The effect of mHealth and conventional awareness campaigns on caregivers' developmental literacy

Courtney Brown[a]*; Renata Eccles[a]; Marien Graham[b] and Jeannie van der Linde[a]

[a]*Department of Speech-Language Pathology and Audiology, University of Pretoria, Pretoria, South Africa;*

[b]*Department of Science, Mathematics and Technology Education, Faculty of Education,*

University of Pretoria, Pretoria, South Africa

*Corresponding author: Dr. Jeannie van der Linde; e-mail address: Jeannie.vanderlinde@up.ac.za

Abstract

Children in impoverished settings face a multitude of risk factors that may impact early childhood development (ECD). Poor ECD can lead to negative outcomes and the continuation of the intergenerational cycle of poverty. Early stimulation from caregivers can counter the effects of risk factors. Increased developmental literacy supports positive parenting, thus improving ECD outcomes. This study aimed to determine the effect of mHealth and conventional awareness campaigns on caregivers' developmental literacy.

Caregivers were recruited from a primary health care facility in a low-resource setting. Participants were randomly divided into three groups; two intervention groups (mHealth and conventional awareness campaigns) and a control group. Caregivers' developmental literacy was assessed prior to their exposure to awareness campaigns. Participants were reassessed after three months, during which participants in the intervention groups received the same information, through different mediums.

The results showed that neither of the awareness campaigns was effective (p=.359); as the intervention groups' results were similar to those of the control group. There was a significant improvement (p=.000) however, from pre-test to post-test across the entire sample. The improvements may be due to pre-test face-to-face interviews with caregivers. This approach may be more effective than awareness campaigns in improving development literacy.

Keywords: Developmental literacy; mhealth; awareness campaign; early childhood development

Introduction:

Early childhood development (ECD) should be monitored closely as unattained early milestones are one of the first signs of possible developmental delay (Jeyaseelan & Sawyer, 2017). ECD relies on speech and language, sensory, motor, cognitive, and emotional processes that are necessary for children to grow and thrive in the first nine years of life (Bolajoko, 2011). The first two years of children's lives are particularly vital for development due to the high plasticity of the brain (English, Peer, Honikman, Tugendhaft, & Hofman, 2017; Gao, Lin, Grewen, & Gilmore, 2017).

Many young children in lower-middle-income countries (LMIC), such as South Africa, are at risk of developmental delay due to biological risks, including poor maternal health and infectious diseases, as well as environmental risk factors such as limited maternal education and poverty (Meintjies & van Belkum, 2013; Tomlinson, et al., 2014; Zand, et al., 2015). In 2014, 63% of children in South Africa were living below the upper-bound poverty line, which at the time equated to approximately $50 or less per household per month (Hall et al., 2016). The risk factors that impoverished children face can result in poor health outcomes, reduced academic preparedness and performance, later poor vocational outcomes and consequently the continuation of the intergenerational poverty cycle (Engle et al., 2007). Improvement of ECD is one of the most effective approaches for the reduction of poverty (Hall et al., 2016).

Adequate maternal education improves ECD outcomes by decreasing the impact of biological and environmental risks factors (van der Linde et al., 2015; Walker et al., 2011). Children's developmental outcomes are directly linked to caregivers' ability to apply developmental literacy when supporting the child's development (Burger, 2010; Zand et al., 2015). Developmental literacy entails caregiver knowledge of typical child development and allows for appropriate stimulation and early recognition of developmental disorders (Jeyaseelan & Sawyer, 2017).

Informed caregivers tend to have sensitive and positive interactions with their children (Cooper et al., 2009) that encourage behavioural and physiological development (Bernard, Meade & Dozier, 2013; Britto et al., 2017). In contrast, children are at risk of delayed development when caregivers do not know when to expect skills to develop (Ertem, Peer, Honikman, Tugendhaft, & Hofman, 2007; Stith et al., 2009). Often, due to a lack of developmental knowledge, intervention is sought too late, and the optimal period of neural plasticity is missed (Anderson, Spencer-Smith, & Wood, 2011).

