

Title: Playfulness in children with HIV/AIDS: A comparative study**Authors:**

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A short running title:

Play of children living with HIV/Aids.

Authors' declaration of authorship contribution*;

All the co-authors listed have contributed to the research process and writing of the manuscript.

Funding statement*;

Part funding for data collection was provided by Elizabeth Casson Trust.

Conflict of interest statement*;

No conflict of interests declared

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A minimum of five MeSH or CINAHL terms should be included as key words; Note that MeSH key words are reviewed by an indexer and may be edited.

Key Words: children, Play, Playfulness, HIV/Aids,

Play profiles of children with HIV/AIDS: A comparative study

Introduction

More than three decades after it was first diagnosed, HIV/Aids remains a major global health problem, despite global solidarity in response to the epidemic (Demmer, 2011). Until recently, paediatric HIV treatments focused on preventing mortality (Potterton et al., 2016). However, with the advent of Antiretroviral therapy (ART), improvements in health and life expectancy has resulted in HIV/Aids changing from being an incurable disease to a chronic disease (Kandawasvika et al., 2015). Subsequently, the efforts of saving children's lives need to be complimented by availing opportunities for children to live meaningful lives through interventions that mitigate the impact of HIV/Aids on children.

Children living with HIV/Aids face life long risk of concomittant illnesses (Skeen et al., 2017) and are at high risk of developing mild to severe impairments in all spheres of development (Potterton et al., 2016). A study by Mlambo et al. (2017) revealed that children infected with HIV/Aids are likely to have neurocognitive impairments that will affect their everyday activities, such as schooling. Furthermore, children with HIV/Aids are likely to experience stigma, trauma and low mood (Demmer, 2011). Research has shown that most people living with HIV/Aids in the Sub-Saharan Africa live in poverty (Masanjala, 2007). In Zimbabwe, the situation is precipitated by the socio-economic challenges and migration to neighbouring countries. In most rural settings, everyday doings of both children and adults are mainly centred on survival (Campbell et al., 2013). Economic factors that threaten survival, combined with cultural and relational practices are likely to limit engagement and participation in meaningful occupations, such as play. As a result of a combination of these factors, many children with HIV/Aids are likely to experience deficits in their play and other areas of child development. Therefore, to limit the impact of HIV/Aids on the lives of children, research recommends screening, early identification, comprehensive assessment and interventions for this population (Potterton et al., 2016; Skeen et al., 2017).

Play is the main childhood occupation that allows children to learn and develop fundamental motor, cognitive and socio-emotional skills (Lynch et al., 2016). Through play, children learn survival skills, build resilience to deal with adverse life events and develop self-efficacy (Milteer et al., 2012). Play provides a window to child's deveopment (Lynch & Moore, 2016), thus occupational therapists have used it as both a means and an outcome to

intervention. Over the years, occupational therapists used play as a means to understand and improve the functional outcomes of children with a broad range of disabilities. Inability to engage in play well with others can lead to children developing a negative self-concept and becoming socially isolated (Pearson et al., 2014). Recent developments on the centrality of occupation in occupational therapy practice have seen play also being viewed as an outcome measure (Reinie Cordier et al., 2010a). Occupational therapists are positioned to enable play in children with limitations. The process of promoting play in children extends beyond teaching play skills or practising play activities in therapy clinics to include the design of context-focused interventions that focus on play, playfulness and participation in play by collating a detailed profile of all aspects of play in children (Lynch & Moore, 2016). A detailed play profile, in turn, is important in understanding children's play deficits and helps in formulating evidence-informed interventions (Halfon, 2017).

Skard and Bundy (2008, p. 71) define play as "...a transaction with the environment that is intrinsically motivated, internally controlled and free from the constraints of reality." Play manifests itself as playfulness in children (Bundy, 1997; R. Cordier et al., 2010). Playfulness is the predisposition to play, which remains constant overtime and is related to a child's ability to cope in later life (Skard & Bundy, 2008). Based on Bundy's model of playfulness (Bundy, 1997), the construct of playfulness is comprised of the following four elements: intrinsic motivation, internal control, freedom to suspend reality and framing. Playfulness offers researchers and clinicians an opportunity to focus on a child's quality of play, adaptability and coping mechanisms, regardless of ability (Hamm, 2006). The terms play and playfulness have been used interchangeably in literature. For the purpose of this study, the term play profiles will be used henceforth where appropriate.

Even though the benefits of play and being playful has been widely explored (Halfon et al., 2016), the play profiles of children with HIV/Aids is likely to be affected due to neuro-cognitive deficits and developmental delays associated with HIV/Aids (Potterton et al., 2016), and factors in the environment like stigma and poverty. Broadly, there is a paucity of literature on children's play in this context. One of the few studies on the caring occupation for children with HIV/Aids in Zimbabwe reported that due to fear of stigma, guiltiness and self blame, caregivers were not willing to share their caregiving role with anyone instead their everyday doings were centred on care and protecting the children from stigma and possibilities of further harm (Munambah et al., 2020). Developing a better understanding of

the play profile would improve the use of play as both an intervention outcome, as well as a medium for delivering intervention. This study aims to compare the play profiles of children with HIV/Aids aged 4-7 years to that of age and gender matched typically developing children living in the same low resourced community. Play profiles vary across age groups and the type and nature of play profile changes as the child matures (Cordier, Bundy, Hocking, & Einfeld, 2010a). However, typically developing children aged 4-7 years engage in similar types of play (Dadson et al., 2020), thus enabling comparison. Creating an understanding of the play profile of children with HIV/Aids would produce building blocks towards developing play-based interventions for this population. Thus, this study seeks to address the following objectives:

- To determine if there is a difference in overall play profiles of children with HIV/AIDS versus typically developing children;
- To compare the play profiles (indoor versus outdoor) of children with HIV against typically developing children; and
- To determine if there is a difference in individual item scores of ToP categories between children with HIV versus typically developing children.

