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Feasibility and Acceptability of the *Mazi Umntanakho* Digital Tool in South African Settings: A Qualitative Evaluation

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ABSTRACT

To address the need for interventions targeting social emotional development and mental health of young children in South Africa, the *Mazi Umntanakho* ('know your child') digital tool was co-designed, and piloted with caregivers and 3–5-year-old children involved in home visiting programmes promoting early childhood development. The aim of this study was to qualitatively evaluate the feasibility and acceptability of this tool in four urban and four rural low-income communities, from the perspective of home visitors and caregivers. Focus groups were conducted with home visitors ($n = 117$) and caregivers ($n = 72$). Issues relating to the feasibility of implementing the tool included timing of using the tool, technical and social implementation challenges, WhatsApp as the preferred platform, and participants' recommendations for future implementation. Overall, the tool was acceptable for home visitors and caregivers and was perceived to have a positive impact on children's development, and the relationship between caregivers and children.

1 | Introduction

Social emotional development is a key component of early childhood development, typically referring to skills such as emotional awareness (of self and others' emotions), social skills (particularly with peers) and self-awareness (anonymised). In early childhood, these skills relate to mental health, and children's readiness for school, especially the age of 3–5 years. In South Africa (SA), a Majority World country (Alam 2019; Draper et al. 2022; Khan et al. 2022), the importance of social emotional development for school readiness has been recognised (Goldschmidt and Pedro 2020; Munnik and Smith 2019). School readiness is a highly salient issue in South Africa, and it is generally acknowledged to encompass a range of developmental skills that children need to successfully navigate the school environment, such as cognitive, social emotional, motor, early literacy and early numeracy skills (Draper et al. 2024). A national study with 4-year-old children has highlighted the positive association between social emotional development and learning outcomes (Giese et al. 2022; Tredoux et al. 2023), and social emotional functioning was positively associated with 'positive deviance' (i.e., children from low-income settings who outperform their peers) (Henry and Giese 2023). However, in this study, 27.5% of the sample did not meet the standard (locally derived) for

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Summary

- Is the *Mazi Umntanakho* digital tool feasible and acceptable in urban and rural low-income South African communities?
- Focus groups with home visitors and caregivers (of 3–5y children) found the tool acceptable and feasible, although with some challenges.
- Findings on the perceived impact of the tool are promising, and future work to evaluate child outcomes is recommended.

social relations with peers and adults, and 33.5% did not meet the standard for emotional readiness (Giese et al. 2022; Tredoux et al. 2023).

Previous qualitative research with community-based workers in low-income SA settings identified numerous risks to the social emotional development and mental health of children in this age group (anonymised), interpreted through the lens of the nurturing care framework (Britto et al. 2017). These risks largely related to responsive caregiving (perceptions of caregivers' attitudes, knowledge, beliefs, behaviours and challenges not conducive to the provision of responsive caregiving), as well as safety and security (substance abuse, economic challenges, neglect, abuse and violence). Risks to other aspects of nurturing care included basic needs not being met, insufficient services, limited resources and caregivers' limited education and literacy (anonymised). Various risks to the mental health of children in SA have also been identified, as well as the challenges and lack of child mental health services, highlighting the importance of community-based services and support for children, their caregivers and families (Davids et al. 2019; Mokgaola et al. 2022; Mokitimi, Schneider, and de Vries 2018; Mokitimi et al. 2019; Tomlinson, Kleintjies, and Lake 2022).

There are few published interventions targeting social emotional development and mental health of young SA children (Dawes et al. 2023; Dowdall et al. 2021; Lunga, Esterhuizen, and Koen 2022). None have used digital tools, which have been shown to offer innovation solutions for promoting child development and health in Majority World countries for potentially cost-effective, accessible and scalable strategies (Till et al. 2023). The development and testing of such digital tools to promote the mental well-being of young children builds on this research from other places and addresses needs in the SA context. Specifically, it addresses the need for digital interventions in Africa for early childhood health and development (Bergin et al. 2020; DeWitt et al. 2022; Huang et al. 2019), the application of participatory approaches such as co-design in Africa (Freire et al. 2022; King et al. 2022), and for digital interventions using co-design approaches (Till et al. 2023; Bevan Jones et al. 2020; Coleman et al. 2023; Thabrew et al. 2018). Only a small number of co-designed digital interventions for young children have been published in Africa, including a parenting app to support on social emotional and cognitive development (Alam et al. 2023), language outcomes (Le Roux et al. 2022) and maternal and child health (Coleman et al. 2023). All of these raised the relevance of local contextualisation for digital interventions, and one reported no significant change in language outcomes that authors suggest was due to low use of their app as a result of limited support and guidance for parents (Le Roux et al. 2022).

1.1 | *Mazi Umntanakho* – 'Know your child'

The goal of the *Mazi Umntanakho* project was to co-design, pilot and qualitatively evaluate a digital tool to assess mental well-being (specifically, social emotional development and mental health) of young children (3–5 years) in low-income settings (anonymised). The components of the *Mazi Umntanakho* tool are presented in Figure 1, and it was originally intended for use by community-based workers (e.g., home visitors, community health workers). An essential component of the co-design process for *Mazi Umntanakho* was qualitatively exploring community-based workers' understandings of social emotional development and mental health of young children in their communities, including risks and protective factors for these outcomes, which have been reported elsewhere (anonymised). Co-design considerations relating to community-based workers involved in the initial co-design phase of the *Mazi Umntanakho* tool are being reported elsewhere in work that explored these workers' work processes, experiences and preferences. Issues raised included the lack of community trust, home visitors' work-life management and social-economic inequalities, all of which impact on the delivery of a sustainable and scalable digital tool.

The aim of the study presented in this paper is to report on the qualitative evaluation of the feasibility and acceptability of the *Mazi Umntanakho* tool where it was piloted in selected urban and rural low-income communities in SA. The objectives of this study were to qualitatively explore:

1. community-based workers' perceptions of the tool's feasibility and acceptability;
2. caregivers' perceptions of the tool acceptability and
3. perceptions of changes in caregivers, children and community-based workers during the pilot.

2 | Materials and Methods

2.1 | Study Design and Approach

This qualitative evaluation study draws on implementation science concepts of intervention feasibility and acceptability and recognises the importance of contextual relevance (Britto et al. 2018). In the context of this study, feasibility refers to whether an intervention can be successfully implemented in a given setting, and acceptability can be defined as the extent to which an intervention is perceived to be 'agreeable, palatable or satisfactory' (Proctor et al. 2011). The study forms part of a long-term community-based research project with a co-design orientation to the development of contextually relevant community-based interventions with the goal of privileging community perspectives (Till et al. 2023). While many definitions of

