A randomized clinical trial of an intervention to promote resilience in young children of HIV-positive mothers in South Africa

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Objective: The objective of this study is to assess the efficacy of an intervention designed to promote resilience in young children living with their HIV-positive mothers.

Design/methods: HIV-positive women attending clinics in Tshwane, South Africa, and their children, aged 6–10 years, were randomized to the intervention (I) or standard care (S). The intervention consisted of 24 weekly group sessions led by community care workers. Mothers and children were in separate groups for 14 sessions, followed by 10 interactive sessions. The primary focus was on parent–child communication and parenting. Assessments were completed by mothers and children at baseline and 6, 12 and 18 months. Repeated mixed linear analyses were used to assess change over time.

Results: Of 390 mother–child pairs, 84.6% (I: 161 and S: 169) completed at least two interviews and were included in the analyses. Children's mean age was 8.4 years and 42% of mothers had been ill in the prior 3 months. Attendance in groups was variable: only 45.7% attended more than 16 sessions. Intervention mothers reported significant improvements in children's externalizing behaviours ($ß = -2.8$, $P = 0.002$), communication ($ß = 4.3$, $P = 0.025$) and daily living skills ($ß = 5.9$, $P = 0.024$), although improvement in internalizing behaviours and socialization was not significant ($P = 0.061$ and 0.052, respectively). Intervention children reported a temporary increase in anxiety but did not report differences in depression or emotional intelligence.

Conclusion: This is the first study demonstrating benefits of an intervention designed to promote resilience among young children of HIV-positive mothers. The intervention was specifically designed for an African context and has the potential to benefit large numbers of children, if it can be widely implemented.

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Introduction

The scope of the AIDS epidemic in sub-Saharan Africa and its devastating effects on families has potentially serious implications for a growing generation of children. Approximately 17 million children have already been orphaned by the disease [1], but now, with increased access to antiretroviral medications, millions more

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children are being raised by parents living with HIV. In 2012, 61% of all persons eligible for HIV treatment (based on the 2010 WHO guidelines) were receiving treatment, almost doubling the number receiving treatment just 3 years earlier [1]. In South Africa, antenatal surveys indicate that as many as one-third of women aged 25–39 years are HIV positive [2], an age at which these women may already be mothers of young children.

Reports examining the psychological and behavioural effects of parental HIV infection have primarily focused on children orphaned by the disease, but there is now an extensive literature suggesting that children living with their HIV-infected parents – those often referred to as vulnerable children – also experience a psychological burden [3–5]. Most studies have examined adolescents, but there are a few studies, conducted in Europe [6] and the U.S. [7–10], which have demonstrated increased depressive symptoms and behaviour problems among young vulnerable children, those in middle childhood, between the ages of 6 and 10 years. Despite the fact that young children are seldom told their parents' HIV status [11,12], they may still suffer as a result of the psychological effects of HIV on their parents [13–16]. There is also evidence that young children are most affected when their parents are symptomatic [9,17,18], which can contribute to compromised parenting, resulting in children's behavioural difficulties and poor functioning [8,19–22].

There has been a sustained call for interventions to address the psychological needs of HIV-affected children [23,24] and many diverse programmes do exist. There is, however, a dearth of empirical evidence establishing the success of interventions, whether they are community-based programmes [25] or those providing family-centred, psychosocial support [26–28]. A systematic review by Betancourt *et al.* in 2012 [28] identified four intervention studies designed to promote resilience in HIV-affected children. Two focused on adolescents in the U.S. [29] and France [30] and the third was a school-based intervention for orphans aged 10–15 years in Uganda [31]. The fourth study, considered most rigorous in its design, demonstrated the efficacy of a support group intervention for adolescents in New York [32] with some positive effects persisting for as long as 6 years [33,34]. To date, however, there have been no studies that have examined whether younger children of HIV-infected mothers – those in middle childhood– might benefit from resilience-promoting interventions. Compared with interventions for adolescents, an intervention for young children requires a greater focus on the parent–child dyad and attention to issues of parenting.

The purpose of this study was to assess the efficacy of an intervention designed to promote resilience among young children living with their HIV-positive mothers. Resilience is defined as the capacity for successful adaptation despite challenging circumstances [9,35–38]. It is generally not measured as a single construct, and in this study was operationalized as a decrease in problem behaviours and improved adaptive and psychological functioning in the context of maternal HIV infection.