Methodology

Ethical approval was obtained from the University of Cape Town (HREC number 640/2017). In Zimbabwe where data was collected, ethical approvals were obtained from Medical Research Council of Zimbabwe (MRCZ ref no. A/2364) and Joint Research and Ethics Committee (JREC ref no.163/18).

Study Design : This study is a quantitative matched control, comparative study.

Research setting: Children with HIV/Aids and their caregivers were recruited from two major referral hospitals in Zimbabwe. Almost all the children with HIV recruited for this study were from high density urban settings and attended government schools. Typically developing children were recruited from two government primary schools. Globally, Zimbabwe is ranked as a low income country with a gross national income per capita of less than or equal to US\$1005 (Bank, 2013; McIndoe-Calder et al., 2019). Participants were drawn from urban settings with the vast majority living in poverty. A study by (Manjengwa et al., 2016) revealed that Zimbabwe experiences urban poverty and the major determinants of poverty were large sized family, low education level of the household head, and lack of

income from permanent employment. All participants in our study were drawn from within this context of being a low resourced setting (Manjengwa et al., 2016).

Participants and recruitment

The study involved 98 children, aged 4-7 years living in low resourced settings. Data from two children were excluded from data analysis because they were identified to be outliers as evidenced by poor person fit statistics according to the Rasch model, thus reducing the total sample from 98 to 96 children. Children involved in this study were divided into two groups. The composition of groups was as follows: group 1 involved 44 dyads (44 children with HIV/Aids playing with 44 typically developing children) and group 2 involved 26 dyads (26 typically developing children playing with 26 typically developing children). The data from the 44 children with HIV/Aids in group 1 and the 52 typically developing children in group 2 were included in the analysis. Intergroup frequency matching based on age and gender was used to match children with HIV/Aids in group one to typically developing children in group two. Playmates of children who are HIV positive in group one and children in group two were not infected with HIV as reported by their caregivers and the health screening from the nurse. All playmate pairs were familiar with one another. Motor skills are important in facilitating play performance (Harkness & Bundy, 2001). As such, only the domain of 'getting around' of the World Health Organization Disability Assessment Schedule (WHODAS) was used as a screen questionnaire to ensure children involved in the study were able to stand up from sitting, to stand for long periods (> 30 minutes) and moving around the home among other things. None of the children involved in this study had difficulty in performing two or more of the five items in the domain: 'getting around' of WHODAS questionnaire.

Children with HIV/Aids group: comprised of 44 children who were diagnosed by doctors and undergoing medical treatment. These children were recruited from two main central hospitals in Zimbabwe at the outpatient clinics, as they attended their monthly review meetings with doctors. Children who had physical disabilities that affect engagement and participation in play were excluded from the study. To reduce research fatigue, children participating in other studies were excluded from this study. Children who had attended play-based interventions were also excluded from the study, so as to reduce the risk of contamination due to being exposed to a play-based intervention.

Typically developing children group: comprised of 52 children who had not been diagnosed of HIV by a medical doctor as reported by the caregivers and from the health assessment by the nurse. The children were recruited from two public government primary schools. One school is located in a peri-urban area and other school is in high density suburb of Harare. This group was matched by age and gender to children with HIV/Aids. In this study a typically developing child was defined as a child who is not HIV positive, based on medical records and from caregiver report. Also, the child passed a health assessment performed by a nurse and no concerns about development had been raised by the teacher or health professional. Children with any other diagnosis that might affect play or children with physical disabilities that affect engagement and participation in play and those involved in another research running parallel to this study were excluded from the study.

Recruitment Procedure

Recruitment for children with HIV/Aids was done at the hospitals and typically developing children were recruited at the school. At the hospital, caregivers of children with HIV/Aids were invited to participate in the study via a recruitment pamphlet which provided a brief explanation about the study. Those who expressed interest to participate were invited to a private clinic room, where they were provided with a detailed explanation using the participant information letter. Those caregivers willing to take part in the study were asked to sign informed consent and, where possible, children also signed assent forms. Care was taken to ensure caregivers had enough time to make an informed decision. A nurse then carried out a health assessment and reviewed the road to health card for each child. Recruitment of typically developing children at schools followed the schools' formal communication procedures. Participant information letters about the study were sent out to the caregivers and those interested in the study were invited to attend a meeting at the school. A detailed explanation of the research was given before caregivers were asked to provide signed consent to participate in the study and, where possible, children also signed assent forms as well.

