of education among this age group.[26] However these learnerships typically focus on employment skills and do not address health.[26] Health education has shown some success in improving health behaviours and modifying CVD risk factors in other regions,[28–31] though it remains unclear if health-focused learnerships can have a similar impact in South Africa. Therefore, our aim was to compare chronic disease health beliefs between NEET youth and previously NEET youth undertaking a health-education training initiative (HETI), focusing on HTN, and reported intentions or barriers for health behaviour change.

3.3 Materials and methods

Ethical Considerations. Ethical committee approval for the study was obtained from the University of the Witwatersrand Human Research Ethics Committee (Medical) [reference M210549]. All participants invited to take part gave written informed consent to participate in the study and to have their responses audio recorded. The data was anonymised on transcription and recorded audio and transcribed data were stored on a password-protected computer with de-identified files saved using only study identification numbers.

Study setting and participants. The study was conducted from August to October 2021 at a youth development centre in Soweto, a historically disadvantaged, urban township in South Africa. The population in Soweto is predominantly black with a small percentage classifying themselves as middle-class and the majority having a low socioeconomic status.[32] More than half of the youth in this area are unemployed with low education levels and access to few opportunities with limited work experience or skills training.[24,33]

Purposeful criterion sampling was used to select all participants. Twenty previously NEET youth undertaking the Health and Education Training Initiative (HETI) were interviewed at the end of this 12-month learnership. These youth were selected for the HETI programme in the previous year from approximately 750 applicants based on specific inclusion criteria: residing

in the township; aged 18 to 34 years old; having no tertiary qualification; and not in any employment, education, or training (NEET). There were no specific requirements on their health or health behaviour. The HETI has a 5-year seed funding grant from a government institution to create a sustainable project within the local community to upskill youth to work with basic community health issues, to secure employment in the health sector and improve their own health in the process. During this 12-month program, youth receive a small study bursary ($225/month) while completing accredited training as a Health Promotion Officer and delivering basic community health screening.

An equal number of NEET youth were recruited using the same inclusion criteria as HETI youth from a database of over 500 local young adults (18-34years old) registered at the youth development centre for employment and training opportunities. Recruitment took place through the database communication platform (Bulk text messenger application) with those who showed interest to participate invited to attend at the centre.

3.3.1 Data collection. Focus-group discussions (FGDs) took place in a private room with six to eight participants in each group and each FGD lasted just over an hour. Strict adherence to all COVID-19 protocols was maintained throughout the discussions. FGDs were conducted using a semi-structured topic guide (Table 1: end of the chapter) designed around the constructs of the Health Belief Model (HBM; perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, cues to action and individual health behaviour).[34] The version of HBM with self-efficacy was used similarly to studies evaluating age-group differences in non-communicable disease (NCD) risk perceptions and self-care behaviour.[21,35] This model is widely applied in health promotion and education studies,[22] including studies conducted in similar urban African contexts.[21,22] The FGD facilitators included a post-graduate level researcher and an observer who were both multilingual. All FGDs were audio recorded and conducted in English, with participants encouraged to use local languages to express themselves more freely if needed. Audio recordings were transcribed and translated into English, and then crosschecked by a third researcher who was fluent in the languages used.

Analysis. Transcripts were analysed using manual deductive thematic analysis informed by the HBM constructs. In the analyses, Braun and Clarke's six-phase analytical process was undertaken, involving (1) familiarization with the data; (2) generating initial succinct codes; (3) identifying themes; (4) reviewing themes; (5) defining and naming themes expressed in relation to the data set and research question; and (6) producing the report.[36] The first author

conducted the initial coding process and created a coding frame. In qualitative research, it is well established that for analytic rigour (i.e., increase credibility and reduce bias), data description, interpretation and theory *operationalization* of constructs using triangulation must take place.[37] In this study, excerpts and interpretation of codes and themes were reviewed with the second and third authors to ensure that there was consensus on the inferences made from the data.

3.4 Results

In the results, we identify similarities and differences in perceptions and intention for behaviour change between the NEET and HETI group for each construct of the Health Belief model as shown in the diagram below (Figure 1).

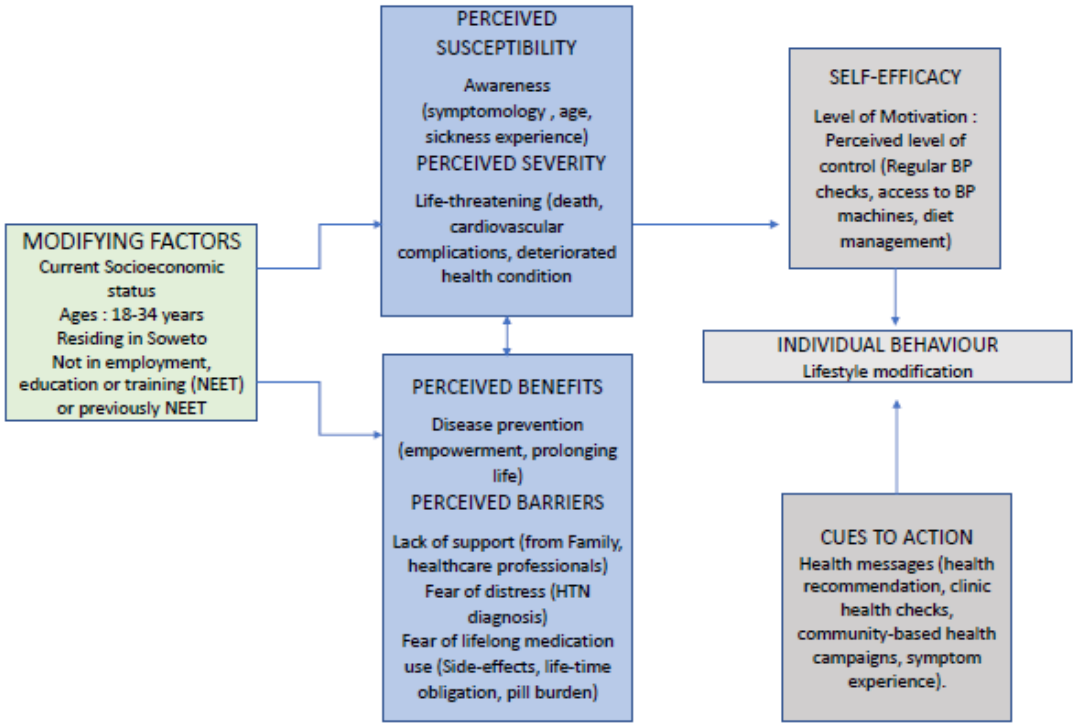

Figure 1. The Health Belief Model: broader identified themes.

Perceived susceptibility. Within this theme, the two groups differed in their perceptions of susceptibility, viewing the presence or absence of physical symptoms of high blood pressure (BP) differently. The HETI group were aware that the absence of symptoms did not imply low susceptibility to HTN. While the NEET group perceived a lack of HTN-related symptoms to mean they were not susceptible and a reason for not engaging in BP screening. The HETI group described how their perception of risk had changed through taking part in the health-education training initiative.

PT	Participant
F	Female
M	Male

Figure 2: Key for participant quotes

PT 6 - F; NEET group: "I would know if something is wrong with me. So only then I would panic and go (screen for HTN), but for now, I don't think it's important."
PT 3 – F; HETI group: "… I was twenty-four years old; I was told I could get it (HTN) […]so I knew but I didn't do anything cause I wasn't feeling anything. Fast forward to now, I know better."

The two groups also viewed a HTN diagnosis in relation to age differently. While the HETI group expressed that all age groups are susceptible to HTN, the majority of the NEET group perceived HTN as an older person's illness, furthermore, viewing a HTN diagnosis as being inevitable at an older age.
PT 3 –F; HETI group: "Anyone is most likely to get it (HTN) if maybe they don't have like a good lifestyle."
PT 6-M; NEET group: "I always thought it was for old people this thing (HTN)."
PT 5- M; NEET group: "I feel like (HTN) it's a norm cause eventually the stress of life as you grow up, we are gonna have it."