The intervention was provided in a structured group setting for both the mothers and their children and was specifically developed for use in an African setting through action research that involved focus groups with HIV-positive mothers in South Africa, and piloting and refinement of the intervention following this formative evaluation [39]. The conceptual framework has been described previously [39] and is based on the understanding that the psychological trauma experienced by mothers dealing with HIV [13–16], and the resulting compromised parenting contribute to children's behavioural difficulties and poor functioning [8,19–22]. Thus, the intervention was designed not only to improve the wellbeing of the mother and child but also the interaction between them. The intervention was also informed by literature on resilience theory [36–38] and similar programmes for older children [40]. Promotion of resilience involves addressing personal characteristics such as increasing self-esteem as well as enhancing contextual variables such as family relationships.

Materials and methods

The study was conducted in two separate communities within Tshwane (formerly Pretoria), South Africa and was approved by the institutional review boards of the University of Pretoria and Yale University School of Medicine.

Enrolment

HIV-positive women attending clinics in each of the communities were referred to the study by clinic staff and invited to participate. All women provided written consent and verbal assent was obtained from the children. Participants were eligible for the study if they were able to communicate in at least one of five local languages (Sepedi, Setswana, Sesotho, isiZulu or English) and the children were aged 6–10 years and lived with their mothers at least 5 days per week. If there was more than one child in the family within the age range, the oldest child was selected. To decrease the potentially confounding effect of other persons being ill, families were excluded if the child or others living in the household were known to be HIV positive or were reported as having a life-threatening illness. After completing baseline interviews conducted by trained research assistants,

mother–child pairs were randomized to either the intervention ('I') or standard care ('S') conditions at each of the two study sites separately, using a block randomization process and table of random numbers with 30 individuals in each block. Individuals randomized to the standard care condition were provided with information about local resources available for assistance.

Description of the intervention

The intervention groups were conducted over 24 weekly sessions, each lasting 75 min. For the first 14 sessions, mothers and children participated in separate groups occurring concurrently and thereafter they participated together in 10 interactive sessions (see Table 1). The mother and child groups were each facilitated by two community care workers. These were individuals who exhibited good interpersonal skills and had at least 12 years of education. They were trained within the project and supervised by a social worker. The training included information about HIV and AIDS and skills for facilitating groups, counselling and identification and management of children's emotional and behavioural problems. A manual identified specific objectives for each session and provided an outline for experiential learning activities such as games, group discussions and behavioural modelling.

The first seven sessions focused on the mothers' issues relating to living with HIV; these were followed by sessions addressing parenting. The children's sessions focused on building self-esteem and enhancing interpersonal and practical life skills. Activities included board games, story telling and traditional cultural games. The

Table 1. Summary of sessions provided in the intervention.

	Separate sessions 1–14 Mothers	Children
Week 1	Introduction, orientation and relationships of trust	Introduction and getting to know each other. 'Let's get to know one another'
Week 2	Living positively 'How do I look after myself?' (Basic HIV&AIDS info)	Developing relationships within the group 'Let's get to know one another'
Week 3	Disclosure	Describe self and self in family 'Who am I?'
Week 4	HIV and relationships	Describe self and family within community 'My community'
Week 5	The emotional experience of having HIV (Part 1), 'How do I feel?'	Identify strengths within self 'What do I look like? I have, I am, I can!'
Week 6	The emotional experience of having HIV (Part 2), 'How do I feel?'	Identifying coping that is linked to strengths identified 'What can I do/ What am I good at?'
Week 7	Coping, problem solving and stress management	Problem solving 'How can I do it?'
Week 8	HIV in the household, human rights and stigma	Protecting self and identifying boundaries 'Protecting myself'
Week 9	Parenting skills (Part 1), 'Knowing and understanding myself as a parent'	Social skills 'Socializing with peers'
Week 10	Parenting skills (Part 2), 'Knowing and understanding myself as a parent'	Identifying emotions (focus on self), 'How do I feel?'
Week 11	Development of children (Part 1), 'Knowing and understanding my child'	Identifying emotions (focus on other and communication skills)
Week 12	Development of children (Part 2), 'Knowing and understanding my child'	Survival skills (Part 1), 'Look and learn'
Week 13	My child and HIV	Survival skills (Part 2), 'Look and learn'
Week 14	Life planning and goal setting	Identifying meaning, purpose and future orientations 'Let's live life'
	Joint sessions 15–24	
Week 15	Mother and child getting to know each other (Part 1) 'Knowing me, knowing you'	
Week 16	Mother and child getting to know each other (Part 2) 'Knowing me, knowing you'	
Week 17	Mother and child getting to know each other (Part 3) 'Knowing me, knowing you'	
Week 18	Creating a legacy. (Part 1), 'Let's make a family memory'	
Week 19	Creating a legacy. (Part 2), 'Let's make a family memory'	
Week 20	Interaction between mother and child (Part 1), 'Let's have fun'	
Week 21	Interaction between mother and child (Part 2), 'Let's have fun'	
Week 22	Mother and child sessions revisited (Separate session), 'Where are we at now?'	
Week 23	Planning for the future. 'Let's dream together'	
Week 24	Family celebration. 'Let's celebrate life'	

final 10 joint sessions were designed to promote healthy parent–child interaction and modelling of positive parenting behaviours and included activities such as compiling a family legacy box. The focus was on overarching skills rather than HIV-specific themes.

