

IMPACT OF THE MEDIATIONAL INTERVENTION FOR SENSITIZING  
CAREGIVERS ON SOCIAL COGNITION IN ORPHANS AND VULNERABLE  
CHILDREN IN SOUTH AFRICA

by

Madeleine Elise Allman, MPH

A thesis submitted to the Psychology Department,  
College of Liberal Arts and Social Sciences  
in partial fulfillment of the requirements for the degree of

MASTER of ARTS

in Clinical Psychology

Chair of Committee: Carla Sharp Ph.D.

Committee Member: Amanda Venta Ph.D.

Committee Member: Paulina Kulesz Ph.D.

University of Houston  
May 2022

## **ABSTRACT**

Orphans and vulnerable children (OVC) in South Africa have high rates of attachment trauma and are at increased risk of a multitude of adverse psychosocial outcomes, including disrupted social cognitive development (resulting in diminished mentalization capacity) and mental health difficulties. The Mediational Intervention for Sensitizing Caregivers (MISC) is an intervention aimed at improving child outcomes by increasing sensitive and responsive caregiving using operationalized mentalization-based behavioral components. MISC has demonstrated positive treatment effects on mental health and cognitive outcomes. However, no mentalization-based caregiver intervention's impact on child mentalizing capacity has yet been evaluated. The present study had an overall aim of examining social cognition (mentalizing capacity) of OVC and evaluating MISC's impact on social cognition (mentalizing capacity) compared with a TAU control group (Treatment as Usual). Social cognition was assessed using a culturally adapted version of the Affect Task at baseline and after 12 months of MISC with community-based organization (CBO) careworkers. Results of the study revealed a statistically significant treatment effect of MISC on social cognition when compared to the TAU group. However, when controlling for mental health difficulties at baseline, the treatment effect of MISC was not statistically significant. This study represents the first demonstrated increase in child mentalizing capacity by a mentalization-based caregiver intervention and adds to the MISC evidence base for children with attachment trauma. However, important future directions of research are also discussed, including the need to further assess how improvements in social cognition may represent a mechanism of change in improving mental health outcomes.

## TABLE OF CONTENTS

<b>ABSTRACT</b> .....	ii
<b>LIST OF TABLES</b> .....	iv
<b>INTRODUCTION</b> .....	1
Attachment Disruption and Social Cognition among OVC.....	1
Interventions Aimed at Improving Social-Cognitive Function and Mental Health.....	4
Current Study.....	7
Aims and Hypotheses.....	8
<b>METHODS</b> .....	8
Participants and Procedures.....	8
Measures.....	9
Intervention.....	12
Data Analytic Strategy.....	14
<b>RESULTS</b> .....	15
Aim 1.....	16
Aim 2.....	16
<b>DISCUSSION</b> .....	17
<b>REFERENCES</b> .....	21

## LIST OF TABLES

<b>Table 1.</b> Demographic variables and outcomes by treatment group.....	26
<b>Table 2.</b> Bivariate correlations between study variables.....	27
<b>Table 3.</b> Multiple linear regression between intervention and social cognition.....	28
<b>Table 4.</b> Multiple linear regression between intervention and social cognition controlling for mental health difficulties.....	29

## **Attachment Disruption and Social Cognition among OVC**

South Africa (SA) has one of the highest rates of HIV/AIDS globally with over 14% prevalence in the overall population (Simbayi et al., 2019). The impact of the HIV/AIDS epidemic in SA is far-reaching; with families and communities bearing substantial effects beyond the morbidity and mortality of the individuals living with the disease. The term “Orphans and Vulnerable Children” (OVC) has been operationalized to describe children who are impacted by the loss or chronic illness of a parent or are otherwise made vulnerable by HIV/AIDS (Foster et al., 2005). OVC are at increased risk for a variety of adverse events including hunger, school dropout, homelessness, physical and sexual abuse, lack of family support, and psychological problems (Betancourt et al., 2013; Chi & Li, 2013; Cluver et al., 2007; Doku, 2009; Govender et al., 2014; Lata & Verma, 2013; Sharp et al., 2015; Skinner et al., 2013; Thurman & Kidman, 2011). There are an estimated 2-4 million OVC in South Africa (UNAIDS, 2012; UNICEF, 2013).

In addition to the difficulties mentioned above, OVC experience consequential impacts within their formative relationships with caregivers and their families. Beyond the possibility of losing a primary attachment figure, OVC may shoulder the difficulty of becoming the caretaker of a chronically ill parent or the “child-head” of a household or be placed in institutionalized care (Kang’ethe & Makuyana, 2015; Skinner et al., 2006; Thurman & Kidman, 2011). Even if children remain living at home with family members, they may receive additional services and care at institutions such as Community Based Organizations (CBO’s) such as meals, counselling services, financial assistance, and healthcare counseling (Marais et al., 2018; Richter et al., 2009). CBO attendance on its own has been found to have a positive psychosocial effect on OVC (Yakubovich et al., 2016).

The disruption of relationships with attachment figures or “attachment trauma” adversely impacts emotional, cognitive, and psychological development for OVC (Heath et al., 2014; Levy & Orlans, 1998; Sharp et al., 2008). Indeed, the “serve and return” of a relationship with a primary caregiver is the learning environment for many skills used throughout childhood and beyond including social-cognitive development (Sharp et al., 2008). Sharp and colleagues define social cognition as “the capacity to think about others’ thoughts, intentions, feelings, attitudes, and perspectives” which allows us to function interpersonally (Moskowitz, 2005; Sharp et al., 2008). Social cognition encompasses several domains including social perception, emotion recognition, and theory of mind (or mentalizing) which develop as children age. Without the natural laboratory of an attachment figure relationship, whether due to the death of the parent, chronic illness, or other risk factors which inhibit the parent’s ability to be sensitive and responsive to a child, the child’s social-cognitive development may be disrupted, resulting in a limited ability to relate to others or function effectively interpersonally (Sharp & Hernandez, 2021). Such disruptions and their associated social-cognitive dysfunctions do not uniquely manifest in any specific psychopathology but is viewed as a transdiagnostic risk factor for psychopathology (Lavoie et al., 2014; Preißler et al., 2010; Weightman et al., 2014). Children with disrupted social cognition, who have trouble understanding and attributing mental states to self and others, encounter difficulty when communicating with others and exchanging information (Ahmed & Stephen Miller, 2011; Hamilton, 2009), including misinterpretation of verbal or facial cues. These social cognitive difficulties impact global functioning and quality of life (Fett et al., 2011; Maat et al., 2012).