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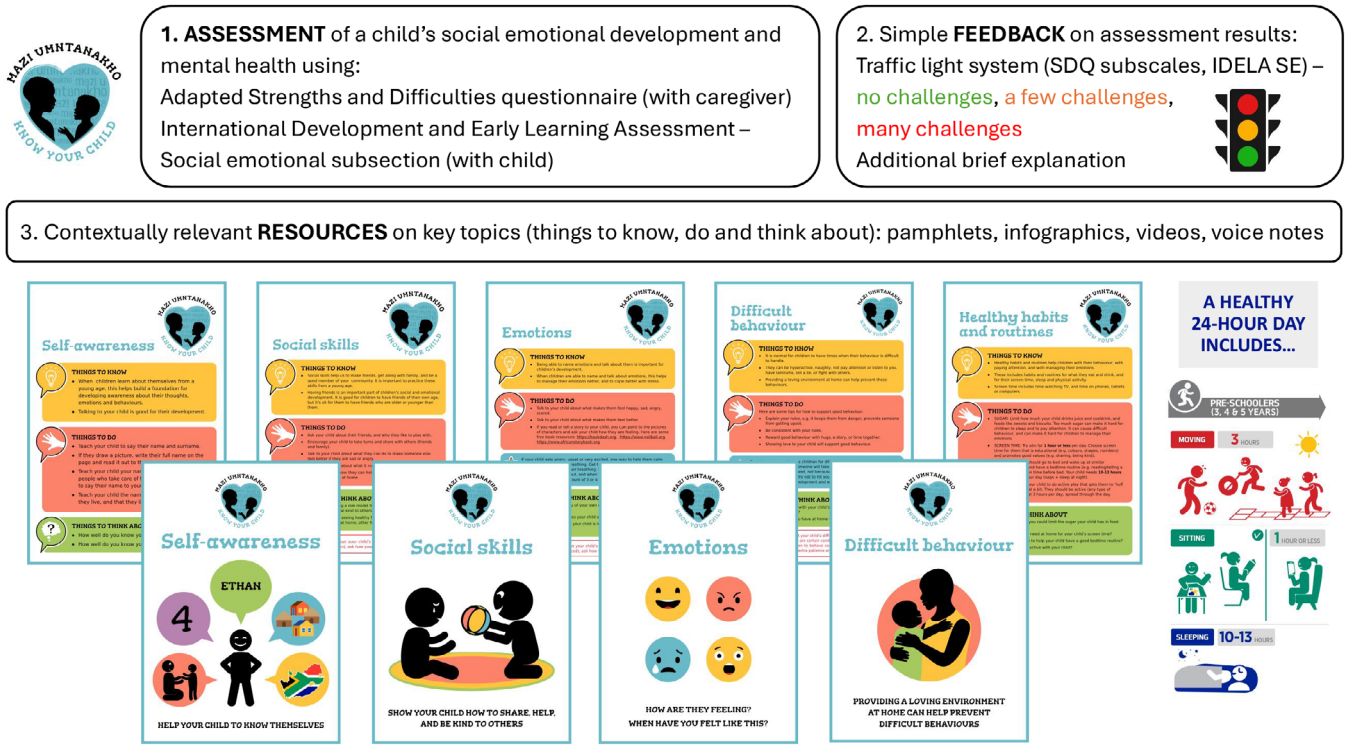


FIGURE 1 | *Mazi Umntanakho* tool overview.

co-design exist in relation to the development of digital interventions, there is consensus on co-design's collective and empowering nature, and the view that this work is done 'with' rather than 'for' or 'on' communities (Till et al. 2023; Freire et al. 2022; King et al. 2022; Bevan Jones et al. 2020). Co-design approaches combine the strengths of researchers, community members and stakeholders, promoting meaningful engagement that facilitates dialogue and equal contribution, thereby increasing the likelihood of interventions being used and beneficial for communities (Till et al. 2023). Our co-design project involved initial qualitative fieldwork, a series of co-design prototyping workshops, the development of a community informed system and the pilot deployment, which is the focus of this paper.

This project was conducted in partnership with community-based organisations (CBOs) and community health worker programmes working in low-income settings to address various aspects of early childhood health and development, and including our target age group of 3-5-year-old children and their caregivers. In these communities, it is not uncommon for children to have more than one caregiver, and caregivers in these settings are usually female (mother, grandmother, aunt), with a very small proportion of men playing a primary caregiving role. Community-based workers with these CBOs generally work within or close to the communities where they live, and are thus able to provide rich perspectives of their community contexts, making them integral to the co-design process.

Ethical approval for the study was obtained from (anonymised). All participants (home visitors and caregivers) gave written informed consent for their involvement, and approval was obtained from the CBOs involved. All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

2.2 | Study Settings, Participants and Recruitment

The pilot implementation of the *Mazi Umntanakho* tool took place over 8 months in eight low-income communities from two provinces of SA (see Figure 2 for the project timeline). Four urban and two rural communities were purposively selected in the Western Cape province, in partnership with a CBO implementing a home-based programme for caregivers of children not attending early care and education services, to promote early childhood development. In KwaZulu-Natal province, we partnered with two CBOs working in two rural towns that worked in the villages surrounding the towns (some up to 50 km away). The first CBO implements a home-based stimulation programme to promote early childhood development, and other community-based activities to promote early literacy; the second CBO implements a community-based programme to promote early childhood development, including play groups. The CBOs were involved in the earlier phases of the Mazi Umntanakho co-design process and were recruited based on existing contacts of the SA authors (and referrals from these contacts), or were already involved in early childhood development research with the SA authors.

All of the CBO's home visitors in the selected communities were invited to participate in the pilot, and CBOs provided local oversight for the pilot of the *Mazi Umntanakho* tool with their staff. Home visitors received training on the *Mazi Umntanakho* tool, which was conducted over two mornings with each CBO

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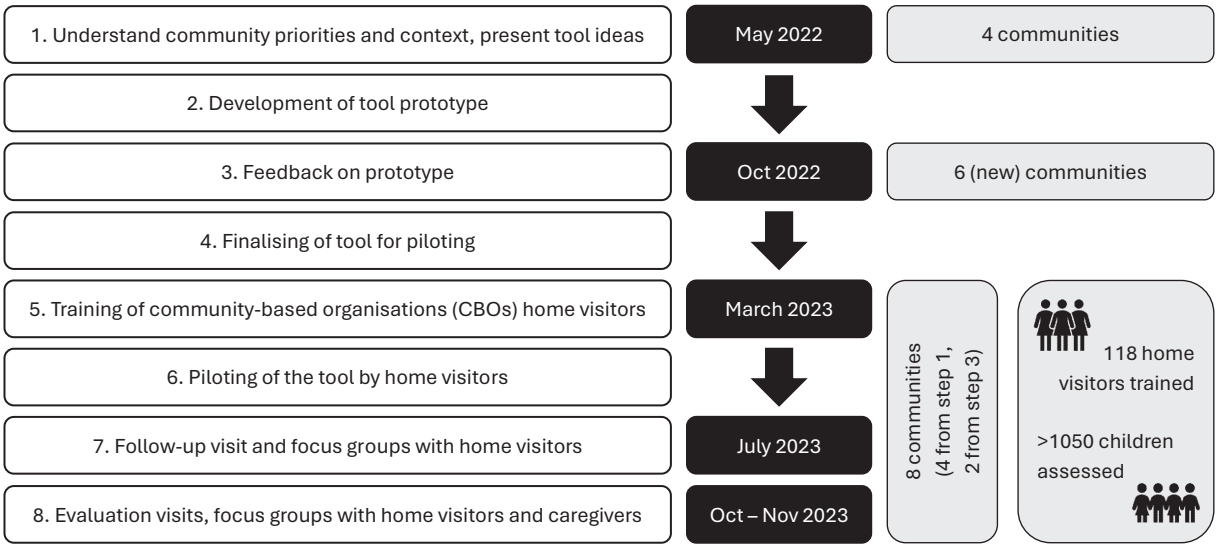


FIGURE 2 | *Mazi Umntanakho* project timeline.

(at their location). This training covered theoretical aspects of social emotional development and mental health of young children, as well as the components of the tool shown in Figure 1: (1) the assessments included in the tool (to be administered by home visitors), (2) the traffic light system to provide feedback on assessment results and (3) the sharing of contextually relevant resources (developed for the tool). The resource topics and formats were a product of the *Mazi Umntanakho* co-design process and covered the topics of self-awareness, social skills, emotions, difficult behaviour and health habits and routines.

Regarding the assessments included in the *Mazi Umntanakho* tool, home visitors were trained to administer the Strengths and Difficulties Questionnaire (SDQ, suitable for children 2 years old and older, with the language simplified for use in low-literacy environments in SA) (Goodman 1997) with the caregiver of the child. Home visitors were also trained to use the social emotional subsection of the International Development and Early Learning Assessment (IDELA, suitable for children 3–6 years old) (Pisani, Borisova, and Dowd 2018) with the child. The SDQ is used extensively across diverse global settings, and the IDELA is also optimised for use across global settings and has been used previously in this age group in SA (Draper et al. 2024). In this sample, the SDQ and the social emotional section of IDELA showed acceptable internal reliability (>0.7). The feedback for SDQ results was based on the original three-band categorisation of 'normal' (green), 'borderline' (orange) and 'abnormal' (red) (Goodman 1997). For the feedback on IDELA social emotional results, green was determined by a score of ≤ 1 for one of the sections (self-awareness, friends, emotional awareness, empathy, solving conflict), orange was determined by a score of ≤ 1 for 2–3 sections and red was determined by a score of ≤ 1 for four or more sections. Both the SDQ and social emotional subsection of the IDELA were professionally translated (including back translation) into the local languages of the pilot communities.