The lack of access to health services can further hinder timeous intervention. The South African government recognises the challenges that families experience in the public health sector including inadequate quality of care in facilities, the limited number of healthcare professionals, and poor infrastructure and access to the facilities (Jobson, 2015; Samuels, Slemming & Balton, 2012). One-fifth of the children in South Africa experience poor access to clinics where developmental surveillance takes place (Hall et al., 2016). Healthcare professionals are, often, not able to fulfil their role in meeting the needs of caregivers and young children due to these challenges. Alternate service delivery models, such as caregiver-focused prevention programmes, have been considered as a means to reduce the strain on the health care system (Jeyaseelan & Sawyer, 2017) and respond to the needs of vulnerable and overlooked young populations (Vally, Murray, Tomlinson, & Cooper, 2015).

Caregiver-focused awareness programmes targeting ECD hold potential as an alternative to professional-led awareness programmes (Jeyaseelan & Sawyer, 2017). Awareness campaigns, as the first level of early childhood intervention and stimulation, help establish developmental literacy and positive parenting (United Nations Children's Fund, 2017). Positive parenting is defined as warm, consistent parenting accompanied by good relationships, non-violent forms of discipline

and supervision over children that is developmentally appropriate (Gould & Ward, 2015). Positive parenting is enhanced by improved developmental literacy (Dermott & Pomati, 2016). According to the World Health Organization (WHO), caregivers, resultingly, support development and seek intervention for their child when needed (WHO, UNICEF, Worldbank, 2012). In the Nurturing Care Framework, the WHO and other collaborators recognise that positive parenting is vital for children's development (WHO, UNICEF, Worldbank, 2018). The South Africa's National Integrated Early Childhood Development Policy for 2030 has subsequently incorporated the Nurturing Care Framework into (Lindland, Richter, Tomlinson, Mkwanazi, & Watt, 2016). Positive parenting and developmental literacy can be targeted through awareness campaigns (WHO, UNICEF, World Bank, 2018).

Conventional awareness campaigns, such as paper-based pamphlets, have been used in multiple domains with varying degrees of success (Danaei, Faghihi, Golkari, & Saki, 2016; Khurana et al., 2016). Paper-based awareness campaigns show promise as knowledge outcomes increase steadily and are maintained for up to two years when participants are provided with written educational material (O'Mahony et al., 2017; Teo, Ling, & Ng, 2018). The time, labour and money required for the design, production, and distribution of these resources may however act as barriers to implementation (Bloomfield et al., 2015). In the resource-constrained public health care sectors of LMIC, these barriers may prove challenging as conventional awareness campaigns are resource-intensive (Bloomfield et al., 2015).

Alternatively, text messaging, a form of mobile Health (mHealth) service delivery, is becoming an economical and effective means to communicate with a large group of people (WHO, 2011). This mode of service delivery is a potentially powerful means of communicating health messages to populations that struggle to access services (Smith, 2011). Young South Africans aged eight to

25 years old show an interest in using mobile devices to acquire health-related information (Hampshire et al., 2015). A South African study also indicated that mobile phone users who received informational or motivational text messages about HIV testing were more likely to seek counselling and testing services (de Tolly, Skinner, Nembaware & Benjamin, 2012). Many South Africans experience financial constraints, although 99.5% of households own a cell phone (Hampshire et al., 2015). Several studies across different South African contexts have effectively used text messaging to target family planning, sexually-transmitted infections, and pregnancy education (Poorman, Gazmararian, Parker, Yang, & Elon, 2015); while limited research evaluated campaigns focused on ECD and developmental literacy (Nilsen et al., 2012).

It is vital to help prevent developmental delays in young, vulnerable populations, through increasing caregivers' developmental literacy and consequently, positive parenting. The most efficient method for distributing developmental information is, however, undetermined. The effect of a conventional versus an mHealth awareness campaign on caregiver developmental literacy should, therefore, be explored.