All the children who meet the inclusion criteria and their caregivers consented to participation in this study were screened for physical challenges that might affect participation in play. The 'Getting around' domain on the WHODAS questionnaire was used to screen children with physical challenges. As part of the recruitment process; a health assessment by a nurse was carried out on all children who participated in the study. The health assessment included observations, the measurement of vital signs and self-reported symptoms. The nurse also reviewed the road to health card for each of the children involved

in this study. The road to health card is used in primary health care as a way of monitoring a child's health. Caregivers were also asked about the health of their child. Following screening, none of children with HIV/Aids presented with co-morbid conditions or physical challenges that may have influences on their play.

Instruments

Socio-demographics Questionnaire: A questionnaire collecting demographic data of the caregiver and the child was developed by the researcher in line with study objectives. The questionnaire was given to a panel of experts to review the questionnaire for relevance, comprehensiveness and comprehensibility. The panel included four experienced occupational therapists, a researcher with experience in working with children, and a local (Zimbabwean) experienced researcher. The questionnaire was refined through a pilot study. Variables on demographic information such as age, sex and condition of the child, as well as demographic information of the caregiver were covered. The questionnaire was also used to collect information on the play history of the child.

Test of Playfulness (ToP): An observational tool called the Test of Playfulness (Version 4), which was designed to evaluate playfulness in children aged 6 months to 18 years, was used in this study (Skard & Bundy, 2008). The ToP measures playfulness without giving penalties to motor deficiencies, thus allowing for comparisons of playfulness across children (Hamm, 2006). The ToP comprises of 29 items that are rated on a four-point scale (0-3) and scores reflect the extent (amount of time), intensity (degree of participation) and skill (ease of performance) relative to the play behaviours expressed by the child (Skard & Bundy, 2008). Social play items require an interaction between two or more players for the item to be scored (Wilkes-Gillan et al., 2014). Nine out of the 29 items of the ToP reflect social play and a list of these can be found in supplementary Table 3.

The ToP has been used with different clinical populations and across different environments (Rigby & Gaik, 2007) and has been found to be a stable assessment for play. The validity and reliability of the ToP has been established in children with and without disabilities (Bundy et al., 2001). The ToP has evidence for excellent inter-rater reliability (data from 96% of raters fit the expectations of the Rasch model) and construct validity (data from 93% of items and 98% of people fit Rasch expectations) (Harkness & Bundy, 2001).

The ***Test of Environmental Supportiveness (TOES):*** The TOES assesses the extent to which elements of a particular environment support an individual child's play (Bronson & Bundy,

2001). The elements of the environment could either be human (the caregivers, playmates) or non-human (objects and play spaces). The TOES is a 17 item observational measure which takes 15 to 20 minutes to administer (Harkness & Bundy, 2001). The reliability coefficient for the TOES, associated with the separation value (equivalent to Cronbach's alpha) was 0.77 (Bundy et al., 2001). In this study the TOES was used to assess the extent to which the human and non-human aspect of the environment supported or interfered with the child's play.

World Health Organization. Disability Assessment Schedule (WHODAS) version 2: The WHODAS Version 2 is an assessment of disability based on the conceptual framework of the International Classification of Functioning, Disability, and Health (ICF) (Garin et al., 2010). It provides a global measure of disability and has seven domains: Understanding and Communicating (6 items), Getting around (5 items), Self-care (4 items), Getting along with others (5 items), Life activities: household (4 items), Life activities: work/school (4 items), and Participation in society (8 items). In this study only the domain of getting around was used to screen the children for difficulty in moving around. The reliability coefficient Cronbach's alpha was above 0.7 for all WHODAS-2 sub-scales (Garin et al., 2010).

Procedure of data collection

The first author and the research assistants involved in data collection were all qualified health professionals practising in Zimbabwe and were familiar with the language and cultural nuances within that context. Prior to data collection, the research team had training on data collection procedures, child policy, cultural sensitivity and ethics in research and signed confidentiality agreement forms. Recruitment at the hospital was done by the first author with the help of the nurse. The nurse works at outpatient clinic and has experience in research. Two research assistants blinded of the HIV status of the participants were involved in data collection.

Caregivers provided informed consent on behalf of their children through signing informed consent forms provided. Children who met the inclusion criteria together with their playmates were invited to take part in this study and, if able, signed assent forms that were also co-signed by the caregivers. Caregivers were asked to fill in a socio-demographic questionnaire with the help of the researcher. Data collection involved observing each participant and his/her playmate playing in both an indoor and outdoor play environments.

The *indoor play environment* was a room with standard local toys. Children with HIV/Aids and their playmates were observed playing in a room with toys at the clinic they regularly attended and the control group was observed playing in a room, equivalent in size to the clinic room, with toys at the respective schools the children attended. The ToP requires no special equipment (Bundy et al., 2001). However, to motivate the children to engage in free play, a box of standard toys for children aged 4-7 years, bought from a local toy shop, was provided to children both at the clinic and at the schools. The toys were carefully selected to make sure they were culturally sensitive and they catered for gender differences. The same toys were used throughout the study and included dolls, cars, building blocks, boxes, masks, sand pit, variety of animals, balls of different sizes, dress up clothes, jingles and musical drums, to name but a few. The children were allowed to choose play materials and activities. A digital camera was mounted in the room in such a way that it did not obstruct the children's play and was used to video record all the play sessions. Also, an unobtrusive observer was present in the play room and did not interfere with the play unless a child was in danger. Each play dyad was given 15 minutes to adjust to the playroom environment before recording started. The researcher adhered to the ToP procedures which states that children should be observed for 15 minutes while playing (Bundy et al., 2001).