While the literature base in Sub-Saharan Africa (SSA) and SA specifically with regard to the above premise is still being developed, available research does indicate disrupted social-

cognitive development among OVC. In a study of attachment in a peri-urban sample of mother-infant dyads in SA (n=147) using the Strange Situation procedure (Ainsworth et al., 1978), over one-quarter of the sample was characterized as disorganized (Tomlinson et al., 2005), which is higher than the average 15% (Van Ijzendoorn et al., 1999). Insecure attachment disrupts the natural laboratory where children can practice the serve-and-return to promote optimal social-cognitive development (Sharp et al., 2020). Consistent with other populations, the presence of trusting relationships with adults has been found to be protective for psychological well-being of OVC in SSA, regardless of living environment (with extended family members or institutionalized care; Barenbaum & Smith, 2016), underscoring the importance of attachment figures in social cognitive development. Another study in Uganda with low-SES preschool aged children found that child theory of mind ability was positively correlated with caregiver social support, caregiver education level, and time spent reading aloud to children (Goodman & Dent, 2019), supporting the relationship between positive parenting behaviors and characteristics, such as education and SES, and social- cognitive development. Another mentalization-related construct is empathy, which has been measured in association with aggressive behavior in low and middle-SES school-aged children in South Africa. Empathy had an inverse correlation with aggressive, externalizing behavior indicating emotional and behavioral problems in nearly one-quarter of a study sample (Malcolm-Smith et al., 2015). A study of Swaziland youth found that perceptions of sadness in negative and ambiguous expressions mediated the relationship between adversity and empathic concern in an emotion recognition and empathy function task (Quas et al., 2017). This study is consistent with previous research that shows higher reactivity and response bias associated with negative emotions among maltreated children (da Silva Ferreira et

al., 2014). In the current literature, we were not able to identify any longitudinal examination of social cognitive development in vulnerable children in SSA or SA specifically.

### **Interventions Aimed at Improving Social-Cognitive Function and Mental Health**

Given the disruptions, including attachment trauma experienced by OVC, culturally and developmentally appropriate interventions have been developed to support the socio-emotional and cognitive development of OVC in SA. One such intervention is the Mediation Intervention for Sensitizing Caregivers (MISC). MISC is a year-long semi-structured, manualized video-feedback caregiver intervention that targets the interaction between caregivers and children. Theoretically grounded in both Bowlby's attachment theory (Bowlby, 1979) and Feuerstein's theory of cognitive modifiability (Feuerstein, 1979), MISC has been utilized across the developmental spectrum with a variety of child populations and their caregivers to target several outcomes including cognitive and mental health problems by targeting the serve-and-return between caregivers and children.

Previous research has established that children with mentalizing caregivers, compared to children with caregivers who do not mentalize, have higher performance on social cognitive tasks and social-cognitive development (Fonagy & Allison, 2014). In addition, several mentalization-based caregiver interventions have been developed and evaluated (Slade et al., 2020; Suchman et al., 2017). However, the behavioral components of mentalizing are difficult to operationalize and therefore difficult to measure. Rigorous, evidence-based mentalization-based therapies (MBT) have not been fully utilized as MBT has not been operationalized or broken down into more tangible components that do not require MBT expert involvement and supervision (Sharp et al., 2020). MISC uses cognitive (mediational) and emotional (affective)



components to translate mentalizing into observable, measurable behaviors. Therefore, it is assumed that MISC increases mentalization capacity of both caregivers and children. However, no mentalization-based intervention has demonstrated improvements in mentalization capacity in children.

MISC aims to increase caregivers' mediational behaviors to allow learning in every interaction, thereby improving children's cognitive and socio-emotional outcomes. Mediational behaviors of caregivers include affective components such as eye contact, smiles, vocalization, sharing of joy, touch, physical closeness, and turn-taking, which communicate messages of "it's worthwhile to act," "I'm with you," and "I love you" to the child. In MBT, these affective behaviors are referred to as "ostensive cuing" which indicates epistemic trust between the child and the caregiver (Fonagy & Allison, 2014). In addition to the affective components, cognitive (mediational) components including focusing, providing meaning, expanding, regulating, and rewarding are used to facilitate learning. For example, in an everyday interaction like coloring a picture, a caregiver may sit close to a child and make eye contact (affective components). The caregiver may then say "Let's look at this" (focusing: communicating intention to teach). "These are crayons we can use to color the picture" (providing meaning: describing, naming without interpreting). "Have you ever used a crayon to color before?" (request for expansion: explaining, clarifying, comparing, or adding new experiences that go beyond the immediate interactions). "First, we hold the crayon like this. Then we carefully use the crayon to color within the lines of the drawing" (regulating: connecting experiences in the present with those in the past or future). "Nice job coloring within the lines! Now let's do another" (rewarding: expression of satisfaction of behavior). Together, the affective and mediational components form the foundation of MISC (Klein et al., 1987).

MISC has been implemented across a variety of settings, including its original validation in low-SES mother-infant dyads in Israel (Klein & Alony, 1993) which showed MISC's longitudinal (three-year follow up) positive effect on maternal mediation and positive child behavioral and cognitive outcomes. In Uganda, MISC has shown significant child cognitive treatment effects, especially in language development, and improvements in caregiver well-being for HIV-affected caregiver-child dyads (Bass et al., 2017; Boivin et al., 2013a) and for HIV-exposed, uninfected caregiver-child dyads (Boivin et al., 2013b; Boivin et al., 2017). In South Africa, MISC has demonstrated positive intervention effects on child mental health outcomes and improved quality of caregiving (Sharp et al., 2021).

Despite the evidence of MISC's positive effects on cognitive outcomes (Boivin et al., 2013a, 2013b) and mental health outcomes (Sharp et al., 2021), it is not currently known how MISC impacts mentalizing capacity (social cognition). Social cognition represents both an additional treatment outcome of MISC and a mechanism of change which may ultimately improve mental health outcomes. MISC's goal of improving the serve-and-return between children and their caregivers is hypothesized to increase mentalizing capacity, thereby improving children's ability to function interpersonally.

Another advantage of MISC is its cultural transportability and adaptability is due to its orientation as a strengths-based intervention that does not impose a model of parenting on the caregiver. Rather, MISC encourages maternal reflective function (Sharp & Fonagy, 2008) and builds awareness so that caregivers enhance their own caregiving independently and consistent with their own culture by sensitizing the caregiver to the mind of the child (Sharp et al., 2021; Sharp et al., 2020). As MISC does not require any materials or additional activities and targets everyday interactions, it is well suited for low-resource settings (Klein, 1996; Sharp et al., 2018).

Additionally, MISC is developmentally transportable, with demonstrated effects in infants (Klein, 1996), preschool-aged children (Boivin et al., 2013a, 2013b), and children aged seven to eleven (Sharp et al., 2021). Given the transportable attributes of MISC across developmental stages and diverse populations, this intervention holds promise to promote the healthy social cognitive development in OVC in South Africa.