After receiving training on the tool, these home visitors were requested to use the *Mazi Umntanakho* tool twice in the pilot period (approximately 3–4 months apart) for the children (and their caregivers) in their care for their CBO's programme and were provided with mobile data to use the tool for the duration of the pilot. To mitigate anticipated connectivity issues, a paper back-up of the assessments was created and provided to home visitors. Home visitors would then provide feedback on the assessment results, as well as contextually relevant resources about social emotional development and mental health in young children.

In the selected communities, common challenges, typical in low-income SA communities, include the high prevalence of poverty, unemployment, food insecurity, as well as substandard housing, infrastructure and amenities. Urban low-income communities, including those in this study, are typically characterised by high housing density; rural communities (particularly those close to former homelands) are characterised by more limited access to services given their remote location. The home visitors working with the selected CBOs in these communities do not typically have any qualification (and may or may not have completed high school), but would have received training to conduct the programmes they implement for the CBO that uses them. Although home visitors used in these CBOs receive a modest salary or stipend, many of them experience similar socioeconomic challenges as the community members with whom they work.

Participants in this qualitative study included CBO home visitors ($n=117$) and caregivers of children 3–5 years old ($n=72$, all age >18 years), with further details in Table 1. For this qualitative study, all home visitors from the CBOs who had taken part in the pilot were invited to participate in the focus groups; none of the home visitors specifically refused participation, although their availability on the day for data collection affected attendance. Caregivers were purposively selected from the CBO home visiting programme and were therefore from the same communities (and spoke the same language) as the home visitors. Home visitors were requested to invite caregivers with whom they had used the *Mazi Umntanakho* tool, and who were willing to take part in a focus group to share their and their child's experiences of the tool. The predominance of females in this sample is reflective of the reality of individuals working in community-based work in SA and primary caregivers being mostly female.

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TABLE 1 | Participant and data collection details.

Province	Group	Groups	*n*	
Visit 1: Feedback sessions				
Western Cape	Urban 1 (U1)	Home visitors: 1	30	
	Urban 2 (U2)	Home visitors: 1	12	
	Urban 3 (U3)	Home visitors: 1	21	
	Urban 4 (U4)	Home visitors: 1	9	
	Rural 1 (R1)	Home visitors: 1	10	
	Rural 2 (R2)	Home visitors: 1	9	
KwaZulu-Natal	Rural 3 (R3)	Home visitors: 1	16	
	Rural 4 (R4)	Home visitors: 1	10	
Visit 2: Feedback sessions and focus groups				
Western Cape	Urban 1 (U1)	Home visitors: 1	28	
		Caregivers: 1	8	
	Urban 2 (U2)	Home visitors: 1	9	(1 male)
		Caregivers: 1	9	(2 males)
	Urban 3 (U3)	Home visitors: 1	19	
		Caregivers: 1	8	
	Urban 4 (U4)	Home visitors: 1	9	
		Caregivers: 1	10	
	Rural 1 (R1)	Home visitors: 1	9	(1 male)
		Caregivers: 1	9	(2 males)
	Rural 2 (R2)	Home visitors: 1	8	(1 male)
		Caregivers: 1	5	
KwaZulu-Natal	Rural 3 (R3)	Home visitors: 1	14	(3 males)
		Caregivers: 2	14	
	Rural 4 (R4)	Home visitors: 1	8	
		Caregivers: 1	9	

2.3 | Data Collection

As outlined in Table 1 and Figure 2, data for this qualitative evaluation was collected at two time points: a first round of follow-up feedback sessions (focus groups) was held with home visitors in July 2023, and further focus groups were conducted with home visitors (same group as first round), along with focus groups with caregivers in October/November 2023. A total of 25 focus groups were conducted for this study.

The first round of focus groups was conducted as part of a visit to provide support for implementation and to obtain feedback on the tool and how it was being implemented, to deal with any challenges as soon as possible, without waiting until the end of the pilot. Given the size of some groups, the description of them as focus groups may not be seen as strictly accurate. However, despite the large size of some groups, these were facilitated in a similar way to how focus groups would be facilitated, in terms of asking open-ended questions using a semi-structured discussion guide, and encouraging participation from all group members. These guides were developed by the authors to cover a range of topics relevant for the evaluation of the pilot implementation of the tool. The discussion guides for the focus groups are provided as supporting information. Data from questions about the technical aspects of the tool will be reported elsewhere and are not discussed in any depth in this paper.

Each focus group was facilitated by one of the local research team (CD or CC), with the other team member taking notes and providing facilitation support. The duration of the focus groups ranged between 38 min and 1 h 26 min for home visitors, and 14 min and 1 h 20 min for caregivers (most between 25 and 40 min). This difference in length can be explained by the willingness of participants to engage in the discussions, and some discussions took longer due to the need to translate from a local language into English. Questions were posed in English, with a translator in each group to translate questions and responses from local languages into English where necessary. All group discussions were audio recorded, and translated and transcribed into English by a professional transcribing team made up of individuals who are able to translate from local SA languages into English, and transcribe into English.

2.4 | Data Analysis

A codebook thematic approach was taken to the descriptive and exploratory process of data analysis (Braun and Clarke 2019; Braun and Clarke 2021; Braun and Clarke 2023) (led by CD). The analysis process began with the focus group discussion guides, which prompted participants to share their perceptions of the tool, in a way that would be helpful to provide insight into the tool's feasibility and acceptability. However, there was room for participants to raise other relevant issues, and where relevant, these were captured in the analysis of the focus group data as well. These discussion guides generated some initial ideas for organisation and interpretation of the data in relation to the feasibility and acceptability of the *Mazi Umntanakho* tool. The next stage of the data analysis involved data familiarisation, which led to the development of a conceptual outline of potential themes and sub-themes, drawing on the topics raised in the discussion guides. An initial coding framework was developed based on these themes and sub-themes. After receiving input from a member of the co-author team (KL), the codebook was finalised and applied to the transcripts to identify relevant portions of the text that corresponded to these codes using MAXQDA data analysis software (Version 2020, VERBI GmbH, Berlin; MAXQDA code system available as supporting information).

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Coded sections were then exported and summarised, and illustrative quotes were selected, and are presented in the results section (see Table 1 for abbreviations; HV = home visitor, CG = caregiver).

After a process of synthesising these summaries, the following broad themes and sub-themes were identified: (1) feasibility of implementation (timing of using the tool, technical and social implementation challenges, WhatsApp as the preferred platform, recommendation for future implementation); (2) acceptability of the *Mazi Umntanakho* tool (home visitors' and caregivers' perceptions) and (3) perceived impact of the *Mazi Umntanakho* tool.

2.5 | Researcher's Positionality

The two local researchers who facilitated the group sessions collectively have extensive experience conducting community-based research and qualitative research. At the time of the study, two of the researchers (who identify as cisgender, White and English-speaking) were based at a university in SA and have expertise in child development and cross-cultural research. The lead author comes from a background in psychology and public health and has > 20 years of experience as a qualitative researcher, including in cross-cultural settings, but acknowledges the white, privileged lens she brings to the research process.

3 | Results

3.1 | Feasibility of Implementation

With regards to the feasibility of CBO home visitors implementing the *Mazi Umntanakho* tool in the low-income communities in this pilot study, this section will discuss the role of timing on the integrating of the tool in home visitors' existing programme activities, technical and social challenges associated with the tool's implementation, the preference of WhatsApp as a platform for the tool and participants' recommendations for future implementation of the tool.

3.1.1 | Timing of Using the *Mazi Umntanakho* Tool

Overall, the *Mazi Umntanakho* tool was perceived by home visitors to be complementary to the work they were already doing in their organisation with young children and caregivers. While some found it initially challenging to fit into their work schedule, home visitors' comments indicated that they seemed to find it easier to fit into their schedule over the course of the piloting period. Home visitors of the organisation in the Western Cape found it more difficult to fit the use of the tool within their sessions with caregivers since their session times are closely monitored using a digital app specific to their CBO, and they need to meet a target number of sessions in an allocated time. Some groups of home visitors from this organisation figured out ways to do this (e.g., doing the *Mazi Umntanakho* tool after hours or on weekends if they lived close to caregivers), while other struggled more. When asked whether the *Mazi Umntanakho* tool should be incorporated into their monitoring app, some were in favour, but others thought it was best to have them separate. For this organisation in the Western Cape, the turn-over of home visitors influenced the implementation of the *Mazi Umntanakho* tool, since new home visitors did not receive the same training in the tool, and handover of materials and organisation cell phones (allocated to home visitors) was not always smooth, as described in the next section.

