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Observational Measurement of Attachment in Toddlers with Disruptive Behavior Using the Strange Situation Procedure and Attachment Q-Set

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Abstract

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Child-caregiver attachment is an important factor in healthy child development and is often targeted by early intervention programs. To assess the efficacy of these interventions, attachment must be accurately measured across the toddler years in populations referred for treatment of externalizing behavior problems. The Strange Situation Procedure (SSP; Ainsworth et al., 1978) and Attachment Q-Set (AQS; Waters, 1987) are empirically-validated measures of child-caregiver attachment, each with unique strengths and weaknesses. Previous research has reached mixed conclusions on relations between the observer-report AQS and SSP, depending on sample and study characteristics, and a review of the literature did not produce any published investigations on concurrent relations between the two measures across clinically-referred, mental health populations. Using a clinical sample of 69 Australian mother-toddler dyads referred for disruptive behavior problems, this study examined associations among behavior problems, SSP classifications, AQS Security scores, and child age. In line with hypotheses, data revealed a significant small to medium correlation between AQS Security and externalizing behavior. Unexpectedly, no significant association was found between SSP classifications and externalizing behavior. Although AQS and SSP Security scores were not significantly correlated for the sample as a whole, there was a moderate correlation among the two measures for children ages 19-25 months. Implications of these results on future research measuring attachment in this population, with particular relevance for early intervention outcome studies and clinical work, are discussed.

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Attachment, as defined by Ainsworth (1969), is "an affectional tie that one person (or animal) forms to another specific individual," the first of which is most often formed with the individual's mother (p. 971). Since its conception, attachment has served as a vital construct in the study of healthy child development and supportive caregiving. Accordingly, early childhood interventions aiming to improve attachment and parenting practices must be able to measure it accurately. To date, little research has examined the comparative utility of different attachment measures for toddlers with behavior problems, a population often targeted with early intervention. The purpose of this study was to examine the utility of two unique measures of attachment in clinically-referred toddlers to inform measurement validity for future intervention research with this population.

Attachment Theory

Attachment theory can be traced back to the work of Mary Ainsworth, John Bowlby, and even Konrad Lorenz (Ainsworth, 1963; Bowlby, 1958; Lorenz, 1935). The theory holds that infants must maintain at least one close attachment relationship (e.g., with the mother) to ensure healthy development. An infant must experience his or her attachment figure as a secure base from which to explore the world (Ainsworth, 1969) in order to develop a secure attachment style (Type B; Ainsworth et al., 1978).

Infants who consistently experience rejection from caregivers when they seek comfort are more likely to develop anxious/avoidant attachment styles (Type A; referred to as insecure-avoidant in this paper), showing little outward emotion when separated from or reunited with their caregivers (Ainsworth & Bell, 1970; Ainsworth et al., 1978). Main (1977) theorized that

these infants learn to suppress expression of distress to achieve proximity to their caregivers without being rejected. Children who experience inconsistent caregiver sensitivity and support often develop anxious/ambivalent attachment styles (Type C; referred to in this paper as insecure-resistant), displaying great distress at separation and ambivalence upon reunion with their caregivers (Ainsworth et al., 1978). Demonstration of frustration and emotional volatility by insecure-resistant children before and after separation is thought to be the child's strategy of "maximizing" his or her chance of receiving caregiver attention or responsiveness (Main, 1979).

Finally, infants who experience frightening behavior from caregivers (e.g., physical abuse) are likely to develop disorganized attachment styles (Type D; Main, & Solomon, 1986; Cicchetti et al., 1995), demonstrating inconsistent or fearful behaviors (e.g., dissociation) when reunited with their caregivers. Main and Hesse (1990) also suggested that caregivers' trauma histories related to their own childhood attachment figures influence the transmission of disorganized attachment behavior to their children. In response to their infants seeking to meet attachment-related needs, these caregivers may engage in frightened or frightening behavior, as their own attachment problems are triggered. Other predictors of disorganized attachment behavior in infants include overly intrusive caregiver behavior, extreme neglect of child's needs, and contradictory affective communication errors (Lyons-Ruth et al., 1999; Lyons-Ruth & Jacobvitz, 2008).

The construct of attachment as a whole is a well-supported, robust phenomenon. For more than six decades, researchers have continued to investigate its predictive validity, stability over time, and links to other constructs important to development (e.g., temperament, behavioral problems). The presence of attachment relationships and secure-base behavior has been

demonstrated cross-culturally (Archer et al., 2015; Jin et al., 2012; Posada et al., 1995; Posada & Jacobs, 2001; van IJzendoorn & Kroonenberg, 1988).