### **The Current Study**

Despite the known attachment trauma and associated disruptions in social cognitive development among OVC, social cognition is understudied in OVC. Current research is limited to cross-sectional studies of OVC in SSA (Barenbaum & Smith, 2016; Goodman & Dent, 2019; Quas et al., 2017). Other studies in SA have focused on community-based samples of vulnerable children and their caregivers without attachment trauma (Tomlinson et al., 2005). The current study will utilize a validated measure, the Affect Task (Steele et al., 1999), to examine social cognition (mentalizing) in a sample of OVC in SA during a one-year intervention period with treatment and control groups.

Further, interventions to promote social cognitive development and mentalizing capacity are understudied in vulnerable global populations. This study will expand the evidence of MISC as an intervention to improve social cognitive outcomes in OVC in SA. This study will compare social cognitive outcomes between MISC and Treatment as Usual (TAU) post-intervention, controlling for age, gender, quality of child's home environment, and socio-economic status. This is the first study to evaluate whether a mentalization-based intervention (MISC) impacts social cognition (mentalization capacity) in children.

## **Aims and Hypotheses**

**Aim 1:** The first aim of this study was to describe social cognition (using the Affect Task) and relevant factors including age, gender, orphan status, socio-economic status (SES), quality of home environment, and mental health difficulties.

**Hypothesis 1:** We expected to find social cognition to be negatively correlated with experiencing attachment disruption by losing one or both parents, decreased quality of home environment, decreased SES, and increased mental health difficulties (SDQ).

**Aim 2:** The second aim of this study was to investigate the effect of MISC on social cognition (using the Affect Task) compared to treatment as usual at the end of the yearlong study period, controlling for relevant covariates. Mental health problems was included as an exploratory variable.

**Hypothesis 2:** We expected to find a statistically significant effect of the intervention on social cognition such that scores on the Affect Task at follow-up were increased for the MISC group when compared to the TAU group.

## **Methods**

### **Participants and Procedures**

For the purposes of this study, an archival dataset was utilized of a quasi-experimental trial that was conducted in South Africa between 2018-2019. Data were collected from 88 OVC ages 7-11 ( $M= 9.4$ ) that were recruited from four CBO's in Mangaung, Free State, South Africa. Mangaung is a large urban center characterized by a high HIV prevalence rate of 40% (Groenewald et al., 2012), compared to 12.2% in the general SA population (Zuma et al., 2016) and a high rate of orphanhood in children (31%; Marais et al., 2013). The majority of Mangaung's population is Black (82%) and Sesotho. Sesotho culture emphasizes community

parenting and authoritarian parenting practices such as physical punishment, obeying adults, and avoiding eye contact as a sign of respect (Sharp et al., 2021; Sharp et al., 2011). These cultural factors are important for this study as MISC pertains to caregiving practices and cultural factors related to children and adults. The cultural adaptation of MISC is discussed below.

Demographic, baseline, and outcome data are included in Table 1. Inclusion criteria for this study were that the child was a resident in the CBO catchment area, the child was between the ages of 7-11, and that the child and caretaker agreed to participate in the study. Exclusion criteria included a medical history of serious birth complications, severe malnutrition, bacterial meningitis, encephalitis, cerebral malaria, other known brain injury or disorder requiring hospitalization or continued evidence of seizure or other neurological disability or had a first language other than Sesotho.

The present study was approved by institutional review boards at the University of Houston and University of the Free State. Of the four CBO's that participated in the study: two received MISC training for careworkers and two continued care as usual (TAU). Recruitment for the study occurred at the level of the CBO. Eligible children were identified by CBO caregivers and staff. Parental or legal guardian consent was obtained in addition to child assent. CBO careworkers also provided consent to participate in the study.

## **Measures**

**Social Cognition (Mentalizing).** The Affect Task (Steele et al., 1999) is a cartoon-based measure of emotional understanding which depicts ambiguous scenarios and prompts for the child to identify and discuss facial expressions and emotions. A child is shown a set of cartoon scenarios of a social interaction between a child and another person (peer, parent, sibling, teacher), each with a final panel where the characters are drawn without any facial expression.

The child is then asked to identify what emotion the characters might be feeling, why they are feeling that way, and whether they could be feeling any other emotions. Each item of the Affect Task is scored out of three points, where 1= no reference involving either the transparent faces or words, 2= reference with faces or words with no explanation, 3= reference with faces or words with a verbal justification or references with faces and words in the context of a full verbal justification, with three separate scores for the child's labeling of the first emotion, understanding mixed or multiple emotions, and understanding the emotions of others. The Affect Task has demonstrated good reliability between raters with 94% agreement (Steele et al., 1999) and validity with correlated attachment security (Steele et al., 1999) and rates of emotional and behavioral problems with children aged 7-14 (Schlesinger, 2015). For this study, a subset of 13 (19.4%) Affect Tasks were reliability coded by a second trained rater. Intra-class correlation for average scores at baseline was .80 indicating good inter-rater reliability.

The Affect Task was selected for this study because it is an accessible, adaptable measure of children's understanding of mixed emotions. Originally developed for use in the United Kingdom, the measure was culturally adapted to fit with Sesotho children. Adaptations included administration of the prompts in Sesotho, altering characters' appearance (skin tone, hair texture) to be consistent with Black South African children, and elimination of cartoon scenarios which did not fit the cultural context (e.g., riding a bicycle, going on vacation).

**Socioeconomic Status.** Consistent with widely used measures in LMIC and in order to account for fluctuations in income and expenditure (Booyesen et al., 2008; Kabudula et al., 2017), SES was assessed using a composite index of household assets. A questionnaire was used containing a list of available household assets including dwelling type (ex: traditional, brick, shack), access to water and sanitation, use of electricity, and eight types of items such as

household appliances (television, radio, stove, phone, car), productive manufacturing equipment, and farming equipment. A count of these assets created an SES score. Asset data were collected by trained fieldworkers during a home visit for each child in the study. SES composite scores ranged from 0 to 4 ( $M = 2.9$ ;  $SD = 1.1$ ).

**Home Environment of the Child.** The Caldwell Home Observation for the Measurement of the Environment (HOME; Bradley et al., 1988) is an interview- and observation-based tool with the legal guardian of a child to assess the quantity and quality of social, emotional, and cognitive support available to the child in the home environment. Several developmental versions of the HOME Inventory have been developed and this study used the version validated for children aged six to ten. The HOME Inventory contains five subscales: emotional and verbal responsiveness, encouragement of maturity, emotional climate, growth-fostering materials and experiences, provision for active stimulation, family participation in developmentally stimulating experiences, paternal involvement, and aspects of the physical environment. The HOME Inventory has been previously validated in South Africa in a sample of Black South African infants and families (Richter & Grieve, 1991). The HOME Inventory has been used in previous MISC studies in SSA (Boivin et al., 2013a, 2013b; Sharp et al., 2021). Consistent with these previous studies, trained fieldworkers administered the HOME Inventory assessments. Cronbach's alpha for this study was .87.