> The ones that were on training...we've been trying to get the books, but they said they gonna bring it... But these guys didn't want to let go. So we actually not having books for the new people that's here to continue with. (U4 HV)

Home visitors were able to do the assessments with the caregiver and child on separate occasions, but many chose to do the assessments together if the caregiver and child were both at home. Those working with young children in preschools (often referred to as *creches* in SA) would do the assessments with the children at their preschool, and then do the assessment with the caregiver on another day negotiated with the caregivers. Sometimes assessments were done separately because home visitors did not want caregivers to answer for the children.

3.1.2 | Technical Implementation Challenges

Challenges to the implementation of the *Mazi Umntanakho* tool related to network connectivity, devices, minor technical issues. Network connectivity was the main issue influencing the feasibility of using WhatsApp, and hence the *Mazi Umntanakho* tool, since it relies on an internet connection. This meant that many home visitors would start doing the assessments within the tool, but it would stop working while they were using it, or the connection would be slow, which they felt was not good for their interaction with the caregiver and child. This also influenced home visitors' ability to share the resources on WhatsApp, if there was no or limited connectivity. Network connectivity was an issue in both rural and urban settings, since some urban communities have particularly bad spots for network connectivity, but it was especially bad in remote, rural areas in KZN where network connectivity is not optimal. In all these areas, connectivity was exacerbated by the rolling blackouts experienced in SA ('load shedding'), which affects the functionality of cell phone network towers. This was particularly bad at the time of the first visit (July 2023), but had improved somewhat towards the end of 2023 when the second visit was conducted (October/November). This improved network connectivity (due to fewer blackouts) contributed to the perception that the tool was working better at this time.

> That is what I am saying, it is easier to do it on the paper, because when you do it on the WhatsApp, it's a problem, so it's better to do it on the paper, so that you can finish. Because other parents get bored when you are doing it for a long time... I have a problem with my phone, it doesn't have network. (R2 HV)

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While all home visitors had a smart phone (but many caregivers do not), a few spoke about their phones getting lost or stolen, and some mentioned that their device did not work well (e.g., broken screen), which made the use of WhatsApp challenging. Also, if they were not able to charge their phone due to lack of electricity, they could not use their phones. Relatedly, due to the high cost of internet data and the lack of availability of free Wi-Fi in these communities, many home visitors struggle to keep their apps up to date, which meant that the *Mazi Umntanakho* tool sometimes did not function optimally in older versions of WhatsApp. For example, older version of WhatsApp presented a link to the video rather than video itself, a usability challenge that slowed down or prevented usage of the videos for people with these older platforms. There were other minor technical issues experienced by home visitors, such as not noticing certain options for some questions, entering lowercase instead of capital letters or adding in the word 'years' for a child's age when they just needed to enter in a number. However, these were all easily resolved by further clarification of the tool, and the instructions provided in the training manual.

3.1.3 | Social Implementation Challenges

Social challenges to the implementation of the *Mazi Umntanakho* tool related to caregivers and the environment. In terms of challenges with caregivers experienced by home visitors, many of the children included in this study had another caregiver besides their biological parent/s, such as a grandmother or aunt, as reported by home visitors and caregivers. This meant that the tool was implemented with this other caregiver if the parent (usually the mother, fathers were often perceived as absent) was not available, and the messages imparted to this caregiver may not reach the child's parent. However, home visitors acknowledged the importance of having a good relationship with parents (if they are present) and caregivers, and their buy-in for the work they are doing with their organisation, as highlighted by one rural home visitor:

> Many of the parents with whom we work, sometimes the child is not with the mom, but is being looked after by the auntie or uncle, and the things don't reach the mother accurately as it was delivered to the person who is looking after the child. (R2 HV)

Environmental challenges included the seasonal work (on wine and fruit farms in the Western Cape) of some caregivers. During heavy work seasons, these caregivers were not as available. In addition, in KZN, the remoteness of some of the rural villages in which the home visitors lived and worked made collaborating with their CBO difficult. Such coordination is required if home visitors wanted to collect print resources to leave behind with families after using the digital tool, update or repair a phone and so on. The high costs of transport and the distances that need to be covered could create major barriers to access to these resources. Lastly, some home visitors and caregivers voiced concerns about safety in their community environment, which would often prevent children from being allowed to play outside, which came up in discussions about children develop social skills. Taken together, these challenges with resources and environment provide additional complexity for any digital health intervention, which might be undertaken.

3.1.4 | WhatsApp as the Preferred Platform

Despite the challenges mentioned above, WhatsApp was still the preferred digital platform for the tool, mainly because of home visitors and caregivers' familiarity with the app, given its ubiquitous use in SA (Marques 2022) across all income groups, according to the home visitors and caregivers. It was evident from both the discussions and other interactions with the team that the use of another app would have created more problems. Many of them reported using the paper backup of the assessments that was provided to mitigate connectivity issues. This involved completing the assessments on paper first, and later entering it into WhatsApp when they had connectivity. Some home visitors said they preferred doing the assessments on paper because it went quicker (possibly due to slow connectivity mentioned above), and a few home visitors described children as being distracted by their phone, for example, wanting to play games on their phone instead. Others did not want to use paper because they felt it got confused with their other programme work that was paper based or they preferred WhatsApp because they could share resources with caregivers who had smartphones. Home visitors acknowledged that the main drawback of doing the assessments on paper and not WhatsApp is that the feedback on the assessments is not provided in real time.

> For me it's just on WhatsApp because like I said it gave them more information on the other things also. It also gives you the colours [traffic lights]. It gives you the colours to tell if they were struggling. (U4 HV)

> It went very well for me because I was using the forms and uploaded them on WhatsApp. It was an easy way for me. (R3 HV)

3.1.5 | Recommendation for Future Implementation

In the focus groups, home visitors and caregivers were given the opportunity to share recommendations for future use of the tool. Some suggested that the tool could be used with caregivers in other organisations (e.g., churches, libraries), programmes, clinics or at schools. The main recommendation for future implementation of the *Mazi Umntanakho* tool was to use it in preschools, because practitioners in these settings understand children, they are well positioned to ask and answer questions to or about the child, and can help with preparing children for school since they are already starting early with the child's development and education.

> I think if maybe this tool can be used in creches, it can be good because it's where the children start learning. And if the teachers know how to ask children these questions and teach them how to answer these questions, it's where they can see if there is an improvement or not in the child before

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> he/she can move forward in school... They can do that because they understand children well, they stay with the children more than the parents. (R3 HV)

3.2 | Acceptability of the *Mazi Umntanakho* Tool

In terms of the acceptability of the *Mazi Umntanakho* tool (extent to which it was found to be agreeable, palatable or satisfactory), this section shares the perspective of home visitors and caregivers. For home visitors, this covers their general perceptions of the tool, how they found that caregivers and children responded, as well as what they thought of the assessments, and feedback on assessment results. For caregivers, this also covers their general perceptions of the tool, plus their perceptions of the assessments, and feedback on assessment results. Given the similarity in feedback about the acceptability of the *Mazi Umntanakho* resources, home visitors and caregivers' feedback are presented together.

3.2.1 | Home Visitors' Perceptions

3.2.1.1 | General Perceptions of the Tool. In all groups, home visitors found the tool was easy to work with and worked well, and something they would recommend to others. The wording used in the tool was perceived to be simple to understand, and they appreciated the translations, although sometimes English was preferred because it is more concise. From the discussions with home visitors, they found the tool interesting, relevant and helpful. Their comments indicated that the tool helped to address gaps in caregivers' knowledge and understanding, particularly around emotional awareness and their child's social behaviours.