The study included 12 groups, with approximately 15 participants in each group. Participants were reimbursed for travel expenses and meals were provided. Following each session, the community care workers completed quality assurance questionnaires that were used to ensure fidelity to the intervention.

Assessment and measures

Interviews were conducted at baseline and follow-up at 6, 12 and 18 months in research offices located within each of the two communities. Participants were reimbursed for travel expenses. Because the instruments used had originally been developed in English and validated in western populations, cultural modifications were made through consultation with local personnel, before translating, back translating and piloting with 22 HIV-positive mothers. The modifications were minor and included things such as substituting words that might not be clearly understood with more colloquial words and changing a reference to a toy that was likely not familiar to the children with another more commonly available toy.

Maternal illness and HIV status disclosure

Mothers were considered ill if, in the prior 3 months, they reported any nonspecific symptoms (unintentional weight loss $>$ 5 kg or fatigue that interfered with daily activities for more than 2 weeks) or they had an HIV-related illness that satisfied WHO clinical staging 3 or 4 [41]. Mothers were asked whether the participating children had been told their HIV status.

Maternal assessment

The reliability of all scales was examined using the data collected at baseline.

Maternal psychological characteristics

Maternal depression was measured with the Center for Epidemiologic Studies – Depression Scale (CES-D) ($\alpha = 0.87$) [42]. As done in earlier studies, five items that assess somatic symptoms were excluded, as these symptoms could be attributed to HIV disease, giving a range of scores of 0–45 [43]. Maternal coping was assessed using The Brief COPE [44]. In this study, a factor analysis of the baseline data identified three different coping styles, which were labelled 'self coping' (range 12–48, $\alpha = 0.70$), 'seeking help from others' (range 9–36, $\alpha = 0.71$) and 'avoidant coping' (range 7–28, $\alpha = 0.71$). The internal consistency of the three coping domains are within the range obtained by Carver for the individual scales in the development of the Brief COPE [44] and the reliability of the CES-D is similar to that found in other studies [45,46].

Maternal parenting characteristics

Parenting stress was assessed using two subscales of the Parenting Stress Index (PSI): Parenting Distress (range 11–55, $\alpha = 0.82$) and Parent-Child Dysfunction (range 12–60, $\alpha = 0.82$) [47]. Mothers' responses to their children's negative behaviours were assessed using the Coping with Children's Negative Emotions Scale (CCNES) [48]. This scale assesses maternal responses to distressing situations for their children. Three parenting behaviours (emotion-focused, problem-focused and expressive encouragement) were combined to form a measure of positive parenting (range 27–162, $\alpha = 0.79$) and two parenting behaviours (distress and punitive reaction) were combined to form a negative parenting domain (range 18–36, $\alpha = 0.67$).

Child assessment

Parent-reported measures

Parental perception of children's behaviour was assessed using the Child Behavior Checklist (CBCL) that provides two subscales: Internalizing (range 0–64, $\alpha = 0.85$) and Externalizing behaviours (range 0–64, $\alpha = 0.92$) [49]. Children's adaptive functioning was measured using the Vineland Adaptive Behavior Scales (VABS) that assesses the parent's perception of a child's functioning across three domains: communication, daily living skills and socialization (range 20–160 for each) [50].

Child-reported measures

Depressive symptoms among children were assessed using the Child Depression Inventory (CDI) (range 0–42, $\alpha = 0.68$) [51]. Children's anxiety was measured using the Revised Child Manifest Anxiety Scale (RCMAS) (range 0–28, $\alpha = 0.82$) [52]. The BarOn EQ-i: Youth Version (range 24–96, $\alpha = 0.80$) assesses emotional intelligence, which comprises abilities related to understanding oneself and others and managing one's emotions [53]. The RCMAS is intended for use for children as young as 6 years, whereas the CDI and Bar-On are intended for children age 7 and older. Although the study included children younger than 7 at enrolment, all children were at least 7 years old by the 12-month follow-up evaluation.