The HETI group were aware of their personal risk for HTN and were motivated to engage in preventive health action. In contrast, the NEET group were aware of the increased risk for older people and were not inclined to change unhealthy behaviours because they were still young.
PT 4 – F; HETI group: "…for me I think I am at risk of getting HTN because I am obese obviously; I am not free because now I have to watch my weight and also check on my high blood regularly."
PT 7 – M; NEET group: "Well to be honest […] I do have some information about it (HTN)…the thing is I'm not concerned about it […] both sides of my family got high blood, my mother and my father."

Perceived severity. Participants from both groups recognized that HTN is life-threatening and related to other cardiovascular conditions, although the NEET group considered HTN as exposing one to additional health issues such as gout.

PT 6 – F; NEET group: "Yes, it leads to death cause my grandma recently passed on."
PT3- F; HETI group: "…if it is not treated it can lead to health issues and it is very likely for one to get a stroke."
PT 2- M; NEET group: "I think that is what it (HTN) leads to… it causes the gout."

Perceived Barriers. Both groups identified a lack of support as a major barrier to adopting preventive health behaviours. For the HETI group, this was primarily in relation to support from family for eating healthily. For the NEET group, it was support from healthcare professionals; they felt mistreated by clinic staff and saw primary healthcare service provision as inefficient and inadequate, choosing not to engage with primary healthcare facilities.

PT 6 – F; HETI group: "…I can't change my diet alone cause [name] at home is okay, she has her pap[2] *and I can't eat pap. It's not easy to change your diet alone, we need to get support from our families as well."*
PT 4 – M; NEET group: "You go for an injection; she (the sister) will look and say you are here (at the clinic) to waste time. So, it's so boring for us (young people), whether it's to go and check HTN or anything else you cannot go because of the treatment that you get there."

The two groups had different viewpoints regarding measuring BP. Many from the NEET groups had not checked their BP and did not want to be screened or know their HTN status. They described the knowledge of having HTN as a trigger for stress, that would lead to deteriorated health. In contrast, the HETI group saw checking BP to give only benefits.

PT 1 - F; NEET group: "…with many diseases, if you don't know, you continue with your life as if it's normal. But once you go there to the health centre and they say you have this (HTN). Now it's going to be in my mind all over and then I'm gonna be stressing and stressing and I'm gonna end up dying sooner."

Both groups presented feelings of vulnerability and fear around embarking on lifelong HTN medication should this be necessary, indicating adherence could be problematic if medication was needed. Youth feared that medication would expose them to other illnesses or side effects, which would ultimately lead to a deteriorated health condition**.**

[2] Pap is a traditional South African staple food made from softly grounded maize.

PT 2 – M; NEET group: "I just personally feel that medication is not healthy, it exposes you to other illnesses."
PT 1- M; HETI group: "Just the thought of taking a pill every day […], it's just a no no, and the side effects apparently."

Both groups also viewed taking medication to manage HTN as a chore. Many referred to it as a lifetime obligation, where the idea of taking medication every day, over many years was seen as a burden, especially if starting at a younger age. Young adults were reluctant to take medication as a treatment option, expressing that they would rather engage in alternative measures to reduce BP.

PT 2 – F; HETI group: "Now…no, I'm still young (to start taking medication). I'd rather stop like alcohol […] before medication. Cause it's not a six-month treatment […] it's a lifestyle, lifetime thing."
PT 4 – F; NEET group: "…last time at the clinic I saw, they were giving them, […] three or four packets, […] it's too much, you have to take a lot of pills."

Perceived benefits. Groups had different views regarding the benefit of healthy behaviour for HTN prevention. The HETI group perceived screening and knowing their BP status as a benefit that empowered them to prevent disease and prolong their lives. However, the NEET group perceived no benefits to preventive health behaviour for HTN.

PT 1 – F; HETI group: "…it's important to know your status and go for health checks, also because when you are pre-hypertensive it's still entirely dependent on you to manage it as opposed to when you are now diagnosed with HTN, […] you are dependent on the medication to manage the HTN for you."
PT 5 – F; HETI group: "…I think (BP screening) it's important because it determines how long you gonna live because if you don't take care of yourself obviously, you're reducing your lifespan."

Self-efficacy. In both groups, young adults' confidence in their ability to engage in health behaviours to prevent HTN was influenced by their level of motivation. For the HETI groups, self-efficacy was bolstered by regular BP checks through regular access to BP monitors. This provided motivation through feedback and increased their perceived level of control. However,

the NEET group, without access to such equipment or health checks and no desire to engage in screening or other preventive behaviour, had lower confidence levels.

PT4 –M; HETI group: "I think we have a good motivation currently to actually make sure that we at least try to initiate the change in our lifestyles because of the health checks that we've been doing; that is a motivation."

Both groups had low confidence levels in their ability to manage their diet. NEET group also mentioned using food to manage stress levels, a behaviour they felt would be challenging to manage or change.

PT 1- F; HETI group: "I love my food [...] so those kinds of things are still kind of difficult to change, even though I try to you know manage and limit some things."
PT 5-M; NEET group: "...food (is difficult to manage) because the minute I start stressing the first thing I think of is the food."

Cues to Action. Participants described how they were exposed to health messages in their environment, which raised awareness about health and, at least for the HETI group, appeared to act as cues to action. For this group, health messages came through their health education. For the NEET group, health messages came from clinic health checks or community-based health campaigns, though neither were focused on HTN.

PT2 –F; HETI group: "The last time I spoke to (name of health educator) she told me that instead of getting off at my stop at the taxis; I should maybe get off two stops before my stop and walk, so I think I walk more than before now."
PT 3 – F; NEET group: "I do take […] contraceptives, so I have to test (for BP)."
PT 3- M NEET group: "The first time I tested for HIV, it wasn't at the clinic, it was at those tents that they put like maybe at the mall, for me it's convenient."

However, this health messaging was insufficient in the NEET group to drive action, and many said they would need to experience a symptom of HTN to consider going for BP measurements.

PT 7-F; NEET group: "If I felt that there are symptoms or […] that I'm not feeling well then, I would go (get checked) but if I'm not feeling anything or I feel healthy then like no I wouldn't."

Self-reported health behaviours. Lifestyle modification was a central feature of discussions around individual health behaviour. The HETI group attributed their intention to change health behaviour to frequent BP checks and practically applying HTN knowledge in their daily lives. As a result, they expressed that they now know they are more vulnerable to HTN and mindful of its consequences. They perceived more benefits in living healthily to prevent HTN, felt more confident and motivated to control their BP and responded more positively to health action recommendations. This resulted in more self-reported proactive health behaviours such as being more physically active, frequent self-monitoring, and improved health outcomes.

PT 6 – M; HETI group: "(I am now) tracking my BP. I actually bought the (BP) machine at home, we have a day where we actually check."
PT3 – F; HETI group: "I also walk more now […]. Even my BP is low now."

In contrast, the NEET group gave no evidence that they had or were inclined to implement any lifestyle change to prevent problems with BP. Those who engaged in health behaviours such as physical activity did so for other reasons (i.e., stress management) and not necessarily to reduce CVD risk. This groups' intentions were only to react in the event that they experience symptoms or have a HTN diagnosis.

PT 4- M; NEET group: "Right now, I am someone who gyms […] and then everything including stress finishes because of going to the gym."
PT 6 – F; NEET group: "I would honestly ignore you (If you told me I had HTN). I would honestly let it slide. It won't change my lifestyle completely […] I don't want to change my lifestyle."

3.5 Discussion

The aim of this study conducted among young adults from a historically disadvantaged township in South Africa was to explore hypertension-related risk perceptions and beliefs among NEET (not in employment, education, or training) and HETI (health education training initiative) youth and intention for health behaviour change, using the Health Belief Model (HBM).

Our study showed that a health-focused learnership influenced all constructs of the HBM within the HETI group. Although some barriers remained, the HETI group reported intentions

to proactively engage in health behaviours to prevent HTN. In contrast, the perceived severity, perceived benefits, and cues to action constructs did not translate into intention for health behaviour change for the NEET youth. This group saw no importance in engaging in HTN preventive behaviour because of low perceived susceptibility, and they reported healthcare service providers as a barrier to their healthcare seeking, even if they were to engage. This was despite NEET youth being aware of the severity of HTN and holding perceptions that it was an inevitable outcome for them as they aged.

