

CAREGIVER MENTALIZING OPERATIONALIZED AS MEDIATIONAL  
LEARNING AMONG CAREGIVERS OF ORPHANS AND VULNERABLE  
CHILDREN IN SOUTH AFRICA

by  
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## ABSTRACT

Parental mentalizing is an important component of caregiving quality that is thought to facilitate sensitive and responsive caregiving and the development of adaptive social cognition and emotion regulation in children, and ultimately to promote children's mental health and resilience. However, there is less research about parental mentalizing beyond infancy and early childhood, and a lack of observational measures of parental mentalizing for middle childhood and adolescence. Recently, an observational measure of caregiver behavior called Observing Mediational Interactions (OMI), which assesses caregivers' mediation of children's learning during dyadic interactions, has been suggested as a behavioral operationalization of caregiver mentalizing. The present study had an overall aim to evaluate the reliability and validity of the OMI as a behavioral measure of parental mentalizing among caregivers during middle childhood. Reliability and construct validity (convergent and discriminant validity) of the OMI were evaluated in a population of caregivers of orphans and vulnerable children (OVC) in South Africa, a particularly at-risk group for mental health difficulties. Children in this study ( $N = 88$ ) were 7-11 years old and enrolled in one of four community-based organizations (CBOs); caregivers were their CBO careworkers ( $N = 18$ ). Participants were assessed at three time points (baseline, 6-month, 12-month) as part of a larger intervention trial. Careworker-child dyads filmed an interaction at each timepoint, which was coded using the OMI. To evaluate convergent validity, careworkers completed self-report measures of parental mentalizing and their responses from an interview were also coded for mentalizing. Children also completed a task to assess social cognition. To evaluate discriminant validity, children, their parents, and careworkers completed a measure of child emotional and behavioral difficulties. Reliability for OMI components (affective components and five mediational components: focusing, affecting, expanding, rewarding, regulating) was

assessed using intra-class correlations, and adequate reliability was demonstrated in 12 of 18 OMI components across timepoints. Cross-sectional associations between OMI components and convergent and discriminant validity measures were mostly non-significant. However, significant negative associations between Expanding and Regulating behaviors and measures of parental mentalizing, and significant positive associations between Affective components and measures of parental mentalizing, point to directions for future research.

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## **Introduction**

Parental mentalizing is an interpersonal process with transdiagnostic relevance to child socio-emotional and mental health outcomes. It can be conceptualized as part of the Research Domain Criteria (RDoC) Systems for Social Processes, which includes crosscutting factors that help to mediate individuals' responses to interpersonal contexts (Insel, 2010). Parental mentalizing has been shown to help to enhance children's socio-emotional functioning, mental health, and resilience. This study seeks to improve measurement of and advance knowledge on caregiver mentalizing in middle childhood and early adolescence by evaluating the reliability and validity of an existing observational measurement tool, the Observing Mediation Interactions (OMI), as a behavioral measure of caregiver mentalizing. The overall goals of this study are to expand measurement and knowledge on caregiver mentalizing particularly during the developmental periods of middle childhood and adolescence.

### **Background and Significance**

#### ***Parental Mentalizing***

Parental mentalizing refers to a parent's capacity to treat his or her child as a psychological agent with individual needs, internal states, and abilities—a “meeting of the minds” between parent and child (Sharp & Fonagy, 2008; Fonagy & Luyten, 2016). Parental mentalizing is highly significant for children's socio-emotional outcomes: It is foundational to sensitive caregiving (Slade, 2005; Meins, 1997), the transmission of secure attachment from parent to child (Meins, Fernyhough, Fradley, & Tuckey, 2001; Grienberger, Kelly, & Slade, 2005; Slade, Grienberger, Bernbach, Levy, & Locker, 2005), and therefore to the development of adaptive social cognition, emotion regulation, and mental health in children (Fonagy & Luyten, 2016; Slade, 2005; Sharp & Fonagy, 2008). As a mechanism of secure

parent-child attachment, which is a core factor in children's resilience and adaptive outcomes (Masten & Cicchetti, 2016; Weinfield, Sroufe, Egeland, & Carlson, 2008), parental mentalizing may also act as a protective factor for youth against the development of mental illness (Fonagy, Steele, Steele, Higgitt, & Target, 1994; Venta, Shmueli-Goetz, & Sharp, 2014). Importantly, experimental evidence from caregiver interventions (Suchman et al., 2010; Sadler et al., 2013) has shown that caregivers' mentalizing can be improved via intervention. As a modifiable and crosscutting process relevant for children's psychological outcomes, parental mentalizing has considerable promise as a target for caregiver interventions to enhance youth resilience.

### ***Previous Research on Parental Mentalizing and Children's Outcomes***

Parental mentalizing has been positively associated with parents' caregiving behavior (Camoirano, 2017), secure attachment (Borelli et al., 2016; Grienberger et al., 2005; Meins et al., 2001; Slade et al., 2005), and children's socio-emotional outcomes including theory of mind and mentalizing (Benbassat & Priel, 2012; Laranjo et al., 2014; Meins et al., 2002; Meins et al., 2003; Ensink et al., 2015), emotion regulation (Heron-Delaney et al., 2016), and adjustment (Benbassat & Priel, 2012), and inversely associated with internalizing (Esbjörn et al., 2013; Ensink, Leroux, et al., 2017) and externalizing behaviors (Ensink, Leroux, et al., 2017). Moreover, parental mentalizing has shown inverse associations to internalizing and externalizing symptoms among children who have experienced sexual abuse (Ensink et al., 2016; Ensink, Begin, et al., 2017). This evidence illustrates that parental mentalizing may play a protective role against the development of psychopathology and a role in children's resilience following adverse events associated with increased risk for mental illness. This evidence underlines the promise of parental mentalizing as a protective and resilience factor

during development, and aligns with recent calls for increased attention to parental mentalizing in psychological (Borelli et al., 2016) and medical settings (Ordway et al., 2014).

### ***Current Operationalizations of Parental Mentalizing***

In the last 20 years, parental mentalizing has been operationalized in several ways, leading to multiple forms of measurement. Across operationalizations, parental mentalizing refers to a caregiver's ability to treat his or her child as an individual with his or her own mind and to see the child's perspective (Sharp & Fonagy, 2008). In addition, across operationalizations the foundation of parental mentalizing is parent-child attachment (Fonagy, Steele, Moran, Steele, Higgit, 1991), and parental mentalizing is thought to have a pedagogical function (Fonagy, Gergely, & Target, 2007) in helping the child appropriately match their internal experience with the outside world, thereby helping the child learn about the self and the world, and providing a form of scaffolding and facilitating (Csibra & Gergely, 2006; Gergely & Csibra, 2005). Finally, across operationalizations, parental mentalizing serves to slow down interactions, promote the sharing of psychological states, and facilitate cultural learning by the provision of meaning from parent to child (Fonagy et al., 2002; Gergely & Csibra, 2005; Klein, Wieder, & Greenspan, 1987; Sharp et al., 2020; Sharp & Fonagy, 2008).

**Parental Reflective Function.** Perhaps the most common operationalization of parental mentalizing is parental reflective function (RF), which refers to parents' ability to hold, regulate, and fully experience their own and their child's emotions and to understand their own and their child's behavior in terms of underlying mental states (Slade, 2005). Parental RF is typically assessed via parent interview, using the Reflective Function Scale (RFS; Fonagy et al., 1998) coding system applied to the Parent Development Interview (PDI;

Aber et al., 1985; RF-PDI; Slade, Aber, Bresgi, Berger, & Kaplan, 2004), or through self-report, with the Parental Reflective Function Questionnaire (PRFQ; Luyten et al., 2009, 2017). Therefore, measurement of parental RF is typically representational, in that the parental RF is thought to be manifested via parents' descriptions of their own behavior in narrative (when assessed by the PDI) or via representations of their own behavior in self-report (when assessed by the PRFQ).

Recently, Ensink and colleagues (2017) developed a method of assessing parents' RF stance from interactions with children ages 5-12. This task is referred to as the Reflective Parenting Assessment (RPA; Ensink, Normandin, & Terradas, 2003; Normandin et al., 2015). The RPA codes parent behavior from a videotaped parent-child interaction in which the dyad completes Winnicott's Squiggle task, a drawing task in which the parent and child create six drawings together that are representative of stories. The parent directs the task, instructs the child in sequencing a story, and is free to comment and ask questions of the child during the task. The parent also has to maintain the child's interest and cooperation during the task (Ensink et al., 2017). The interaction is then coded for parents' reflective stance. Scores on the RPA have shown moderate association to scores from the Reflective Functioning Scale applied to the Parent Development Interview (Ensink et al., 2017).

**Parental Mind-Mindedness.** Meins' construct of parental mind-mindedness refers to the "proclivity to treat one's infant as an individual with a mind, capable of intentional behavior" (Meins et al., 2002). Meins operationalized parental mind-mindedness in behavior as parents' explicit use of mental state language in interactions with their infants in the first year of life (Meins et al., 2003; Meins & Fernyhough, 2015). These comments are meant to be "mentalistic" in that they are appropriate (i.e., attuned; Meins & Fernyhough, 2015) verbal

references to what the child may be experiencing internally (thoughts, desires, intentions, and memories) based on the child's behavior. In the long-term, mentalistic comments are thought to help children scaffold their experience by helping them make sense of their own behavior in terms of mental states (Meins et al., 2002).

**Marked Mirroring of Affect.** Another means of conceptualizing parental mentalizing during infancy is through parents' marked mirroring of infant affect (Fonagy et al., 2002; Gergely & Watson, 1996). Specifically, marked mirroring refers to parents' mirroring of their infant's emotion, but in a tempered way that both reflects the emotion (therefore helping the infant learn about his or her internal experience and connect it to the outside world) and reflects the idea that the internal experience, even if painful, can be tolerated and even regulated. This process is thought to teach the infant about his or her own internal experience and also send the message that the parent is understanding and trustworthy (Fonagy et al., 2007).

**Parental Meta-Emotion Philosophy.** Gottman and colleagues (1996) developed the idea of PMEP, or caregiver meta-emotion philosophy, which refers to parents' metacognition about both their own and the child's emotions (Gottman et al., 1996; Sharp & Fonagy, 2008). PMEP also involves a coaching element for parents when a child is experiencing a negative emotion; specifically, PMEP considers the extent that parents view the child's negative emotion as a teaching moment or opportunity for closeness, validate their child's emotion, verbally label the child's emotion, and help with problem solving following situations that led to negative emotions (Gottman et al., 1996). Through the parent's awareness of emotions and ability to coach in moments when negative emotions are being experienced, the child learns to regulate his or her emotions. PMEP is measured using the meta-emotion interview

(Katz & Gottman, 1986), which is typically delivered to parents of pre-school children and coded using the meta-emotion coding system (Katz, Mittman, & Hooven, 1994). This coding system is meant to assess the parent's awareness of his/her own and the child's emotion as well as the parent's coaching of the child's emotion.