> It was very interesting, to take questions [in the tool]... the question is interesting, and I could go to one of the teachers on the street, one of the creche teachers and ask her to do that questions [from the tool] to the children, just to see how interesting it is and how helpful it is, to do that questions with the kids. (R2 HV)

> What I've noticed when I'm working with these kids is that the caregiver or parents don't talk about feelings because if you are asking that child, what's happening with the child, they just tell you that she's crying and they don't talk about the feelings if she's sad or happy. Even if you ask, "what makes you happy?", they don't answer those questions...It shows that parents or caregivers don't talk about those things to children. If you ask them, where do you live, they keep saying "I live here", they don't know where. (R3 HV)

Home visitors described the tool as helping to emphasise the importance of caregivers' roles in their children's development and also helped caregivers to know their children, and learn how to communicate with them better. For children, many home visitors believed that the tool helped them learn self-awareness, especially knowing where they live and the name of their caregiver in case they get lost, given the safety concerns prevalent in these communities. Some of them highlighted how the tool addresses concerns at an early age (e.g., with social interactions), so that something can be done early on and that it could pick up other challenges, such as speech delays.

> We'll explain that with us we pay attention to our child late in the future. But then now with this tool available, you can use it, and it can help you figure out which direction their life is going even before they go to school. Because there at schoolteachers usually deal with over 45 kids in a class. This is where your child won't be seen if they're struggling. But with this tool of Mazi Umntanakho, it's as if it's school for one child. (U1 HV)

> The tool works well, with the parent, we talk to them and tell them that when they read, they are going to be able to communicate with the child and know what is going on, and when they get home, the parent is going to be okay. So it works well, and we also give them posters to have around the house so the child can see them. (R4 HV)

> But I really like this tool, it gives you a lot of interaction with the mom, it brings the mom in, because that is what we are trying to do, we are trying to get the caregivers to know more about their kids and how they are. (U3 HV)

3.2.1.2 | How Caregivers Responded. Home visitors reported varied responses from the caregivers to the *Mazi Umntanakho* tool, and these ranged from enjoyment and engagement, to concerns about the assessment results and whether they would be reported to government services, and disinterest. Many indicated that caregivers had responded positively to the use of the tool in their work, since it assisted them to know and understand their children better, which was beneficial to them and their children. Some home visitors described caregivers as responding openly and honestly to the questions, while others thought the caregivers were not being honest, which could be because they are concerned about their child having a problem.

> A lot of parents said that it was a very positive program. Because they got a better understanding as to how their children are compared to how their children were. So with the parents I did the questionnaire with, where there's a question of, “Does my child share? Does my child interact with others and not only with myself?” Most of the parents said that the child started interacting more

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> with other people and not only them seeing that they the only children that's in the house. So for me the app was positive. (U4 HV)

> What I have discovered with the parents, some of them are hiding the true nature of the child. They were not fully honest when they were answering the questions. You had to emphasise before starting that, please give correct and valid answers. What I have noticed is that some of them were not honest. (R4 HV)

Many home visitors emphasised the importance of building trust in their relationship with caregivers. They reported that having trust helped to elicit a positive response to the tool, particularly when homeworkers were able to convey a non-judgmental attitude with the caregivers. Sharing some of their own experiences was perceived by the home workers to help to build this trust.

> Some of the parents in the first place, they won't, actually, some of the parents, they won't talk about things that they are going through, they tell that you will talk to someone else about it, like that, but when you share something with them, like the things that you also go through, then they also open, if you tell them your story. They will tell you stories. So that is how my experience is, so I will tell my parent my story that I am going through, and she open with me and tell me what she is going through... That is how we trust each other on our personal stuff. (R1 HV)

Some home visitors reported caregivers not being interested in the *Mazi Umntanakho* tool and resources, were resistant to input about their parenting/caregiving or were initially sceptical about whether they would be reported to social workers. There was general agreement that caregivers responded more positively and communicated more honestly and openly the second time the assessments were done. They felt this could have been due to caregivers feeling more comfortable with the tool or understanding the questions better the second time round. Or it could be due to caregivers seeing positive changes in their child's social and emotional skills as a result of caregivers becoming more aware of the importance of these skills, and therefore engaging their child to develop these skills.

> And the parents, it became easier when we went back, because with some questions, they would be shocked by them and if their child knows this or doesn't know this. But now they were able to notice a number of things that we spoke about now that we've come back. At first when we arrived, they noticed that there were quite a number of things that they didn't know at first. So it helped a lot with the parents because now they are paying a lot more attention on their children now. (U2 HV)

In two of the communities, home visitors spoke about caregivers wanting to know what was going to be done with the information, and if the home visitors were going '*get something out of these questions*' from the caregivers. While this sentiment is not uncommon in low-income communities in SA, it was only specifically expressed in these two communities. This also pointed to the importance of trust mentioned earlier. In other pilot communities, caregivers wanted to know what tangible benefits they would receive from participating (in the pilot of the *Mazi Umntanakho* tool), and this was raised in one of the focus groups where caregivers wanted to know if the researchers would be helping with food and clothes, and even building a school. In these instances, home visitors spoke about needing to emphasise that the benefit is for their child.

> The other thing is, as I indicated you mustn't get tired to explain... And you make sure that they understand the benefit of the child. Because yes, they ask you these questions, What I'm going to benefit, what I'm going to get? And they think even us we are getting something more over that. It's our job for not getting to say to them it's for the benefit of the kids and just explain thoroughly to them that it's that important to know the development of your child. (U1 HV)

3.2.1.3 | Children's Reactions to the Tool. The ways in which children reacted to the use of the tool also varied, according to home visitors. Some children were said to be more open and spoke more freely when their caregiver was there, whereas some were more reserved around their caregivers, and some home visitors noticed that children attending preschool were more open than those staying at home. Some home visitors noted that some caregivers wanted to answer for their child if they were not being responsive, and they were certain the child knows how to answer. A few home visitors found that it was sometimes difficult to get the children to sit down and focus on the questions, particularly if they wanted to go and play outside or if they were distracted by the home visitor's phone, as mentioned earlier. Making the questions fun and playful helped in these instances. The responses of the children seemed to be more positive for home visitors who already knew the children through their existing programme activities, and the fact that many home visitors felt that children were more responsive, confident and comfortable when the assessments were done a second time helps to reinforce this observation.

> It went well but what I have noticed is that children are not the same. There are those that feel free to talk and there are those that are shy. It helps to start by having a friendly conversation with the child before you can start with the questions, this makes them feel free to open up...The challenge of using the phone is that children want to take it. They want to see what you are doing...They will be asking you to take pictures of them. (R3 HV)

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> They were more confident when answering the questions. There was a few children that would just give you a normal straight answer. There were children that need a little bit more on the answer that they gave you. But they felt more open. They felt more honest. They felt more trusting in giving you an answer to the question that you are asking them. (U4 HV)

3.2.1.4 | Perceptions of Assessments. Home visitors generally reported that the assessments used within the *Mazi Umntanakho* tool (adapted SDQ with caregivers, IDELA social emotional questions with children) were easy to understand. Overall, there were mixed views about whether the questions to caregivers or children were easier. They commented on the length taken to complete the assessments being dependent on how caregivers and children responded, in light of some initial concerns expressed by home visitors in the co-design phase about length of time needed to use the *Mazi* tool (particularly the assessments). However, there were only a few comments from home visitors in these discussions about the assessments taking too long, and this view had changed by the end of the pilot. In the first round of discussions, there were some comments about the repetition of questions, but it was explained that this is common for questionnaires used for research (e.g., asking similar questions about the same behaviour).

The question about the child stealing seemed to be the most sensitive (mentioned by caregivers and home visitors), and home visitors spoke about how they needed to ask sensitive questions like these in a way that did not offend caregivers. They also mentioned the importance of tone and phrasing (especially for some local languages), and asking the questions in a conversational way to make caregivers feel comfortable. With older caregivers, for whom literacy was a challenge, home visitors said they needed to spend more time explaining the questions to ensure they understood them well.

Most home visitors described the children responding well to the IDELA social emotional questions, such as enjoying the interaction and being willing to answer the questions; and that their experience working with young children and existing relationship with the children helped with this. Some children were reported to be shy because the questions were new to them, or they were not used to being asked questions. A few did not want to answer the questions, but these seemed to be in the minority. Home visitors found that some children struggled identifying feelings (e.g., 'what makes you sad?') or did not know how to respond to follow up questions (e.g., 'what else makes you sad?'); there were mixed responses to a question about sharing a toy with another child. They found that most children did not know how to respond to the question asking them which country they lived in, and many struggled to answer the questions about where they lived and the name of the caregiver. However, they saw this as a good learning opportunity for the children.