Materials and method

IRB clearance was obtained (GW20180104HS). Once the participants confirmed that they understood the information leaflet, consent was obtained.

Aim:

The research objective was to determine the effect of mHealth and conventional awareness campaigns on developmental literacy.

Research design:

An experimental, pre-test-post-test comparative design (Leedy & Ormrod, 2010) was utilised. Quantitative data regarding caregiver developmental literacy was collected with the use of a

standardised tool, the Knowledge of Infant Development Inventory (KIDI) (MacPhee, 1981). Convenience sampling was used when recruiting participants and randomisation used when organising participants into groups.

Participants and setting:

Participants were recruited from an immunisation clinic at a primary health care (PHC) facility in Mamelodi, South Africa. Mamelodi is a poverty-stricken area where the average annual income is $2475 or less for 60% of households per month (Gauteng Department of Agriculture and Rural Development, 2010).

Participants were required to be 18 years or older and able to comprehend English. The participants needed to be at the PHC clinic to immunize a child that was either three or six months old. In South Africa, children are required to receive immunisation at three, six and nine months of age, resulting in three-month periods between clinic visits (Kibel, Saloojee, & Westwood, 2013). In total 150 primary caregivers of children aged three or six months consented to participate and were randomly divided into three groups of 50 participants each. The first group was exposed to a conventional awareness campaign, whereas the second group was exposed to an mHealth awareness campaign. The third set, the control group, was not exposed to any awareness campaign.

The average age of the participants was 29 years old (*SD* = 6.72), with the youngest and oldest participants being 18 and 49 years old, respectively. Approximately 76.0% (n = 96) of the participants were the child's mother, while 3.0% (n = 4) were non-family members such as childminders. Approximately 42.0% (n = 53) of the participants were first-time caregivers. The participants' level of education indicated that 12.6% (n = 16) achieved 10th grade or less; 72.4% (n = 92) completed the 11th or 12th grade, and 8.7% (n = 11) achieved a qualification (degree or

diploma) after completing 12th grade. Approximately 69.0% (n = 88) of the participants were unemployed.

Material and apparatus:

Firstly, a case history collected information regarding family and participant biographical information. Data regarding the caregivers' developmental literacy was collected using the abridged version of the Knowledge of Infant Development Inventory (KIDI) (Huang, O'Brien Caughy, Genevro, & Miller, 2005). The KIDI is considered as the gold standard for determining caregivers' developmental literacy level and has been used in South Africa and other LMIC (Al-Maadadi & Ikhlef, 2015; Bornstein et al, 2010; Nuttall, Valentino, Wang, Lefever, & Borkowski, 2015; Rowe, Denmark, Harden, & Stapleton, 2015; September, 2014; Zand, et al., 2015). The abridged version of the tool was utilised due to time constraints and included 30 of the original 75 items. The tool is made up of three categories, namely; caregiver knowledge of milestones and norms (section 1), parenting practices (section 2) and parenting principles (section 3). The KIDI was designed to be understandable by participants with a low literacy level (MacPhee, 2002).

months due to the unpredictability of clinic visits. The total number of participants after the post-test interview was 127, as some participants could not be contacted at follow-up.

***Intervention*:**

The content used in both awareness campaigns was the four, six and nine-month sections of the evidence-based "Milestone Moments: Learn the signs. Act early." (Center for Disease Control [CDC], 2016). The resource aims to increase developmental literacy, instil the importance of tracking development, encourage communication between caregivers and healthcare professionals, and motivate early action when delays are identified. The booklet has been used in

countries with diverse cultures and socioeconomic situations (CDC, 2018). Both awareness campaigns utilised identical content but differed in the manner of presentation. The conventional awareness campaign made use of coloured pamphlets. The mHealth awareness campaign involved the distribution of screenshots from the Milestone Moments booklet (Figure 1) via messages sent weekly to participants' mobile telephones.

Figure 1. Screenshot of Milestone Moments: Learn the signs. Act early (Centers for Disease Control and Prevention, 2016).