**Parental Insightfulness.** Oppenheim & Koren-Karie (2002) define parental insightfulness as “the degree to which the parent provides an emotionally complex, accepting picture of the child that includes a wide spectrum of contextually appropriate motives while updating their view of the child in line with new information.” Rather than viewing parental insightfulness as one aspect of sensitive caregiving (Ainsworth et al., 1978), Koren-Karie and Oppenheim (2018) wanted to assess insightfulness on its own as parent's ability to take their child's perspective, as part of the parent's representation of the child. Their measure, the insightfulness assessment (IA; Koren-Karie & Oppenheim, 2000) videotapes three parent-child interactions in everyday, age-appropriate contexts; the parent then watches two minutes of each videotape back and answers questions related to what the child was thinking and feeling during the interaction. The parent's responses are then coded using the IA coding system (Koren-Karie & Oppenheim, 2000). The IA has been used with parents of infants up to adolescents.

**Parental Embodied Mentalizing.** The notion that the majority of caregiver mentalizing measurement had thus far been centered on parents' verbal expressions, which may not capture all aspects of interactive and implicit mentalizing, led to the development of a coding system for parent's embodied mentalizing (PEM) in parent-infant interactions (Shai & Belsky, 2011). PEM is interested in non-verbal kinesthetic interactions between parents and infants, given that this is how infants communicate. PEM is defined as the parent's

ability to “implicitly conceive, comprehend, and extrapolate the infant’s mental states from the infant’s whole-body kinesthetic expressions, and adjust one’s own kinesthetic patterns accordingly” (Shai & Belsky, 2011, p. 3). PEM is measured using the Parental Embodied Mentalizing Assessment (PEMA; Shai & Belsky, 2017), which analyzes videorecorded parent-infant interactions across six dimensions of observable movement to rate the parent’s level of PEM. PEMA is used for coding PEM from parent-infant interactions in parents of infants ages 0-2 years.

### ***Gaps in the Study of Caregiver Mentalizing***

There is clearly a rich background of study in the field of parental mentalizing as evidenced by multiple means of conceptualizing and measuring the construct. However, gaps in this area of research remain, in terms of both measurement and substantive knowledge.

**Gaps in Measurement.** The majority of measures of parent mentalizing thus far tap into the caregiver’s *representation* of child, and require coding that can be demanding and time-intensive (Fonagy & Luyten, 2016). Doubts have been raised about representational measurement of mentalizing because it is retrospective and therefore “offline” (Camoirano, 2017; Fonagy et al., 2016; Luyten et al., 2017; Sadler et al., 2013), and researchers have suggested that caregivers’ *behavior* also be considered in the assessment of mentalizing (Luyten et al, 2017; Shai & Belsky, 2011) rather than considering only representational or verbal aspects. Behavioral measurement of caregiver mentalizing assessed during in vivo interactions can, on the other hand, allow for “online” measurement by capturing parents’ mentalizing during real-time interactions between parents and children (Luyten et al., 2017). While there are in-vivo behavioral methods for assessing parental mentalizing in interactions between caregiver-*infant* dyads (ages 0-2), including Meins’ parental mind-mindedness



coding and Shai & Belsky's (2017) assessment of parental embodied mentalizing, the field has thus far lacked measures for in-vivo assessment of parental mentalizing between caregivers and youth during middle childhood and adolescence. The exception is Ensink and colleagues' (2017) RPA, which is a measure of parents' reflective stance in interactions with children ages 5-12. However, the RPA utilizes the Winnicott Squiggle task, which is not developmentally appropriate for older youth and may not represent an ecologically valid interaction. Moreover, it can be argued that Ensink and colleagues' (2017) measure is still semi-representational in nature in that behavior during the interaction is considered holistically to provide a rating on a nine-point scale in three domains (interest in subjective experience of child, affective communication, and capacity to play), rather than being considered only at the level of each verbalization or objective behavior, as is done in Meins and colleagues' (2002) and Shai & Belsky's (2017) interactional coding systems.

Thus, there is currently no observational, behaviorally based (non-representational) measure that captures parental mentalizing as observed in real-time, ecologically valid interactions between caregivers and children and that is also appropriate for caregiver-child interactions *in middle childhood and adolescence*. A tool for assessing in-vivo parental mentalizing at the level of observed behavior rather than at a representational level in middle childhood and early adolescence, when risk for psychopathology begins to rise, would allow for concrete measurement of caregivers' mentalizing behavior that would not only advance research into parental mentalizing in middle childhood and adolescence, but could also serve as a feedback tool in clinical settings to provide concrete information to caregivers on how to improve their mentalizing at the behavioral level.

**Gap in Knowledge.** Likely because the measurement of parental mentalizing has mainly focused on infancy and early childhood, only a handful of studies (Borelli et al., 2016; Ensink et al., 2015, 2016; Ensink, Begin, et al., 2017; Ensink, Leroux, et al., 2017; Esbjørn et al., 2013; Ha et al., 2011) have examined parental mentalizing in parents of school-age children, and only one study in parents of adolescents (Benbassat & Priel, 2012). Parental mentalizing continues to be important throughout development as it enables parents to better understand, facilitate, and scaffold children's experiences as they progress through later development stages and challenges (Borelli et al., 2016; Benbassat & Priel, 2012). Moreover, middle childhood and adolescence present increased periods of risk for the development of psychopathology such as anxiety and mood disorders (Kessler & Wang, 2008; Merikangas et al., 2009, 2010), and therefore are particularly important periods in which to understand parental mentalizing as a potential protective factor against mental illness.

These gaps can be addressed by means of an observational tool that 1) assesses parental mentalizing at a concrete level and during in-vivo interactions to provide new information beyond the current representational measures, and that 2) has been validated for use with caregivers and youth during middle childhood and adolescence. Such a tool holds considerable promise for addressing research gaps and advancing knowledge and assessment of caregiver mentalizing.

### ***Parental Mentalizing Operationalized as Caregivers' Mediation of Learning***

Recently, it has been suggested that parental mentalizing can be operationalized in dyadic behavior as mediation of children's learning (Sharp et al., 2020). Mediation of learning occurs when "the environment is mediated to the child by a person who understands

the child's needs, interests, and capacities and takes an active role in making components of that environment, as well as of past and future experiences, compatible with the child" (Klein et al., 1987, *p.* 112). Mediation of learning was first articulated in the field of education by Feuerstein, based on his theory of cognitive modifiability and mediated learning experience (MLE; Feuerstein, 1979, 1980). This theory was then applied to caregiver-child interactions by Klein (Klein, 1984; Klein & Feuerstein, 1984), who found that parents' cognitive mediation during interactions with their children could enhance children's cognitive outcomes (Klein et al., 1987; Klein & Alony, 1993; Tzuriel, 1999). Klein outlined criteria for coding parents' mediation of learning in everyday interactions, in a coding scheme called Observing Mediational Interactions (OMI; Klein, 1984, 2014). The OMI is also used as a tool to provide feedback to caregivers on their mediational behaviors as part of the Mediational Intervention for Sensitizing Caregivers (MISC; Klein, 1985), a caregiver intervention developed by Klein that now has a large evidence base (Bass et al., 2017; Boivin et al., 2013a, 2013b, 2017; Klein, 1996, 2001; Klein & Rye, 2004; Lifshitz et al., 2010; Sharp et al., revise and resubmit). Though mediation of learning has traditionally been studied in the field of education, or evaluated as a means of improving children's cognitive and developmental outcomes (e.g. Bass et al., 2017; Boivin et al., 2013a, 2013b, 2017), a recent intervention trial (R01HD081985; PI: Sharp) was undertaken to evaluate how caregivers' mediation of learning in everyday contexts influences children's socio-emotional outcomes (Sharp et al., 2018). Data from this trial will be used in the present study. The relevance of the OMI and MISC for children's socio-emotional outcomes is not only that MISC has a foundation of attachment, which is crucial to children's socio-emotional development, but

also that previous research with the OMI has found that mediational behaviors were associated with improvements in child prosocial behavior (Shuper Engelhard et al., 2013).

Caregivers' mediation of children's learning can be understood as a form of caregiver mentalizing because it involves a "meeting of the minds," in that caregivers who mediate their child's learning are expanding the child's mind, understanding what the child does and does not know, and facilitating and scaffolding the environment for the child in a way that is matched to the child attention, needs, and internal states, and slowed down to the child's pace (Sharp et al., 2020). All of these mediational capacities require an ability to take the child's perspective and see the child as a psychological agent with an independent mind. This operationalization of caregiver mentalizing, like others, is also based in attachment theory, with the idea that helping to mediate and scaffold the child's learning about his or her environment works best when there is a base of secure attachment. Further, caregiver mediation of learning, like other forms of caregiver mentalizing, is a method of providing meaning and facilitating cultural learning between caregiver and child, and serves to slow down interactions and encourage the sharing of internal states (Sharp et al., 2020).

**Measurement of Caregiver Mediation of Learning.** The Observing Mediational Interactions (OMI) assessment tool was developed by Klein (1984, 2014) in order to operationalize criteria of mediated cognitive learning experiences in caregiver-child interactions. The OMI focuses on mediation of learning during naturalistic everyday caregiver-child interactions and is designed to be highly adaptable across settings and developmental periods.

The theoretical components providing the framework for the OMI are shown in Figure 1 (the MISC "tree"; Klein, 2014). Like operationalizations of caregiver mentalizing,

this model is founded in attachment (“ABCs of Love”), which is assessed by the emotional and communicational components of the OMI (the tree’s “root”): touch, turn-taking, physical closeness, smiles, vocalizations, sharing of joy, and eye contact. These nonverbal behaviors are meant to promote mutual attention, engagement, and reciprocity, and send the “basic messages” of security to promote the child’s readiness to learn. The ABCs of love and basic messages are the foundation for mediation (the tree’s “trunk”). Mediation is assessed by the OMI’s cognitive mediation components: focusing, affecting, expanding, rewarding, and regulating (Klein, 2014). Table 1 provides more detail for these OMI criteria. Together, these components are meant to produce the tree’s “leaves”: child competence, self-regulation, and openness to future learning. The extent that a caregiver implements the OMI components in each domain determines the extent that he or she is mediating the child’s learning (and therefore mentalizing) because the caregiver is seeing the experience from the child’s perspective, recognizing the mind of the child, slowing down the interaction, and scaffolding or facilitating the child’s understanding of the world through the interaction.

The OMI has been used across multiple contexts and cultures, including Israel, the United States, Norway, Ethiopia, Uganda, and Kenya (Klein, 1996, 2001; Klein et al., 1987; Nyborg, 2011). It has also been used across developmental periods. For example, the OMI has been used to measure mediational behaviors with caregivers of infants (Klein et al., 1984), preschool children (Boivin et al., 2013a, 2013b), school age children (Tzuriel, 1999; Isman & Tzuriel, 2008), 9-12 year olds (Nyborg, 2011), and adults with developmental disabilities (Lifshitz et al., 2010). Evidence for high inter-rater reliability (coefficients ranging from .42 to .99; Tzuriel, 1999) has been demonstrated in several studies utilizing the OMI, and its validity has been demonstrated in several studies that have shown its

associations to child cognitive outcomes (Klein et al., 1987; Klein & Alony, 1993; Tzuriel, 1999). Together, this evidence supports the OMI as a reliable and valid assessment tool that can be utilized flexibly in various types of caregiver-child interactions and that is sensitive to differing cultural contexts and child developmental stages.