Regarding the HBM model threat perceptions (perceived susceptibility and severity), our study demonstrates that health education can increase both awareness and perception of personal risk for young adults. Previous studies focused on health behaviour change argue that for a recommended health action to have lasting effects, individuals must find personal relevance.[38–41] Conversely, when youth perceive their risk of disease to be low, as demonstrated in two previous South African studies that focused on NCDs in young adults, those young adults tend to underestimate the consequences of unhealthy behaviours thus exposing themselves to adverse health outcomes.[21,22]

Our study further suggests that knowledge alone without experiential learning may be insufficient in young adults to translate into positive health behaviour change. Both groups of young adults perceived HTN as life-threatening, ultimately resulting in cardiovascular complications or death if left untreated, however, this did not drive intention for preventive behaviour for the NEET group. Similarly, Arlinghaus and colleagues (2017) showed the difference between targeted health education and general knowledge, where the former aims to prompt change by practically applying knowledge, allowing an individual to better understand the personal relevance of information in relation to an illness.[40] Increasing general health knowledge without such targeted efforts may be useful to create awareness but with limited effect, if personal relevance is not attached.[40] For example, among young adults recently diagnosed with HTN, more than 50% reported discarding information handouts due to redundancy and information not addressing their specific questions.[14] Recent studies also report that healthcare workers (nurses, physicians and community health workers) with detailed knowledge of chronic diseases, who do not attach personal relevance to such knowledge generally do not themselves engage in healthy behaviours to prevent illness and are also less likely to encourage healthy behaviours in their patients.[42,43]

Likelihood of action (perceived benefits and barriers): Furthermore, in terms of threat perceptions, our study showed that NEET youth perceived negative effects of stress from a positive HTN diagnosis as a bigger threat than not going for BP screening, simultaneously perceiving this threat as a barrier to screening health behaviour. In contrast, the HETI group perceived screening and knowing one's status as a benefit for disease prevention. Not screening for chronic illness as a strategy to prevent stress is a global phenomenon not only in older populations but also in young adults.[44–46] For example, in young Spanish women (17-35 years) the heightened fear of increased distress following a breast cancer diagnosis was associated with the avoidance of mammography screening.[45] Among adolescents in South Africa, the fear of a positive result has presented a major barrier to the acceptance of HIV testing.[46] This is a complex phenomenon, health education targeting fears associated with a HTN diagnosis could reduce screening hesitancies among young adults. Future research exploring a more comprehensive approach to address the fear of chronic illness in young adults should be considered.

Our study showed that NEET youth were not engaging in clinic health services, perceiving no personal relevance for this behaviour due to a lack of support from healthcare providers, indicating a barrier to the accessibility of healthcare services that can be important to prevent HTN. Studies on a local and global scale have identified barriers to health service accessibility for young people as lack of insurance, limited clinic time, financial barriers,[15,47] and similar to our study perceived negative attitudes of health providers and perceived poor staff competencies.[16,17] Additionally, research has also demonstrated that primary healthcare (PHC) facilities in SSA are under-resourced, with limited human and medical resources, hindering youth-friendly healthcare provider policies.[16,17,20] This in turn hinders screening, preventive, and control measures for chronic illness in this age group globally. Training community-based workers to provide screening and health education services may bridge the gap between the primary healthcare inadequacies and the youth accessing screening or general care services, especially to support the prevention of NCDs. Positioning young adults to deliver these services themselves may enhance this effect. Furthermore, similar services have been useful in supporting HTN and diabetes awareness and management in other age groups in South Africa.[48]

Our results also showed that young adults generally fear embarking on lifelong medication use, a significant barrier to healthy behaviour. This indicates that young adults specifically, would be highly treatment-resistant and likely to default on medication in the event of a HTN

diagnosis, highlighting that prevention is critical in this age group. While knowledge of the benefits of medication use was a likely outcome of the health education received by the HETI group, this did not influence intention for behaviour change and was not personally relevant for either group. Our findings are consistent with other research suggesting that medication adherence in young adults is generally low,[14,35,49] and medication side-effects and feeling too young to take medication are the main barriers to adherence in young adults with HTN.[14] Health promotion interventions may need to specifically address this fear of medication use in young adults that require such intervention. The HETI group did perceive preventive health behaviour as a means to avoid having to take HTN medication, but the NEET group perceived no benefits for this or any other preventive behaviours.

Self-efficacy (to change behaviour) and cues to action: Social psychological literature for behaviour change reveals an intention-behaviour gap, where an individual intending to engage in healthy behaviour, fails to do so.[50,51] Our study found self-efficacy was closely related to intention to change behaviour for both groups, potentially mediating the gap between intention and self-reported behaviour for HETI youth. While NEET youth reported no motivation for HTN behaviour change, HETI youth reported active self-regulation namely, regular BP self-checks and the practical application of knowledge in their daily lives, to increase perceived levels of control and motivation to engage in preventive behaviour. Similarly, a study conducted by Paech and colleagues (2016) found that planning and social support at 4 weeks and self-regulation at 6 months (which built motivation and perceived levels of control), mediated the link between intention to be physically active at baseline to physical activity behaviour at 6 months.[52] Similar health promotion interventions that target implementation intentions and action planning strategies by providing necessary resources may be central to closing this gap.[52–54]

Our study also found that the intention to change dietary behaviour for HETI youth was ambiguous. HETI youth perceived lack of family support as a potential barrier to dietary behaviour change and similar to NEET youth, also reported low confidence levels to eating healthily. Whether this was a real challenge necessitating family-based interventions, or a perceived challenge, necessitating investigation into aspects of perceived locus of control (internal and external; the extent to which life's outcomes and events are consequences of an individual's own actions or influenced by external factors i.e., people),[55] requires further research. Overall, the HETI group had more confidence in their ability to manage BP and were motivated to engage in health behaviour to prevent HTN. Whereas participants in the NEET

group showed no intention to change their behaviour with regards to screening for BP, engage in physical activity specifically to prevent HTN or have healthier diets.

Our findings suggest that a health-focused learnership can enhance both youth employment skills and promote health behaviour change in young adults. Such double duty benefits could impact employment levels and may prevent HTN in South Africa's young adults, where both the NEET and HTN rates remain high in youth.[1,12,26] This is critical in a country where two out of three young adults are unemployed.[24] Considering that healthy behaviours among young adults are frequently unobtainable in the absence of secure employment and career prospects,[56] and that NEET status and poor health among youth are inextricably linked,[25,57] such interventions are sorely needed and rarely found.[58]

Limitations and strengths. Our study is not without limitation in that it only included young adults from one historically disadvantaged location. However, our findings are supported by previous research from across countries showing similar experiences among young adults in relation to NCD risk perceptions and health behaviour.[14,15,21,22] The lack of demographic information to ascertain education and knowledge background for participants was a further limitation in this study. Although within the South African context, four out of five NEET youth have a matric (high school certificate) or lower qualification, with few having completed tertiary education (6% in 2018).[25,26,59] However, future studies should assess if sociodemographic variables within groups further impact the health beliefs and behaviours investigated.

With HTN levels growing among youth on the continent and youth unemployment levels highly intractable, double-duty interventions are needed that impact both challenges. This is especially the case in a country ill-prepared to cope with the current NCD levels,[19] and worse prepared to deal with future increases in NCDs if prevention efforts in youth fail. Previous studies have analysed risk factors, perceptions and self-care behaviours among young people already diagnosed with HTN,[12,14,35,49,60,61] this study focused on preventive measures in young adults without a known diagnosis in which investment in prevention efforts may be most beneficial.

3.6 Conclusion

Our study compared hypertension risk perceptions and intention for health behaviour change between NEET (Not in employment, education, or training) and previously NEET young adults from a historically disadvantaged township in South Africa. Our findings suggest that a health-

focused learnership improved health knowledge, as would be expected, but critically impacted young adults' perceptions of the personal relevance of health information. This in turn appeared to drive intention for preventive health behaviour and motivation to bridge the gap between intention and behaviour to reduce the risk for hypertension and non-communicable disease. Given the governments drive for youth employment and education initiatives, those that focus on health may show multiple benefits for the future of South Africa's young adults.