Procedures for data collection

Institutional review board clearance was obtained (GW20180104HS). After obtaining informed consent, the biographical case history and abridged KIDI were completed.

The speech-language therapist and nurse working at the immunization clinic confirmed that the caregivers did not receive any other official resources or training targeting infant development. Thus, the information provided during the study was the only source of formal information received regarding infant development.

The conventional awareness group were given paper-based versions of the intervention tool. mHealth group participants received weekly text messages for three months consisting of the same information provided in the pamphlets. The control group did not receive any information between pre-test and post-test data collection. The KIDI was re-administered telephonically after three

Data analysis

Descriptive and inferential statistics were utilised to determine if there was a statistically significant difference in developmental literacy in response to the mHealth or conventional awareness campaigns. To test differences between two related variables for continuous data, the Wilcoxon signed-rank test was used (e.g. pre- and post-test scores), and the 2-proportions z-test was used to test for differences in proportions between two nominal variables (e.g. pre- and post-test proportion answered correctly). The Mann-Whitney test was used to test for differences between two independent groups (e.g. mHealth group and Control group). To test for differences between three or more independent groups (e.g. mHealth group, Conventional group and Control group), the Kruskal-Wallis test was used. To probe the gaps in knowledge, the 2-proportions z-test

was used to test for significant improvements in the number of incorrectly answered items between pre- and post-test scores.

Ethics

Ethical clearance was attained from the Research Ethics Committee of the Faculty of Humanities of the University of Pretoria. Consent to perform the study was then obtained from the Tshwane Research Committee and the facility manager of the primary health care (PHC) clinic. A full explanation was given to each participant about the study and their role in the study. Consent was obtained once the participants confirmed that they understood their role and choices. The core values of ethics, such as respect, beneficence, human rights, autonomy, integrity, confidentiality, which are crucial when working with human participants (HPCSA, 2016), were abided by when conducting the research.

Results

In the pre-test performance, there was no significant difference between the three groups ($p = .376$) as to the number of questions answered correctly on the abridged KIDI. Similarly, in the post-test performance, no significant difference between the three groups was noted ($p = .497$). This result indicates that neither awareness campaign was more effective than the other as the three groups showed similar improvements from pre- to post-test. significant improvement (17.7%; p=.000) was however, identified across all three groups when comparing pre and post-test outcomes (n = 127) (Table 1).

Table 1. Pre and post-test group comparisons of correct responses on the (KIDI)

Participant		Mean	Standard deviation	Means represented as a percentage (%)	Difference pre- and post-test (%)	p-values of the Wilcoxon signed-rank tests
mHealth (n=44)	Pre-test total out of 30	15.59	3.97	51.8	17.73	0.000*
	Post-test total out of 30	20.91	3.22	69.7		
Conventional (n=39)	Pre-test total out of 30	15.85	3.18	52.8	19.15	0.000*
	Post-test total out of 30	21.59	2.41	80.0		
Control (n=44)	Pre-test total out of 30	16.55	3.29	55.2	15.98	0.000*
	Post-test total out of 30	21.34	2.26	71.1		
All participants (n=127)	Pre-test total out of 30	16.00	3.51	53.3	17.66	0.000*
	Post-test total out of 30	21.27	2.67	71.0		

* p-value <0.05 thus indicating a statistically significant difference

A large portion of participants (81.1%; n = 103) achieved an education level of 11th grade and higher. For the pre-test, the participants' educational level did not correlate significantly with the performance on the KIDI (p = .548). In the post-test, however, there was a significant positive correlation between participants' level of education and their performance on the KIDI (p = .004). Participants with a higher education level performed significantly better (r = .257) than those with a lower education level.

When pre-test and post-test scores for the three sections of the abridged KIDI were compared across the sample, section one (milestones and norms; p = .000[1]), section two (parenting practices; p = .000) and section three (parenting principles; p = .000) showed significant improvement (Table 2). Section one improved the most (20.4%) from pre- to post-test and section two showed the least

[1] Theoretically, a p-value cannot equal zero. Thus, p=.000 means that the p-value is smaller than 0.001.

improvement (9.2%). Section two's pre-test scores were higher (62.3%) than both the other sections' pre-test scores. Overall, section three had the lowest percentage of correct responses at pre- (50.4%) and post-test (64.8%).