### **The Potential of the OMI to Address Measurement and Knowledge Gaps**

As previously discussed, gaps in measurement of caregiver mentalizing include that there currently is no assessment tool for assessing caregiver mentalizing during parent-child interactions that is appropriate for middle childhood and adolescence, ecologically valid, and non-representational. There is also a gap in substantive knowledge of caregiver mentalizing, in that there is a lack of research on caregiver mentalizing during middle childhood and adolescence, relative to infancy and early childhood. This study puts forward the idea that caregiver mentalizing as operationalized as parents' mediation of learning, by the OMI assessment tool, has potential for addressing these gaps. The OMI is appropriate to use for middle childhood and adolescence given that it has been used already in interactions with caregivers and infants, young children, school-age children, and adults. The OMI is ecologically valid in that it is designed to be used to assess everyday interactions and has been used across various interactional contexts, languages, cultures, and countries. The OMI is not a representational form of measurement, but focuses on concrete and observable behaviors. It assesses behavior at a fine-grained, molar level, verbalization by verbalization, and also codes non-verbal behavior. Each statement is coded for whether it is one of the types of mediational behaviors (focusing, affecting, expanding, rewarding, or regulating), and the number of each type of mediational behavior observed is then tallied. In addition, interactions are coded for nonverbal behavior, called the "affective" (emotional and

communicative) components, displayed across multiple categories of affect (e.g., smiles, physical touch, eye contact), which are each rated on a Likert-type scale from 1-5, with the scores from each category then summed to provide an overall affective components score. Finally, the OMI may be particularly useful for generating new knowledge on caregiver mentalizing during middle childhood and adolescence. Middle childhood and adolescence—when emotions are changing and developing, and there is increased risk for socio-emotional problems and psychopathology—is a particularly important time for parents to mediate the experience for the child, match their internal experience to the outside world, and help children learn from their experiences. Understanding how parents can do this at an observable, fine-grained, and behavioral level by using the OMI would be beneficial for identifying concrete mediational behaviors that parents can engage in, in order to better scaffold children’s experiences and boost children’s socio-emotional outcomes during middle childhood and adolescence.

### **Evaluating the OMI as a Measure of Parental Mentalizing among Caregivers of Orphans and Vulnerable Children**

The potential of the OMI is clear; however, the suggested theoretical overlap between MISC and the OMI and mentalizing (Sharp et al., 2020) is yet to be tested empirically. The current study aims to do so by evaluating the reliability and validity of the OMI as a measure of parental mentalizing in a population of caregivers of orphans and vulnerable children (OVC) in sub-Saharan African (SSA). The term OVC refers not only to children who have lost a parent, but also to children who have been made otherwise vulnerable by the effects of HIV/AIDS on their family or community, for reasons such as currently living with a chronically ill caregiver, living in poverty or not having basic needs met, having low access

to services and resources, or impaired caregiving (Foster, 2006; Skinner et al., 2006). Research has demonstrated that OVC have an increased risk of mental health problems (Cluver & Gardner, 2007; Cluver et al., 2012; Sharp et al., 2015; Wild, 2001), and that the quality of caregiver-child relationships is an important resilience factor for OVC (Cluver et al., 2009; Ismayilova et al., 2012; Kagawa & Hindin, 2010; Nyamukapa et al., 2008; Sun et al., 2008; Xu et al., 2010; Wild et al., 2011; Zhao et al., 2011). Given the importance of the caregiving environment and increased level of risk for OVC, they may benefit from having a caregiver who mentalizes by mediating and scaffolding their understanding of the world and the stressors with which they are faced. Therefore, interactions between caregivers and OVC are a fitting context for assessing parental mentalizing as operationalized by the OMI.

### **Current Study**

In order to establish the overlap between the OMI and parental mentalizing, evidence for the *construct validity* of the OMI—its empirical overlap with the construct of interest, parental mentalizing—must be demonstrated (Haynes, Smith, & Hunsley, 2011). One method for demonstrating construct validity is through a pattern of convergent and discriminant associations (Campbell & Fiske, 1959). Convergent validity refers to the idea that the measure shows strong relationships to measures that it is intended to overlap with or relate to, or measures that purport to measure the same construct. Discriminant validity refers to the idea that the measure demonstrates strong inverse relationships to measures with which it is intended to differ (Campbell & Fiske, 1959). Before validity can be demonstrated, an instrument must first show internal structure or *reliability*, referring to consistency in measurement suggesting that the measure is consistently measuring the same thing (American Psychological Association, 2014). There are multiple ways to assess reliability.



For measures involving the coding of behavior by trained raters, a common form of reliability measurement is inter-rater reliability, which refers to the level of agreement between two or more raters who measure the same subjects (Koo & Li, 2016). One method for assessing inter-rater reliability is intraclass correlation (ICC; Koo & Li, 2016). Therefore, the first aim of this study was to evaluate the inter-rater reliability of the OMI in this study sample, using intra-class correlation to compare the scores by two raters when rating the behavior of the same subject using the OMI. The second aim of this study was to evaluate the construct validity of the OMI as a measure of parental mentalizing by examining convergent and discriminant associations. The current study conducted this reliability and validity evaluation of the OMI in a population of caregivers of OVC in South Africa.

**Aim 1:** Evaluate the reliability of the OMI by testing interrater reliability for the five mediational components (focusing, affecting, expanding, rewarding, regulating) and the affective component score of the OMI. **Hypothesis 1:** The OMI will show interrater reliability of .70 or higher as measured by intraclass correlation coefficient (ICC).

**Aim 2:** As a means of testing the construct (convergent and discriminant) validity of the OMI as a measure of caregiver mentalizing among OVC caregivers in South Africa, Aim 2a evaluated the cross-sectional associations between OMI scores and two measures of mentalizing completed by careworkers: the Parental Reflective Function Questionnaire and mentalizing as coded from the MISC-related Knowledge Interview. Aim 2b evaluated the cross-sectional associations between OMI scores and child outcomes previously demonstrated to be related to caregiver mentalizing, including child social cognition (Affect Task) and child mental health problems (SDQ). **Hypothesis 2a:** OMI mediational and affective scores will be positively related to caregiver mentalizing, demonstrating convergent

validity. **Hypothesis 2b:** OMI mediational and affective scores will be positively associated with children's social cognition (convergent validity) and negatively associated with children's mental health problems (discriminant validity).

## **Methods**

### **Study Design**

This study utilizes data from a completed quasi-experimental trial (R01HD081985; PI: Sharp), "The acceptability and feasibility of an adaptation of The Mediational Intervention for Sensitizing Caregivers for Community Based Organizations in a sample of South African HIV/AIDS orphans" (MISC-CBO), conducted at University of Houston and University of the Free State. The MISC-CBO study was focused on adapting and evaluating the MISC program in community based organizations (CBOs) in the Mangaung Metropolitan Municipality of the Free State, South Africa. The Free State has a high HIV/AIDS prevalence (14.9%). Mangaung is the most densely populated municipality in the Free State, with a population of 752,906, and 31% of children in Mangaung are orphaned. CBOs are local, grassroots organizations staffed by community members that provide care and services for OVC and families in resource-limited settings (Yakubovich et al., 2016). The MISC program is a year-long caregiver intervention meant to enhance everyday 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. The OMI is the central assessment tool used in the MISC to provide feedback to caregivers on their mediational behaviors. Four CBOs participated in the MISC-CBO quasi-experimental trail; two CBOs received MISC, which was delivered to CBO careworkers, and two CBOs continued care as usual (TAU). While

CBO care can take many forms, the children and CBO careworkers in the MISC-CBO study interacted during the daytime when children attended the CBO (typically after school) for caregiving, meals, activities, and homework help. Careworker- and child-level outcomes were measured at baseline, 6 months (mid-intervention), and 12 months (end of intervention).

### **Participants and Procedure**

See Table 1 for child and careworker characteristics at baseline. Participants included OVC ages 7-11 receiving care by careworkers at four CBOs in Mangaung that had agreed to participate in this study. Inclusion criteria were that the child was a resident in the CBO catchment area, the child was in the study age range, and that the child and his/her principal caregiver were willing to participate. Exclusion criteria included that the child was HIV/AIDS infected, had 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, and had a first language other than Sesotho. Recruitment occurred at the level of the CBO, with all children considered if they met inclusion/exclusion criteria. Staff working with children as well as children's caregivers were used to identify children who met study criteria. Children's parents or legal guardians provided written consent, and children provided written assent. CBO careworkers also provided written consent to participate in the study. Assessments at baseline, 6-month, and 12-month timepoints were completed individually in private rooms at the CBO location. A total of 80 children and 14 careworkers participated at baseline, 72 children and 13 careworkers participated at the 6-month time point, and 68 children and 9 careworkers participated at the 12-month timepoint, with a total

of  $N = 88$  unique OVC and  $N = 18$  unique careworkers participating across the three time points. This study was approved by institutional review boards at University of Houston and University of the Free State.

## **Measures**

### ***Observing Mediation Interactions (OMI)***

The OMI was developed by Klein (1984, 2014) in order to operationalize criteria of mediated cognitive learning experiences in caregiver-child interactions. The OMI components include 1) emotional and communicational (affective) components: touch, turn-taking, physical closeness, smiles, vocalizations, sharing of joy, and eye contact, and 2) cognitive (mediational) components: focusing (focusing the child's attention and making the environment compatible with the child's needs), affecting (attempts to assign meaning or express excitement about things or people), expanding (attempts to explain, associate, or elaborate), rewarding (conveying satisfaction with the child's behavior in a way that is specific and meaningful), and regulating (modeling or suggesting behavioral regulation). OMI coding was based on videotaped interactions between careworker-child dyads. Dyads were filmed for 10 minutes in a typical interaction at each timepoint. These videotapes were also transcribed. Interactions were conducted in Sesotho, and the two raters were Sesotho-speaking and trained in coding the OMI. To score affective components, coders watch the videotaped interaction and rate the caregiver from 1-5 on each emotional or communication component (touch, turn-taking, physical closeness, smiles, vocalizations, sharing of joy, and eye contact), and the sum these ratings to provide an overall sum of affective components. For coding the mediational behaviors, videos and transcripts from the caregiver-child interaction are used, and behaviors meeting each component's criteria are tallied. This study

therefore used six separate OMI scores (the sum of affective components, and five mediational components: focusing, affecting, expanding, rewarding, and regulating).

### ***Self-Reported Caregiver Mentalizing***

The Parental Reflective Functioning Questionnaire (PRFQ; Luyten et al., 2017) was completed by CBO careworkers to assess parental mentalizing. The PRFQ asks caregivers to rate 18 statements from 1 – *strongly disagree* to 7 – *strongly agree*. Items evaluate caregivers’ understanding, curiosity, or rejection of their own and the child’s mental states and how they relate to behavior; for example, “I like to think about the reasons behind the way this child behaves and feels.” Factor analytic work has supported three six-item subscales of the PRFQ: pre-mentalizing modes (PM), certainty about mental states (CMS), and interest and curiosity (IC; Luyten et al., 2017). The score for each subscale is a mean of the 6 items. Due to the content of some of the items in the PM scale, which were oriented toward behavior children may display at home but are less likely to display in a CBO setting (e.g., “This child cries around strangers to embarrass me”), we used only the CMS and IC subscales.