**Mental Health Problems.** To assess child mental health outcomes, the Strengths and Difficulties Questionnaire (SDQ) was administered to children, parents, and careworkers. The SDQ is a 25-item multi-informant survey measure of emotional and behavioral problems for children ages 3-17 (Goodman, 1997). The SDQ produces a total difficulties score representing overall mental health difficulty, as well as five subscales: emotional problems, conduct

problems, inattention-hyperactivity, peer problems, and prosocial behavior. The total difficulties score is a sum of all items excluding the prosocial behavior scale. Higher total scores indicate higher psychiatric disorder burden. The SDQ has been utilized in Sub-Saharan Africa and in South Africa with Sesotho-speaking populations previously (Cluver et al., 2007; Doku, 2009; Sharp et al., 2014). For each study participant, the three informants' (self, parent, and careworker) total scores were standardized and averaged to create an overall index of child mental health difficulties. The parent-report form was completed by the child's legal guardian and the teacher-report form was completed by the child's careworker at his or her CBO. Cronbach's alpha for self-report, parent-report, and teacher-report were .73, .83, and .83 respectively.

**Demographics.** Demographic information including gender, age, and status of parents (orphan status) was collected at the time of study enrollment via trained study staff. Consistent with previous research with OVC, orphan status was categorized as non-orphan (both parents alive), single orphan (one parent deceased), and double orphan (both parents deceased).

### **Intervention**

MISC is a year-long caregiver intervention meant to enhance interactions between caregivers and children. The intervention aims to increase caregivers' mediational behaviors in order to bring about learning in every interaction and thereby to improve children's cognitive and socio-emotional outcomes. Caregivers were trained by study team members and received bi-weekly individual sessions using video feedback.

MISC was adapted for the CBO context in South Africa using the Framework for Reporting Adaptations and Modifications-Expanded (FRAME; Stirman et al., 2019). FRAME contains eight modules used to describe intervention adaptation. Iterative adaptations were made



to MISC in the year preceding the implementation of the study to achieve acceptability. Several modifications including adaptation to culture and context were identified based on theoretical models but all adaptations were collaboratively determined with the community advisory board (CAB), focus group participants, intervention experts, and finalized with the study team. The CAB consisted of directors of two CBO's, two community religious leaders, and two representatives from a well-established non-governmental organization working with children's rights. A member from the local municipality and a representative from the Department of Social Development were invited to the CAB. These community stakeholders were selected on the basis of their knowledge and legitimacy in the community. In addition to the CAB, feedback was sought via focus groups with community religious leaders, CBO careworkers, and OVC and their caregivers to incorporate their feedback into the intervention.

MISC was adapted for the Sesotho cultural context and to enhance MISC's socioemotional focus. The importance of eye contact as an affective component of MISC and the cognitive component of Expansion were evaluated throughout implementation after focus group participants identified cultural barriers to these components. As Sesotho culture tends to include more authoritarian instruction practices and emphasize a passive role for children (instead of collaborative), the MISC components were kept to maintain intervention fidelity but were evaluated throughout implementation to determine relevance for future adaptations. MISC's strength-based approach was viewed as culturally sensitive in general, as MISC does not impose any model of caregiving. Rather, MISC enhances the practices already taking place that have positive effects. For implementation at CBO's, increased managerial support was necessary for careworkers and MISC training sessions were set bi-weekly to fit with CBO schedules. To enhance MISC's mental health application, examples of socio-emotional learning events were

incorporated. Finally, discussions of the severe trauma and emotional problems of the children involved of the study occurred in focus groups. While no adaptations were made to MISC as a result, these discussions underscored the importance of sensitivity to the vulnerability of the population participating in the study. These modifications reflect adaptation at the child level, systems level, and treatment focus level. All adaptations maintained intervention fidelity and maximized cultural fit for the Sesotho CBO context.

### **Data Analytic Strategy**

Descriptive statistics were computed for the following variables: age, gender, orphan status, socio-economic status (SES), quality of home environment (HOME), mental health difficulties, and social cognition. All analyses were computed using SPSS version 27.

To test regression assumptions, the following were used: (a) a bivariate plot of the predicted value against residuals (fitting a Loess curve) to test linearity, (b) the bivariate plot of the predicted value against residuals to examine homoskedasticity, (c) a Q-Q plot of standardized residual to examine normality of residuals, and (d) boxplots of residuals and time variables to look for non-independence. Boxplots were also looked at using a modified boxplot rule for determining outliers (Carling, 2000). The modified boxplot rule considers a distance as an outlier if  $D > \text{median} + k * IQR$  or  $D < \text{median} - k * IQR$ , with the  $k = (17.63n - 23.64)/(7.74n - 3.71)$ , where  $n =$  sample size, and the  $IQR$  represents the difference between the upper quartile and the lower quartile (Complete computational details can be found in Wilcox, 2003). All regression assumptions were met.

**Aim 1.** Pearson correlations were computed to examine relations between each of the following variables: social cognition at baseline (Affect Task), age, gender, orphan status (orphan vs. non-orphan), SES, HOME, and mental health problems (SDQ).

**Aim 2.** For Aim 2, the data was first analyzed to determine whether a statistically significant clustering effect of caseworker was present among children using a multilevel modeling (MLM) approach. Children (Level 1) were nested within careworkers at follow up (Level 2,  $n = 13$ ). First, an unconditional model with no predictors was tested for the dependent variable (Affect Task score at follow up). An intraclass correlation coefficient (ICC) was calculated to determine whether a statistically significant effect was present due to children clustered within careworkers. If ICC was above .10, the clustering effect would have been included in the model. The ICC was calculated for this sample as .036, meaning only 3.6% of the variability in the outcome (Affect Task at follow up) is accounted for by careworkers, leaving 96.4% of the variability to be accounted for by children. As such, the clustering effect was not included in the model.

A multiple linear regression was utilized to predict social cognition (Affect Task) at follow up. All variables from Aim 1 were included in the model. Additionally, to control for baseline social cognition score, Affect Task at baseline was included as a covariate. All continuously distributed variables were grand mean-centered to alleviate potential collinearity and ensure a correct interpretation of results. A dummy coded intervention group (MISC vs. TAU) was included as a covariate. Covariates were considered as statistically significant if  $p < .05$ .

[Table 3]

## Results

Descriptive statistics are contained in Table 1 and the treatment groups were compared the using Pearson Chi-Square test. No significant differences between MISC and Treatment as Usual (TAU) groups for gender, age, SES, and social cognition. Significant differences were found between MISC and TAU groups for orphan status, quality of home environment, and mental health difficulties at baseline ( $p < .05$ ).

[Table 1]

**Aim 1.** Pearson Correlations were computed to examine relations between each of the following variables: social cognition at baseline and follow-up (Affect Task), age, gender, orphan status (orphan vs. non-orphan), SES, HOME, and mental health problems at baseline and follow-up (SDQ). Statistically significant positive correlations were observed between age and orphan status ( $r = .235, p < .05$ ), social cognition at baseline and SES ( $r = .265, p < .05$ ), social cognition at baseline and mental health difficulties at baseline ( $r = .341, p < .05$ ), mental health problems at baseline and at follow up ( $r = .426, p < .05$ ), and social cognition at follow-up and SES. A statistically significant negative correlation was observed between mental health difficulties at baseline and orphan status ( $r = -.329, p < .05$ ).