Table 2. Across group (n = 127) pre- and -post-test comparisons between three sections of the KIDI using the Wilcoxon signed-rank test.

	Percentage (%) obtained for a specific section	Difference between pre- and post-test percentage (%)	p-values of the Wilcoxon signed-rank tests
Section 1			
Pre-test Percentage	51.2	20.4	0.000*
Post-test Percentage	71.6		
Section 2		9.2	
Pre-test Percentage	62.3		0.000*
Post-test Percentage	71.5		
Section 3		14.4	
Pre-test Percentage	50.4		0.000*
Post-test Percentage	64.8		

* p-value <0.05 thus indicating a statistically significant difference
Theoretically, a p-value cannot equal zero. Thus, *p*=.000 means that the p-value is smaller than 0.001

Of the 21 items in section one (norms and milestones), 16 items showed significant differences in pre- and post-test comparison (76.2%). In section two (parenting practices), of the six items, three items (50.0%) showed significant improvement from pre- to post-test. Of the three items in section three (parenting principles), two of the items (66.7%) had significant improvement from pre- to post-test.

Table 3: Items from the KIDI that demonstrated a significant difference from pre-test to post-test across groups (n=127) using the 2-proportions z-test.

		Correct response	Percentage (%) and number answered incorrectly pre-test	Percentage (%) and number answered incorrectly post-test	Difference between pre and post-test (%)	p-values of 2-proportions z-test
Item	**Sections one (norms and milestones)**					
21	Babies do some things just to make trouble for their parents, like crying or soiling their diapers	Disagree	46.5 (n=59)	15.7 (n=20)	30.8	0.000*
25	The newborn can see a face six feet away as well as an adult can	Disagree	32.3 (n=41)	3.1 (n=4)	29.2	0.000*
27	A two-year-olds sense of time is different from an adult's	Agree	29.9 (n=38)	9.4 (n=12)	20.5	0.000*
34	Most two-year-olds can tell the difference between a make-believe story on TV and a true one	Disagree, Older	54.3 (n=69)	15.7 (n=20)	38.6	0.000*
35	Infants usually are walking by about 12 months of age	Agree	29.1 (n=37)	15.7 (n=20)	13.4	0.016*
36	An eight-month-old acts differently with a familiar person than with someone not seen before	Agree	23.6 (n=30)	42.5 (n=54)	-18.9	0.000*
37	A baby is about seven months old before he or she can reach for and grab things	Disagree, Younger	65.4 (n=83)	32.2 (n=41)	33.2	0.000*
38	A two-year-old is able to reason logically, much as an adult would	Disagree, Older	52.0 (n=66)	18.9 (n=24)	33.1	0.000*
39	A one-year-old knows right from wrong	Disagree, Older	48.0 (n=61)	18.1 (n=23)	29.9	0.000*
41	Most infants are ready to be toilet trained by one year of age	Disagree, Older	78.0 (n=99)	11.8 (n=15)	66.2	0.000*
42	An infant will begin to respond to his or her name at ten months	Disagree, Younger	70.9 (n=90)	35.4 (n=45)	35.5	0.000*
44	Five-month-olds know what "no" means	Disagree, Older	47.2 (n=60)	8.7 (n=11)	38.5	0.000*
47	One-year-olds often cooperate and share	Disagree, Older	71.7 (n=91)	10.2 (n=13)	61.5	0.000*