CMS refers to recognition of the opacity of mental states, with very high scores demonstrating that the caregiver is overly certain about the child’s mental state (hypermentalizing), and very low scores reflecting complete lack of certainty (hypomentalizing). CMS has been positively related to mutual attunement, affect quality, parent and dyadic emotional availability, and intrusiveness, and negatively related to hostility in parents of infants (Luyten et al., 2017), and has been positively related to ASQ - confidence in self and others in parents of school-age children (Pazzagli et al., 2017). IC refers to having interest and curiosity about the child’s mental states, and at very low scores

shows an absence of interest, while at very high scores it can be reflective of over-certainty or hypermentalizing. Higher levels of IC have been shown to be related to higher odds of secure attachment in parents of infants (Luyten et al., 2017) and to higher levels of ASQ - confidence in self and others and lower levels of ASQ - relationships as secondary in parents of school-age children (Pazzagli et al., 2017). Validity of the PRFQ was first demonstrated in sample of mothers of 0-3 year old children (Luyten et al., 2017), and has been further shown in parents of school age children (ages 6-10; Pazzagli et al., 2017).

For this study, the PRFQ was translated into Sesotho by a translator accredited for English to Sesotho translation, with IRB-approved translation assurance. Both the CMS and IC scales have one reverse coded item (item 11 for CMS; item 18 for IC), which we removed for the purposes of this study due to low item-total correlations and concern about the understandability of reverse coded items in translation. Therefore, 5-item CMS and IC scales were used. At each time point, each careworker completed the PRFQ for every child in her care (“cluster”) at the CBO who was part of the study. Cronbach alpha values for the CMS 5-item subscale were  $\alpha = .69$  and  $\alpha = .73$  at Time 2 and Time 3, and for the IC 5-item scale were  $\alpha = .61$  and  $\alpha = .78$  at Time 2 and Time 3.

#### ***Careworkers’ Mentalizing Coded from MISC-Related Knowledge Interview***

The MISC Knowledge Questionnaire (Klein, 1996) was revised in order to be delivered to careworkers as a semi-structured interview evaluating the caregivers’ MISC-related knowledge prior to the intervention (baseline) and at the end of the intervention (12-month timepoint). The interview was administered by research staff who spoke Sesotho, and responses were recorded, transcribed, and then translated into English by the research team. For this study, responses on three questions from the interview that were from the original

MISC Knowledge Questionnaire were coded for the careworker's level of mentalizing. These questions asked about the careworker's educational goals for children, view of an ideal caregiver, and view of the ideal child. Interview responses were coded using the positive mentalizing scale of the Observational Coding System for Parent-Child Mentalizing (OCS-PCM; Vanwoerden & Sharp, 2019). Ratings on this scale range from 1-7, with higher scores representative of greater mentalizing. Scores of "1" represent no use of mental state language (thoughts, feelings, internal states), with answers only focused on concrete events or observable behavior in the self or the child. Scores of "7" represent prevalent mental state language with complexity or elaboration, ability to elaborate on the child's experience, and/or acknowledgement of one's own agency and an understanding that behaviors are driven by complex mental states. Ratings for the three questions were averaged for each careworker to yield an overall mentalizing score. Responses were double-coded. The two coders were the first author and another graduate student who had both been trained in the OCS-PCM and had met reliability criteria to be a trained coder. Inter-rater reliability between the two raters for participants' average mentalizing scores was calculated using intraclass correlations (ICC) using a two-way mixed model with an absolute agreement definition. ICC was equal to .87,  $p < .001$  at 12-months, indicating good inter-rater reliability. The average between the two coders' scores was used as each caregiver's mentalizing score.

### ***Child Social Cognition***

The Affect Task (Steele et al., 1999) is an experimental task assessing children's level of mixed-emotion understanding. In the task, children first view six basic emotion faces, two mixed-emotion faces, and a neutral face, and are asked to label the emotions. The experimenter (a Sesotho-speaking member of the research team) then tells the child the

correct label for each expression. The experimenter then shows the child 12 cartoon drawing sequences showing interpersonal dilemmas meant to evoke a strong emotion, in which the child is the center of an interaction with a parent, teacher, or friend (Steele et al., 1999). The experimenter reads aloud the narrative of the sequence as the pictures are shown. At the end of each cartoon sequence, the picture shows one of the characters without a facial expression, and the child is asked which of the nine previously labeled faces fits that character (by pointing at the face or stating the emotion label) and is given the opportunity to discuss his/her choice. The child is also asked if another emotion could fit that character, thereby assessing the child's ability to consider mixed emotions, and for some questions is also asked what emotion secondary characters may be experiencing. The child's responses were recorded and transcribed into English for coding, which was performed by two trained coders. Each child's responses are then coded on a three point scale, from 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 the first emotion, understanding mixed/multiple emotions, and understanding the emotions of others. For current analyses, the average score for each child's mixed-emotion ratings across all cartoon sequences was used to represent mixed-emotion understanding. This task has shown good inter-rater reliability, with 94% agreement between raters (Steele et al., 1999), and validity: infant-parent attachment security has been shown to predict mixed-emotion understanding scores at 6 years old (Steele et al., 1999) and 11 years old (Steele et al., 2008), and Affect Task scores have been related to lower levels of emotional and behavioral problems both concurrently and predictively among children ages



7-9 (Schlesinger, 2015). For the current study, a subset of 19.4% ( $n = 13$ ) of Affect Tasks from the 12-month follow-up timepoint were reliability coded by a second trained rater. Inter-rater reliability was calculated using two-way mixed model intraclass correlation (ICC) using an absolute agreement definition. For average mixed-emotion understanding scores,  $ICC = .81$  ( $p = .004$ ), indicating good inter-rater reliability between raters.

### ***Child Mental Health***

The Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) is a 25-item survey measure of emotional and behavioral problems for children ages 3-17. Parent-report, child-report, and teacher-report versions of the measure are available. Items have a response scale of 0 – *not true*, 1—*somewhat true*, or 2—*certainly true*. The measure produces a total score as well as five subscales: emotional problems (e.g., “often unhappy, depressed, or tearful”), conduct problems (e.g., “often accused of lying or cheating”), inattention-hyperactivity (e.g., “restless, cannot stay still for long”), peer problems (e.g., “one good friend or more”), and prosocial behavior (e.g., “kind to younger children”). The total score, representing overall mental health difficulties, is a sum of the “problem” subscales (emotional problems, conduct problems, inattention/hyperactivity, and peer problems). The SDQ has been translated into over 60 languages and has been used previously in sub-Saharan Africa (Doku, 2009), and specifically in South Africa (Cluver, Gardner, & Operario, 2008; Sharp et al., 2014). Further, the SDQ has shown good psychometric properties among the Sesotho-speaking population in South Africa (Sharp et al., 2014). Validity of the SDQ is demonstrated by research showing that higher SDQ scores are associated with increased likelihood of meeting criteria for a psychiatric disorder (Bourdon et al., 2005; Goodman, 1997, 2001). In the current study, the total difficulties scores from child-, caregiver-, and

teacher-report forms of the SDQ were used as measures of child mental health, with higher scores indicative of greater mental health difficulties. To account for all three informant scores, the three informants' total scores were standardized and then averaged together to create an overall index of child mental health difficulties. This method has been used previously with the SDQ in a South African sample of children (Sharp et al., 2018). The current sample size was not large enough to allow for latent variable modeling with the three informant scores. The parent-report form of the SDQ was completed by the child's legal guardian, and the teacher-report form was completed by the child's careworker at the CBO. Each version of the SDQ was translated into Sesotho for the purposes of this study, with translation assurance obtained and IRB-approved. Cronbach's alpha values were  $\alpha = .67$  and  $\alpha = .64$  for SDQ – Parent/Guardian report at Time 2 and Time 3;  $\alpha = .65$  and  $\alpha = .61$  for SDQ – Child report at Time 2 and Time 3; and  $\alpha = .85$  and  $\alpha = .71$  for SDQ – Careworker report at Time 2 and Time 3.

### **Data Analytic Strategy**

Analysis was conducted in SPSS Version 26. For Aim 1, Sesotho-speaking raters did not double code any of the careworker-child interactions using the OMI, so inter-rater reliability could not be determined by using a subset of interactions that had been double coded. However, both raters coded each careworker multiple times at each time point, with different children. In order to calculate reliability, each rater's codes for each careworker were averaged across children at each timepoint, so that each careworker had average ratings from Rater 1 and average ratings from Rater 2 at baseline, 6-month, and 12-month time points. Intraclass correlation (ICC) was then used to compare Rater 1 and Rater 2 and determine if their average scores for each careworker were reliable, for every OMI

component at each timepoint. ICC values were calculated using two-way mixed models, with an absolute agreement definition.

For Aim 2, a multilevel modeling (MLM) approach was used, with children (Level 1) nested within careworkers (Level 2,  $n = 4-10$  children per careworker at 6 months,  $n = 5-18$  per careworker at 12 months). Cross-sectional associations between OMI scores and scores from identified validity measures (PRFQ, careworker mentalizing from MISC Interview responses, Affect Task, SDQ) were used to evaluate the construct validity of the OMI as an assessment of parental mentalizing by examining convergent and discriminant relations. First an unconditional model (no predictors) was tested separately for each of the dependent variables (PRFQ – CMS, PRFQ-IC, Affect task, and SDQ total scores). Unconditional models were tested to estimate variance components and calculate intraclass correlation coefficients ( $\rho$ ) in order to determine whether there was significant variation in that dependent variable due to clustering of the data. A separate unconditional model was run for each outcome variable for the whole sample, and within samples (MISC and TAU groups), at each timepoint. If the  $\rho$  value was above .10, this suggested that there was significant variability in the outcome variable due to clustering of children within careworker, and necessitated inclusion of clustering structure in the model. Next, we tested conditional models with a predictor added, in which the random effects (intercept only) due to careworker were estimated in addition to fixed effects of each OMI component. Maximum likelihood (ML) estimation was used, and an unstructured covariance matrix was specified. When the independent variable was one of the five OMI mediational behaviors, variables were not mean centered because they are interpretable at zero. When the independent variable was the OMI affective components sum, grand mean centering was used.

Please note that associations between OMI variables and outcome measures were tested for the whole sample and within groups separately for each timepoint. The purpose of this strategy was to evaluate relationships *within* each timepoint only, and not evaluate relationships across timepoints due to the fact that one group received the MISC program and one continued usual services (TAU). The goal was to provide a pattern of relationships between the OMI and identified validity measures in order to demonstrate discriminant and convergent associations. Only data from the 6- and 12-month timepoints was used, because careworkers and children may not have had a pre-existing relationship at baseline. Therefore, we could not expect that careworkers' mediational behaviors (OMI scores) would already significantly relate to their PRFQ ratings about the child or to children's SDQ scores at baseline. For measures only assessed at baseline and 12 months (MISC Interview coded for mentalizing; Affect Task), only 12-month scores were used.

One also needs to keep in mind that careworkers' mentalizing as coded from the MISC Interview was only collected at the level of the careworker. To test this variable in association with OMI scores, which were collected at the level of the child, each child with the same careworker (i.e., in the same cluster) received the careworker's mentalizing score. We did not apply clustering for careworkers' mentalizing because this variable was only collected at the level of the careworker. Therefore, the variability in scores was entirely due to careworker and the statistical association with OMI components could not be calculated in nested models. Therefore, fixed effects models were used for Careworker Mentalizing, with OMI components and careworker ID as predictors.

## **Results**

### **Preliminary Analyses**

Means and standard deviations by group for study variables at the three timepoints are shown in Table 3.