> I think the only question that was difficult for the children and needed to be explained more, it is when you ask about things that make them sad. It was like they did not know what you are talking about and it was difficult for them to understand someone's feelings. There was a question about if a child took your toy. They only think about themselves only. They would even say "It is my toy, I will take my toy." (R3 CG)

A few home visitors thought the questions for the children were *too much*, and some home visitors and caregivers felt that the children were too young for the questions, and that they were too difficult for their children. This was usually mentioned in the context of 3-year-olds, for which the IDELA is suitable, but also understandably more difficult for children of this age. However, discussions around this highlighted the possibility that 3-year-olds in these communities who perform poorly across all questions may have genuine developmental difficulties, and there is a risk that these may be missed if there is the assumption that the questions are not appropriate for 3-year-olds.

3.2.1.5 | Perceptions of Feedback on Assessment Results. Home visitors responses in the discussions indicated that the traffic light (often referred to as 'robots' in SA) system to provide feedback on the assessments worked well, and it was easy and simple to understand (and hence explain) for both home visitors and caregivers. Due to the connectivity challenges mentioned earlier, it was not always feasible to provide feedback in the way it was intended, that is, showing the robots on WhatsApp. While in some settings home visitors found a way to return and provide the feedback relatively quickly (up to a few days or a week later for some), in some settings this led to delays in providing the feedback if caregivers were not available to receive the feedback, or to it not being given to some caregivers. Overall, how home visitors communicated the feedback, with an emphasis on how caregivers can help their child to improve, using the *Mazi Umntanakho* tool resources as a support, seemed integral to eliciting a constructive response from the caregiver.

Home visitors sometimes described some caregivers as 'in denial' about the challenges their child was experiencing. Although we do not have direct evidence of how the caregivers viewed their children, it is notable that the home visitors reported this concern and also that the tool assisted in raising awareness of these challenges with the caregivers. Situations like these became more complex when the caregiver (another relative) completing the assessment was willing to face these challenges, but the child's mother was not. In other cases, home visitors reported that the results were not an accurate reflection of their experience with the child, or a child shows challenges in a particular area, for example, hyperactivity, but the caregiver does not think there is a problem. These kinds of different perceptions can create challenges for an approach in which the accuracy of assessments relies on caregivers providing accurate answers, when caregivers may be unable or unwilling to do so.

> The mother sees her as normal, and for me it's a concern because she is too bored for her age, she only turn three in June, so she talk things, I wouldn't see other children speak like that, but to get the mother,

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> actually, to get all the parents, not all of them, but the majority, it was like, it can't be, my child is not... if you explain to them in the robot, the lights of the robot, what it stands for, how to go about it, they will feel like, no, but it's normal for my child to be like this. So what I suggested is they should watch them often, because I also feel that, it's, for some parents, it's normal for children to be on their own, to play on their own or to be hyperactive. (R1 HV)

In terms of the questions in the tool about whether the caregiver and home visitor had concerns about the child, it appeared from the discussions with home visitors that most caregivers found it difficult to articulate specific concerns about their child's development. However, for those whose children scored orange or red, some caregivers expressed concerns about this feedback, although others were not concerned, even if their child scored red for difficult behaviours that may have become normalised (e.g., being rough with other children). This then had an effect on how referrals were managed and indicated that home visitors perhaps did not fully understand the referral criteria as outlined in the tool and training (one red robot, plus caregiver being concerned, plus the home visitor being concerned).

There are a few potential explanations for home visitors not following the proposed referral process. Firstly, they may not want to elicit a negative reaction from the caregiver due to the stigmatisation of developmental challenges in these communities. Secondly, because of very limited referral options in these communities (which often incur transport costs for the caregiver), home visitors may only be inclined to refer those who they and/or the caregiver were very concerned about. Both of these explanations could contribute a 'wait and see' approach that may be reinforced by feedback they have previously received from overburdened public health facilities. In these cases, the *Mazi Umntanakho* resources provided could be a valuable source of information for caregivers, but it is also possible that children with genuine developmental delays may lose out on the benefits of early intervention from an appropriate health professional.

3.2.2 | Caregivers' Perceptions

3.2.2.1 | General Perceptions of the Tool. Caregivers expressed generally positive views about the *Mazi Umntanakho* tool and its relevance. They commented that it helped with their caregiving skills, communication and interactions with child and helped to show how other aspects of development are important, for example, emotional development, and not just academic skills. In addition, it was mentioned that the tool increased their understanding about how their child is behaving and developing, where they are having challenges, and how they can help them. Some acknowledged that it raised their awareness about how their emotions and behaviour affect their child.

> I also learnt that the title alone of the program. It's wow. It's giving. You know when you later find out that something bad happened to your daughter and you knew nothing about it. How are you going to feel as a parent at the end of the day? So it's also showing us to invest a lot more time to our children. No matter what the circumstances are. But know your child. (U2 CG)

> They were about behaviour, hyperactive, emotional, social, I would say it was good and the tool is good, and so you sometimes you can see what the tool does, and the tool helps you with that. (R1 CG)

3.2.2.2 | Perceptions of Assessments. Similar to home visitors, caregivers generally found the assessment questions easy to understand, and their responses indicated that they were happy with the number of questions. Regarding the SDQ, caregivers had overall positive views about the questions directed to them. They mentioned finding the questions helpful and interesting, giving them a new perspective and bringing them closer to their child. Some caregivers also spoke about learning things about their children that they did not know or were not aware of (or aware of the importance), such as asking if their child has friends, or finding out that they were being bullied. Caregivers' responses also indicated that the questions were something of a 'wakeup call'. For those children who performed well on the SDQ, it was an affirmation for their caregivers. Most caregivers reported feeling comfortable with the questions asked about their child, and while some caregivers acknowledged that the SDQ questions were quite personal, only a few said that the questions were too personal.

> I felt very good about the questions, the questions are easy to understand and ask...And it is easy to explain it to the kids, and they get it...they can give you a proper response. (R2 CG)

> The questions were fine, we are now able to know what type of children we are raising. The child might have short temper or bullying other children. My child on the other side was the one was crying, which made me realise that they were being bullied. (R4 CG)

Some caregivers commented on how their children enjoyed the experience of answering the questions and the opportunity to express themselves. One caregiver recounted how her children liked the questions so much, she went and asked her friends the questions she had just answered with her home visitor. Some caregivers mentioned learning about their children from the way they answered the questions, and there was agreement across groups that children being able to answer the questions about themselves (especially where they live) is important for children's safety in their community.

3.2.2.3 | Perceptions of Feedback on Assessment Results. Although caregivers generally described the traffic light system to provide feedback as easy to understand, their responses to this feedback were complex and varied. Those whose children did well (received a green robot) were

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happy with the feedback, whereas other caregivers were reported by home visitors to be more sensitive to how their child performed, which sometimes led to a negative reaction from the caregiver. In some cases, this led to the feedback not being given by home visitors. However, for some caregivers, the orange or red robots were taken well, particularly if they felt the resources provided helpful information about how to help their child to improve.

> I felt alright because it will help me know where they are lacking. And where he needs to be helped here and there. (U2 CG)

> It was easy to understand, because when it was red, you would know what to help the child with and where they need to improve even if it's just a little. So I would say it is very easy to understand and to know how it works, and if the robot is green, then everything is okay, so it is very easy to understand. (R1 CG)

3.2.3 | Perceptions of *Mazi Umntanakho* Resources

In line with perceptions of the *Mazi Umntanakho* tool discussed earlier, home visitors and caregivers' responses indicated that they found the resource topics (self-awareness, emotions, social skills, difficult behaviour, healthy habits and routines) to be relevant and helpful. The most popular topics mentioned were emotions, social skills and self-awareness. Although the tool was designed to guide caregivers to select a topic that was most relevant to their child, feedback from home visitors and caregivers suggested that caregivers did not choose specific topics, particularly with regards to concerns they might about their child. While it was not always clear what guided decisions about which topics were given out, it seemed that home visitors tended to share resources for all of the topics, seeing them all as potentially beneficial. It is possible that this was also easier if they thought the caregivers did not fully understand the choice presented to them.