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Table 1. Focus Group Discussion Topic Guide and related Health Belief Model (HBM) Constructs

Question	HBM Construct
1. What do you know about high BP/HTN?	Introductory question
2. What are your personal views/ feelings about high BP/HTN?	Introductory question
3. How severe do you think HTN can get? Probe: What do you think are the consequences to a person's health?	Perceived severity
4. Who in your opinion do you think is most likely to get high BP?	Perceived susceptibility
5. If you were told that you are very likely going to develop HTN, what would your response be? Probe: Do you think you are at risk? Probe: what do people who are at risk look like or how do they behave? (e.g., things that they do in their everyday life)	Perceived susceptibility and severity
6. How important do you think it is to know if you're at risk of getting HTN or to monitor your BP?	Perceived susceptibility and severity
7. How important do you think it is to go to a health centre for the diagnosis and treatment of HTN? Probe: Do you think this is always necessary?	Perceived benefits
8. What do you think are other lifestyle changes that you can make to prevent or manage HTN besides taking medication? Probe: which of these lifestyle changes do you think is most important in preventing or managing HTN?	Perceived benefits
9. How likely are you to agree that these are reasonable lifestyle changes to make?	Perceived benefits
10. How do you think engaging in regular exercise or a healthier diet can prevent/ manage HTN?	Perceived benefits
11. [HETI group only]: What is the likelihood that you would have gone for a BP check if you had not been screened by the [name of HETI program]? Probe: Is this a motivation to continue getting regular check-ups? [NEET group only]: What is the likelihood that you would go to the clinic or any health facility for a BP check? Probe: Is this a motivation to continue getting regular check-ups?	Cues to action
12. How did you feel before taking your BP measurements?	Follow-up question
13. How did you feel once you got your BP results?	Follow-up question
14. What changes would you like to make/ have you made after taking your BP measurements? Probe: What motivated you to make these changes? Probe: How confident are you that you will stick to these changes?	Cues to action and Self-efficacy
15. How do you feel about taking BP measurements again?	Follow-up question to HETI youth
16. How often would you feel comfortable taking your BP measurements?	Self-efficacy
17. Would you ever consider taking HTN medication if you were diagnosed with HTN? Probe: What would prevent you from taking HTN medication? Probe: What would prevent you from accessing treatment for HTN?	Perceived barriers
18. What would prevent you from engaging with healthy behaviour or changing your lifestyle to prevent HTN?	Perceived barriers

CHAPTER FOUR - DISCUSSION

4.1 Main Findings

The aim of this study was to explore hypertension-related risk perceptions and intention for health behaviour change between NEET (not in employment, education, or training) and formerly NEET YAs (who were undertaking a health employment and education training initiative) from Soweto, South Africa, using the health belief model (HBM) as the theoretical framework.

The study found that the health education component of the intervention appeared to influence all constructs of the HBM for the HETI group, apart from perceived barriers. In comparison, the perceived severity, perceived benefits, and cues to action constructs were not associated with health behaviours in NEET youth. Self-efficacy was the most closely related construct to intention for behaviour change in both groups. Where motivation, resulting from access to resources (i.e., BP machines) for the HETI group or lack of motivation, in the case of the NEET youth, determined the level of confidence and perceived level of control to engage in healthy behaviours to prevent HTN. The study found that personal relevance resulting from the health education and training component of the initiative largely informed the higher levels of HTN risk perception and intention for behaviour change in the HETI group. Interestingly, within this group, employment status (and income) did not come up as a determinant of these changed perceptions. A detailed interpretation of these findings is discussed below.

Threat perceptions: perceived susceptibility and perceived severity

Our study demonstrates that health education increased levels of awareness and personal risk perception for HETI youth in this study. Whereas the NEET youth perceived themselves to be invulnerable to HTN because of the absence of symptoms, and their young age. Similar to what was observed in the NEET group of this study, YAs in the US and Nigeria also perceived HTN as an "older person's illness"[21,129]. Furthermore, the YAs from the US, similar to the NEET youth in this study, reported that a potential HTN diagnosis would negatively affect their young self-identity and also perceived HTN as an inevitable outcome at an older age[21]. This is an indication that community-based health education initiatives can be used to reach the YA population in South Africa and equip this age group with accurate information about their own HTN risk and susceptibility.

The few studies that exist, which investigate how the youth understand NCD risk and susceptibility, demonstrate that individuals who understand their own susceptibility engage

better in prevention and personal disease-management strategies[127], as was the case for HETI youth. The biggest hurdle to overcome in health promotion interventions is to help young people appreciate the consequences of unhealthy behaviour and make them aware of the benefits that accrue to those who commit to behaviour change[125,130].

Our study, similar to other research, demonstrates that HTN knowledge alone may not always translate to healthy behaviour or the intention to enact those behaviours. NEET youth knew how severe HTN could get through observing the illness experience of family and community members. However, a lack of personal relevance, i.e., seeing older people getting sick from HTN-related issues and therefore falsely reinforcing the perception that young people were not vulnerable to HTN, did not promote the intention to adopt preventive health behaviours in this group. Therefore, in this instance perceived severity seemed unrelated to reported health behaviour.

Consistent with other health promotion literature[123,131–133], findings in this study indicate that participants value behaviour change strategies that are personally relevant, first to increase awareness and for the adoption of positive health behaviour. Arlinghaus et al. (2017), highlight differences between general knowledge and targeted health education, where the latter is tailored to ensure that information is relevant to the individual, making it personally important[133]. Experiential learning, as a component of targeted health education, is critical for health behaviour change in individuals and promotes personal relevance[133]. This study demonstrates that the personal relevance of health promotion interventions can determine their credibility and effectiveness among YAs.

Likelihood of action: Perceived Barriers and benefits

We also showed that NEET youth were not engaging with healthcare services and that barriers to health service access and utilisation for YAs are often two-fold. Firstly, NEET youth believed that healthcare practitioners mistreat patients and lack professionalism (i.e., scolding patients or long waiting time at healthcare facilities before receiving health service) and therefore had no intention to engage in healthcare-seeking behaviour. Similar experiences have been reported among youth in other parts of South Africa[26,114], demonstrating that YAs to a large extent feel underserved by the public healthcare system. The factor of patient ill-treatment by healthcare practitioners is seen as receiving very little attention from government and policymakers and yet evidently affects patient mental health, which in turn undermines health promotion interventions[114]. Patient-sensitive communication training would be beneficial for

healthcare staff to raise awareness of how ill-treatment can negatively influence a YAs intention to utilise health services[114]. Secondly, PHC services are primarily focused on the management and treatment of illnesses in older populations (regarded as the more at-risk group) rather than the prevention of an illness[17,22,119]. This further contributes to the exclusion of YAs in the healthcare service system while simultaneously demonstrating negligence of a cohort that can benefit from screening and preventative measures for NCDs and other chronic illness[130,134,135]. Furthermore, initiatives promoting the integration of YAs into healthcare services should focus on expanding the coverage of NCD healthcare, as the majority of youth-friendly health services in PHC facilities are focused on sexual and reproductive health[26,118,136].

This study also found that the fear of distress in the event of a HTN diagnosis was a barrier to screening health behaviour in NEET YAs, which prevented them from wanting to know their status. This could very well have contributed to the lack of healthcare service utilisation for these YAs. Similar to our findings, the fear of distress as a result of a positive diagnosis in younger and older populations has been identified in numerous chronic diseases, including HTN, cancer, and HIV[137–139]. To improve negative attitudes about knowing one's status, task shifting of screening services from PHC facilities to community-based services rendered by trained community healthcare workers has been suggested[27]. Globally, community-based HIV screening strategies have proven effective in identifying and counselling high-risk youths who are unaware or fearful to know their HIV status[140,141]. Implementing such initiatives in LMICs could facilitate counselling for YAs who are at high risk of developing HTN, reducing the negative attitude toward knowing their status.

The study found that YAs in both groups were fearful of engaging in lifelong medication use, indicating no intention to engage in treatment health behaviour in the event of a diagnosis. Non-compliance with antihypertensive medication is a major obstacle to the management of HTN[21]. While medication adherence is identified as relatively lower in hypertensive YAs[21,142], the fear of lifelong medication use in undiagnosed or pre-hypertensive YAs needs attention and further investigation. Consistent with the study's findings, medication side-effects are a major barrier to medication adherence in YAs generally, including those already diagnosed with HTN[21].