Statistical analyses

Potential differences in the baseline socio-demographic characteristics of mothers and children randomized to the two conditions were examined using Chi-square test and Student's t-test, with the Mann–Whitney U test being used when data were not normally distributed. The

efficacy of the intervention was examined using Repeated Mixed Linear Analysis, which assesses change over multiple time points, while taking into account within-individual dependence and allowing for missing data points [54–56]. Variables that were significantly different between the two conditions (I and S) at baseline were included in all models and the baseline value for each outcome was entered as a covariate into the specific model for the outcome [57]. The interviews were treated as a continuous variable, thus as a covariate. No random effects were specified and the covariance structure found to be the most suitable in all analyses was that of compound symmetry [56].

Further analyses were performed to examine whether there might be interaction effects, with certain groups responding differently to the intervention. Three-way interactions were created between specific variables (i.e. sex, age of child and maternal illness), condition and interview. In these analyses, the order of the interview (baseline, 1, 2 or 3) was treated as a categorical variable in order to make interpretation of the interactions easier [56].

Results

A total of 390 mother–child pairs completed the enrolment process and were randomized to one of the two conditions. The socio-demographic characteristics of the study population are summarized in Table 2. Forty-two percent of the women reported having had an illness in the prior 6 months. Approximately one-quarter of the women were pregnant. Significantly fewer mothers in the intervention condition were employed. The women had known of their HIV status for a mean of 24.3 months, with 30.6% having known for less than 6 months. The children randomized to the intervention condition were significantly younger than those in the standard care condition. Only 7% of the children had been told of their mother's HIV status.

As seen in Fig. 1, 161 (81%) mothers in the intervention condition and 169 (88%) mothers in the standard care condition completed at least one follow-up interview and were included in the analysis. Women lost to follow-up were less likely to be living with a partner (29 versus 50%, $P = 0.03$) and had known of their HIV status for a shorter period of time (median 9 versus 13 months, $P = 0.013$). The proportions completing the 6, 12 and 18-month follow-up interviews were 73.9, 73.7 and 74.7%, respectively, with no significant differences in attendance between the two study conditions. Of those included in the analyses, 72% of the women and 63% of the children completed all three follow-up interviews. Twenty women are known to have died during the period of follow-up, 10 in each condition.

Table 2. Characteristics of intervention and standard care conditions at baseline.

Characteristic	Intervention ($N = 199$)	Standard care ($N = 191$)
Maternal socio-demographic characteristics		
Mean age (S.D.)	33.1 (5.9)	33.1 (6.0)
Marital status, %	19	17
Married	48	55
Single with partner	28	22
Single, no partner	5	6
Widowed		
Education, %	12	14
Primary	86	83
Secondary	2	3
Tertiary		
Employed %	23	34[a]
Mean housing score (S.D.)	3.6 (1.7)	3.6 (1.7)
Mean persons in household (S.D.)	6.5 (2.7)	6.2 (3.0)
Maternal health		
Months since HIV diagnosis (S.D.)	22.2 (27.6)	26.6 (31.1)
HIV-related illness in prior 3 months,		
None or mild	62%	53%
Moderate or severe	38%	47%
Mean $CD4^+$ cell count (cells/μl, S.D.)	288 (224)	312 (221)
Pregnant at present, %	21	28
Child characteristics		
Sex: Male, %	54	52
Mean age (S.D.)	8.22 (1.51)	8.51 (1.46)[a]
Mean number of siblings (S.D.)	2.3 (1.1)	2.1 (1.2)
Stays overnight with someone else at least once per week	15%	12%
Disclosure of mother's status		
No disclosure	86%	90%
Told health problem or something wrong	6%	3%
HIV disclosed	8%	7%

[a]Difference between groups at $P < 0.05$.