Attachment-Associated Outcomes

Ensuring attachment security in infants and young children is of great importance for individuals, families, and society as a whole. Individuals with insecure or disorganized attachment styles are more likely to experience psychopathology, including dissociative symptoms (Lyons-Ruth et al., 2016), callous-unemotional traits (Kohlhoff et al., 2019), and externalizing behavior problems (Fearon et al., 2010; van IJzendoorn et al., 1999), which are in turn linked with a variety of negative outcomes (e.g., substance abuse, physical violence, delinquency; Broidy et al., 2003; King et al., 2004; Plattner et al., 2009; Vogel & Messner, 2012). Further, insecure attachment disproportionately affects our most vulnerable children. For example, Cicchetti et al. (2006) classified more than 99% of maltreated children in their sample as having insecure attachment styles, and nearly 90% of maltreated children displayed disorganized attachment styles. On the other hand, secure attachment in early childhood is considered to be a protective factor against negative outcomes even for children impacted by known risk factors such as poverty (Delker et al., 2017) and parental substance abuse (Edwards et al., 2006).

Stability in Attachment

Attachment theory is based on the idea that patterns of attachment security are relatively stable throughout the life course and are modeled around prototypes of early attachment relationships (Fraley, 2002). Stability, or consistency in these patterns over time, has been investigated from numerous angles over the past few decades. Great attention has been paid to attachment stability within different developmental periods across the lifespan. At first glance,

research across all age groups—infancy, early childhood, adolescence, and adulthood—has provided inconsistent results regarding attachment stability (McConnell & Moss, 2011). Pre-post measures of attachment stability range from nearly perfect (96% stable in sample of infants from low-risk environments between the ages of 12 and 18 months; Waters, 1978) to highly variable (38% stable in a sample of children assessed at 14, 24, and 58 months; Bar-Haim et al., 2000). Waters et al. (2000) argued, however, that changes in attachment security over time can be tied to life experiences, particularly those occurring early in life and those related to caregiver consistency.

Overall, it can be concluded from meta-analysis that during the growing-up years, insecure versus secure attachment styles remain moderately stable (Fraley, 2002). Risk factors for shifting from a secure to an insecure attachment style include stressful life events (e.g., divorce, death, illness) and caregiver variables (e.g., substance abuse, insensitive caregiving, depression; McConnell & Moss, 2011; Vaughn et al., 1979). Inversely, parental sensitivity, high relationship satisfaction, and positive life events are correlated with shifts from insecure to secure attachment styles (McConnell & Moss, 2011). Evidence of these associations provides hope in the area of early intervention. Roisman et al. (2002) showed that over a 23-year longitudinal study, young adults who demonstrated earned-secure status—meaning that they were securely attached as adults despite negative childhood experiences—reported fewer psychological problems than those classified as insecurely attached in adulthood.

Attachment in Children with Behavior Problems

Researchers have highlighted associations among insecure attachment styles and behavior problems from infancy to adolescence (Carlson et al., 2004; Greenberg et al., 1997; Greenberg et al., 1993; Shaw et al., 1994). In their review of the literature, Greenberg et al.

(1993) concluded that insecure infant attachment in the context of other biological, family, and parental risk factors, predicted later externalizing behavior problems, especially for boys. It appears that infant-caregiver attachment can serve as both a protective factor against the development of behavior problems, for securely attached infants (Morisset et al., 1990) and as a risk factor for externalizing problems for infants who are insecurely attached (Lyons-Ruth et al., 1989). For example, results from the Minnesota Mother-Child Project, a large, longitudinal study, showed that insecure-avoidant attachments at 12 and 18 months predicted behavior problems at ages 5 and 7-8 years of age for boys (Erickson et al., 1985; Renken et al., 1989).