#### **Aim 1**

Intraclass correlations from inter-rater reliability analysis are shown in Table 4. Reliability was calculated between Rater 1 and Rater 2 for each OMI component in each time point, producing 18 values. ICC values were above the hypothesized level ( $ICC > .70$ ) for seven of 18 scores, and were in moderate reliability range ( $ICC = .50-.75$ ; Koo & Li, 2016) for four additional scores. Six ICC scores were below the .50 level: Focusing at baseline and 12 months, Rewarding at baseline and 12 months, Regulating at baseline, and Affective components at baseline. Because of their low reliability, results with these scores are shown in red in Tables 5-8 and should be interpreted with caution.

#### **Aim 2**

To evaluate the convergent and discriminant validity of OMI scores in relation to validity measures with established psychometric properties, we applied a multilevel modeling framework. Unconditional models that were separately estimated for each outcome at 6 and 12 month time-points within the whole sample and within intervention and control groups revealed that the PRFQ and Affect Task variables had  $\rho$  greater than .10, suggesting there was significant variation in those dependent variables due to variability in careworkers, and that nested models should be used. SDQ values had  $\rho$  less than .10, suggesting there was not significant variability due to clustering in the data, and therefore, fixed effects models

without nesting could be used. Magnitude of all intraclass correlation coefficients ( $\rho$ ) is reported in Table 5.

Next we computed conditional models that included predictors necessary to evaluate the validity of the OMI components in relation to PRFQ scores cross-sectionally at 6- and 12-month timepoints. Findings for the PRFQ are presented in Table 6. For OMI components that showed moderate or greater reliability ( $ICC > .50$ ), there were no statistically significant relations for OMI – Focusing and OMI – Rewarding with PRFQ scales. OMI-Affecting at 6 months was significantly, positively associated with PRFQ-CMS at 6 months in the control group ( $\beta = .42, t(23.15) = 3.07, p = .005$ ) and whole sample ( $\beta = .21, t(63.92) = 2.20, p = .03$ ), and with PRFQ-IC at 6 months in the MISC group ( $\beta = .31, t(31.79) = 2.15, p = .04$ ). There was a significant negative association between OMI-Affecting at 12 months and PRFQ-CMS at 12 months in the MISC group ( $\beta = -.58, t(27.24) = -2.88, p = .008$ ). OMI-Expanding at 6 months was significantly, negatively associated with PRFQ-CMS at 6 months in the TAU group ( $\beta = -.86, t(28.44) = -2.13, p = .04$ ). OMI-Regulating at 6 months had one significant negative association, with PRFQ-IC at 6 months in the whole sample ( $\beta = -.28, t(66.04) = -2.35, p = .02$ ). OMI-Affective components at 6- and 12-months had a significant positive relationship with PRFQ-CMS in the control group at 6 ( $\beta = .61, t(26) = 4.15, p < .001$ ) and 12 months ( $\beta = .27, t(30.63) = 2.06, p = .048$ ), respectively.

For relations between OMI and the Affect Task, nested models with predictors yielded the same parameter estimates and standard errors when compared to fixed effects models (without nesting). Because they performed similarly, fixed effects models without random effects were used with OMI components as predictors and Affect Task scores as outcome, controlling for careworker. Results from these analyses are shown in Table 7.

Results for reliable ( $ICC > .50$ ) OMI components showed no statistically significant associations between OMI behaviors at 12 months and child mixed-emotion understanding as measured by the Affect Task at 12 months.

Fixed effects models without random effects were used to estimate relations between OMI scores and Careworker Mentalizing (coded from MISC Interview responses), controlling for careworker. Results are shown in Table 7. For OMI components that had shown reliability of  $ICC > .50$ , there was one significant negative association between OMI-Affecting at 12 months and Careworker Mentalizing at 12 months in the TAU group ( $\beta = -.31, t(31) = -2.80, p = .009$ ). OMI-Expanding at 12 months showed two significant negative associations with Careworker Mentalizing at 12 months, in the control group ( $\beta = -.56, t(31) = -5.68, p < .001$ ) and whole sample ( $\beta = -.34, t(63) = -2.71, p = .009$ ). OMI-Regulating at 12 months showed three significant negative associations with Careworker Mentalizing at 12 months, in the control group ( $\beta = -.35, t(31) = -2.52, p = .02$ ), MISC group ( $\beta = -.64, t(29) = -3.14, p = .004$ ), and whole sample ( $\beta = -.56, t(63) = -5.47, p < .001$ ). OMI-Affective components showed no significant associations.

SDQ variables at 6- and 12-month time points had  $p$  values less than .10 in unconditional models. Therefore, there was not significant variability due to the clustering of the data by careworker, and fixed effects models (without nesting) were used to evaluate cross-sectional associations between OMI components and SDQ scores, with careworker covaried. Results of these analyses are shown in Table 8. OMI-Expanding at 6 months was associated with higher levels of child mental health problems at 6 months in the MISC group ( $\beta = .45, t(33) = 2.48, p = .02$ ) and whole sample ( $\beta = .35, t(66) = 2.91, p = .005$ ). There were no other significant associations with OMI components that had shown reliability above .50.

## Discussion

The aims of this study were to evaluate the reliability of the OMI (Aim 1) and its validity as a measure of parental mentalizing (Aim 2) in a sample of CBO careworkers of orphans and vulnerable children (OVC) in South Africa. Providing reliability and validity data on the OMI as a measure of parental mentalizing would help to address gaps in measurement by supporting the OMI as a behaviorally-based, non-representational measure of parental mentalizing for middle childhood. Measurement of parental mentalizing has tended to focus on assessing the construct in infancy and early childhood, and current assessments of parental mentalizing for middle childhood or adolescent periods are mainly representational in nature and require time-intensive coding and training, which may be one reason why there is less research on parental mentalizing during middle childhood and adolescence.

### Aim 1 Results

For Aim 1, it was hypothesized that interrater reliability would be equal to .70 or higher. This hypothesis was partially supported. Inter-rater reliability was assessed using intraclass correlations (ICC). Double coded OMI interactions were not available to assess inter-rater reliability between raters for same careworker-same timepoint-same child. Therefore, reliability between raters was assessed by averaging Rater 1's ratings for each careworker (across children) in each OMI component and Rater 2's ratings for each careworker across children in each OMI component, and calculating ICC between Rater 1 and Rater 2 averages for each careworker. Results supported the reliability of the OMI at ICC > .70 for seven of 18 OMI scores. Twelve of 18 OMI scores had a reliability of ICC > .50,



indicative of moderate or greater reliability (Koo & Li, 2016). Reliability was generally lower at baseline than at other timepoints.

It is likely that this method of calculating reliability was overly conservative given that ratings were averaged across careworkers' OMI interactions with different children, and therefore child effects may have led to inconsistency between raters. Additional research is needed, with double-coded interactions so that raters' codes for same careworker-same child-same timepoint can be compared, to determine the reliability of the OMI across components in this population. Notably, the OMI has been used many times in previous research and has shown good reliability (see Tzuriel, 1999). Because the method for calculating reliability in this study likely contributed to less consistency between raters' scores, any OMI component that had an ICC value of .50 or greater was considered reliable and interpreted for Aim 2 analyses. OMI components with inter-rater reliability of less than .50 were reported but should be interpreted with caution.

### **Aim 2 Results**

For Aim 2, which focused on construct validity, it was hypothesized that a) OMI mediational and affective scores would be show positive cross-sectional associations with caregiver mentalizing, as measured by the PRFQ (Certainty about Mental States and Interest and Curiosity subscales) and by careworker mentalizing coded from the MISC interview, and that b) OMI scores would demonstrate positive cross-sectional associations with children's social cognition (mixed emotion understanding on the Affect Task) and negative cross-sectional associations with children's mental health problems (total score from Strengths and Difficulties Questionnaire, composite of child-, parent-, and careworker-reports).

Hypothesis 2a was mostly not supported. Most relations were non-significant. When PRFQ scales were outcome variables, there were three positive (PRFQ-CMS and PRFQ-IC) and one negative significant association (PRFQ-CMS) for OMI-Affecting. There was one significant negative association for OMI-Expanding (with PRFQ-CMS) and one for OMI-Regulating (with PRFQ-IC). There were two significant positive associations for OMI-Affective components with PRFQ-CMS. When careworker mentalizing, coded from MISC interview responses using the Observational Coding System for Parent-Child Mentalizing, was the outcome variable, there was one negative association with OMI-Affecting, two negative associations with OMI-Expanding, three significant negative associations with OMI-Regulating, and no significant associations with OMI-Affective components. OMI-Focusing and OMI-Rewarding at 12 months were not reliable at the level of .50.

Hypothesis 2b was mostly not supported by results. No OMI components that showed adequate reliability were significantly associated with Affect Task scores. When SDQ-total score was the outcome variable, OMI-Expanding had two positive associations with SDQ scores at 6 months, suggesting that these mediational behaviors were sometimes associated with greater mental health concerns among OVC. There were no other significant associations with reliable OMI components.

In summary, hypotheses for Aim 2 were generally not supported, though there were some significant associations that suggest possible patterns of relationships between specific OMI components and parental mentalizing. In particular, OMI-Regulating showed four negative associations with mentalizing measures. OMI-Expanding had a similar pattern of three negative relations with mentalizing measures, as well as two positive relations to child mental health problems. These significant associations noted for both OMI-Regulating and

OMI-Expanding may suggest that higher levels of these caregiver mediational behaviors suggest lower levels of parental mentalizing. OMI-Affective components showed two significant positive associations with parental mentalizing self-report measures and therefore showed some evidence for hypothesized relations to validity measures. OMI-Focusing and OMI-Rewarding had reliability less than .50 at baseline and 12-month timepoints, making it more difficult to assess a pattern of relations with these OMI components. Relations with OMI-Affecting were inconsistent, with three positive associations and two negative associations to mentalizing measures.

It is important to note that significant associations may have occurred because multiple tests were conducted, leading to a greater likelihood of Type I error. Further, relationships were inconsistent, so any potential pattern of relationships is tentative and requires replication in future research. The possible patterns of relationships that appeared in Aim 2 results were for OMI-Regulating, OMI-Expanding, and OMI-Affective components. Though speculative because even these variables did not show consistent significant associations with outcomes, below we provide perspective on why these findings may have occurred.

### **OMI Components with Negative Associations to Measures of Mentalizing**

OMI-Regulating showed multiple negative associations with caregiver mentalizing measures, suggesting it may be a non-mentalizing behavior. OMI-Regulating behaviors include behaviors that model, demonstrate, or verbally suggest behavioral regulation for the requirements of a task (e.g. planning, sequencing, considering alternatives; Klein, 2014). It is possible that the specific focus on regulating child behavior in this OMI domain is in contrast to the caregiver mentalizing ideals of mind-mindedness. If the careworker is overly focused

on the child's behavior or on the steps required to complete a task, they may not be giving as much thought to the child's internal states. This finding is particularly interesting for showing that behavioral regulating behaviors could be discriminant from parental mentalizing. The idea that verbalizations to suggest or request behavioral regulation may be associated with lower parental mentalizing capability is interesting to consider in relation to parent interventions such as Parent Child Interaction Therapy (PCIT; Eyberg, 1988). PCIT highlights the importance of child-directed interactions (CDI) in the first phase of therapy. CDI interactions involve one-on-one play between caregivers and children when the caregiver follows the child's lead and does not give instruction, only makes reflective statements about what the child is doing, similar to behaviors that would be captured by OMI-Affecting. Engaging in CDI in this way is meant to help build the parent-child relationship during PCIT (Lieneman et al., 2017). Along these same lines, it may be the case that OMI regulating behavior is not consistent with "keeping the child's mind in mind," whereas letting the child direct the interaction may be more effective for mentalizing the child and building the attachment relationship.