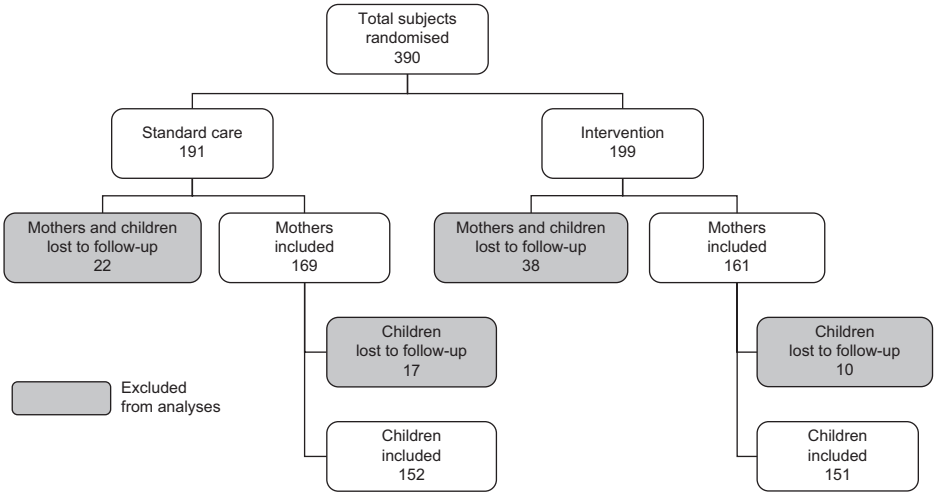

Fig. 1. Individual participation.

Attendance at support group sessions for those in the intervention condition

Intervention exposure varied: nearly half (45.7%) of the mothers attended more than 16 sessions, 25.8% attended 9–16 sessions, 14.6% less than nine sessions and 13.9% failed to attend any sessions. Attendance was relatively constant over time, however, with a mean of eight women attending each session. In 62% of instances, the reason for not attending is unknown, but when information was available, the reasons given were obtained employment (14%); lack of interest (10%); death (8%); relocation out of area (4%); and illness (2%).

Efficacy of the intervention

The efficacy of the intervention was examined with inclusion of all individuals for whom there were follow-up data. The two variables that were significantly different between the two conditions – maternal employment and child age – were included in the analyses.

Maternal psychological and parenting characteristics

As illustrated in Table 3, there were no significant effects of the intervention on any of the maternal psychological or parenting measures. Although there were substantial improvements in depression over time, this was true for mothers in both conditions and the difference between conditions was not significant ($\beta = -1.07$, $P = 0.092$). In further analyses to assess whether higher attendance at group sessions increased the effectiveness of the intervention, the number of sessions attended was entered into the model as a continuous variable with those randomized to the standard care condition receiving a value of zero. These analyses demonstrated that increased attendance in the intervention was significantly associated with decreased maternal depression ($\beta = -0.096$, $P = 0.047$) and an increase in the coping domain of seeking help from others ($\beta = 0.047$, $P = 0.032$). Subsequent analyses did not demonstrate any threshold effect.

Child psychological and behavioural functioning

Child outcomes based on mother's reporting showed significant improvements. Externalizing behaviours improved significantly for those in the intervention condition ($\beta = -2.81$, $P = 0.002$), while improvement in internalizing behaviours was more modest ($\beta = -1.43$, $P = 0.061$). The intervention also resulted in significant improvements in two of the adaptive functioning domains assessed by the Vineland Adaptive Behavior Scales: communication ($\beta = 4.26$, $P = 0.025$) and daily living skills ($\beta = 5.86$, $P = 0.024$), but improvement in the socialization domain was not significant ($\beta = 0.53$, $P = 0.052$). There were no significant differences between conditions in the child-reported measures except for anxiety, which increased for those randomized to the intervention groups ($\beta = 0.50$, $P = 0.044$). The analyses were repeated excluding individuals who were younger than 7 years at the time of enrolment, but this produced little change in the results (not shown). Similarly, analyses conducted to assess the potential effect of increased attendance at groups showed little change in child outcomes.

As seen in Fig. 2, the results provide some evidence of sustainability of effect over time for some of the children's outcomes. Externalizing behaviours continued to decrease for the children in the intervention condition after the 6-month intervention resulting in an even greater difference between conditions at 18 months ($P < 0.001$). The responses in communication and daily living skills were slightly different; for both of these, the intervention children showed significantly greater improvement during the 6-month intervention period,

Table 3. Baseline and estimated mean scores at follow-up for intervention (i) and standard care (s) conditions.