The *outdoor play environment* was at the children's homes. All the children who participated in this study came from similar socio-demographic backgrounds and as such, in practical terms, had the same access to community spaces. None of the children involved in this study lived in apartments. For outdoor play, both children with and without HIV/Aids were asked to play in their yard with the toys they would normally play with. Data was collected in different yet equivalent settings. This was to ensure familiarity with the play environments and convenience for the families (R. Cordier et al., 2010). The researchers made sure that play environments used to score the ToPs were ones in which the child felt physically and emotionally safe in order to increase chances of spontaneous and intrinsically motivated play behaviour to occur (Bundy 2004). The test of environmental supportiveness (TOES) was used to assesses the extent to which human and non-human aspect of the environment support an individual child's play (Bundy et al., 2001). The TOES operationalises the ways in which the following four aspects influence players motivation to play: playmates, objects, play space, and the sensory environment (Skard & Bundy, 2008). The same procedure was followed for data collection in the home environment as was done in the playroom at the clinic and the school.

Data Analysis

The recordings were given to two independent raters who were trained and calibrated on the use of the ToP. Calibration ensured consistency of the raters by comparing their scores to hundreds of other raters in the larger ToP sample ($N > 3000$ observations) and goodness of fit statistics derived from the calibration data were within acceptable range. In order to minimise bias, the raters were blinded for the purposes of the study and they did not participate in any other aspect of the study. The raters scored the performance of the children on the ToP score sheet. The raw ToP scores were subjected to Rasch analysis using Winsteps program (version 3.70.1) to convert children's ToP raw ordinal scores (0, 1, 2, 3) into interval level measure scores and generate total measure score for each child. All the blinded raters' were calibrated and found to be reliable with fit statistics within acceptable ranges ($MnSq < 1.4$; standardised value < 2) (Bond & Fox, 2007). The resulting measure scores were entered into SPSS version 22 and independent t -test was used to compare differences between the means of the groups. Analysis of the individual ToP items (ordinal level) was conducted using the Mann Whitney U test in cases where there was no data dependency (e.g., comparing the play between different children) and the Wilcoxon Signed Ranks test was used where there was data dependency (e.g., comparing indoor and outdoor data for the same child).

Results

Participants: The study involved 98 children. However, person measure scores for two children were identified to have poor fit statistics according to the Rasch model and their data was excluded from further analysis. Fifty two (54.2%) were typically developing children and 44 (45.8%) were children with HIV and received antiretroviral treatment. Table 1 summarises the demographics of the children. Most children (22; 50.0%) with HIV and 44 (84.6%) control were enrolled in grades 1 and 2. There were 4 (9.1%) children with HIV who were not attending school, as compared with none in the control group. Most children with HIV (40; 91%) were on first line of antiretroviral drugs and the reported comorbid conditions were Tuberculosis, Heart problem and Malnutrition.

Table 1: Demographics of the Children

Item	Description	Typically Developing Children (n=52)	HIV positive Children (n=44)
Mean Age†		7.1 (SD=1.49)	6.8 (SD=1.49)
Gender‡	Female	20 (38.5%)	23 (52.3%)
	Male	32 (61.5%)	21 (47.7%)
Grade in school	Not in school	0	4 (9.1%)
	ECD	4 (7.7%)	12 (27.3%)
	Grade 1 and 2	44 (84.6%)	22 (50.0%)
	Grade 3 and 4	4 (7.7%)	6 (13.6%)
Antiretroviral Therapy	First line	-	40 (90.9%)
	Second line	-	4 (9.1%)
Co-morbid conditions	Tuberculosis	-	2 (4.5%)
	Heart problem	-	2 (4.5%)
	Malnutrition	-	1
Main Person child plays with	Older child	8 (15.4%)	10 (22.7%)
	Same age child	19 (36.5%)	21 (47.7%)
	Younger child	25 (48.1%)	11 (25.0%)
	Alone	0	2 (4.5%)
Most common play spaces	Outdoor – Playgrounds§	21 (40.4%)	4 (9.1%)
	Outdoor – streets	5 (9.6%)	3 (6.8%)
	Outdoor – around the yard	22 (42.3%)	32 (72.7%)
	Inside house	4 (7.7%)	5 (11.4%)

Note. †There was no significant difference in the mean age of typically developing children and HIV+ children ($t = 1.26, p = 0.209$).

‡There was no significant gender difference between typically developing and HIV+ children ($X^2 = 1.84, p = 0.18$).

§Playgrounds – these are outdoor play spaces outside the proximity of the house where children play. This includes school grounds, open spaces where children play within the community.