OMI-Expanding had one negative association to self-reported caregiver mentalizing (PRFQ-CMS) and three negative associations to interviewed-coded mentalizing. OMI-Expanding also showed two positive associations with SDQ scores. Similar to the patterns seen with OMI-Regulating, these patterns could suggest that OMI-Expanding behaviors may sometimes reflect non-mentalizing behaviors for caregivers. The Expanding component of the OMI captures behaviors that are attempts to explain, elaborate, associate, relate past and future, and view from a different perspective (Klein, 2014). Expanding behaviors are an important domain of mediational behaviors because they are meant to help the child make

connections and learn about the world, and are considered the mediational behavior most helpful in promoting children's cognitive modifiability, which is one of the primary goals of MISC (Klein, 1996). Because of the importance of this behavior in the MISC model, this result was particularly unexpected. It is possible that some careworkers' Expanding behaviors may have continued past the child's span of attention or been inappropriate to the child's developmental level and not worked effectively to mediate the child's learning and connect to the child's mind. While the OMI purposely only considers mediational behavior that is intentional and meaningful, and behavior to which there is reciprocity (i.e., the interaction partner taking notice and responding; Klein, 2014), it may still be possible that some Expanding behaviors captured in coding were more effective than others. It is possible that there needs to be the "right" amount of Expanding for it to represent parental mentalizing. The negative finding may also have been due to the effects of the careworker; perhaps, certain careworkers were more effectively engaging in Expanding behavior than others, due to their other mediational behaviors in place (e.g., focusing to ensure attention prior to expanding), their affect, or to the length or strength of the relationship between that careworker and child. Tzuriel and Caspi (2017) created a weighted equation, the Quality of Mediation Index (QMI), by asking 15 clinicians to rate the five OMI mediational components in order of which contributed most to children's cognitive modifiability, and then weighting each term in an equation according to its overall ranking. Rankings from least to most important for quality of mediation were 1) focusing, 2), affecting, 3) rewarding, 4) regulating, and 5) expanding. Using overall QMI scores with this weighting, they found that greater quality of mediation in the mediators was associated with greater cognitive modifiability in the learner. This suggests there may be "right" amounts of the different

mediational behaviors for cognitive modifiability; it is possible that the relative weights of the OMI mediational components might be different to best reflect parental mentalizing through mediation. It is also possible that a different type of interaction task or discussion may have elicited Expanding behavior that is more indicative of parental mentalizing.

### **OMI Components with Positive Associations to Measures of Mentalizing**

OMI-Affective components showed two significant positive associations with parental mentalizing self-report measures. While it is difficult to extrapolate a pattern from two significant associations, it is worthwhile to consider that OMI's Affective components might have particular relevance to caregiver mentalizing. Lower levels of OMI affective components have been associated with greater BPD symptom severity in mothers (Kerr, 2020). The affective components also have an important role within the MISC model (Figure 1), as they represent the base of emotional components that sends message of love and security and build attachment in order for learning to take place through the mediational components (Klein, 2014). Considering that nonverbal behaviors and affect have important roles in the formation of attachment bonds in infancy, and that attachment is the basis of parental mentalizing, affect has an important role in both attachment and mentalizing (Fonagy et al., 2002). Further, one of the existing operationalizations of parental mentalizing in infancy, parental embodied mentalizing (PEM; Shai & Belsky, 2011), considers only affect/nonverbal behavior in coding. While this focus is because PEM is focused on parent-infant interactions, it still underlines the significance of affect in attachment-related and mentalizing interactions. It is possible that affect continues to be an important index of caregiver mentalizing even in later developmental stages beyond infancy. It is also important to consider that in the present study, careworkers may not have had longstanding

relationships with the children in their care, and were in some cases building new bonds with them during these interactions. Perhaps because these relationships were new for some dyads, careworker affect was particularly important as the “root” of the careworker-child relationship. As in the MISC model, the emotional components have to be in place first before the mediational components. Sharp and colleagues (2020) point out that the OMI’s affective components provide an operationalization of the use of mentalized affectivity (Jurist, 2005), further highlighting that the affective components may be important for tapping into aspects of mentalization.

### **OMI Components with Inconsistent or No Relation to Validity Measures**

OMI-Affecting (Providing Meaning) behaviors had inconsistent associations with caregiver mentalizing measures (both positive and negative relationships). In OMI coding, Affecting behaviors can include both verbal and nonverbal behavior, which are summed together for each careworker’s Affecting score. It is possible that if nonverbal and verbal affecting were considered separately, that they might have shown different strength of relationships to validity measures, particularly given the possible importance of affect as an assessment of caregiver mentalizing. It may be the case that in careworker’s verbal affecting behaviors, there can be tone or subliminal meaning that weakens the verbalization for its intended purpose or that effectively fails to keep the child’s “mind in mind” in a way that would be consistent with parental mentalizing. While the OMI manual specifies that verbalizations that are counted as mediational behaviors should be positive, it is possible that there were neutral or subtly negative messages that were coded as mediational behavior, and therefore that the manual’s criteria for being a “positive” behavior needs to be more stringent. Rather, it may be that some careworkers just talked too much during the

interaction. In a pertinent study, more frequent positive word use in the self-focused section of the Parent Development Interview among substance-using mothers of infants was associated with lower levels of parental mentalizing and with greater maternal insensitivity (Borelli et al., 2012). The idea is that using more frequent positive feeling words use may represent emotional avoidance on the part of the caregiver, and that this avoidance of the caregivers' own emotions may mean that the caregiver also has difficulty being attuned to the emotional needs of the child (Borelli et al., 2012). Given potential issues with too many verbalizations or too many positive (and potentially emotional avoidant) verbalizations, it would be beneficial in future research to test whether Affecting Nonverbal and Affecting Verbal behaviors have any differing relations to parental mentalizing measures and whether Nonverbal Affecting better reflects parental mentalizing.

OMI-Rewarding had low reliability at baseline and 12 months, and did not show any significant associations at the 6-month timepoint. Incidence of rewarding behavior in OMI interactions tends to be low (Table 3); the lack of significant associations may be due to low variability. In this same sample of careworkers and children, there was evidence that the MISC intervention improved rewarding behavior in careworkers (Sharp et al., revise and resubmit), and it can also be seen in Table 3 that while rewarding behaviors increased over the timepoints in the MISC group, they decreased in the TAU group, where the significant association with mental health concerns was noted. While it is thus far unclear whether OMI-Rewarding behaviors are reflective of caregiver mentalizing, it is promising that the intervention—which was also effective in improving child mental health relative to the control group—was effective at increasing this type of behavior. Rewarding will be important to examine in future research in terms of its usefulness as an index of mentalizing.



OMI-Focusing showed low reliability at baseline and 12 month time points, and no significant associations at the 6-month timepoint with caregiver mentalizing measures, child mixed-emotion understanding, or child mental health. Focusing behavior decreased in both groups over the course of the three timepoints, and similar to Rewarding mediational behaviors, there was lower incidence of Focusing behavior relative to some of the other OMI components. At face value, Focusing appears to have overlap with caregiver mentalizing in that it requires thinking about the child's thinking – i.e., “is the child paying attention? How can I get the child's focus? What does the child need for this interaction and how can I make the environment compatible?” However, the low reliability and low incidence suggest that behavioral criteria for Focusing may need to be outlined in more detail or expanded in order for this behavior to empirically overlap with parental mentalizing. It is interesting to consider that focusing was weighted least in the equation of OMI mediational behaviors created by Tzuriel and Caspi (2017) when they created an index of quality mediation for promoting cognitive modifiability. Perhaps Focusing would be weighted more heavily if the equation were weighted as an index of quality mediation to promote caregiver mentalizing.

## **Measurement and Design Considerations**

### ***Measurement***

There may be other features of this study's measures and design that contributed to non-significant findings. With regard to measures, the Parental Reflective Functioning Questionnaire (PRFQ) had to be modified for this study by removing reverse coded items from both scales used, due to low internal consistency reliability. This suggests that reverse coded items may not have translated well into Sesotho, or that there are reliability issues more broadly with the measure. Another issue with the PRFQ is with the definition and

directionality of the scales. Two scales of the PRFQ were used in this study: Certainty about Mental States (CMS) and Interest and Curiosity (IC). In general, both are meant to represent better mentalizing at higher levels of the scale; however, in the development and validation paper for the PRFQ, authors state that at very high levels, both IC and CMS scores may represent hypermentalizing, or being *overly* certain about mental states, which is maladaptive. CMS scores have even been positively related to intrusiveness while also positively relating to attunement, affect quality, and emotional availability (Luyten et al., 2017). Therefore, these PRFQ scales may have methodological issues of their own. While this serves to further highlight the difficulty in measuring parental mentalizing, at the same time, any conceptual problems in this measure may have been exacerbated when it was translated into another language and used in an entirely different culture in this study. The validity of the PRFQ in non-Western cultures has not yet been examined, and therefore it is unknown how well the concepts generalized. Further, the PRFQ was used uniquely in this study in that careworkers completed the measure multiple times—once each for each child in their “cluster” for each timepoint. The measure was designed to be completed by a parent/guardian about his or her own child, with whom there is (presumably) an existing attachment relationship. It may be that the act of completing the measure multiple times or completing it for children who were not their own also altered the validity of the measure.

The other assessment of caregivers’ mentalizing used in this study was the coded responses of the MISC-Related Knowledge Interview. Each careworker’s interview was coded using the Observational Coding System for Parent-Child Mentalizing (OCS-PCM). This form of assessment was also imperfect in that the OCS-PCM is designed for coding dyadic interactions between caregivers and children, rather than interview responses from

one individual. The OCS-PCM assesses a caregiver's mentalizing ability during the interaction, and the OCS-PCM scale of positive mentalizing, which was used here, is a measure of overall mentalizing capabilities in a dyadic interaction, and not parental mentalizing specifically. In addition, OCS-PCM coding is supposed to utilize both the video and the transcript of the interaction. For this study, only careworkers' transcribed interview responses were used for coding. None of the coding criteria was modified, but any criteria that related to caregivers' response or reaction to the child during the interaction could not be utilized when coding interview responses. Still, it is promising that the two raters showed high inter-rater reliability for coding interview responses with the OCS-PCM. Further, the OCS-PCM is innately flexible in that it was designed for coding dyadic conflict discussions when the parent and child are both focused on topics they disagree about; these interactions can vary significantly across dyads, yet still be coded with the OCS-PCM. Therefore, it is reasonable to think that it could also be applied to other types of caregiver verbalizations in an interview about caregiving.

The child-focused outcome measures included the Affect Task, a child task of mixed-emotion understanding, and the Strengths and Difficulties Questionnaire, a multi-informant survey of child emotional and behavioral problems. These outcome measures were included because of previous studies demonstrating empirical relationships between parental mentalizing when assessed in primary caregivers/guardians and child social cognition and mental health. However, the associations here between OMI scores and these child-level outcome measures were mostly non-significant. Considering that careworkers only saw children during the day in the CBO setting, it makes sense that there would be more tenuous relations between *careworker's* mentalizing and child outcomes. In future research, there

may be stronger relationships observed between the OMI and child-focused outcomes if the OMI is coded from interactions with primary caregivers rather than careworkers. There were also limitations of both the Affect Task and the SDQ in this study. Specifically, the Affect Task showed low variability, as evidenced by low standard deviations in Table 3. Lack of significant relationships with the Affect Task may be in part due to this low variability. Regarding the SDQ, while alpha values were adequate for the SDQ total scores, they were low for subscale scores, suggesting low internal consistency reliability for these subscales. Because of this, only composite SDQ scores were used, and relations with subscales were not tested. This low reliability may have been due to the fact that the measure was translated for this population.