Variable		Estimated mean value (standard error)				Overall effect: Estimated β	Overall *P*
		Baseline	6 months	12 months	18 months		
Maternal psychological measures							
Depression (CES-D)	I	16.51 (0.74)	12.07 (0.92)	10.79 (0.91)	10.43 (0.89)	− 1.07	0.092
	S	15.87 (0.76)	13.77 (0.85)	12.35 (0.85)	11.50 (0.86)		
Coping (Brief-Cope)							
Self coping	I	40.96 (0.42)	41.72 (0.47)	41.39 (0.46)	42.20 (0.45)	0.05	0.94
	S	40.21 (0.46)	41.43 (0.44)	41.82 (0.43)	42.16 (0.44)		
Help from others	I	25.57 (0.48)	27.73 (0.44)	27.68 (0.44)	28.49 (0.43)	0.32	0.21
	S	24.50 (0.44)	26.51 (0.41)	27.75 (0.41)	28.17 (0.42)		
Avoidant coping	I	14.21 (0.38)	13.55 (0.44)	13.60 (0.44)	13.02 (0.43)	−0.24	0.99
	S	13.88 (0.39)	13.91 (0.41)	13.02 (0.41)	13.26 (0.41)		
Parenting							
Parenting Stress Index (PSI)							
Parental distress	I	30.71 (0.67)	29.48 (0.77)	28.77 (0.76)	26.98 (0.75)	−2.15	0.41
	S	30.31 (0.64)	29.76 (0.72)	28.09 (0.71)	29.13 (0.72)		
Parent–child dysfunction	I	25.69 (0.61)	26.02 (0.67)	25.54 (0.66)	25.64 (0.65)	−0.20	0.89
	S	25.51 (0.61)	26.07 (0.62)	25.57 (0.62)	25.83 (0.63)		
Coping with Children's Negative Emotions (CCNES)							
Positive responses	I	119.8 (1.2)	116.9 (1.3)	121.6 (1.3)	118.3 (1.3)	−1.10	0.84
	S	119.8 (1.1)	119.4 (1.3)	118.7 (1.2)	119.4 (1.3)		
Negative responses	I	78.7 (0.8)	78.7 (0.9)	80.7 (0.9)	78.5 (0.9)	−0.86	0.98
	S	79.2 (0.8)	79.7 (0.9)	78.9 (0.9)	79.4 (0.9)		
Child outcomes							
Parent-reported measures							
Behaviour problems (CBCL)							
Externalizing behaviours	I	13.29 (0.79)	11.16 (0.79)	10.91 (0.78)	9.06 (0.76)	−2.81	0.002
	S	13.73 (0.88)	13.48 (0.73)	13.32 (0.73)	11.87 (0.74)		
Internalizing behaviours	I	11.73 (0.59)	9.75 (0.60)	10.24 (0.60)	8.85 (0.58)	−1.43	0.061
	S	12.05 (0.67)	11.56 (0.56)	10.43 (0.56)	10.28 (0.57)		
Adaptive Functioning (VABS)							
Communication	I	95.7 (1.5)	102.0 (1.4)	100.7 (1.4)	104.1 (1.4)	4.26	0.025
	S	95.0 (1.4)	97.9 (1.3)	100.9 (1.3)	99.9 (1.3)		
Daily living skills	I	93.8 (1.4)	100.0 (1.7)	101.6 (1.6)	107.7 (1.7)	5.86	0.024
	S	95.4 (1.3)	96.6 (1.5)	100.2 (1.5)	101.8 (1.6)		
Socialization	I	109.0 (1.3)	117.2 (1.6)	115.7 (1.6)	11.7.4 (1.6)	1.53	0.052
	S	110.3 (1.4)	111.8 (1.4)	114.9 (1.6)	115.9 (1.5)		
Child-reported measures							
Depression (CDI)	I	7.41 (0.36)	7.71 (0.44)	6.70 (0.44)	5.81 (0.42)	−0.67	0.88
	S	7.52 (0.35)	6.91 (0.41)	6.65 (0.43)	6.49 (0.42)		
Anxiety (RCMAS)	I	8.85 (0.38)	9.60 (0.45)	8.36 (0.45)	8.01 (0.43)	0.50	0.044
	S	9.33 (0.39)	8.01 (0.42)	7.73 (0.43)	7.50 (0.43)		
Emotional intelligence (Bar-On)	I	59.6 (0.7)	59.5 (0.9)	59.6 (0.9)	61.0 (0.8)	0.61	0.63
	S	58.6 (0.7)	60.1 (0.8)	60.8 (0.8)	60.3 (0.8)		

but differences between groups were not sustained at 12 months. Subsequently at 18 months, the intervention group again had significantly higher scores. For both internalizing behaviours and socialization, the intervention appeared to have an immediate effect, but differences were not sustained postintervention. Similarly, the increased anxiety experienced by those in the intervention condition did not persist.