Furthermore, research also suggests that medication adherence is associated with higher SES, such as higher income[143]. Therefore, further research investigating the association between medication adherence and SES at a younger age may be useful to identify strategies to address

medication non-adherence in YAs. Research examining medication adherence among patients with chronic illness, also suggests that individuals who follow a healthy diet often show good medication adherence and conversely, those who adhere to medication often eat heathily[135,144]. Interestingly, this study found that both NEET and HETI youth had medication use hesitancies, and both engaged in unhealthy diets. While the association between medication adherence and eating healthy was not investigated further in this study, further research examining this relationship may also be useful to inform strategies to address medication non-adherence in YAs. This study highlights that in the event of a HTN diagnosis, YAs are likely to be highly treatment resistant. This suggests that it may be important to encourage youth to engage in early interventions for prevention rather than treatment because of the youth-and-medication-stigma nexus. Using messaging that shows that YAs have an advantage of avoiding chronic illness by being more proactive may help curb early HTN.

In this study, we found that facing daily stressful life events had contrasting effects on health behaviour for NEET youth, either motivating YAs to become active or to engage in increased alcohol consumption, cigarette smoking and an unhealthy diet. Globally, maladaptive coping is a reality for NEET youth; who often engage in risky or unhealthy behaviours as a means of dealing with distress emanating from an unfavourable socio-economic reality[29,145,146]. Physical activity and stress reduction interventions have been successful in lowering BP and CVD-related risk factors in other age groups globally[85,147–150]. Community-based interventions engaging NEET youth in physical activity may have triple effects of reducing stress, may prevent risky health behaviour, while simultaneously improving BP levels. Such interventions may be particularly important for NEET youth, who have been reported as highly susceptible to stress as a result of their NEET status[27,53]. This study found that the HBM was not able to predict health behaviour according to the perceived benefit construct in NEET youth. This group either engaged in physical exercise for non-HTN-related reasons or expressed the benefits of healthy behaviour but had no intention to engage in this regard, perceiving no personal relevance. The above-mentioned strategies among NEET youth may also enhance the perceived benefit of engaging in physical exercise for disease prevention and the prolonging of life, as in the case of HETI youth.

Self-efficacy to change behaviour and cues to action

The study found that self-efficacy was a strong predictor of intention for behaviour change in both NEET and HETI youth. While health psychology literature for behaviour change states

that there is often an intention-behaviour gap among individuals intending to improve their health[151,152]. This study found that self-efficacy, through motivation, served to bridge the intention-behaviour gap for HETI youth. NEET youth reported no motivation for HTN behaviour change, only choosing to engage in health action in the event of symptom experience.

Motivational measures as highlighted in health behaviour literature, include action planning and self-regulatory strategies, which help to increase perceived levels of control, further increasing perceived self-efficacy[151–154], as was the case with HETI youth. Literature reports that both action planning (cognitive orientation needed for behavioural enactment) and self-regulation (self-monitor, self-instruct, goal setting, and self-reinforcement) also identify and respond to internal and external cues for health behaviour change[155,156]. This demonstrates the link between self-efficacy and cues to action constructs. However, in this instance, the HBM could not adequately predict NEET youths' health behaviour through cues to action. For HETI youth, the external cues were expressed through health messages, such as recommendations for healthy behaviour from their health educators, which triggered health action through regular BP checks. Interventions that promote healthy behaviour in YAs by building self-efficacy levels through action planning and self-regulation strategies might prove successful.

The study also found that the intention to change dietary behaviour for HETI youth was unclear. While this group described a lack of family support regarding diet management as a barrier to health behaviour, challenges to diet management were also influenced by low self-efficacy resulting from a preference for unhealthy food. This was indicative of YAs' lack of confidence to eat healthily regardless of family influence. While the role of family support in diet management is important to promote healthy behaviour among youth and has shown some success[157,158]. This study suggests that future research should consider the link between locus of control (internal and external; the extent to which life's outcomes and events are consequences of an individual's own actions or influenced by external factors, i.e., people)[159], and diet management in YAs, which our study did not consider. This might explain YAs' challenges with diet management, as the literature suggests that locus of control (LOC) predicts health through health behaviours and that individuals with an internal LOC generally eat healthily[159]; however, contextual considerations (social or environmental) and other contributing factors should not be neglected in this assessment. Assessing NEET youths' lack of engagement with healthcare services in relation to LOC may also help to ascertain future intentions towards healthcare-seeking behaviour.

The impact of subjective norms (the belief that important or influential people or groups will approve and support or disapprove of a particular health behaviour)[160], on intentions to eat healthily may also be suggested for examination, as family food preference may be an important determinant impacting both LOC and self-efficacy. A study looking at YAs' intention to eat healthily, proposed that YAs' perceived behavioural group norms from an influential reference group, would predict their intention to eat healthily[161]. However, this study found attitude to be more significant in predicting intentions compared to subjective norms[161]. To the contrary, a study assessing intentions for eating healthily in Tanzanian adolescents found that subjective norms largely influenced intentions to avoid sugary snacks[161]. The study attributed these findings to African cultural social norms and values, thereby highlighting the importance of group norms in influencing food choices[161]. Similarly, in this study HETI youth were more proactive and had a positive attitude towards healthy behaviour to prevent HTN but mentioned their family as highly influential regarding diet management, it could be that another person in the family is buying and preparing the food and thus subjective norm may apply in this regard.

Overall, using the HBM to assess YAs' perceived risks, beliefs about health behaviour to prevent HTN and intentions for health behaviour change was meaningful. It was clear that HETI youth, through health education, found more personal relevance in healthy behaviour to prevent HTN compared to NEET youth who perceived no risk of developing HTN and were currently not engaging in preventive health behaviour and lacked interest in behaviour change.

4.2 Strengths and Limitations

This study is not without limitations in that we did not collect demographic information on participants' age, sex, previous employment, and education level, which might have been relevant to further inform differences in HTN perceptions. Future research should investigate gender differences in HTN perception and health behaviour in YAs, as gender differences in HTN prevalence, awareness, treatment, and control rates have been the prime focus of existing research[18,162,163]. Such evidence could be relevant to assess other contributing factors for pro-HTN health behaviour among YAs. Furthermore, we did not explore non-modifiable HTN risk factors such as a family history of HTN, even though research highlights these factors as strongly associated with elevated BP and HTN in YAs[16,52]. However, this research focused on modifiable risk factors to further explore prevention strategies for HTN in YAs.

Limitations notwithstanding, the use of the HBM as a theoretical framework was useful to explore determinants and potential drivers of beliefs and behaviours, which could be used to explicate the problem of the lack of awareness among YAs and later inform health promotion efforts for YAs in similar contexts. This is a novel study in South Africa, which employed a comparative (NEET and previously NEET) approach in trying to understand YAs' HTN risk perceptions and behavioural intentions, moreover, assessing perceptions and behavioural intentions in a subgroup (NEET youth) where little prior research has been conducted, even in the rest of Africa. Other studies focus on risk factors, perceptions and self-care behaviours among older people, and young people who are already diagnosed with HTN[16,21,52,127,164,165]. This study considered the role of NEET status on preventive health behaviour in YAs without a known diagnosis, for whom prevention efforts may be most useful. This evaluation is crucial in a country where two out of three YAs are unemployed[94].

In summary, we set out to address the question: What is the impact of a health employment and education training Initiative (HETI) on YAs' perceptions of HTN? The objectives were to gain insight into differences, if any, in perceptions of HTN risk and health behaviour between NEET and non-NEET YAs and explore intentions for behaviour change. This research has shown that there were indeed differences in perceptions of HTN risk and health behaviour as well as intentions for behaviour change to prevent HTN among both groups. The HETI resulted in changed perceptions and personal relevance through health education for previously NEET youth to engage in health behaviour for HTN prevention.

Significance of research findings & recommended next steps

This research is important to inform targeted and effective youth-focused health promotion interventions. Recommended next steps are:

- Extension of the Health Belief Model framework: While the HBM is widely used to explore perceptions around health in YAs in similar contexts to that of the current study[125,130]. A perceived importance construct, assessing the value attached (negative or positive) and relevance of health behaviour to manage BP is suggested to extend the predictive capacity of the model[123], and to better understand health behaviour outside of a health education context. The application of perceived importance has already resulted in successfully predicting dietary, weight concerns and smoking cessation

health behaviour among other populations globally[123]. This study has demonstrated that health education is highly associated with perceived importance.