Finally, the method for calculating reliability of the OMI in this study likely limited our ability to test true reliability between raters. Twelve of 18 components/timepoints of the OMI showed at least adequate reliability ( $ICC > .50$ ), but six did not. However, the way that inter-rater reliability was calculated was likely overly conservative given that the scores compared between raters were not for the same careworker with the same child. Therefore, child effects may have caused there to be more inconsistency between raters. There has been strong evidence for the reliability of OMI coding across multiple studies in the past (see Tzuriel, 1999). However, the lack of double-coded videos in this sample prevented typical inter-rater reliability calculations. It is likely that reliability was higher than is represented here, which may have allowed interpretation of additional significant associations in Aim 2 results.

### *Study Design*

Particular aspects of this study design may have also influenced the lack of significant findings. The larger study design was quasi-experimental and conducted in a natural setting: CBOs that were already in place in the community. While this trial carried out an important test of the MISC intervention in a real community setting, the study design also leads to more variability and less control over certain study characteristics. For example, careworkers in this study were not always observed with the same child across time points, such that Child 1 could have OMI scores for an interaction with Careworker A at 6 months and then with Careworker B at 12 months. Similarly, child 1's PRFQ could have been completed by Careworker A at 6 months and Careworker B at 12 months. In addition to this inconsistency, it is important to consider that when the study began, children had been enrolled in the CBO for differing lengths of time and had known their careworkers for differing lengths of time. It is likely that some careworkers and children already had stronger bonds than others or naturally spent more time together in the CBO setting than others. Another feature of the larger R01 study was that the intervention was delivered to careworkers, which enabled the study to test the effectiveness of MISC when delivered to CBO workers rather than to parents/guardians. For the purposes of this measurement study, it is important to consider that careworkers, though they often spent all day with the children in their care, were not the children's primary caregivers and likely did not have the same level of attachment bond as one would expect between a primary caregiver and child. Therefore the parental mentalizing assessed was at a different level than typical parental mentalizing with a primary caregiver. A final consideration is that identified validity measures were all written in English and translated into Sesotho for the purposes of this study. Although strict translation and back-

translation procedures were followed, the change in measure language may have introduced additional error into measurement that contributed to the lack of consistent relationships.

### **Limitations**

This study has several limitations, which have been mentioned above. Limitations include issues with the psychometrics of the PRFQ, the use of the OCS-PCM outside of its designed purpose, the tenuous relationship between parental mentalizing in careworkers and child outcome measures, the Affect Task variability and SDQ reliability, and with the lack of double coded videos for the OMI, which impacted the accurate calculation of inter-rater reliability. Study design limitations include the naturalistic, quasi-experimental design which introduced more variability through the way that careworkers were paired with different children at different time points and the differing length of relationships across careworker-child dyads, and the measurement of caregiver mentalizing among careworkers rather than children's parents/guardians. In addition, the translation of measures from English into Sesotho and cross-cultural use of some measures such as the PRFQ may have introduced additional error into this study.

### **Future Research**

This study provided an initial test of relations between the OMI components, which have conceptual overlap with parental mentalizing (Sharp et al., 2020), and self-report and interview-coded measures of caregiver mentalizing, a task-based measure of child emotion understanding, and a multi-informant measure of child emotional and behavioral problems. While results largely did not support hypotheses, they do point to next steps for research related to observational measurement of parental mentalizing. The preliminary relationships observed in these results suggest that it would be worthwhile to evaluate the validity of the

OMI as an assessment of parental mentalizing in a larger sample of parent/guardian caregivers and children, with additional criterion validity measures, such as the Parent Development Interview Reflective Functioning Scale. Present results also point to possible directions between individual OMI components and caregiver mentalizing, which reveal information about mentalizing and non-mentalizing behavior. Future research should continue to examine OMI components separately in relation to parental mentalizing and related outcome measures to confirm or reject these relations, which would also serve to provide more specific knowledge about the nature of parental mentalizing behavior during dyadic interactions. Findings here identified affective components of the OMI as a particular feature that may be important for assessing parental mentalizing, and this potential link should be examined further in future studies. If affect can be a valuable marker of parental mentalizing beyond infancy, this may significantly improve our ability to measure and operationalize the construct in later developmental stages. Related, it may be helpful to examine nonverbal and verbal scores separately for OMI components such as Affecting, in order to evaluate whether certain mediational behaviors are more strongly linked to mentalizing when considering only nonverbal behavior. Future research may also benefit from applying Tzuriel and Caspi's (2017) method of asking expert raters to weigh the OMI components in terms of their importance. The same method could be applied by asking expert raters to weigh the components in terms of their importance for parental mentalizing, creating a weighted equation, and testing whether the quality of mediation indexed by that equation is more strongly related to existing measures of parental mentalizing than the individual OMI components.

## **Conclusion**

This study aimed to evaluate the Observing Mediatonal Interactions (OMI) observational measurement tool as a behavioral measure of parental mentalizing during middle childhood, with the goal advancing measurement and knowledge of caregiver mentalizing behavior during middle childhood and older developmental stages. Reliability of the OMI and its validity against existing measures of mentalizing and related constructs (child social cognition, child mental health) were evaluated in a sample of caregivers of OVC ages 7-11 in South Africa. Caregivers were careworkers at CBOs which the children attended during the day. Inter-rater reliability of the OMI was mostly supported by the data, despite that a conservative approach to calculating reliability was used. Results for the validity aim of the study were largely non-significant. However, the significant associations that were observed help to build the nomological net of parental mentalizing, an important transdiagnostic construct that remains understudied in middle childhood and adolescence. Results also suggest multiple steps for future research to further test the OMI as a behavioral assessment of parental mentalizing and to add to knowledge of parental mentalizing behavior during caregiver-child interactions.



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**Table 1** *Observing Mediation Interactions (OMI) criteria*

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|                        |   |
|------------------------|---|
| Affective Components   |   |
|                        | Smiles, physical closeness, touch, eye contact, turn taking, vocalizations, sharing of joy, mutual attention, mutual engagement |
| Mediation Components   |   |
| Focusing               | Attempts to focus the child's attention and make the environment compatible with child's needs                                  |
| Affecting (Meaning)    | Nonverbal or verbal attempts to assign meaning or express excitement about things and people                                    |
| Expanding              | Attempts to explain, elaborate, associate, relate past and future, view from a different perspective                            |
| Rewarding (Competence) | Conveying satisfaction with a child's behavior in a way that is specific and meaningful to the child                            |
| Regulation             | Modeling or suggesting behavioral regulation (planning, sequencing, considering alternatives)                                   |

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**Table 2** *Participant characteristics at baseline*

| Children   | Control ( <i>n</i> = 40) | Intervention ( <i>n</i> = 40) | Whole Group ( <i>N</i> = 80) |
|--|--------------------------|-------------------------------|------------------------------|
| Female (%)   | 53.5%                    | 37.8%                         | 45.5%                        |
| Age <i>M</i> ( <i>SD</i> )                         | 9.70 (1.20)              | 9.06 (1.70)                   | 9.38 (1.49)                  |
| Orphan status                                      |                          |                               |                              |
| Non-orphan (%)                                     | 16.3%                    | 42.2%                         | 29.5%                        |
| Single Orphan (%)                                  | 44.2%                    | 31.1%                         | 37.5%                        |
| Double Orphan (%)                                  | 20.9%                    | 8.9%                          | 14.8%                        |
| SES <i>M</i> ( <i>SD</i> )                         | 3.03 (.84)               | 2.76 (1.36)                   | 2.90 (1.13)                  |
| Careworkers  | Control ( <i>n</i> = 7)  | Intervention ( <i>n</i> = 7)  | Whole Group ( <i>N</i> = 14) |
| Female (%)   | 100%                     | 100%                          | 100%                         |
| Months of Experience at CBO <i>M</i> ( <i>SD</i> ) | 64.29 (71.76)            | 113.29 (77.83)                | 88.79 (76.28)                |
| Worked with Children Prior to CBO (%)              | 42.9%                    | 14.3%                         | 28.6%                        |
| Hours Per Day at CBO <i>M</i> ( <i>SD</i> )        | 5.79 (2.16)              | 8.00 (0)                      | 6.89 (1.86)                  |

**Table 3** Descriptive statistics for study variables

|  | <i>M (SD)</i> at Baseline   |                          |                                    | <i>M (SD)</i> at 6-months   |                          |                                    | <i>M (SD)</i> 12-months     |                          |                                    |
|--|-----------------------------|--------------------------|------------------------------------|-----------------------------|--------------------------|------------------------------------|-----------------------------|--------------------------|------------------------------------|
|  | Control<br>( <i>n</i> = 40) | MISC<br>( <i>n</i> = 40) | Whole<br>Group<br>( <i>N</i> = 80) | Control<br>( <i>n</i> = 35) | MISC<br>( <i>n</i> = 37) | Whole<br>Group<br>( <i>N</i> = 72) | Control<br>( <i>n</i> = 34) | MISC<br>( <i>n</i> = 34) | Whole<br>Group<br>( <i>N</i> = 68) |
| OMI – Focusing                               | 1.78 (1.54)                 | 2.67 (3.16)              | 2.22 (2.50)                        | .62<br>(.74)                | 1.25<br>(1.27)           | .94<br>(1.09)                      | 1.06<br>(1.81)              | 1.41<br>(1.90)           | 1.23<br>(1.85)                     |
| OMI – Affecting<br>(Meaning)                 | 53.82<br>(22.79)            | 42.00<br>(19.16)         | 47.99<br>(21.77)                   | 46.18<br>(18.32)            | 53.61<br>(17.72)         | 50.00<br>(18.27)                   | 38.82<br>(17.99)            | 57.62<br>(11.29)         | 47.94<br>(17.74)                   |
| OMI – Expanding                              | 3.93 (3.88)                 | 4.72 (5.58)              | 4.32 (4.78)                        | .79<br>(1.10)               | 4.83<br>(4.55)           | 2.87<br>(3.90)                     | 2.44<br>(3.85)              | 13.06<br>(7.95)          | 7.59<br>(8.14)                     |
| OMI – Rewarding                              | 1.28 (1.69)                 | 2.41 (2.69)              | 1.84 (2.30)                        | .56<br>(.71)                | 5.33<br>(5.40)           | 3.01<br>(4.56)                     | .44<br>(.66)                | 3.09<br>(2.47)           | 1.73<br>(2.22)                     |
| OMI – Regulating                             | 6.98 (5.57)                 | 11.41<br>(6.79)          | 9.16 (6.55)                        | 6.71<br>(4.88)              | 9.53<br>(4.91)           | 8.16<br>(5.07)                     | 5.88<br>(4.44)              | 10.00<br>(7.34)          | 7.88<br>(6.32)                     |
| OMI – Affective<br>Components                | 35.83 (4.67)                | 36.11<br>(6.29)          | 35.96<br>(5.47)                    | 30.04 (3.74)                | 34.53<br>(3.11)          | 32.60 (4.04)                       | 31.27 (3.48)                | 40.28<br>(3.59)          | 35.71 (5.74)                       |
| PRFQ – Certainty<br>about Mental States      | 4.95 (1.21)                 | 4.45 (1.25)              | 4.69 (1.25)                        | 4.91 (1.11)                 | 4.57 (1.48)              | 4.74 (1.31)                        | 4.99 (.90)                  | 4.22 (1.52)              | 4.61 (1.29)                        |
| PRFQ – Interest and<br>Curiosity             | 6.14 (.77)                  | 5.90 (.90)               | 6.02 (.84)                         | 6.00 (.86)                  | 6.02 (1.19)              | 6.01 (1.03)                        | 6.38 (.35)                  | 5.09 (1.52)              | 5.75 (1.26)                        |
| Caregiver Mentalizing<br>from MISC Interview | 3.55 (.54)                  | 2.62 (.79)               | 3.08 (.81)                         | --                          | --                       | --                                 | 2.94 (.82)                  | 3.56 (1.03)              | 3.35 (.96)                         |
| Affect Task – Mixed<br>Emotion Understanding | 1.16 (.24)                  | 1.18 (.30)               | 1.17 (.27)                         | --                          | --                       | --                                 | 1.14 (.15)                  | 1.31 (.32)               | 1.23 (.27)                         |
| SDQ – Parent/<br>Guardian report             | 11.78 (7.87)                | 14.84<br>(6.79)          | 13.27<br>(7.48)                    | 11.58 (5.54)                | 13.09<br>(5.81)          | 12.32 (5.68)                       | 9.56<br>(5.03)              | 10.41<br>(4.79)          | 9.99<br>(4.90)                     |
| SDQ – Child report                           | 15.21 (5.79)                | 16.66<br>(7.36)          | 15.99<br>(6.67)                    | 15.31 (4.99)                | 17.06<br>(6.58)          | 16.19 (5.86)                       | 14.09 (5.01)                | 15.88<br>(5.67)          | 14.97 (5.38)                       |
| SDQ – Careworker<br>report                   | 10.18 (7.54)                | 12.03<br>(5.42)          | 11.06<br>(6.65)                    | 7.56<br>(4.91)              | 13.76<br>(6.96)          | 10.90 (6.79)                       | 12.79 (5.20)                | 9.97<br>(5.28)           | 11.38 (5.39)                       |