It is difficult to disentangle whether attachment problems primarily increase the risk of externalizing behavior or if demanding, aversive behavior in infants (e.g., intense crying, restlessness, minimal expression of pleasure toward caregivers) is a primary cause of insecure child-caregiver attachment relationships (Cicchetti et al., 1995; Ramsauer et al., 2014). In support of the former explanation, Kochanska and Kim (2013) found that greater resistance in attachment measured during infancy predicted higher likelihood of teacher-reported externalizing problem behavior at age 6.5 years. With respect to the latter hypothesis, Madigan and colleagues' (2007) model demonstrated that disrupted/un-responsive maternal behavior predicted disorganized attachment at one year of age, which predicted behavior problems at age two. In another examination of these variables, Shaw et al. (1994) showed that for infant boys, *both* maternal unresponsiveness and child attention-seeking, aggression, and noncompliance predicted disruptive behavior at two to three years of age. For infant girls, only noncompliance in infancy predicted later behavior problems (Shaw et al., 1994). Based on this body of evidence, it appears that infant behavior (e.g., level of demandingness), caregiver responsiveness, and the attachment relationship may interact to predict later child disruptive behavior.

It is also useful to understand how attachment styles of children with behavior problems compare with those of children from normative samples. Generally, children from clinical populations are less likely to be securely attached than are those from non-clinical populations. In their meta-analysis, van IJzendoorn et al. (2004) found that average attachment security scores in clinical samples (i.e., preterm, congenital anomalies, low birth-weight, down syndrome) were significantly lower than those in non-clinical samples, with a small to medium effect size (r = .30). A larger meta-analysis replicated this effect and included additional clinical samples of fostered and adopted children (Cadman et al., 2018b). Speltz et al. (1990) classified 84% of children ages 3-6 years with scores above the 90th percentile on the Externalizing Scale of the Child Behavior Checklist as insecurely attached, whereas only 28% of children from an aggregated normative sample showed insecure attachment styles. Other studies comparing children with disruptive behavior disorders with non-clinical controls have reported similar proportions (DeKlyen, 1996; Greenberg et al., 1991). Significant correlations between child–caregiver attachment security and child conduct problems in preschoolers have been measured at r = -.31 to -.15 (Bureau et al., 2017; Stefan & Avram, 2017).

Research examining connections between attachment and behavior problems in younger children (i.e., infant or toddlers) is rarer. Nevertheless, Madigan et al. (2007) found that higher ratings of externalizing behavior problems at 24 months were correlated (r = .39; p < .05) with disorganized attachment measured at 6 months. Pauli-Pott and colleagues (2007) showed that infants assessed as having insecure or disorganized patterns of attachment at 18 months were more likely to demonstrate severe behavior problems at 2.5 years as compared to their secure or organized counterparts. These findings suggest that attachment insecurity and behavior problems in children tend to go hand in hand.

Temperament is another influential variable when examining children with externalizing behavior and attachment problems. Temperament refers to individual differences in patterns of responses to environmental stimuli, often thought to be biologically based (e.g., tendencies toward emotions or activity levels; Kagan, 2012). Children with disruptive behavior difficulties are typically rated strongly in behavior or affect broadly associated with negative temperamental attributes (e.g., fussiness, inflexibility; Groh et al., 2017). Similarly, in a meta-analysis assessing associations among attachment styles and characteristics of positive/negative affect-related temperament (overall effect of d = .14), Groh et al. (2017) found the strongest correlations between negative affect-related temperamental traits and insecure-resistant (Type C) classifications, ranging from d = .23 – .77, depending on study design moderators. Because negative temperamental characteristics are associated with both externalizing behavior disorders (Martel et al., 2012; Singh & Waldman, 2010) and attachment insecurity (Groh et al., 2017), they are likely prevalent in clinical populations of young children experiencing disruptive behavior problems (e.g., those referred for attachment-based therapy).

Measurement of Attachment

Strange Situation Procedure

Historically, researchers have measured attachment categorically, using what is considered to be the gold standard assessment: the Strange Situation Procedure (SSP; Ainsworth et al., 1978; Main & Solomon, 1990). The SSP is an observational measure of infant-caregiver interactions involving repeated caregiver and stranger entries and exits. Children's attachment styles are classified based on certified coders' ratings of children's behavior in these situations, namely their levels of exploration and responses to caregiver departures and returns. Coding of

the SSP results in a categorical rating of attachment style as either insecure-avoidant (A), secure (B), or insecure-resistant (C).