Potential interactions

Three variables were examined to determine whether certain characteristics might have affected intervention outcomes; these included maternal illness and the sex and ages of the children (<8 versus >8 years). Maternal illness affected mother's coping responses but did not affect any other outcomes: mothers who had been ill and were assigned to the intervention condition had a decrease in avoidant coping over the period of follow-up, although this increased among those in the standard care condition and remained relatively unchanged in both groups for those women who had not experienced illness ($P < 0.001$). Boys tended to gain greater benefit from the intervention than did girls. There was a significant three-way interaction between sex, condition and follow-up for externalizing behaviours ($P = 0.035$), internalizing behaviours ($P = 0.05$) and depression ($P = 0.038$), with improvement occurring among the boys assigned to the intervention, although scores for boys in the standard care

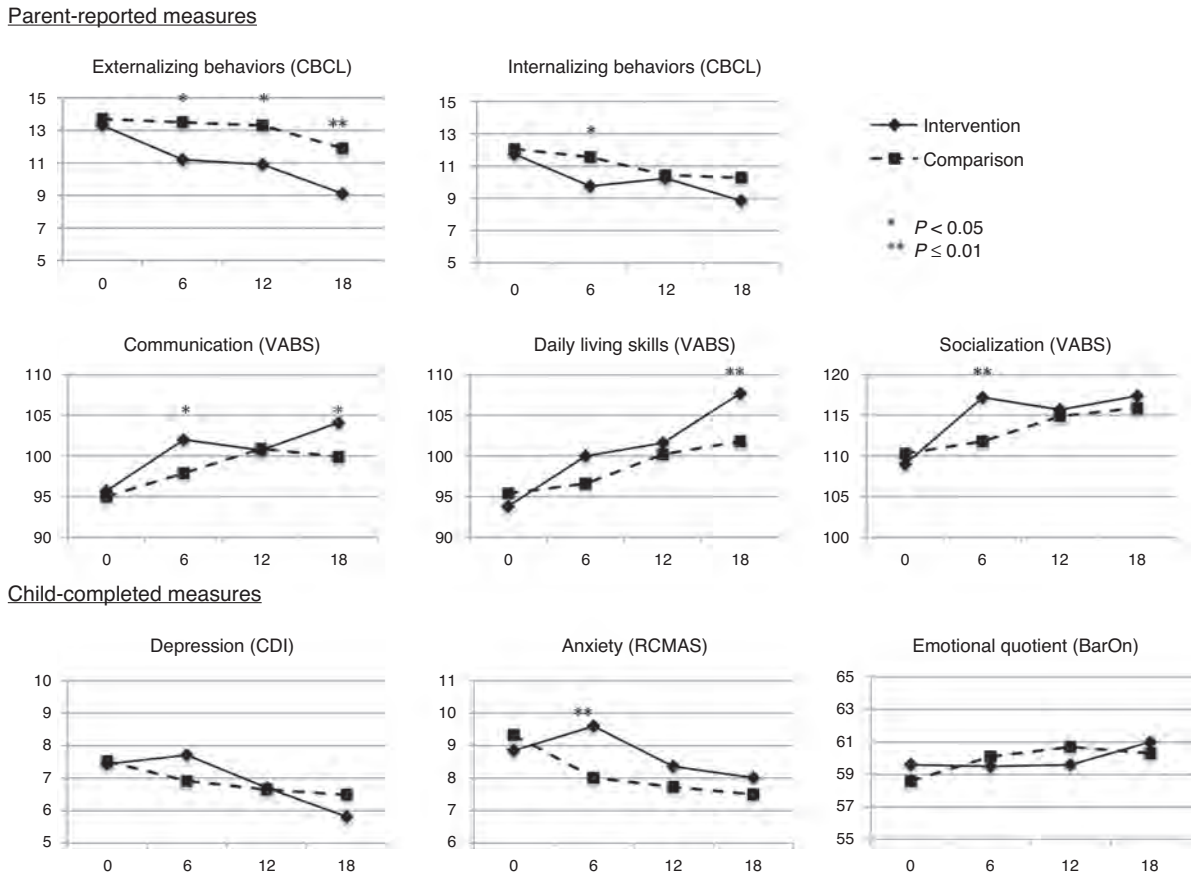

Fig. 2. Child outcomes for intervention and comparison conditions.

condition tended to remain stable. Girls tended to improve over time whether or not they were in the intervention or standard care condition. There was no effect of children's ages on outcomes and no interaction effects on the other outcomes assessed.

By 18 months, rates of maternal HIV-status disclosure had increased but remained low in both conditions (intervention: 16.7%, standard care: 13.8%), making it impossible to assess the potential effect of disclosure on child outcomes.

Discussion

This is the first study to provide empirical evidence of the benefits of a parent–child group intervention for young children living with their HIV-infected mothers. Other programmes that have been shown to be beneficial have focused on children in different circumstances including a school-based intervention for older children (10–15 years) who were orphaned [31]; and an intervention for adolescents in the United States, who were all aware that their mothers were HIV-positive [32]. In contrast, the objective of the present study was to promote resilience in children at a younger age through strengthening the parent–child dyad.