- Youth Employment Initiatives: The findings of this study could help inform the government's national health and youth development priorities, by supporting health-focused youth employment and education initiatives (YEIs), the government could address a NEET status while promoting health at the same time.
- Health promotion: Implement a task-shifting strategy within local government's national health promotion efforts in communities, schools, as well as clinics. For example, the health promotions officer (HPO) programme that operates within these spheres could provide HTN health education and add to this the practical application of the theory by providing BP self- screening services to create personal relevance. This could increase YAs' healthcare-seeking behaviour and may encourage YAs to engage in self-referral health behaviour, meaning increased utilisation of health services, which are currently underutilised by YAs in South Africa[26,114], therefore preventing the devastating health consequences of untreated HTN.
- Intervention design: Involve YAs in the intervention design and implementation process, this will ensure personal relevance and might aid in the retention of these YAs on such programmes, promoting sustainable health behaviour. Although not feasible and practical for this study design, which is nested into an already existing initiative, other research shows that including adolescent youth in intervention designs positively impacts intervention outcomes[56]. Where such involvement promotes internal motivation, ownership and accountability among youth[56].
- Youth-targeted education sessions: Workshops addressing the fear of medication use and the fear of distress in the event of a HTN diagnosis should be implemented for YAs, especially among those youth with already high BP levels. Such workshops should also involve training healthcare workers to understand the role they play in encouraging prevention and treatment health behaviour as well as reducing stress levels associated with a diagnosis and having to take medication.
- Food-based subsidies: Interventions promoting healthy diets among YAs are required as this study has demonstrated low self-efficacy levels regarding this health behaviour. Such interventions would require funding from the government, as diet recommendations for YAs and their families would need to take into consideration affordability.

Future research

A longitudinal quantitative follow-up study, assessing health behaviours in YAs and measuring changes in BP levels in relation to such health behaviours would be valuable. Future research should also investigate both components (employment and education or training) as independent variables, including employment and education levels and duration needed to achieve a change in HTN awareness and health behaviour. Furthermore, while this study employed a comparative analysis between NEET and HETI youth, assessing the intervention components separately would be beneficial given that while the HETI entailed education on HTN and other chronic diseases such as diabetes and HIV, this was not the sole focus of the programme. This research will contribute to developing comprehensive, age-inclusive risk models or guidelines to predict HTN, which are currently mainly based on studies among older people[39].

4.3 Conclusion

This qualitative analysis, compared hypertension risk perceptions and intention for health behaviour change between NEET (Not in employment, education, or training) and previously NEET young adults, utilizing the Health Belief Model as the conceptual framework. The study revealed that personal relevance of health information, demonstrated by practically applying health knowledge, is important to encourage young adults to engage in healthy behaviour to prevent hypertension and other chronic disease. This finding was the main difference in health behaviour between these two groups and useful to inform future health interventions.

South Africa has some of the highest levels of youth unemployment globally, leading to the creation of many employment and training initiatives for this age group. While these programmes may positively impact the economic future of YAs in the country, this study suggests that grounding such initiatives within the health sector may also encourage health behaviour to prevent chronic disease, further reducing future non-communicable diseases, thus leading to double-duty benefits.

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APPENDICES

Appendix 1: Focus Group Interview Guide

1. What do you know about high blood pressure/hypertension?
2. What are your personal views/ feelings about high blood pressure/hypertension?
3. How severe do you think hypertension can get? (perceived severity)

    Probe: What do you think are the consequences to a person's health? (perceived severity)

4. Who in your opinion do you think is most likely to get high blood pressure? (perceived susceptibility)
5. If you were told that you are very likely going to develop hypertension, what would your response be? (perceived susceptibility & severity)

    Probes: Do you think you are at risk? (Perceived susceptibility)

    Probe: what do people who are at risk look like or how do they behave? (e.g. things that they do in their everyday life) (perceived susceptibility)

6. How important do you think it is to know if you're at risk of getting hypertension or to monitor your blood pressure? (perceived susceptibility and severity)
7. How important do you think it is to go to a health centre for the diagnosis and treatment of hypertension? (perceived benefits)

    Probe: Do you think this is always necessary?

8. What do you think are other lifestyle changes that you can make to prevent or manage hypertension besides taking medication? (perceived benefits)

    Probe : which of these lifestyle changes do you think is most important in preventing or managing hypertension?
9. How likely are you to agree that these are reasonable lifestyle changes to make? (perceived benefits)

10. How do you think engaging in regular exercise or healthier diet can prevent/ manage hypertension? (Perceived benefits)
11. What is the likelihood that you would have gone for a blood pressure check, if you had not been screened by the Wits Health Hubb?

    Probe: Is this a motivation to continue getting regular check-ups? (Cues to action)

12. How did you feel before taking your blood pressure measurements?
13. How did you feel once you got your blood pressure results?
14. What changes would you like to make/ have you made after taking your blood pressure measurements?

    Probe: What motivated you to make these changes? (Cues to action)

    Probe: How confident are you that you will stick to these changes? (Self-efficacy)
15. How do you feel about taking blood pressure measurements again?
16. How often would you feel comfortable taking your blood pressure measurements?
17. Would you ever consider taking hypertension medication if you were diagnosed with hypertension?

        Probe: What would prevent you from taking hypertension medication? (Perceived barriers).

        Probe: What would prevent you from accessing treatment for hypertension? (Perceived barriers).

18. What would prevent you from engaging with healthy behaviour or changing your lifestyle to prevent hypertension? (Perceived barriers)

Appendix 2: Data Collection Process Overview

Participant Information	
Total Number of Participants	40
NEET participants	20
HETI participants	20
Total Number of YAs who declined to participate in this study	7
Participant age range	18-34 years old

Please note: We did not collect demographic information (such as age, gender, previous employment, and education level), this has however been indicated as a limitation to this study and a suggestion for future research (Please refer to page 60). Sociodemographic information collected was according to study participant criteria: Age 18-24 years old; Residing in Soweto; Currently NEET or previously NEET.

Data Collection timeline: August – October 2021

Date	**Time**	**Target group**	**Number of participants**	**Length of FGD**
05/08/2021	10h13am	FGD 1: HETI youth	8	84 minutes
23/08/2021	10h20am	FGD 2: HETI youth	6	67 minutes
08/09/2021	10h03am	FGD 3: HETI youth	6	74 minutes
22/09/2021	14h10pm	FGD 4: NEET youth	7	64 minutes
23/09/2021	14h30pm	FGD 5: NEET youth	7	78 minutes
07/10/2021	15h10pm	FGD 6: NEET youth	6	69 minutes

Appendix 3: Qualitative methodology and consideration of reflexivity

Qualitative research is an evaluation or inquiry into how individuals experience certain aspects of their lives and how they behave in their natural surroundings[166,167]. This includes an analysis of their beliefs or perceptions, values, feelings as well as motivations in relation to particular events[166,167]. Qualitative research is useful to provide context for quantitative research and locates the researcher as the primary data collection instrument, who assesses and gains insight on why events occur and what these events mean to the participants involved in the study[166,167]. Subsequently, this study adopted a constructivist research paradigm, which suggests that individuals construct their own perceptions and understanding of the world through personal experience[168].

Therefore, this study employed a cross-sectional qualitative research method to gain understanding of HTN-related beliefs and intentions for health behaviour change between NEET and previously NEET youth undertaking a health employment and education training initiative (HETI). This study is nested in an ongoing Wits Health Hubb pilot project that aims to assess the impact of the training intervention on the health and welfare of the youth recruited onto the programme (Protocol number M200941).

The use of the Health Belief Model (HBM) as the conceptual framework, informed questions used in the focus group discussions (FGDs). The study applied a deductive thematic analysis, using the six constructs of the model to generate sub-themes and codes. A deductive thematic analysis is useful when utilizing a theoretical framework to guide a study[169]. In the analysis the researcher undertook Braun and Clarke's six-phase analytical process[169].(Please refer to chapter 3 of the dissertation: Analysis).