Half of children with HIV (22; 50%) played mostly with children of the same age, whereas proportionally less typically developing children (22; 42%) mostly played with younger children. Based on the sociodemographic questionnaire that caregivers completed, compared with typically developing children (22; 42.3%), a significantly higher proportion of children with HIV (32; 72.7%) played mostly in their yards when they played outdoors. Conversely, a significantly higher proportion of typically developing children (21; 40.4%) played in designated playgrounds within their communities compared with children who are HIV positive (4, 9.1%; $X^2 = 9.81, p = 0.0017$). This indicates that children with HIV were more likely to be restricted in accessing community play spaces, compared with typically developing children.

Demographics of the responding caregivers: Caregivers of children with HIV were mostly informally employed (25; 56.8%) compared with caregivers of typically developing children

(22; 42.3%). A significantly larger proportion of caregivers of HIV positive children (26; 59.0%) reported spending more than 20 hours per week with their child, compared with caregivers of typically developing children (15, 28.8%; $X^2 = 8.05$ $p = 0.0045$). See Table 2 for demographics of the responding caregivers.

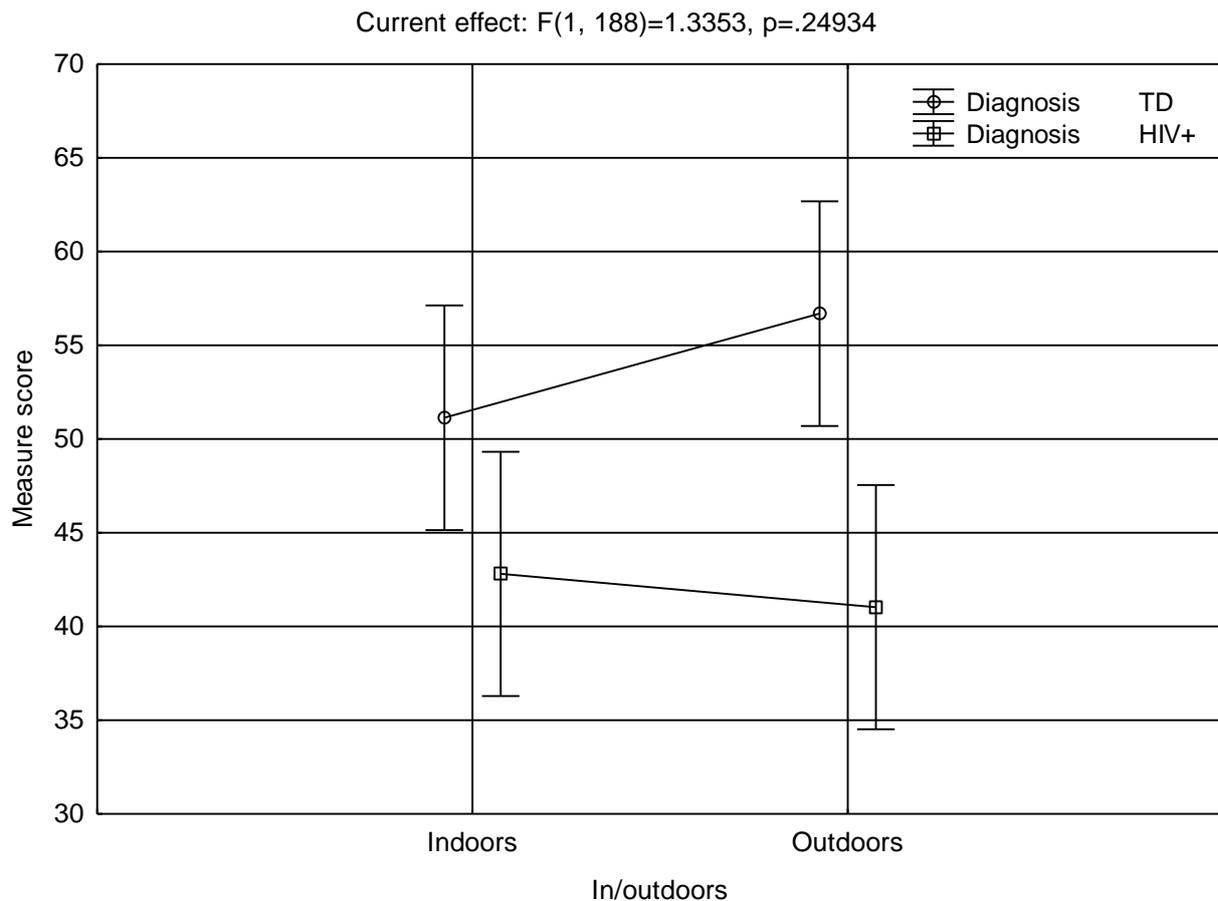
Table 2: Demographics of the Responding Caregiver