	when they play together					
48	An infant of 12 months can remember toys he or she has watched being hidden	Agree	50.4 (n=64)	77.2 (n=98)	-26.8	0.000*
49	A baby usually says his or her first real word at six months	Disagree, Older	44.9 (n=57)	6.3 (n=8)	38.6	0.000*
	Section two (parenting practices)					
24	Some days you need to discipline your baby; other days you can ignore the same thing. It all depends on the mood you're in that day	Disagree	55.9 (n=71)	26.8 (n= 34)	29.1	0.000*
31	The more you comfort your crying baby by holding and talking to him or her, the more you spoil him or her	Disagree	41.7 (n=53)	27.6 (n=35)	14.1	0.025*
32	A good way to teach your child not to hit is to hit back	Disagree	31.5 (n=40)	13.4 (n=17)	18.1	0.001*
	Section three (parenting principles)					
26	A young brother or sister may start wetting the bed or thumb sucking when the new baby arrives in the family	Agree	59.1 (n=75)	27.6 (n=35)	31.5	0.000*
29	An infant may stop paying attention to what is going on around him or her if there is too much noise or too many things to look at	Agree	30.7 (n=39)	7.9 (n=100	22.8	0.000*

The items that showed the most improvement from pre-test to post-test were items 41 and 47 from section one, whereas item 35 and 36 from section one and item 31 from section two demonstrated minimal improvement. The pre-test results showed that item 36, in section one, was answered correctly by 74% (n = 97) of caregivers, but at post-test, the performance declined to 42.5% (n = 73). Item 41, also in section one, was answered incorrectly by 78% of participants (n = 99) in the pre-test and improved at post-test, to 11.8% (n = 15) incorrectly answered. Items answered

correctly by most participants post-test were items 25 and 49 (section one) with 96.9% (n = 123) and 93.7% (n = 118), respectively.

Discussion

The aim of the study was to determine what effect an mHealth and conventional awareness campaign would have on caregivers' developmental literacy. Neither the mHealth (p = .253) nor the conventional (p = .104) awareness campaigns led to a significant increase in developmental literacy when compared to the control group. This result indicates that neither approach was more effective. Overall, there was a significant improvement of 17.7% (p = .000) from pre to post-test scores across all three groups.

At pre-test, developmental literacy was measured as 53.3% using the abridged KIDI, which is lower than the normative sample of 72% (MacPhee, 1981). A South African study performed in a diverse socio-economic population in the Western Cape, reported a higher developmental literacy level of 61% using the KIDI (September, Rich, & Roman, 2016). A study in Italy, a high-income country, reported KIDI scores of 65% and 63% for mothers and fathers, respectively (Scarzello, Arace, & Prino, 2016). The post-test developmental literacy score improved to 71% (n = 90) after intervention, which is close to the normative score of 72%. The improvement indicates that in some way, the post-test results were impacted.

The level of developmental literacy has been linked to the quality of parenting and the provision of high-quality stimulation (Nuttall et al., 2015). When developmental literacy levels are low, positive parenting and thus ECD stimulation are negatively affected during interactions between caregiver and child (Black et al., 2017). Knowing what is appropriate stimulation at a particular

age, is an important aspect of effective ECD (Black, et al., 2017). To provide appropriate stimulation, caregivers need to know the norms and milestones of typical child development.

Section one of the KIDI assesses caregivers' knowledge of developmental norms and milestones. The results from a South African study that used the KIDI showed that section one was consistently the worst performing section (September, Rich, & Roman, 2016). The results from the current study showed that section three (50.4%) had the lowest pre-test score; however, only by 0.8% in comparison to section one (51.2%). A promising sign is that, in the current study, section one showed the most improvement from pre- to post-test (20.4%).

Participants' performance in section three, parenting principles, was the lowest at pre- (50.4%) and post-test (64.8%). The KIDI was developed in North America so there may be a disparity between how the tool scores parenting principles and South African participants' perceptions. Cultural adaptations to the tool, specifically section three, may be warranted and performing the interview in caregivers' home language may have been beneficial. The cultural differences affect what is believed to be important for children to learn and achieve (Balton, Uys, & Alant, 2019). In South Africa, especially in the underserved communities, parenting is often driven by more informal information, such as guidance from family members and comparisons to other similarly aged children (Mbarathi, Mthembu, & Diga, 2016; Vorster, Sasks, Amod, Seabi, & Kern, 2016). What is deemed appropriate parenting principles in North America may not the same in South Africa as there are different perspectives on what aspects of development are important (Balton, Uys, & Alant, 2019).