In an extension of the traditional ABC coding scheme, Main and Solomon (1986), incorporated another layer of classification: disorganization/disorientation. Organization refers to the level of predictability, consistency, and coherence in the child's pattern of secure base behavior. Children rated high in disorganization tend to engage simultaneously in contradictory behavior that does not fit into an "organized" pattern. They may also experience overwhelming levels of physiological arousal, resulting in general disorientation (Main & Solomon, 1986). Disorganized behavior might involve a child backing toward a caregiver, for example, seemingly attempting to seek proximity while avoiding the caregiver. Similarly, disorientation is coded when a child approaches the stranger instead of the caregiver or freezes in place upon reunion, for instance. Using Main and Solomon's system, after receiving an initial classification of secure (B) or insecure (A or C), a child's attachment style is then classified as either organized or disorganized (D). For example, a child whose overall pattern of attachment is classified as secure (B) but also demonstrates a significant amount disorganized/disoriented behavior, would ultimately be classified as insecure-disorganized (D).

On average, rates of attachment security using the traditional 3-way SSP classification system as reported in non-clinical child populations are about 20-22% insecure-avoidant (A), 55-75% secure (B), and 7-12% insecure-resistant (C; Simonelli & Parolin, 2016), although higher rates of resistance and lower rates of avoidance have been reported in more collectivist societies (Archer et al., 2015; Jin et al., 2012; Kondo-Ikemura et al., 2018; van IJzendoorn & Kroonenberg, 1988). Using the 4-way, ABCD system, rates of insecure-disorganized attachment

(D) are about 50-75% in clinical samples as compared with only 15% of children from non-clinical samples being classified as disorganized (van IJzendoorn et al., 1992).

Although hundreds of studies have relied on it as the most reliable and valid measure of attachment, the SSP is not without limitations. Some experts have argued that attachment is a continuous construct (Fraley & Spieker, 2003) reflecting individual and context-specific dimensional measures of coping strategies (e.g., proximity-seeking, avoidance, angry resistance) observed within the SSP. This argument has been paralleled by researchers and theorists studying adult attachment (Fraley & Waller, 1998; Fraley et al., 2000). Other limitations of the SSP include its reliance on minimal observation data (20 minutes), the contrived nature of its separation/reunion tasks, its artificial laboratory-based setting, and its inability to be repeated frequently or within a 3-month period (Cadman et al., 2018a).

Many researchers have opted instead to use longer, more naturalistic observational assessment measures, which can be repeated sooner and more frequently (van IJzendoorn et al., 2004; Waters & Deane, 1985). Alternative measures of child-caregiver attachment have also been developed based on the prohibitive training requirements for administration and coding of the SSP (Spieker et al., 2011; Waters & Dean, 1985). Finally, the SSP has not been validated for children older than 18 months. A key issue here is the fact that children typically respond to the SSP within a broader behavioral repertoire and with differing levels of distress during the first as compared to the second year of life (Cicchetti et al., 1990). For example, a 9-month old infant may become distraught upon separation and crawl toward the mother upon her return to regain contact. However, a 24-month old child is less likely to display an extreme emotional reaction upon separation and more likely to use sophisticated strategies (e.g., smiling, greeting verbally) to regain contact with the mother upon reunion. Although topographically different, behavior in

these examples both represent secure attachment; therefore, behavioral coding systems measuring attachment must take into careful consideration the behavioral repertoires of children in different developmental stages.

MacArthur Preschool Attachment Classification System

In response to the perceived limitations of the SSP, other observational measures of child-caregiver attachment have been developed. The MacArthur Preschool Attachment Classification System (MAC; Cassidy & Marvin, 1992) adapts the SSP protocol slightly to allow caregivers flexibility in interacting in more developmentally appropriate ways with their older children (e.g., negotiating with the child upon separation) and results in two novel attachment classifications: disorganized-controlling and insecure-other, in addition to the traditional ABC classifications (Hoffman et al., 2006). The disorganized-controlling category captures the newly formed ability for children in this developmental period to attempt to punish or control their caregivers upon reunion (Spies et al., 2016). The MAC is appropriate for children about 2 ½ to 4 ½ years of age (Solomon & George, 2008), but coding of samples spanning the infant to preschool age range requires coders to be reliable in both the MAC and SSP coding systems, combining the two at times (Hoffman et al., 2006). Training and coding expertise requirements decrease feasibility for many researchers studying children across the infant and toddler age range. The MAC is also subject to the same criticism often leveled at the SSP: limited construct validity due to artificial categorization of a potentially continuous construct.