Home visitors and caregivers were positive about all the resource formats provided (pamphlets with text, infographics, videos, voice notes). Voice notes were mentioned the least, possibly because the videos were preferred as they offered the same content plus visuals, and were small in size for easy sharing on WhatsApp. While caregivers' preferences for different formats varied, these responses affirmed the need for different formats to cater for different preferences, as well as the need for printed versions of the pamphlets and infographics. Home visitors in some groups spoke about how they used these as teaching tools in meetings with caregivers or even with other adult groups conducting as part of their organisation's activities.

> I like the picture one. Because it's easy to communicate with them when they see the picture. (U1 CG)

> I think our one, the favourite one was the social skills. We use the social skills one. I actually spoke from it. And then I think there is a question at the bottom that asks, "Do you know your child?"...It also had the parents like looking at me and caused a huge discussion. (U4 HV)

Those working in preschools mentioned how the large versions of the printed infographics, particularly on self-awareness and emotions (the children especially liked the emojis), were used as teaching tools with the children. Despite the literacy challenges of some caregivers mentioned earlier, many caregivers liked the pamphlets because of the information they contained. Based on the popularity of the printed resources in all groups, and the considerations about selecting topics mentioned above, home visitors were positive about the idea of putting the printed resources in a booklet so that caregivers have them all together. But in the discussions with home visitors, it was evident that giving physical resources comes with the risk that they get lost or discarded, and there are logistical challenges of distributing these resources in remote areas.

The videos were described as especially helpful for caregivers who cannot read, and while some home visitors did share the videos with caregivers, this relied on caregivers having smartphones and data. Although it was explained to home visitors that they could save the videos on their phones and then show these to the caregivers to overcome these barriers, saving the videos on their phones was not always feasible because of the limited storage space on their phones – quite likely due to being a low-cost smartphone. In addition, a few home visitors did not realise that they could forward videos and images on the *Mazi Umntanakho* tool like they could when they usually use WhatsApp.

> They like the videos. They like something on the phone. But also advise them to give something on the paper because the video is on my phone. When I leave, she's got nothing. So that's why most of the time I just issue with the pamphlet...some of the parents, we give them that pamphlet and then after you pass that, it's like outside. But it's my job that the video is on me for this moment. When I go out with you, you don't have a video. For me I prefer to give you this paper. (U1 HV)

3.3 | Perceived Impact of the *Mazi Umntanakho* Tool

In this section, home visitors and caregivers' perceptions of the perceived impact of the tool are presented, including their perceptions of the most helpful or effective component of the tool. Most home visitors agreed that the most helpful or effective component of the *Mazi Umntanakho* tool was the questions asked to caregivers and children; this was confirmed by the caregivers. Some home visitors and caregivers felt the resources were the most helpful, while others believed it was the feedback given to the caregivers, or a combination of these.

> For me the questions brought me closer to my child. I had to observe how my child reacted to the way I

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> talk to them. They also helped me to observe them when they were playing with other children in terms of their behaviour, are they able to play well with their children at the crèche and not bullying them? The questions are really helping, they are improving our relationships with our children and I also saw a huge difference to how they are playing with their friends now. (R4 CG)

> I would say it's both. But especially the robot is the one that's causing a difference. Because it gives you feedback right? And now with the parent we are going to decide what choice we'll take after we've received the feedback. (U2 HV)

3.3.1 | Home Visitors' Perceptions

For home visitors, their learnings from the *Mazi Umntanakho* tool included raised awareness about social emotional development of children, as well as greater skills in interacting with caregivers and children, observing children in more depth and communicating with caregivers about children's developmental challenges (e.g., autism). Many home visitors also commented on what they learnt as parents or grandparents that they can apply with their children or grandchildren. Some of them spoke about the difference they saw in their own children or grandchildren as a result of the tool and also how they can share their experiences with caregivers to help them relate and build trust. Related to this, some home visitors also commented on how the use of the *Mazi Umntanakho* tool has had a positive impact on their relationship with caregivers.

> The resources help a lot and I even learn through it also. Before my parents I learn first and I know what to do first because in the same way they are parents, I am also a parent so I need to also put that effort in myself. I just need to work it in my home before I go out to someone else. (R1 HV)

> I could say Mazi Umntanakho helped us as caregivers. Because we also have children. So I would see some things. Do you see when a child is hyper? Sometimes we wouldn't pay attention to it because we would give them money to go buy sweets a lot of the time. So I would notice some things and say, "But there's a red flag in a specific area." (U2 HV)

> It made us too close to the caregivers...They welcomed us more than before. And they want more of Mazi. (U1 HV)

In terms of the changes that home visitors observed in caregivers as a result of using the *Mazi Umntanakho* tool, they mentioned caregivers' increased awareness of the importance of social emotional development (beyond just meeting basic needs), a desire to learn more, and a greater understanding of their role in helping to develop these skills; a few noted a change in mindset amongst caregivers. Home visitors saw that this led to caregivers becoming more engaged in their child's development, making more of an effort and doing activities with their child and paying more attention to their child, including their behaviour and emotional state. They felt that caregivers were getting to know their children better, and they observed closer relationships between caregivers and their children, including improved communication.

> I speak for all of us. I think this tool was a big help because for most of the parents, it's like you just have to feed and clothe your child and see that he's healthy and all that. You see your child play, and it's fine he's playing, all is good. But they also started to recognise certain things in their children after learning these tools and things and like my colleague says they did make use of the tools because there were certain things – videos, the videos, all that so that was a big help. (R1 HV)

> You look at the bond between the two, the reaction, and you can literally see, how the mother and child's relationship is, so what they say and what the tool says corresponds with each other, so it showed me that there is a bond between the parent and the child, and how the parent answered the questions on the tool, they answered with how they felt about the child, so it did bring out a lot of stuff where the moms are concerned...And it made them more attentive to the child. (U3 HV)

> I think the parent and the child's bond became much closer. And some parents is more involved in their child's lives now. Working on social skills. Working on emotional skills. So the bond between the parent, I would say became a bit stronger. (U4 HV)

A number of home visitors saw that caregivers were growing in their understanding of why communication is needed instead of physical punishment, and this tool has made them more aware of alternatives to physical punishment when disciplining their children.

> I have seen a difference because people have read and are getting to know their child. Some parents think that they just have to make the child food and bath them and then they're done parenting. Others get annoyed when the child is crying, asking why they are crying and end up hitting them. So now they are learning from scratch to talk to their child instead of hitting them. (R2 HV)

In terms of changes observed in the children taking part in the *Mazi Umntanakho* tool, many home visitors spoke about

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children learning from the IDELA questions and self-awareness resources discussed earlier. They commented on how many children had improved in how they identify emotions and express how they are feeling, as well as improvements in their social skills and behaviour.

> The thing that helped me is the activity of matching emotions. They can differentiate between crying children and stuff. And the parents can also teach them. (U2 HV)

> In some of the small children did not know about sharing. Kids don't like to share their personal stuff, like their toys. But they got to learn that they must share with each other. Because when you share you show that person that you care for the next person... And you can put a smile on that person. (U4 HV)

> We mostly focus on the behaviour of the child. Because that's where it starts. And social skills of the child... Especially the child that has to play with the group of children. How is their behaviour amongst other children...We got some good results back. Children are starting to socialize appropriately, if I may say. Because no one is taking anyone's toys anymore. No fighting. No swearing. (U3 HV)

3.3.2 | Caregivers' Perceptions

Caregivers spoke extensively about what they learned from the tool, echoing much of what was observed by home visitors. This included dealing with emotions, the importance of communicating and spending time with their children, and giving their children attention.

> We have discovered and learned something you because as a parent you do not really pay attention to some of the things. You just give them food and you are done. After the questions we were now able to start paying attention to see how the child was responding. (R3 CG)

> Another thing is, those colours for the robots after they told me what green means, what red means, what orange means. So then I realised that here I have to play a role and not just the lady I saw how things were done even if I'm not the lady, I have to be like, "Okay, my child is learning from this." As soon as that lady leaves, I have to give them a break of at least 10 minutes or 20 minutes and then call them again and take over from where the lady left and start there and teach the child. (U2 CG)

Similar to home visitors, caregivers frequently mentioned that the *Mazi Umntanakho* tool has helped them to learn alternatives to physical punishment and harsh forms of discipline, e.g., shouting. Some caregivers commented on how they have observed the positive influence on reduced physical punishment on how their child interacts with other children.