Demographic variables	Description	Typically Developing Children (n=52)	HIV positive (n=44)
Mean Age		38.3 (SD 7.83)	39.8 (SD 9.18)
Gender	Female	41 (78.8%)	39 (88.6%)
	Male	9 (17.3%)	4 (9.1%)
Level of Education	Primary	8 (15.4%)	10 (22.7%)
	Secondary	36 (69.2%)	34 (77.3%)
	Tertiary	5 (9.6%)	-
Relationship of caregiver to child	Biological parent	46 (88.5%)	35 (80%)
	Aunt	2 (3.8%)	2 (4.5%)
	Grand Parent	4 (7.8%)	5 (11.4%)
	Uncle	-	1 (2.3%)
	Foster Parent	-	1 (2.3%)
Mean number under caregiver's care		2.8 (SD 1.41)	2.8 (SD 1.74)
Employment Status	Informal employment†	22 (42.3%)	25 (56.8%)
	Full-time	16 (30.8%)	2 (4.5%)
	Part-time	4 (7.7%)	3 (6.8%)
	Not employed	10 (19.2%)	14 (31.8%)
Time caregiver spent with child per week	Less than or equal to 7 hours	7 (13.5%)	4 (9.1%)
	8-20 hours	30 (57.7%)	14 (31.8%)
	More than 20 hours	15 (28.8%)	26 (59.0%)

Note. †informal employment – includes workers who are self-employed, or who work for those who are self-employed. In most cases are not on payrolls, and thus are not taxed. Most common informal employment includes backyard manufacturing industries, trading and vending.

Play profiles

The overall ToP mean measure score for outdoor play was 49.5 (SD = 22.74) and slightly lower for indoor play (M = 47.3; SD = 22.63). Using an independent sample *t*-test, there was no significant difference between mean measure scores for indoor play when comparing typically developing children and children with HIV. However, as shown in Figure 1, children with HIV were less playful outdoors as compared to typically developing children ($t(94) = 3.57$, $p = 0.001$).



When comparing the mean ToP measure scores for typically developing children for outdoor play against HIV positive children's indoor play, the results showed that typically developing children scored significantly higher when playing outdoor than HIV positive children playing indoor ($t(94) = 3.02; p = 0.003$). Furthermore, the indoor play of typically developing children was also significantly higher than the mean ToP measure scores for outdoor play for HIV positive children ($t(94) = 2.31; p = 0.02$). We explored the relationship between employment status of caregivers and children's ToP measure scores and found that there was no relationship.

Test of Playfulness item scores: For item level ToP scores, Wilcoxon Signed-Ranks tests indicated that the extent of being involved in the process of play was higher when playing outdoors (mean rank = 3.0) as compared to when playing indoors (mean rank = 2.0; $Z = 2.35; p = 0.02$). Also, the extent of playing with others was higher when playing outdoors (Mean rank = 3.0) as compared to when playing indoors (mean rank = 2.0; $Z = 2.41; p = 0.02$). See supplementary Table 1 for more detail. Although there was no significant differences between the overall mean measure indoor ToP scores of children with HIV and typically

developing children (see Figure 1), an item level analysis using the Mann Whitney U test for indoor ToP scores showed significant differences for seven items (see supplementary Table 2).

Differences in elements of playfulness based on ToP item scores between HIV positive and typically developing children

Based on Bundy's model of playfulness in children (Bundy, 1997), the ToP items were also grouped together according to the four elements of playfulness: intrinsic motivation, internal control, freedom to suspend reality, and framing. Children with HIV scored significantly lower than typically developing children on ability to suspend reality and framing for both indoor and outdoor environments for most items (see Table 3). For the elements of internal control and intrinsic motivation within the indoor environment, only modifying the task ($U = 776.0$; $p = 0.006$) and persist ($U = 830.5$; $p = 0.021$) were significantly lower for HIV positive compared with typically developing children. Conversely for the outdoor environment, significant differences were noted for seven of the 17 items for the elements of internal control and intrinsic motivation.

Table 3: Differences in elements of playfulness based on ToP item scores between HIV positive and typically developing children

Playfulness Element	ToP item	Indoor		Outdoor		
		<i>U</i>	<i>p</i> -value	<i>U</i>	<i>p</i> -value	
Internal control	1	Extent of deciding what to do	919.50	0.099	780.00	*0.011
	2	Intensity of interacting with objects	987.00	0.251	1025.50	0.385
	3	Skill of modifying task requirements	776.00	**0.006	736.50	**0.002
	4	Skill of interacting with objects	1043.00	0.462	733.00	**0.002
	5	Skill of transitioning between activities	963.50	0.185	901.50	0.074
	6	Skill of negotiating needs	1039.00	0.540	806.50	*0.012
	7	Extent of playing with others	970.00	0.203	1040.00	0.448
	8	Intensity of playing with others	892.50	0.064	909.00	0.085
	9	Skill of playing with others	950.00	0.155	777.00	*0.010
	10	Skill of supporting the play of others	908.00	0.083	955.50	0.226
	11	Skill of initiating play	922.00	0.103	891.50	0.090
	12	Skill of sharing ideas and objects	886.50	0.058	852.00	*0.032
Suspension of Reality	13	Extent of pretending	830.50	*0.021	822.50	*0.018
	14	Skill of pretending	754.50	**0.004	701.00	**0.002
	15	Extent of using people/objects unconventionally	827.00	*0.020	776.00	**0.006