[Table 2]

**Aim 2.** The results of the multiple linear regression (Table 3) revealed that the intervention (MISC) had a statistically significant effect on social cognition at follow-up when controlling for age, gender, orphan status, quality of home environment, SES, and social cognition at baseline, such that social cognition was increased in the MISC group compared to the TAU group ( $\beta = .380; p < .05$ ). No other variables were statistically significant in the model in association with social cognition at follow up.

[Table 3]

[Figure 1]

The results of the exploratory multiple linear regression which added mental health problems at baseline as a predictor (Table 4) revealed no statistically significant effects of any of the following variables: age, gender, orphan status, quality of home environment, mental health problems at baseline, or social cognition at baseline. No statistically significant effect of the intervention was observed in the model that included mental health problems at baseline.

[Table 4]

## **Discussion**

This study found that MISC administered by CBO careworkers had a statistically significant treatment effect on social cognitive development among OVC in South Africa, such that the MISC group had higher scores on the Affect Task than the TAU group at one year follow-up. Previous studies had shown positive treatment effects on cognitive outcomes (Boivin et al., 2013a, 2013b) and mental health outcomes (Sharp et al., 2021). Additionally, MISC was hypothesized to impact mentalizing capacity because it operationalizes MBT components into granular, observable behaviors (Sharp et al., 2020). However, this is the first study to show a statistically significant increase in mentalizing capacity (social cognition via Affect Task) through the mediational and affective components of MISC. Put differently, the sensitive and responsive caregiving behaviors in MISC (Sharp et al., 2021), were associated with an increased social cognitive (mentalizing) capacity of vulnerable children in this sample.

MISC has previously demonstrated increases in quality of caregiving by CBO careworkers (Sharp et al., 2021). As social cognition and mentalizing capacity develop within the natural laboratory context of attachment figure relationships, MISC allows caregivers to utilize granular, operationalized, behavioral processes to increase their own sensitive and responsive caregiving behaviors, thereby slowing down the interaction and allowing learning and mentalizing to take place for the child (Fonagy & Allison, 2014; Sharp et al., 2021). MISC operationalizes the use of affect in MBT using the emotional components (Jurist, 2005), and breaks down mentalizing into specific, observable behaviors using the cognitive components (Sharp et al., 2020). Increased social cognitive capacity in the children in the MISC group demonstrates that sensitizing caregivers to the mind of the child via operationalized MBT components during the “serve and return” between a child and caregiver can enhance mentalizing capacity in the child.

Importantly, when the exploratory variable of mental health problems was added into the regression, the treatment effect of MISC on social cognition was not observed. There was a statistically significant difference in mental health problems between treatment groups at baseline such that the MISC group had higher SDQ scores which indicates increased mental health problems. As social cognition is associated with global functioning (Maat et al., 2012) and is transdiagnostically related to psychopathology (Fett et al., 2011), improvements in social cognition may be linked to pre-existing mental health difficulties. However, social cognitive capacity was not statistically significantly different between the groups at baseline. Further research is needed to examine whether social cognition (mentalizing) moderates improvement in mental health outcomes, demonstrating that MISC’s improvements in mentalizing capacity are the mechanism of change in mental health outcomes. Based on the semi-partial correlation

between intervention and social cognition, controlling for mental health problems ( $r = -.118$ ). Future studies should include a larger sample size of 1072 subjects. Additionally, SES was associated with social cognition at both baseline and follow-up timepoints. SES is an important correlate of child socio-emotional outcomes for this sample, regardless of intervention.

This study also demonstrates the high potential of CBO environment and community organization in general as effective intervention delivery contexts. Despite the fact that CBO careworkers are not primary attachment figures for most children in the study sample, indeed children spend on average three hours per day after school and some weekends at the CBO, statistically significant treatment effects were observed. Additionally, CBO careworkers experienced high turnover during the study (Sharp et al., 2021), but received ongoing training, support, and supervision which maintained intervention fidelity and supported treatment outcomes. These ongoing aspects of the MISC model are essential to maintain intervention fidelity and support of the MISC trainers. These aspects of MISC also speak to the agility of the intervention to create outcomes in real-world, resource-poor environments.

This study has several limitations. Future studies would benefit from adding a measure of intervention fidelity, both for trainer-careworker training and supervision, and for careworker-child interactions. Quality of caregiving by the careworker with the child was collected at baseline, six-months, and one year, using the Observing Mediation Interaction (OMI; Klein, 2014) and has been described elsewhere (Sharp et al., 2021). However, fidelity to the intervention was not measured additionally between the child and careworker or at all between the trainer and the careworker. Additionally, randomization at the level of the CBO may have contributed to baseline differences (described in Table 1) and may contribute to lack of generalizability. Finally, the outcome measure of this study, the Affect Task, has not been

validated for use in SSA. While steps were taken to culturally adapt the measure (language, images, content), future research would benefit by validating this measure cross-culturally.

Despite these limitations, this study represents a meaningful expansion of the MISC evidence base to include social cognitive outcomes. This study also demonstrates that the caregiver's operationalized MBT components in MISC (affective and cognitive) increase the mentalizing capacity of children. This effect was observed in this study, despite the careworkers not being primary attachment figures of the children in the sample, and despite significant turnover among careworkers throughout the study period. MISC represents a potentially scalable in a real-world, low resource setting, culturally and developmentally transportable intervention for populations with attachment trauma and disrupted social cognitive development.