> The programme has helped us a lot at home because when the child has done something wrong, we are able to talk to him but then hitting him because if we hit him, when he is out playing with other kids, he will also hit them because he will think it is normal. Now we know that instead of just hitting him when he has done something wrong, we need to sit him down and talk to him and show him the right way. This programme really has helped us because he is now a respectful child and helps around and also able to play well with other children. (R4 CG)

> And the tools, it helps with that, because we would shout at that children, or hit them, now we can start listening to them. (U3 CG)

Caregivers mentioned how the tool had highlighted for them the importance of their child's social skills, specifically making them more aware of how their child interacts with other children, and how good social skills can help prepare them for school. Many caregivers felt that the tool had helped them to get to know their child better, including from their interactions with the tool (IDELA child questions), giving them new insights into their child's strengths and weaknesses. The link was made often about knowing their child and how this has strengthened their relationship with their child; caregivers spoke about feeling closer to their child and communicating with them better due to what they had experienced with the *Mazi Umntanakho* tool.

> My grandson his troublesome sometimes and would take other children's things without their permission. I have been learning what kind of a person he is, and I have been trying to teach him how to play with other children. He is now much better and no longer forcefully take other children's things. The tool has taught me a lot. (R4 CG)

> It was more positive, because now parents know the child. And it was a process where the parent can learn to know the child. Because you don't always know the child. So as small as it was it impacted with a real force. (U4 HV)

> It created a very strong bond. A very strong one. Nothing can come in between us. And then I understand everything. And now she tells me everything. I know we talk about everything. So it created a lot of bond. I don't want to lie. It helped me a lot when it comes to creating a bond with my daughter. [I mean you know your child. 'Uyamazi

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> Umntanakho'] It helped. Everything. So it really helped me. It really did help me. (U2 CG)

In some groups, it was not always entirely clear if caregivers were talking about the *Mazi Umntanakho* tool or the home visiting programme with which they were already involved,

> My child started the program when they were very little. And ever since they started it, he's been able to identify colours and at school. He went with more knowledge of school before it was his time to go to school. (U1 CG)

In response to this potential confusion, the focus group facilitators made an effort to clarify this in the discussions. Nevertheless, the perceived overlap may indicate that the *Mazi Umntanakho* tool was seen by caregivers to fit in well with the programme content and activities already being delivered with them and their children.

Lastly, similar to home visitors, caregivers also observed positive changes in their children as a result taking part in the *Mazi Umntanakho* tool, highlighting the importance of self-awareness for their children's safety. A few caregivers had seen a reduction in their child's hyperactivity or difficult behaviour (e.g., bullying), and some noted that their children were showing more respect to others and being more helpful. One caregiver mentioned that her child now had more confidence to speak with her, particularly if the child had done something wrong; this could be the result of the better communication and less harsh discipline mentioned earlier.

> I am really thankful for Mazi time because now I can see a huge difference in the child's life. She is able to ask the child their name and where they leave and the child is able to answer those questions. The Mazi Umntanakho tool really worked for the child and they also know who their mother's name is. It is really helping because my child will never get lost again. If they happen to get lost, they will be found because they are able to also point out their home. (R4 CG)

4 | Discussion

The findings of this study show that the *Mazi Umntanakho* tool is generally feasible for use in low-income urban and rural communities in SA, when implemented in partnership with CBOs, and that WhatsApp is the preferred digital platform in these settings. However, there were some implementation considerations, including the timing of integrating the tool into the work of CBO home visitors, and various social and technical challenges that need to be overcome (particularly for optimum benefit and future scalability), especially connectivity challenges.

The tool was also found to be acceptable by home visitors and caregivers, and the contextually relevant resources worked well, with support for both paper and digital versions. The findings on the perceived impact of the tool are promising; future work to evaluate child outcomes is recommended to provide more robust evidence regarding impact. The assessments included in the *Mazi Umtanakho* tool were perceived to be the most effective component, although these go hand in hand with the feedback on assessment results. It is possible that the perceived and experienced impact of the tool and its acceptability for home visitors and caregivers contributed to their motivation to overcome feasibility challenges.

There are some broader issues that underpin these findings. First, the contextualisation of interventions is critical, as has been emphasised in previous research (Coleman et al. 2023; Alam et al. 2023; Le Roux et al. 2022), and there are features of these low-income settings that influence the acceptance and adoption of tools such as *Mazi Umntanakho*. This aligns with the findings of Alam et al. (Alam et al. 2023), who emphasised that digital tools for caregivers need to be responsive to local realities, mindful of the challenges faced by caregivers, suited to local child development needs, and relevant and appropriate to the communities in which they are implemented. Other research has echoed the need to address knowledge gaps with accessible and relevant information for caregivers of young children (Coleman et al. 2023).

Furthermore, lessons from the home visitors and caregivers must be seen in context, such as self-awareness being important for safety and understanding other options rather than harsh punishment. It appears that the tool increased home visitors and caregivers' knowledge, which sparked self-awareness amongst home visitors and caregivers; they reflected on their responses and behaviours, and the potential impact of these on the children in their care. This suggests the ability of assessment tools – developed and delivered in contextually relevant ways – to impact on self-perceptions and behaviours, which could be powerful catalysts for positive change in these settings.

The second underpinning issue is the importance of relationships between home visitors and caregivers (and by extension, their children), and the centrality of trust in these relationships. The importance of social connections and trustworthy relationships has been highlighted for digital innovations in other African settings, along with the social nature of adoption of these innovations (Awori et al. 2022). In the context of *Mazi Umntanakho*, the existence of trusting relationships can significantly influence the response of caregivers to the tool, and their willingness to engage in the process of reflecting on their child's development as well as their influence on the child's development, as mentioned above. For caregivers who were resistant to accepting the assessment results, these relationships – which are ongoing with these home visitors – can be essential for shifting caregivers to a point of acceptance, and greater self-reflection.

In addition, trust gained can contribute to greater community acceptance of the tool, which positively impacts its wider adoption, which again could help with overcoming feasibility challenges, especially when community members feel supported in their engagement with the tool. Partnership with CBOs for the co-design, piloting and evaluation of the *Mazi Umntanakho* has

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been strategic in this regard, given that these CBOs have long-standing relationships within these communities, which along with the embeddedness of home visitors in these communities, helps to facilitate the building of trust and hence community acceptance.

The strength of this study is that it is part of a broader community participatory approach to the co-design of a digital tool. Furthermore, qualitative methods has unearthed some of the nuanced complexities of implementing digital tools in diverse low-income settings, which can provide insights for the implementation of similar tools in other Majority World countries. A limitation was the occasional lack of clarity between *Mazi Umntanakho* and CBO programmes in some focus groups with caregivers.

In conclusion, *Mazi Umntanakho* shows promise as a feasible, acceptable and potentially impactful tool for promoting the social emotional development and mental health of 3-5-year-old children in low-income SA settings. The lessons learned from this study are invaluable for future implementation plans for the tool, particularly in preschools, thus contributing to the readiness of these children for school.

Author Contributions

Catherine E. Draper: conceptualization, investigation, funding acquisition, writing – original draft, methodology, visualization, formal analysis, project administration, supervision. **Caylee J. Cook:** investigation, writing – review and editing, project administration. **Elizabeth A. Ankrah:** conceptualization, methodology, writing – review and editing. **Jesus A. Beltran:** conceptualization, methodology, visualization, writing – review and editing, software, data curation, resources, validation. **Franceli L. Cibrian:** conceptualization, methodology, writing – review and editing, software, resources. **Kimberley D. Lakes:** conceptualization, methodology, writing – review and editing, formal analysis. **Hanna Mofid:** visualization, software, data curation, resources. **Lucretia Williams:** conceptualization, methodology, writing – review and editing. **Gillian R. Hayes:** conceptualization, funding acquisition, methodology, writing – review and editing, supervision.

Ethics Statement

Ethical approval for the study was obtained from the Human Research Ethics Committee (Medical) at the University of the Witwatersrand (Ref: M200104). All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Consent

All participants gave written informed consent for their involvement.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Peer Review

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1002/icd.2567.

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