The primary effect of the intervention was on decreasing children's externalizing behaviour problems and increasing children's adaptive functioning, particularly in the areas of communication and daily living skills. Prior studies attempting to assess resilience in children have specifically focused on such areas of behaviour and adaptive functioning [9,19,58]. Importantly, the beneficial effects persisted at least 12 months beyond the period of the intervention suggesting that the intervention potentially has a long-lasting effect on children's resilience.

The children in the intervention condition reported greater anxiety at the end of the intervention and the boys reported a significant decrease in depression, but there were no other differences in the child-reported measures. The fact that children attending the intervention had increased anxiety suggests that the intervention included anxiety-provoking content despite the fact that HIV was not mentioned. This increase in anxiety was temporary, however, and happened concurrently with reported improvements in behaviour and functioning, suggesting it likely had little adverse effect on the children.

It does appear that the intervention had a greater beneficial effect for boys than it did for girls. These differences were limited to the children's behaviour and

measure of depression and not to their adaptive functioning and are likely related to differences between the sexes in their expression of distress. For practical reasons, however, these differences have little relevance, as the intervention was shown to have an effect on the two sexes combined and it would be very unlikely that in the future, the intervention would be offered to families with boys and not to those with girls.

It remains unknown why findings on the child-reported measures were not more robust, when improvements were evident on the mother-reported measures. Such discrepancies have been found in other studies of young children [59] and in this instance could be explained by a reporting bias among the intervention mothers. If this was the case, however, one might expect greater consistency across time intervals. For example, it is particularly notable that intervention mothers reported significant improvements in children's adaptive functioning at 6 and 18 months but not at 12 months. It is also possible that the instruments used with the children were not sufficiently reliable in this sample of children. The instruments have not been validated in the South African context, and despite our best efforts at cultural adaptation and translation, difficulties with nuances pertaining to emotion-focused concepts continued to exist. For example, items such as 'Nothing bothers me' in the BarOn EQ-I and 'Nothing is fun at all' in the CDI are not easily translated and may be considered differently by children in different cultures.

Children whose mothers had been ill might be expected to have greater benefit from the intervention, as these children are more likely to suffer psychologically [9,17,18]. There was, however, no direct evidence of increased benefit for these children, although the intervention did result in decreasing avoidant coping among their mothers. In a prior analysis of the baseline data collected in this study [60], avoidant coping by mothers was shown to have a direct effect on increasing children's externalizing and internalizing behaviours and both avoidant coping and maternal illness had indirect effects on children's adaptive functioning by increasing parenting stress. Thus, the finding in this study that the intervention decreased avoidant coping among the mothers who had been ill suggests that this likely contributed to the improvements in child behaviour and adaptive functioning among the children.

Study limitations

Study limitations include varied intervention exposure. The intervention was lengthy, however, and even incomplete attendance may have contributed to the effects observed. Poor attendance is a known difficulty with group-based interventions with disadvantaged populations [61,62]. The finding that increased attendance was associated with a decrease in maternal depression and an increase in coping through seeking help from others suggests that mothers who did attend more frequently experienced more personal psychological improvement. A further limitation was the lack of follow-up data for some individuals. The data analysis, however, allowed for missing data. There was only a relatively small number of individuals (15.4%) for whom there were no follow-up data, thus these likely had only a limited effect on the results obtained.

The results demonstrated no change in the mothers' parenting behaviours, despite the fact that the intervention model was specifically designed to address parenting. This finding is surprising, particularly because the previously reported analyses of the baseline data suggested that parenting has an important mediating effect on child outcomes [60]. The fact that there were improvements in child behaviour and adaptive functioning without measureable improvements in parenting suggests that there are potentially other mediating variables that were not measured or that the instruments used did not appropriately assess the relevant changes in parent–child interactions.

Conclusion

The demonstration of the efficacy of this intervention in an African setting has important implications for addressing the psychological consequences of parental HIV infection on young children. The success attained in decreasing AIDS-related mortality has not negated the need to address the epidemic's effects on very large numbers of children. This intervention was designed for use in a resource-poor area and because it is manual guided and provided by trained, lay facilitators, it offers real promise for wider implementation. Future research is needed to examine whether the increased resilience and improved functioning demonstrated over the 18-month follow-up period will persist into adolescence and adulthood. Recognizing the limitations on resources, it would also be important to provide greater understanding of what components of the intervention were most effective and whether a shortened intervention might produce similar results.

Acknowledgements

Conflicts of interest

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