There were two notable factors that may have had an effect on the post-test improvement. Maternal level of education appeared to influence perspectives on development at post-test. Post-test, caregivers with a higher education level performed significantly better than those with a lower

education level. Another influencing factor across all three groups may have been the interview format, face-to-face (FTF), at pre-test. In the current study, participants were only asked questions and received no feedback on their performance. Despite the lack of feedback, the post-test scores improved for all participants, indicating that asking questions could have triggered the participants to reflect on ECD. Studies have demonstrated the positive effect of FTF interviews in health care including, intention to take action, high effectiveness amongst at-risk populations, and the opportunity to ask individualised questions (Atherton et al., 2018; Carey et al., 2012; Trivedi, 2014). A meta-analysis that compared mhealth interventions to FTF interviews supported the use of FTF interviews (Carey et al., 2012).

There were no statistical differences in the scores evident between the two different awareness campaigns. The results showed a significant improvement in developmental literacy across the sample. At post-test, the results were well aligned with the KIDI norms. This may indicate that higher education levels and face-to-face interviews are more effective than the awareness campaigns used in improving development literacy. This method may be effective for primary caregivers of young infants in low socio-economic populations by fostering developmental literacy. By improving developmental literacy, it empowers caregivers to advocate for their child and encourages positive parenting. Further research is needed to evaluate the effectivity of face-to-face interviews in improving developmental literacy. Determining the effectiveness of this method in increasing the level of caregivers' development literacy is vital as it can permanently affect all aspects of a child's life through the improvement of ECD.

Limitations:

The informed consent form, biographical questionnaire, KIDI and the interview were in English. All participants reported that English was a language they spoke, but it was not their home

language. Consequently, there is a possibility of misunderstanding and miscommunication during the performance of the KIDI and in their understanding of the intervention.

Participants at the facility are given a date to return to the clinic for the next immunization visit. The participants were, however, not consistent in attending the clinic on the given date. Performing the post-test data collection could not consistently and reliably be performed in person. Thus, the decision was made to perform the post-test data collection via telephonic interview to ensure post-test data could be collected. There was an insignificant number (approximately less than 10) of participants interviewed in person in comparison to the participants contacted telephonically. This decision may be an additional variable that may affect post-test data as the researcher did struggle with some factors that are unique to telephonic interviews, for example high turn-over of cell phone numbers and poor reception. As a result, many participants had to be phoned numerous times and some participants' cell phone number was disconnected. Community health workers may be better positioned to contact caregivers as they could visit the caregivers at their homes (van der Merwe, 2017).

Recommendations:

Recreating this study in various languages may provide more exact results as any miscommunication may be negated. Conducting the study in various clinics across different districts may provide a diverse and comprehensive set of results.

The use of a sample size greater than 127 will give provide valuable information with a smaller margin of error.

Performing an assessment to determine a child's development at pre-test as well as the KIDI then again at post-test, may demonstrate the effectiveness of the campaign on the child's actual development.

Conclusion:

Research has shown the importance of developmental literacy, due to its impact on ECD and consequently future life outcomes. Determining a method of improving developmental literacy is critical for severely underserved communities. In these communities, future potential is already in jeopardy due to environmental and biological risk factors. The lack of significant difference in post-test scores between the experimental and control groups in the current study, demonstrates how the conventional and mHealth awareness campaigns are lacking regarding effectivity. Further research will be required to determine if the poor effectivity generalizes to other populations and settings. There was a significant improvement from pre-test to post-test scores. There is some evidence that face-to-face interventions may be this variable. This study has shown that mHealth and conventional awareness campaigns have limited affects, suggesting that resources may be better utilized in further research into the use of face-to-face interventions.

Declaration of Interests

The authors have no competing interests.

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