In the data collection and analysis phase of the study, it was important for the researcher to assess her position within this study through the consideration of reflexivity[170]. Firstly, the researcher did note that her relationship as a colleague of the participants in the HETI group, might have motivated these participants to give the most ideal response in an effort to represent themselves in the best light, as trainees on a health programme. The researcher also had to take into account her own opinions and expectations regarding the HTN perceptions and intentions for health behaviour change of these youth and be careful not to make assumptions based on their health training status. However, the researcher found that this group felt free to disclose information, because of the existing relationship, even if it was not the expected or ideal response.

Secondly, the researcher, who did not reside in the same setting as study participants, had the assistance of a translator, who resided in the same township as study participants, to sit in all FGDs. This was beneficial in that the translator was familiar with the colloquial language and local cultural nuances of this area and so was able to assist the researcher to pick up on any underlying nuanced information and subtle expressions.

Furthermore, to add to the rigor of the analysis, as indicated in chapter three of the dissertation, the researcher used triangulation to compare the same content and interpretation of codes and themes between herself and her two supervisors[171]. This ensured that themes and their interpretation were non-biased and were a trustworthy representation of participants' experiences. The researcher consulted frequently with her supervisors to ensure agreement in analytical coding of data and interpretation.

Appendix 4: Coding Frame

Health Belief Model (HBM) Constructs: Broader Themes	Sub-Theme	Codes	Quotations
1. Perceived susceptibility	**Awareness**	**Symptomology**	*PT 3 – F; HETI group: "… I was twenty-four years old; I was told I could get it (HTN-hypertension) […]so I knew but I didn't do anything cause I wasn't feeling anything. Fast forward to now, I know better."*
			PT 6 - F; NEET group: "I would know if something is wrong with me. So only then I would panic and go (screen for HTN), but for now, I don't think it's important."
			PT 1 - F; HETI group: "I feel like people don't take it (HTN)seriously, there's no signs and symptoms until it's too late, so we all must check our BP(Blood pressure) all the time."
			PT 3 - F; NEET group: "For me hai, I don't think I have it, but I hear about the high blood but I never checked…okay the way I know, high blood is something like you can feel it, like my system is not right but since I don't have symptom like that hai ah ah."
		Age	*PT 3 –F; HETI group: "Anyone is most likely to get it (HTN) if maybe they don't have like a good lifestyle."*
			PT 6-M; NEET group: "I always thought it was for old people this thing (HTN)."
			PT 5- M; NEET group: "I feel like (HTN) it's a norm cause eventually the stress of life as you grow up, we are gonna have it."
			PT 1 –F; HETI group: "Because now I know, I am informed now and when they told me that before (I had high BP) I was not moved, I mean I was probably fifteen, fourteen then, so it was not talking to me."
			PT 2-M; NEET group:(Possibility of getting hypertension) "I don't think so because It's unlikely to find the youth having the thing the hypertension like because our lifestyle, we are always moving around and flexy we are not lazy like older people. I think it's very rare for the youth is to get it."
		Sickness experience: Personal risk	*PT 4 – F; HETI group: "…for me I think I am at risk of getting hypertension because I am obese obviously; I am not free because now I have to watch my weight and also check on my high blood regularly."*

			PT 5 – F; HETI group: "I think I am likely to get it…It is because I am obese and family history."
2. Perceived severity	**Life-threatening**	**Death**	*PT 6 – F; NEET group: "Yes, it leads to death cause my grandma recently passed on."*
			PT 2 – F; HETI group: "I had an experience like that…like my aunty…she used to stay Esnawani. She was feeling hot when they explained and she fainted, woke up esIbhedlela (at the hospital), only to find out that istroke (a stroke) but didn't last for like a week, two days after she died."
			PT 4 – M; HETI group; "So, it can even lead to death if not treated, so it's very it's very hectic."
			PT 2 – F; NEET group: "Yes it leads to death cause my grandma recently passed on."
		Cardiovascular complications	*PT 3- F; HETI group: "…if it is not treated it can lead to health issues and it is very likely for one to get a stroke."*
			PT 7- F; HETI group: "I know that high blood pressure is as dangerous as low blood pressure, because you can suffer a stroke."
		Deteriorated health condition	*PT 2- M; NEET group: "I think that is what it (HTN) leads to… it causes the gout."*
			PT 5- M; NEET group: "so now I think high blood can also make someone to have diabetes."
3. Perceived benefits	**Disease prevention**	**Empowering: Knowing BP status & screening**	*PT 1 – F; HETI group: "…it's important to know your status and go for health checks, also because when you are pre-hypertensive it's still entirely dependent on you to manage it as opposed to when you are now diagnosed with hypertension, […] you are dependent on the medication to manage the hypertension for you."*
			PT 5 – F; HETI group: "Knowing if you are at risk of developing hypertension that could be that one thing that actually prevents you…from getting hypertension. As opposed to now having to having a chronic disease that you have to deal with for the rest of your life or have to depend on treatment or people."
		Prolongs life: Knowing BP status & screening	*PT 6 – F; HETI group: "…I think (BP screening) it's important because it determines how long you gonna live because if you*

			don't take care of yourself obviously, you're reducing your lifespan."
			PT 5 – F; HETI group: "if you take care and manage it (BP), It gives you ah that thing that says your gonna live longer, you can still be able to do whatever you wanna do without having those restrictions of ah, you don't know ah how much your time is left or what's next from this hypertension…to maybe your stroke."
4. Perceived Barriers	**Lack of support**	**Family: regarding diet management**	*PT 6 – F; HETI group: "…I can't change my diet alone cause [name] at home is okay, she has her pap[3] and I can't eat pap. It's not easy to change your diet alone, we need to get support from our families as well."*
			PT 3 – F; HETI group: "…I stay in a family of six people. So, they come with chocolate, sweets and what not; so, I can't ignore those things. They eat those things; they don't exercise so everything I do feels normal even though at the back of my head I know that this lifestyle is not normal but everything seems normal because they are also doing it."
		Healthcare professionals	*PT 4 – M; NEET group: "You go for an injection; she (the sister) will look and say you are here (at the clinic) to waste time. So, it's so boring for us (young people), whether it's to go and check hypertension or anything else you cannot go because of the treatment that you get there."*
			PT 7 – F; NEET group: "Maybe when you go to the clinic, maybe it's your day to take the treatment then you go clinic and the say (healthcare professionals), no the treatment is not, we don't have treatment today, come next week."
	Fear of lifelong medication use	**Side-effects/ deteriorated health condition**	*PT 1- M; HETI group: "Just the thought of taking a pill every day […], it's just a no no, and the side effects apparently."*
			*PT 7- M; HETI group: "…The side effects; as *name of participant* said that someone with hypertension also has diabetes; sometimes it's the medication that leads to diabetes."*
			PT 2 – M; NEET group: "I just personally feel that medication is not healthy, it exposes you to other illnesses."

[3] Pap is a traditional South African staple food made from softly grounded maize.