Playfulness Element	ToP item	Indoor		Outdoor		
		<i>U</i>	<i>p</i> -value	<i>U</i>	<i>p</i> -value	
	16	Skill of using people/ objects unconventionally	873.50	*0.046	757.00	**0.004
Intrinsic Motivation	17	Extent of being engaged	943.50	0.141	968.50	0.198
	18	Intensity of being engaged	1016.50	0.350	916.00	0.094
	19	Extent of being involved in the process	1050.50	0.493	1020.50	0.365
	20	Intensity of persistence	830.50	*0.021	786.50	**0.008
	17	Intensity of showing positive affect	1054.00	0.512	920.50	0.100
Framing	22	Extent of giving cues	1022.00	0.373	896.50	0.069
	23	Skill of giving cues	850.00	*0.031	689.00	**0.001
	24	Skill of responding to Cues	969.00	0.256	776.00	**0.006
	25	Skill of being engaged	795.00	0.203	795.00	*0.010

Note. * $p < 0.05$; ** $p < 0.01$ - there was a significant difference between typically developing children and children with HIV/Aids.

ToP item scores for Social Skills: There was a significant difference between HIV positive and typically developing children on five of the nine ToP social skills items for the outdoor play (negotiate, shares, social play, giving cues, and responding to cues). HIV positive children scored significantly lower than typically developing children on giving cues ($U = 850$; $p = 0.03$) for indoor play. See supplementary Table 3 for more details.

Discussion

This study compared the play profiles of children with HIV against age and gender matched typically developing children. Both children with HIV and typically developing children involved in this study were living in the same socioeconomic contexts. Generally, children with HIV involved in this study exhibited lower levels of playfulness as compared to typically developing children. This is the only study that we are aware of that explored the impact of HIV/Aids on the play profiles of children who are HIV positive by comparing their profiles against matched typically developing children. Most studies have investigated the impact of HIV on neuro-cognition (Mlambo et al., 2017) and neurodevelopment of children (Kandawasvika et al., 2011). Studies on play profiles of children have focused mainly on children with conditions such as ADHD (Wilkes-Gillan et al., 2014), Autism (Harkness & Bundy, 2001), foetal alcohol syndrome (Pearton et al., 2014) and none has focused on children with HIV.

Indoor versus Outdoor play

Play transactions take place between the child and his/her environment (Lynch et al., 2016). Results from this study showed that children with HIV were less playful outdoors as compared to typically developing children. Generally, more support is needed for outdoor play, as it is characterised by more physical and social interaction than indoor play. Similarly, a study by Pearton et al. (2014) observed children with foetal alcohol syndrome playing outdoors in the playgrounds and found that they had reduced playfulness levels as compared to typically developing children. Similarly, children with with persistent asthma were reported to experience restricted outdoor play (Holderness et al., 2017). These findings are supported by a systematic review on outdoor play decisions by caregivers (Sterman et al., 2016) that reported that children with disabilities are less playful outdoors and highlighted that caregivers often make decisions about where and how children play.

Most of the caregivers of children with HIV (26; 59.0%) did report that they spent more time with their children as compared to caregivers of typically developing children. Similar findings were echoed from caregivers of children with congenital heart diseases who reported that they spent more time with their children (Sabzevari & Nematollahi, 2016) because more is required in the care of their children. Another study pointed out that caregivers wanted to be with their children most of the time, as a way of protecting them from stigma that is commonly associated with being diagnosed with HIV/Aids (Munambah et al., 2020). Caregiver involvement in the play of their children has potential to hamper or promote play. Human, socio-cultural attitudes and poverty, have the potential to prevent or limit opportunities for children to engage and participate in play (Lynch et al., 2016). There are many things that compete with play (Ramugondo, 2012) or restrict children's ability to participate in it, thus leading to occupational deprivation. This does not only deprive this child opportunity to play and interact with others, but it may also affect him/her psychologically.

The findings provide evidence to support the need for interventions to improve play in children with HIV. In this study, the indoor environment constituted a room with standard toys and both children with and without HIV showed similar levels of play, as compared to the outdoor environment which was at the children's respective homes. Similarly to a study by Skaines et al. (2006), children with autism spectrum disorders also performed better in a structured environment. The role played by the environment which includes both the social

environment, for example the influences of other players and caregivers, and the physical environment, which involves physical access and the availability of developmentally appropriate play materials cannot be underestimated in play (Rigby & Gaik, 2007). Focus on the environment is particularly important to occupational therapy because it is difficult to influence the play of a child without disrupting the play flow. However, Occupational Therapists can play a key role in enabling play occupations for children with HIV/Aids through manipulating the environment; thereby removing barriers that limit play while adapting the environment to promote play (Rebeiro, 2001).

Elements of play

Children with HIV performed similar to typically developing children with regards to the elements of intrinsic motivation and internal control. Intrinsic motivation occurs when some aspect of the activity itself provides the impetus for the child to play and internal control is the extent to which the child feels in charge of their actions (Skaines et al., 2006). A study using grounded theory of inquiry by De Santis et al. (2013) reported how people with HIV/Aids develop resilience through a process of motivation, management and mastery. Health professionals can leverage on this resilience to develop effective interventions for children with HIV.