## References

- Ahmed, F. S., & Stephen Miller, L. (2011). Executive function mechanisms of theory of mind. *Journal of autism and developmental disorders*, 41(5), 667-678.
- Ainsworth, M. D., Blehar, M., Waters, E., & Wall, S. (1978). Patterns of attachment. In: Hillsdale, NJ: Erlbaum.
- Barenbaum, E., & Smith, T. (2016). Social support as a protective factor for children impacted by HIV/AIDS across varying living environments in southern Africa. *AIDS care*, 28 Suppl 2(sup2), 92-99. <https://doi.org/10.1080/09540121.2016.1176683>
- Bass, J. K., Opoka, R., Familiar, I., Nakasujja, N., Sikorskii, A., Awadu, J., . . . Boivin, M. (2017). Randomized controlled trial of caregiver training for HIV-infected child neurodevelopment and caregiver well being. *AIDS*, 31(13), 1877-1883. <https://doi.org/10.1097/QAD.0000000000001563>
- Betancourt, T. S., Meyers-Ohki, S. E., Charrow, A., & Hansen, N. (2013). Annual research review: Mental health and resilience in HIV/AIDS-affected children—a review of the literature and recommendations for future research. *Journal of Child Psychology and Psychiatry*, 54(4), 423-444.
- Boivin, M. J., Bangirana, P., Nakasujja, N., Page, C. F., Shohet, C., Givon, D., . . . Klein, P. S. (2013a). A year-long caregiver training program improves cognition in preschool Ugandan children with human immunodeficiency virus. *Journal of Pediatrics*, 163(5), 1409-1416 e1401-1405. <https://doi.org/10.1016/j.jpeds.2013.06.055>
- Boivin, M. J., Bangirana, P., Nakasujja, N., Page, C. F., Shohet, C., Givon, D., . . . Klein, P. S. (2013b). A Year-long Caregiver Training Program to Improve Neurocognition in Preschool Ugandan HIV-exposed Children. *Journal of Developmental and Behavioral Pediatrics*, 34(4), 269-278. <https://doi.org/Doi 10.1097/Dbp.0b013e318285fba9>
- Boivin, M. J., Nakasujja, N., Familiar-Lopez, I., Murray, S. M., Sikorskii, A., Awadu, J., . . . Bass, J. K. (2017). Effect of caregiver training on the neurodevelopment of HIV-exposed uninfected children and caregiver mental health: A Ugandan cluster-randomized controlled trial. *Journal of Developmental and Behavioral Pediatrics*, 38(9), 753-764. <https://doi.org/10.1097/DBP.0000000000000510>
- Booyesen, F., Van Der Berg, S., Burger, R., Von Maltitz, M., & Du Rand, G. (2008). Using an asset index to assess trends in poverty in seven Sub-Saharan African countries. *World Development*, 36(6), 1113-1130.
- Bowlby, J. (1979). The Bowlby-Ainsworth attachment theory. *Behavioral and Brain Sciences*, 2(4), 637-638.
- Bradley, R. H., Caldwell, B. M., Rock, S. L., Hamrick, H. M., & Harris, P. (1988). Home observation for measurement of the environment: Development of a home inventory for use with families having children 6 to 10 years old. *Contemporary Educational Psychology*, 13(1), 58-71.
- Carling, K. (2000). Resistant outlier rules and the non-Gaussian case. *Computational Statistics & Data Analysis*, 33(3), 249-258.
- Chi, P. L., & Li, X. M. (2013). Impact of Parental HIV/AIDS on Children's Psychological Well-Being: A Systematic Review of Global Literature. *Aids and Behavior*, 17(7), 2554-2574. <https://doi.org/DOI 10.1007/s10461-012-0290-2>

- Cluver, L., Gardner, F., & Operario, D. (2007). Psychological distress amongst AIDS-orphaned children in urban South Africa. *J Child Psychol Psychiatry*, 48(8), 755-763. <https://doi.org/10.1111/j.1469-7610.2007.01757.x>
- da Silva Ferreira, G. C., Crippa, J. A., & de Lima Osório, F. (2014). Facial emotion processing and recognition among maltreated children: a systematic literature review. *Frontiers in psychology*, 5, 1460.
- Doku, P. N. (2009). Parental HIV/AIDS status and death, and children's psychological wellbeing. *International Journal of Mental Health Systems*, 3(1), 26. <https://doi.org/10.1186/1752-4458-3-26>
- Fett, A.-K. J., Viechtbauer, W., Penn, D. L., van Os, J., & Krabbendam, L. (2011). The relationship between neurocognition and social cognition with functional outcomes in schizophrenia: a meta-analysis. *Neuroscience & Biobehavioral Reviews*, 35(3), 573-588.
- Feuerstein, R. (1979). *Ontogeny of learning in man*. Raven Press.
- Fonagy, P., & Allison, E. (2014). The role of mentalizing and epistemic trust in the therapeutic relationship. *Psychotherapy*, 51(3), 372-380. <https://doi.org/10.1037/a0036505>
- Foster, G., Levine, C., & Williamson, J. (2005). *A generation at risk: The global impact of HIV/AIDS on orphans and vulnerable children*. Cambridge University Press.
- Goodman, G., & Dent, V. F. (2019). Studying the effectiveness of the storytelling/story-acting (STSA) play intervention on Ugandan preschoolers' emergent literacy, oral language, and theory of mind in two rural Ugandan community libraries. In *Early Childhood Development: Concepts, Methodologies, Tools, and Applications* (pp. 1174-1205). IGI Global.
- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: a research note. *Journal of child psychology and psychiatry*, 38(5), 581-586.
- Govender, K., Reardon, C., Quinlan, T., & George, G. (2014). Children's psychosocial wellbeing in the context of HIV/AIDS and poverty: a comparative investigation of orphaned and non-orphaned children living in South Africa. *BMC Public Health*, 14, 615. <https://doi.org/10.1186/1471-2458-14-615>
- Groenewald, A. J., Walsh, C. M., Van Wyk, H. J., Van Zyl, S., & Van der Merwe, L. J. (2012). Staging and haematological abnormalities of HIV-infected persons in Mangaung in the Free State Province, South Africa. *African Journal of Primary Health Care and Family Medicine*, 4(1), 1-5.
- Hamilton, A. F. d. C. (2009). Research review: Goals, intentions and mental states: Challenges for theories of autism. *Journal of Child Psychology and Psychiatry*, 50(8), 881-892.
- Heath, M. A., Donald, D. R., Theron, L. C., & Lyon, R. C. (2014). AIDS in South Africa: Therapeutic interventions to strengthen resilience among orphans and vulnerable children. *School Psychology International*, 35(3), 309-337.
- Jurist, E. L. (2005). Mentalized affectivity. *Psychoanalytic Psychology*, 22(3), 426.
- Kabudula, C. W., Houle, B., Collinson, M. A., Kahn, K., Tollman, S., & Clark, S. (2017). Assessing changes in household socioeconomic status in rural South Africa, 2001–2013: a distributional analysis using household asset indicators. *Social Indicators Research*, 133(3), 1047-1073.
- Kang'ethe, S., & Makuyana, A. (2015). Re-Thinking and Reconceptualizing Child Care Institutionalisation in South Africa: Effects and Impacts on Orphans and Vulnerable Children (OVCs). *Journal of Social Sciences*, 42(1-2), 121-128.