			PT 2- M; NEET group: "…what can stop me (from taking medication) is like the side-effects. Because I would see, ok I'm taking this medication, but now seems like more things are getting added than taken away."
		Life-time obligation	*PT 2 – F; HETI group: "Now…no, I'm still young (to start taking medication). I'd rather stop like alcohol […] before medication. Cause it's not a six-month treatment […] it's a lifestyle, lifetime thing."*
			PT 2 – F; HETI group: "our generation lifespan it has decreased…they say we die at sixty so forty-five…okay fifteen years its fine (to take medication). Rather than taking it now, what if I die at seventy, how many years… yo fifty years drinking every day…no."
			PT 6 – F; NEET group: "Yo this pills and medication waya'waya (continually) and every day, I don't think I can."
		Pill Burden	*PT 4 – F; NEET group: "…last time at the clinic I saw, they were giving them, […] three or four packets, […] it's too much, you have to take a lot of pills."*
			PT 7 –M; NEET group: "We stay with our grandmother, and she has to drink medication every day, a lot of pills every day. Eish, you see having to take a lot of pills…I can't."
	Fear of distress	**Knowing BP status**	*PT 1 - F; NEET group: "…with many diseases, if you don't know, you continue with your life as if it's normal. But once you go there to the health centre and they say you have this (HTN). Now it's going to be in my mind all over and then I'm gonna be stressing and stressing and I'm gonna end up dying sooner."*
			PT 4 - M; NEET group: "No, it's not important (to know my BP status). Cause I believe that people die because they know…I had a friend, he had HIV for year, but he didn't know. The day he went to the health centre to test he became sicker because of stress."
5. Self-efficacy	**Level of Motivation: Perceived level of control**	**Regular BP checks**	*PT4 –M; HETI group: "I think we have a good motivation currently to actually make sure that we at least try to initiate the change in our lifestyles because of the health checks that we've been doing; that is a motivation."*

			PT 3 –F; HETI group: "look at us now; we are motivated by that we are going for health checks."
		Access to BP machines for self-monitoring	*PT 6 –M; HETI group: "I think I'm confident in managing my BP in mostly tracking my hypertension, yah, I actually bought the machine endlini (at home) we have a day where we actually check."*
			PT 4 –M; HETI group: "I am motivated to continue to track my BP…the equipment things are accessible; I can check it anytime mang'funubona (when I want to see)."
		Diet management (low confidence levels for both groups)	*PT 1- F; HETI group: "I love my food […] so those kinds of things are still kind of difficult to change, even though I try to you know manage and limit some things."*
			PT 5-M; NEET group: "…food (is difficult to manage) because the minute I start stressing the first thing I think of is the food."
			PT 5-F; HETI group: "Okay, let's leave the food part out (when it comes to changing health behavior) ...The other ones (lifestyle changes), yes I do I do a lot."
			PT 5-F; HETI group: "As something I was saying I also do not exercise but I walk a lot. However, yho my diet, I like fried food. I hate veggies and I like a bit of alcohol so that's why I am not sure."
6. Cues to action	**Health messages**	**Health recommendation**	*PT2 –F; HETI group: "The last time I spoke to (name of health educator) she told me that instead of getting off at my stop at the taxis; I should maybe get off two stops before my stop and walk, so I think I walk more than before now."*
			*PT 8 –F; HETI group: "*name of participant*, she gave me a hard time when I drink energy drink. So, it's good she is someone who reminds me and supports me."*
		Clinic health checks: non-HTN related health behaviour	*PT 3 – F; NEET group: "I do take […] contraceptives, so I have to test (for BP)."*
			PT 7 – F; NEET group: "Uhm, last year when I was attending my antenatal classes and pregnancy checks at the clinic, they were like it (HTN) can be dangerous for the fetus and it can be fatal, and I didn't know that, so I had to be careful."
		Community-based health campaigns: non-HTN related health behaviour	*PT 3- M NEET group: "The first time I tested for HIV, it wasn't at the clinic, it was at those tents that they put like maybe at the mall, for me it's convenient."*

			PT 4- M NEET group: "Even those blue tents that do different checks, like for HIV and stuff, you can go check for high blood, you don't have to go to the clinic."
		Symptom experience	*PT 7-F; NEET group: "If I felt that there are symptoms or […] that I'm not feeling well then, I would go (get checked) but if I'm not feeling anything or I feel healthy then like no I wouldn't."*
			PT 7-F; NEET group: "I would know if something is wrong with me. So only then I would panic and go (to the clinic for a check-up), but for now there is nothing, hai I don't think it's important."
			PT 5-F; NEET group: "I currently don't have any symptoms but maybe if I have some of them. I would go just to check."
7. Self-reported Individual behaviour	**Lifestyle Modification**	**Proactive health behaviour**	*PT 6 – M; HETI group: "(I am now) tracking my BP. I actually bought the (BP) machine at home, we have a day where we actually check."*
			PT 3 – F; HETI group: "I also walk more now […]. Even my BP is low now."
			*PT 4 – F; HETI group: "Well, I did initiate change…My resting heart rate was high; and *name of health educator", said for my age it's not good so I started jogging."*
			PT 8 – F; HETI group: I have started exercising at least once a week. I've changed so many things in my lifestyle."
		Lack of interest; non-HTN related health behaviour	*PT 6 – F; NEET group: "I would honestly ignore you (If you told me I had HTN). I would honestly let it slide. It won't change my lifestyle completely […] I don't want to change my lifestyle."*
			PT 4- M; NEET group: "Right now, I am someone who gyms […] and then everything including stress finishes because of going to the gym."
			PT 5- M; NEET group: "because I'm not interested (In knowing about HTN and changing my lifestyle) and I have had people who have been in this process. I think once I have (HTN) I can also ask them you know. I don't have to go this process ya (of the) clinic and hospitals."

Appendix 5: Plagiarism declaration

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 Mimi Mhlaba (Student number: 375687) am a student registered for the degree of Master of Science in Medicine in the academic year 2022.

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: M.Mhlaba Date: 05/10/2022

1

Appendix 6: Turnitin report

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Appendix 7: Supervisor's Motivation Letter for Turnitin Report

DST-NRF Centre of Excellence in Human Development
Individual and Society

Office 154, First Floor East Wing Wits
School of Public Health
University of the Witwatersrand
27 St Andrew's Road, Parktown
Johannesburg South Africa 2193
Email: lisa.ware@wits.ac.za

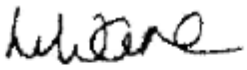
Dear Sir/Madam

Re: Turnitin Report for Ms Mimi Mhlaba – Student Number: 375687

With reference to the Turnitin report showing a 28% similarity index for this student, as the primary supervisor of this student, I have reviewed the report and can see that much of the similar content is due to a preprint on MedRXiv.org which was a requirement of the Wellcome Trust funding. This is shown in the Turnitin index as 16% and again as 1% (for the third match) of the similar content. The student was also invited to give an oral presentation of her research at the South African Hypertension Society Congress this year. As a result, her abstract was also published in a Special Supplement issue of the Cardiovascular Journal of Africa (CVJA). This is shown in the Turnitin index as 2% of the similar content. The proof of oral presentation letter is attached with the submission.

Once these sources of similarity are removed from consideration, the index is within an acceptable range and I hope that this provides some clarity for this result.

Best regards,



Lisa Ware PhD
Senior Researcher DSI-NRF Centre of Excellence in Human Development; Director Wits Health Hubb; and Associate Director Developmental Pathways for Health Research Unit

Tel: +2711 717 2382

Appendix 8: Ethics clearance Certificate

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Ms M Mhlaba

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M210549

NAME: (Principal Investigator)	Ms M Mhlaba
DEPARTMENT:	School of Clinical Medicine Department of Paediatrics and Child Health Developmental Pathways for Health Research Unit Medical School University
PROJECT TITLE:	*The socio-economic impact on health behaviour regarding blood pressure management amongst young adults*
DATE CONSIDERED:	2021/05/26
DECISION:	Approved unconditionally
CONDITIONS:	
NOTE:	If contact information regarding student study participants is required, please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>
SUPERVISOR:	Drs L Ware and F Mpondo
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2021/07/28

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY returned to the** Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

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 submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **May** and therefore reports and re-certification will be due in the month of **May** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator — Date: 28/07/2021

Appendix 9: Proof of presentation at the Southern African Hypertension Society (SAHS) Biennial Congress

27 September 2022

Dear Mimi Mhlaba

ABSTRACT Oral Presentation - SAHS Biennial Congress, 16 – 18 September 2022, Sandton

Thank you for your participation in the ABSTRACT submission of the SAHS Biennial Congress 2022 via the CVJA portal and presenting in the plenary session on Saturday 17 September 2022 at the congress, hosted @ The Capital on the Park Hotel, Sandton, South Africa on 16 – 18 September 2022.

Your Abstract will also be published in a Special Supplement issue of the Cardiovascular Journal of Africa (CVJA), as received: Topic Hypertension perspectives and health behaviors among African youth: the impact of health education and employment.

Any enquiries can be directed to, Karen Nel, at the SAHS Office: E: info@hypertension.org.za or karen@medsoc.co.za

We wish you all the best with your future endeavors.

Yours sincerely,

Prof Nash Ranjith
SAHS President

The Southern African Hypertension Society, E13 Groote Schuur Hospital, Observatory 7925.
info@hypertension.org.za www.hypertension.org.za