**Table 4** *Inter-rater reliability for Observing Mediation Interaction (OMI) components across time points*

|  | Baseline<br>( <i>n</i> = 14) | 6 Months<br>( <i>n</i> = 12) | 12 Months<br>( <i>n</i> = 9) |
|--|------------------------------|------------------------------|------------------------------|
| OMI – Focusing                           | .07                          | .59*                         | .16                          |
| OMI- Affecting<br>(Provision of Meaning) | .57**                        | .83***                       | .84**                        |
| OMI – Expanding                          | .62**                        | .72**                        | .83**                        |
| OMI – Rewarding                          | -.05                         | .93***                       | .43                          |
| OMI – Regulating                         | .18                          | .65**                        | .74**                        |
| OMI – Affective<br>Components            | .46**                        | .59*                         | .72*                         |

*Note.* Inter-rater reliability calculated using intraclass correlation coefficient (ICC), two-way mixed model, absolute agreement definition (Koo & Li, 2016). Inter-rater reliability was calculated using the average for Rater 1 across ratings for careworker compared to the average for Rater 2 across ratings for the same careworker.

OMI = Observing Mediation Interactions

**Table 5** *Intraclass correlation values for unconditional models*

| Dependent variable  | Group        | $\rho$ |
|---|--------------|--------|
| PRFQ CMS – 6 months   | Whole Sample | 0.68   |
|   | TAU          | 0.34   |
|   | MISC         | 0.82   |
| PRFQ CMS – 12 months  | Whole Sample | 0.76   |
|   | TAU          | 0.47   |
|   | MISC         | 0.77   |
| PRFQ IC – 6 months  | Whole Sample | 0.47   |
|   | TAU          | 0.00   |
|   | MISC         | 0.67   |
| PRFQ IC – 12 months   | Whole Sample | 0.82   |
|   | TAU          | 0.00   |
|   | MISC         | 0.77   |
| Affect Task Mixed-Emotion Understanding – 12 months                           | Whole Sample | 0.20   |
|   | TAU          | 0.00   |
|   | MISC         | .04    |
| SDQ – Total (composite of parent, child, and careworker reports) at 6 months  | Whole Sample | 0.03   |
| SDQ – Total (composite of parent, child, and careworker reports) at 12 months | Whole Sample | 0.05   |

*Notes.* PRFQ - CMS = Parental Reflective Functioning Questionnaire – Certainty about Mental States; PRFQ – IC = Parental Reflective Functioning Questionnaire – Interest and Curiosity; SDQ = Strengths and Difficulties Questionnaire; TAU = Treatment as usual (control condition); MISC = Mediational Intervention for Sensitizing Caregivers

**Table 6** Fixed effects between Observing Mediation Interactions (OMI) components and Parental Reflective Functioning Questionnaire (PRFQ) at 6 and 12 months

|                            | PRFQ-CMS 6 months |      |             | PRFQ – IC 6 months |             |              | PRFQ-CMS 12 months |               |             | PRFQ – IC 12 months |             |             |
|----------------------------|-------------------|------|-------------|--------------------|-------------|--------------|--------------------|---------------|-------------|---------------------|-------------|-------------|
|                            | TAU               | MISC | All         | TAU                | MISC        | All          | TAU                | MISC          | All         | TAU                 | MISC        | All         |
| OMI – Focusing             | .02               | .07  | .05         | -.15               | .08         | -.03         | <b>.17*</b>        | <b>-.12</b>   | <b>.02</b>  | <b>.03</b>          | <b>-.02</b> | <b>.000</b> |
| OMI – Affecting (Meaning)  | <b>.03**</b>      | .01  | <b>.02*</b> | -.001              | <b>.02*</b> | .01          | .01                | <b>-.04**</b> | -.005       | -.001               | .003        | -.001       |
| OMI – Expanding            | <b>-.29*</b>      | .01  | -.04        | -.08               | -.01        | -.01         | .03                | .03           | .03         | -.002               | -.005       | -.01        |
| OMI – Rewarding            | .19               | -.04 | -.04        | .06                | -.05        | -.05         | <b>-.27</b>        | <b>.05</b>    | <b>.002</b> | <b>-.18*</b>        | <b>.04</b>  | <b>-.07</b> |
| OMI – Regulating           | -.02              | .01  | -.01        | -.06               | -.06        | <b>-.06*</b> | -.02               | -.02          | -.03        | .01                 | .05         | .03         |
| OMI – Affective Components | <b>.20***</b>     | .01  | .02         | -.02               | .04         | .03          | <b>.06*</b>        | .04           | .04         | -.005               | .02         | -.01        |

*Note.* Values are unstandardized coefficients. Bivariate relationships for PRFQ outcomes were calculated using MLM to control for intercept of random effects due to significant variation in scores because of clustering within careworkers.

All values represent cross-sectional associations.

Bold values are significant relations.

Red values are OMI components/timepoints where inter-rater reliability was less than .50 in Aim 1; results should be interpreted with caution.

PRFQ-CMS: Parental Reflective Functioning Questionnaire – Certainty about Mental States subscale. PRFQ-IC: Parental Reflective Functioning Questionnaire – Interest and Curiosity subscale. For both subscales, higher scores are generally better reflective functioning.

TAU = Treatment as usual (control condition); MISC = Mediation Intervention for Sensitizing Caregivers

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**Table 7** Bivariate associations between Observing Mediation Interactions (OMI) components and Careworker Mentalizing and Child Affect Task scores at 12 months, controlling for careworker

|                            | Careworker Mentalizing coded from MISC |               |                |                               |             |              |
|----------------------------|--|---------------|----------------|-------------------------------|-------------|--------------|
|                            | Interview - 12 months                  |               |                | Child Affect Task - 12 months |             |              |
|                            | TAU                                    | MISC          | All            | TAU                           | MISC        | All          |
| OMI – Focusing             | .05                                    | <b>-.17*</b>  | -.08           | -.004                         | -.01        | .000         |
| OMI – Affecting (Meaning)  | <b>-.01**</b>                          | .01           | -.01           | -.002                         | -.01        | -.002        |
| OMI – Expanding            | <b>-.09**</b>                          | -.02          | <b>-.03*</b>   | .000                          | .001        | .01          |
| OMI – Rewarding            | -.16                                   | .08           | .04            | .02                           | <b>.06*</b> | <b>.06**</b> |
| OMI – Regulating           | <b>-.05*</b>                           | <b>-.08**</b> | <b>-.07***</b> | -.01                          | -.01        | -.01         |
| OMI – Affective Components | -.01                                   | .01           | -.01           | -.01                          | .02         | .02          |

*Note.* Values are unstandardized regression coefficients. Bivariate relations tested using fixed effects models without random effects, controlling for careworker.

All values represent cross-sectional associations.

Bold values are significant relations.

Red values are OMI components/timepoints where inter-rater reliability was less than .50 in Aim 1; results should be interpreted with caution.

Careworker Mentalizing coded from careworkers' MISC Interview responses using the Observational Coding System for Parent-Child Mentalizing.

OMI = Observing Mediation Interactions

TAU = Treatment as usual (control condition); MISC = Mediation Intervention for Sensitizing Caregivers

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .



**Table 8** *Bivariate associations between Observing Mediation Interaction (OMI) components and child Strengths and Difficulties Questionnaire composite scores at 6 and 12 months, controlling for careworker*

|                            | Child SDQ Composite – 6 months |             |              | Child SDQ Composite – 12 months |             |             |
|----------------------------|--------------------------------|-------------|--------------|---------------------------------|-------------|-------------|
|                            | TAU                            | MISC        | All          | TAU                             | MISC        | All         |
| OMI – Focusing             | .27                            | -.03        | .05          | <b>-.01</b>                     | <b>.01</b>  | <b>.15*</b> |
| OMI – Affecting (Meaning)  | -.004                          | .002        | .00          | .17                             | .09         | .003        |
| OMI – Expanding            | .18                            | <b>.08*</b> | <b>.07**</b> | -.10                            | .02         | .02         |
| OMI – Rewarding            | .15                            | .01         | .01          | <b>.57*</b>                     | <b>-.11</b> | <b>-.04</b> |
| OMI – Regulating           | .04                            | -.02        | .01          | .08                             | .03         | .03         |
| OMI – Affective Components | .004                           | -.08        | -.03         | -.01                            | .002        | .01         |

*Note.* Values are unstandardized regression coefficients. Bivariate relations tested using fixed effects models without random effects, controlling for careworker.

All values represent cross-sectional associations.

Bold values are significant relations.

Red values are OMI components/timepoints where inter-rater reliability was less than .50 in Aim 1; results should be interpreted with caution.

OMI = Observing Mediation Interactions; SDQ = Strengths and Difficulties Questionnaire

TAU = Treatment as usual (control condition); MISC = Mediation Intervention for Sensitizing Caregivers

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .



Fig 1 Framework underlying the Observing Mediational Interactions (OMI) assessment tool (from Klein, 2014)