- Klein, P. S. (1996). *Early intervention: Cross-cultural experiences with a mediational approach*. Routledge.
- Klein, P. S. (2014). *OMI - Observing Mediational Interaction Manual* [Unpublished manuscript].
- Klein, P. S., & Alony, S. (1993). Immediate and sustained effects of maternal mediating behaviors on young children. *Journal of Early Intervention, 17*(2), 177-193.
- Klein, P. S., Wieder, S., & Greenspan, S. I. (1987). A theoretical overview and empirical study of mediated learning experience: Prediction of preschool performance from mother-infant interaction patterns. *Infant Mental Health Journal, 8*(2), 110-129.
- Lata, S., & Verma, S. (2013). Mental health of HIV/AIDS orphans: A review. *Journal of AIDS and HIV Research, 5*(12), 455-467.
- Lavoie, M.-A., Battaglia, M., & Achim, A. M. (2014). A meta-analysis and scoping review of social cognition performance in social phobia, posttraumatic stress disorder and other anxiety disorders. *Journal of anxiety disorders, 28*(2), 169-177.
- Levy, T. M., & Orlans, M. (1998). *Attachment, Trauma, and Healing: Understanding and Treating Attachment Disorder in Children and Families*. ERIC.
- Maat, A., Fett, A.-K., Derks, E., & Investigators, G. (2012). Social cognition and quality of life in schizophrenia. *Schizophrenia research, 137*(1-3), 212-218.
- Malcolm-Smith, S., Woolley, D., & Ward, C. L. (2015). Examining empathy and its association with aggression in young Western Cape children. *Journal of Child & Adolescent Mental Health, 27*(2), 135-147.
- Marais, L., Rani, K., Sharp, C., Skinner, D., Serekoane, J., Cloete, J., . . . Lenka, M. (2018). What role for community?: critical reflections on state-driven support for vulnerable children and orphans in South Africa.
- Marais, L., Sharp, C., Pappin, M., Lenka, M., Cloete, J., Skinner, D., & Serekoane, J. (2013). Housing conditions and mental health of orphans in South Africa. *Health & place, 24*, 23-29. <https://doi.org/10.1016/j.healthplace.2013.08.004>
- Moskowitz, G. B. (2005). *Social cognition: Understanding self and others*. Guilford Press.
- Preißler, S., Dziobek, I., Ritter, K., Heekeren, H. R., & Roepke, S. (2010). Social cognition in borderline personality disorder: evidence for disturbed recognition of the emotions, thoughts, and intentions of others. *Frontiers in behavioral neuroscience, 4*, 182.
- Quas, J. A., Dickerson, K. L., Matthew, R., Harron, C., & Quas, C. M. (2017). Adversity, emotion recognition, and empathic concern in high-risk youth. *PloS one, 12*(7), e0181606.
- Richter, L., & Grieve, K. (1991). Home environment and cognitive development of black infants in impoverished South African families. *Infant Mental Health Journal, 12*(2), 88-102.
- Richter, L. M., Sherr, L., Adato, M., Belsey, M., Chandan, U., Desmond, C., . . . Wakhweya, A. (2009). Strengthening families to support children affected by HIV and AIDS. *AIDS Care, 21 Suppl 1*, 3-12. <https://doi.org/10.1080/09540120902923121>
- Schlesinger, K. (2015). *Emotion Understanding and Attachment Representations in Middle Childhood: A Longitudinal Validation of the Affect Task The New School*].
- Sharp, C., & Fonagy, P. (2008). The Parent's Capacity to Treat the Child as a Psychological Agent: Constructs, Measures and Implications for Developmental Psychopathology. *Social Development, 17*(3), 737-754. <https://doi.org/https://doi.org/10.1111/j.1467-9507.2007.00457.x>

- Sharp, C., & Hernandez, J. (2021). Mindreading and psychopathology in middle childhood and adolescence. In *Theory of Mind in Middle Childhood and Adolescence* (pp. 231-252). Routledge.
- Sharp, C., Jardin, C., Marais, L., & Boivin, M. (2015). Orphanhood by AIDS-related causes and child mental health: A developmental psychopathology approach. *Journal of HIV and AIDS, 1*(3).
- Sharp, C., Kulesz, P., Marais, L., Shohet, C., Rani, K., Lenka, M., . . . Boivin, M. (2021). Mediation Intervention for Sensitizing Caregivers to improve mental health outcomes in orphaned and vulnerable children. In *Journal of Clinical Child and Adolescent Psychology*.
- Sharp, C., Shohet, C., Givon, D., Marais, L., Rani, K., Lenka, M., & Boivin, M. (2018). Early childhood development interventions: A focus on responsive caregiving. *Child and Adolescent Development: An expanded focus on public health in Africa*, 245.
- Sharp, C., Shohet, C., Givon, D., Penner, F., Marais, L., & Fonagy, P. (2020). Learning to mentalize: A mediational approach for caregivers and therapists. *Clinical Psychology: Science and Practice, 27*(3), e12334. <https://doi.org/10.1111/cpsp.12334>
- Sharp, C., Skinner, D., Serekoane, M., & Ross, M. W. (2011). A qualitative study of the cultural appropriateness of the Diagnostic Interview Schedule for Children (DISC-IV) in South Africa. *Social psychiatry and psychiatric epidemiology, 46*(8), 743-751.
- Sharp, C., Venta, A., Marais, L., Skinner, D., Lenka, M., & Serekoane, J. (2014). First evaluation of a population-based screen to detect emotional-behavior disorders in orphaned children in Sub-Saharan Africa. *AIDS and Behavior, 18*(6), 1174-1185.
- Sharp, C. E., Fonagy, P. E., & Goodyer, I. E. (2008). *Social cognition and developmental psychopathology*. Oxford University Press.
- Simbayi, L., Zuma, K., Zungu, N., Moyo, S., Marinda, E., Jooste, S., . . . Van Zyl, J. (2019). South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2017: towards achieving the UNAIDS 90-90-90 targets.
- Skinner, D., Sharp, C., Jooste, S., Mfecane, S., & Simbayi, L. (2013). A study of descriptive data for orphans and non-orphans on key criteria of economic vulnerability in two municipalities in South Africa. *Curationis, 36*(1), 1-8.
- Skinner, D., Tsheko, N., Mtero-Munyati, S., Segwabe, M., Chibatamoto, P., Mfecane, S., . . . Chitiyo, G. (2006). Towards a definition of orphaned and vulnerable children. *AIDS and Behavior, 10*(6), 619-626.
- Slade, A., Holland, M. L., Ordway, M. R., Carlson, E. A., Jeon, S., Close, N., . . . Sadler, L. S. (2020). Minding the Baby®: Enhancing parental reflective functioning and infant attachment in an attachment-based, interdisciplinary home visiting program. *Development and psychopathology, 32*(1), 123-137.
- Steele, H., Steele, M., Croft, C., & Fonagy, P. (1999). Infant-mother attachment at one year predicts children's understanding of mixed emotions at six years. *Social development, 8*(2), 161-178.
- Stirman, S. W., Baumann, A. A., & Miller, C. J. (2019). The FRAME: an expanded framework for reporting adaptations and modifications to evidence-based interventions. *Implementation Science, 14*(1), 1-10.
- Suchman, N. E., DeCoste, C. L., McMahon, T. J., Dalton, R., Mayes, L. C., & Borelli, J. (2017). Mothering From the Inside Out: Results of a second randomized clinical trial testing a