Children who are HIV positive performed significantly poorer than typically developing children on the elements of suspending reality and framing for both indoor and outdoor environments. Experiencing difficulties in suspension of reality and framing could be explained by the complex skills involved in these elements which require higher cognitive abilities, thus making it more challenging for children with HIV who are at higher risk of having neuro-cognitive impairments (Mlambo et al., 2017). Suspension of reality is a very important aspect of play and is related to social aspects of play. For example, object substitution ability (suspending the reality of an object in play) is related to social interaction during play (Uren & Stagnitti, 2009). Framing requires an understanding of social rules and allows players to support their playmates during play (Pearson et al., 2014). Play skills are more refined when the child continues to engage in more play. Thus, more opportunities for children with HIV to engage in social play in safe and supportive environments could assist these children in developing play skills.

Social play: Children with HIV performed poorly on five of the nine ToP social play items for outdoor play. Social play is exhibited when a child engages in play with a peer within a

social context. However, children with HIV could have exhibited poor social play because they often have limited opportunities to play as some of their time is spent at the hospital/clinic for medical reviews or when they are actually not feeling well. Reinie Cordier et al. (2010a) also found that children with attention deficit hyperactivity disorders (ADHD) performed poorly in social play as compared to typically developing children. In their study, they also pointed out that social rejection by peers could have caused children with ADHD to want to play with their siblings or other children with social and behavioural difficulties. Stigma related to HIV and deficits in social play due to limited play opportunities can lead to children developing low self esteem and become socially isolated (Pearson et al., 2014). Conversely, frequent engagement in social play with peers has a ripple effect as it further supports peer engagement, social competence, cooperation, problem, solving and communication (Wilkes-Gillan et al., 2014).

Contextual Factors

Despite being matched for age, an analysis of demographic data revealed that children with HIV were enrolled in lower grades as compared to their counterparts who are typically developing. A study conducted in South Africa found that the most common disabilities reported in children with HIV were developmental delays, cognitive and behavioural difficulties and communication difficulty, all of which are likely to affect these children's functioning at school (Potterton et al., 2016). Hence, as a result of HIV, children may start school later and progress academically slower than their typically developing counterparts.

One interesting finding from this study was that children with HIV more frequently played with older children compared with typically developing children who were more likely to play with younger children. Children have a tendency to play with playmates who are skilled players so as to compensate for their own shortcomings (Reinie Cordier et al., 2010b). For example in this study, children with HIV have been reported to have challenges with their social play when compared with typically developing children. It is therefore plausible that children with HIV/Aids were more likely to engage with older playmates who are able to scaffold their play, thereby extending the play frame. A study by (Reinie Cordier et al., 2010b) also revealed that children with ADHD had challenges in finding playmates and mostly relied on siblings for playmates.

Most children recruited were on first line of ART therapy and thus, were likely to be more likely to be those children who were compliant with taking medication. This could have been

as a result of recruitment being done at the hospital where children had come with their caregivers to collect medications. We therefore postulate that the impact of HIV/Aids on the play of children might be more severe if we had recruited participants in the community involving families with children who are HIV positive and who are less compliant with treatment adherence.

In this study, most caregivers of children who are HIV positive were informally employed. This may be due to the prevailing economic challenges in Zimbabwe which has resulted in most people being engaged in informal employment. Informal employment can be defined as, "...system of trade or economic exchange used outside state controlled or money based transactions and this includes among other transactions street trading" (Manjokoto & Ranga, 2017, p. 25). The current economic crisis in Zimbabwe which is characterised by reduced industrial productivity and high levels of unemployment (McIndoe-Calder et al., 2019), has affected the occupations that ordinary citizens engage in every day. In rural Zimbabwe, everyday doings of both children and adults are mainly centred on survival (Manjengwa et al., 2016). Economic factors that threaten survival, combined with cultural and relational practices, are likely to limit engagement and participations in meaningful occupations, such as play, for children. Children like to play when they feel safe and the environment is supportive of play. Deprivation of basic necessities of life is associated with increased risk to poor health outcomes in children and threatens their safety and creates stress which overall may affect their engagement in play (Leadley & Hocking, 2017).

Limitation

The HIV/Aids sample was recruited at a hospital. Hence there are chances that the children with HIV included in this study were the ones coming for medical reviews who are likely to have been compliant with medication. There are chances that a proportion of children who are not consistent in attending medical reviews could have been left out in this study. This study was a matched control comparative study, hence could not report on the causes or other underlying issues that either promote or hinder play in children with HIV. While outside the scope of this paper, there is a need to develop a comprehensive occupational profile for children with HIV/Aids.

Key points for Occupational Therapy

- There is a need to develop interventions to improve the play of children with HIV/Aids.
- Outdoor play may be a key focus of interventions for children with HIV/Aids.
- Occupational therapists play a key role in restructuring the environment to promote play in children with HIV/Aids.

Authors' declaration of authorship contribution

NM, RC, and ER were involved in the conceptualisation and preparation of the study. NM and MC were responsible for the coordination of the study including data collection, cleaning and analysis. NM drafted the manuscript. All authors have read and corrected draft versions of the manuscript and approved the final manuscript.

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 and ethical restrictions.

Funding statement

Part funding for data collection was provided by Elizabeth Casson Trust.

Conflict of interest statement

No conflict of interests declared

Acknowledgements

The authors extend their gratitude to all the families that volunteered their time to participate, as well as Rutendo Chivima for assistance with data collection.

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