- mentalization-based intervention for mothers in addiction treatment. *Development and psychopathology*, 29(2), 617-636.
- Thurman, T., & Kidman, R. (2011). Child maltreatment at home: Prevalence among orphans and vulnerable children in KwaZulu-Natal, South Africa. *New Orleans: Tulane University School of Public Health*, 201(1).
- Tomlinson, M., Cooper, P., & Murray, L. (2005). The Mother-Infant Relationship and Infant Attachment in a South African Peri-Urban Settlement. *Child development*, 76(5), 1044-1054. <https://doi.org/10.1111/j.1467-8624.2005.00896.x>
- UNAIDS. (2012). *Report on the Global AIDS Epidemic*.
- UNICEF. (2013). National Plan of Action for Children in South Africa 2012-2017.
- Van Ijzendoorn, M. H., Schuengel, C., & Bakermans-Kranenburg, M. J. (1999). Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. *Development and psychopathology*, 11(2), 225-250.
- Weightman, M. J., Air, T. M., & Baune, B. T. (2014). A review of the role of social cognition in major depressive disorder. *Frontiers in psychiatry*, 5, 179.
- Wilcox, R. R. (2003). Inferences based on multiple skipped correlations. *Computational statistics & data analysis*, 44(1-2), 223-236.
- Yakubovich, A. R., Sherr, L., Cluver, L. D., Skeen, S., Hensels, I. S., Macedo, A., & Tomlinson, M. (2016). Community-based organizations for vulnerable children in South Africa: Reach, psychosocial correlates, and potential mechanisms. *Children and Youth Services Review*, 62, 58-64. <https://doi.org/10.1016/j.childyouth.2016.01.016>
- Zuma, K., Shisana, O., Rehle, T. M., Simbayi, L. C., Jooste, S., Zungu, N., . . . Moyo, S. (2016). New insights into HIV epidemic in South Africa: key findings from the National HIV Prevalence, Incidence and Behaviour Survey, 2012. *African Journal of AIDS Research*, 15(1), 67-75.

## Tables

**Table 1.** Demographic variables and outcomes by treatment group

Characteristic	MISC		TAU		Full Sample		p
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Gender							.139
Female	17	38	23	54	48	55	
Male	28	62	20	46	40	45	
Orphan Status							.043*
Non-Orphan	20	53	7	18	27	35	
Single Orphan	14	37	23	59	37	48	
Double Orphan	4	11	9	23	13	17	

*Note.* *N*= 45 for MISC group, *N*=43 for TAU group, *N*= 88 for full group.

Age of participants ranged from 7 to 11 years and on average was 9.4 (*SD*= 1.5) and did not significantly differ by condition. SES ranged from 0 to 5 and on average was 2.9 (*SD*=1.1) and did not significantly differ by condition. Quality of Home Environment (HOME) ranged from 0 to 8 and on average was 3.2 (*SD*= 1.8) and did significantly differ between MISC and TAU groups. Mental health difficulties composite score at baseline ranged from 6 to 22 and on average was 13.3 (*SD*=4.5) and did differ significantly by treatment group. Mental health difficulties composite score at follow up ranged from 6 to 19 and on average was 12.2 (*SD*=3.3) and did not differ between groups. Social cognition at baseline ranged from 1.74 to 2.52 and on average was 2.1 (*SD*= .19) and did not differ significantly between groups. Social cognition at follow-up ranged from 1.83 to 2.74 and on average was 2.2 (*SD*= .16) and did not differ significantly between groups.

\*denotes  $p < .05$ .

**Table 2.** Bivariate correlations between study variables

Variable	1	2	3	4	5	6	7	8	9
1. Age	—								
2. Gender <sup>a</sup>	.069	—							
3. Orphan Status <sup>b</sup>	<b>.235*</b>	-.058	—						
4. SES <sup>c</sup>	.023	.094	.037	—					
5. HOME <sup>d</sup>	-.006	-.029	-.125	.008	—				
6. SDQ (baseline) <sup>e</sup>	-.162	-.049	<b>-.329*</b>	.142	.105	—			
7. Affect Task (baseline)	.020	.050	-.131	<b>.265*</b>	.150	<b>.341*</b>	—		
8. SDQ (follow-up)	-.205	.019	-.019	.212	-.080	<b>.426*</b>	.050	—	
9. Affect Task (follow-up)	.029	-.036	.027	<b>-.286*</b>	.056	.172	-.115	.163	—

<sup>a</sup> Gender was coded such that 1= Female, 2= Male.

<sup>b</sup> Orphan status was dichotomized to non-orphan and orphan, (0 = non-orphan, 1 = orphan).

<sup>c</sup> Socioeconomic status was calculated using a composite asset score described in the methods.

<sup>d</sup> Quality of Home Environment measured by HOME.

<sup>e</sup> Strengths and Difficulties Questionnaire (SDQ) scores from each informant were combined and averaged.

\*  $p < .05$

**Table 3.** Multiple linear regression results showing associations between intervention and social cognition at follow-up when controlling for age, gender, orphan status, SES, quality of home environment, and social cognition at baseline

<i>DV</i> = Social cognition at follow-up	Standardized Coefficients ( $\beta$ )	<i>SE</i>	95% CI		<i>p</i>
			<i>LL</i>	<i>UL</i>	
Intercept		.051	1.497	2.513	<.001
Intervention (MISC)	.380	.050	.007	.208	<b>.037*</b>
Age	.004	.016	-.032	.033	.979
Gender <sup>a</sup>	-.003	.042	-.086	.084	.983
Orphan status	.196	.020	-.017	.064	.241
SES	-.273	.020	-.075	.004	.080
HOME	-.185	.012	-.038	.011	.277
Social cognition at baseline	.141	.123	-.139	.358	.379

*Note.* CI = confidence interval; *LL* = lower limit; *UL* = upper limit.

<sup>a</sup> Gender was coded such that 1= Female, 2= Male.

\**p*<.05



**Table 4.** Multiple linear regression results showing associations between intervention and social cognition at follow-up when controlling for age, gender, orphan status, SES, quality of home environment, mental health problems at baseline, and social cognition at baseline

<i>DV</i> = Social cognition at follow-up	Standardized Coefficients ( $\beta$ )	<i>SE</i>	95% CI		<i>p</i>
			<i>LL</i>	<i>UL</i>	
Intercept		.296	1.288	2.500	<.001
Intervention (MISC)	.272	.054	-.033	.187	.161
Age	.195	.017	-.016	.055	.272
Gender <sup>a</sup>	-.105	.046	-.124	.065	.527
Orphan status	.193	.021	-.019	.065	.276
SES	-.266	.022	-.080	.010	.123
HOME	.021	.017	-.032	.035	.918
Mental health problems at baseline	-.318	.006	-.002	.023	.083
Social cognition at baseline	.033	.151	-.284	.334	.869

*Note.* CI = confidence interval; *LL* = lower limit; *UL* = upper limit.

<sup>a</sup> Gender was coded such that 1= Female, 2= Male.

\**p*<.05