Attachment Q-Set

To overcome the limitations of categorical measures, Waters and Deane (1985) developed another observational measure, the Attachment Q-Set (AQS). The AQS (Waters, 1987) is a 90-item observer Q–sort procedure designed to assess attachment security in

naturalistic settings (i.e., the child's home). It has become a widely-used measure for children between the ages of 12 - 48 months and has demonstrated excellent validity and reliability (Cadman et al., 2018b; van IJzendoorn et al., 2004). Unlike the SSP or MAC, the AQS measures attachment security on a continuous scale in which scores range from -1.00 (least like a securely attached child) to +1.00 (most like a securely attached child). This is advantageous as continuous measures generally provide greater measurement sensitivity than categorical ones. Coders must become adequately familiar with children's behavior to later characterize it according to each Q-Set item (e.g., "Child keeps track of mother's location when he plays around the house.", "Child ignores most bumps, falls, or startles."). Therefore, a longer observation period (60-90 minutes) is required in comparison to observation time required for the SSP or MAC (i.e., about 20 minutes).

Increased time requirements for families and researchers as well as travel and intrusion into the family home may limit the feasibility of the AQS in some cases. For this reason, many researchers have opted to use mothers as observers to complete the Q-sort. Still, since mothers are not typically adequately trained in assessment or attachment, use of a maternal-report AQS is not advised, or it should be undertaken with painstaking preparation (Teti & McGourty, 1996; Waters, n.d.; E. Waters, personal communication, February 5, 2018). Observer-report AQS data have demonstrated superior psychometric properties in comparison to maternal sorts (Cadman et al., 2018b; van IJzendoorn et al., 2004). Researchers examining both versions of the AQS have also raised concerns that its criterion score is too heavily influenced by child temperament (e.g., negative affect, sociability, reactivity; Cadman et al., 2018b; Groh et al., 2017; Solomon & George, 1999; Vaughn & Bost, 1999). Despite these limitations, no other observational measures

of attachment in very young children are quite so widely used and psychometrically well-supported as the AQS and SSP.

Toddlerhood: A Critical Window

It is simultaneously important and challenging to accurately and consistently measure attachment during the developmental stage of toddlerhood for several reasons. During the second year of life, developmental theorists posit that children focus on tasks of autonomy development and separation-individuation from their caregivers (Erickson, 1950; Mahler et al., 1975). Throughout the toddler period, caregivers must support their children's efforts in these tasks while enforcing limits and boundaries (Baumrind, 1971). It is a time of great change, presenting new challenges for caregiver and child, especially in the realm of attachment. Toddlers' decreased needs for physical proximity to their caregivers are related inversely to their increasing competencies in communication, perspective-taking, and other social-cognitions (Cicchetti et al., 1990). As they age beyond infancy, children stray further from their caregivers and have more sophisticated internal representations of caregivers and caregiver-child relationships during separations (Cicchetti et al., 1990). These changes have important implications on the measurement of attachment.

Growing autonomy and the expanding behavioral repertoires of toddlers also give rise to the first opportunities for potential behavior problems and related negative feedback among children and their caregivers. Patterson's conceptualization of the Coercive Process provides a useful framework for understanding the negative feedback loops which often occur in caregiver-child relationships characterized by disruptive or aggressive behavior (Patterson, 1976; Patterson et al., 1984).

Patterson's Coercion Theory involves two components: (1) the caregiver models aggressive behavior, and (2) the caregiver and child become entrenched in a cycle of reinforcing the others' negative or aggressive behavior. A pattern of behavior emerges in this cycle in which the caregiver makes a demand, and the child defies it. For example, a mother may tell her child, "It's time to pick up the toys," to which the toddler says, "No!" In response, the caregiver makes the demand more aggressively (e.g., "I said, PICK UP!"), following which the child more aggressively protests (e.g., screams, throws self to the floor, throws toys, hits mother). Finally, the cycle intensifies until one party concedes, reinforcing the other's aggressive behavior. If the child complies with the original command, the caregiver's aggressive approach is negatively reinforced. If the child escapes the command, the child's aggression is negatively reinforced. In either case, the presence of interpersonal reinforcement results in the caregiver and child being more likely to participate in this negative cycle in the future.

Martin (1981) used Patterson's Coercive Process theory to study an "intensity-matching model" of mother-toddler behavior. According to this model, high-intensity child attention-seeking behavior increases in direct relation to lack of responsive maternal attention-giving. Martin (1981) showed that coercive cycles and child behavior problems were evident at 22 and 42 months in families that demonstrated mismatched intensity between child attention-seeking and responsive maternal attention-giving. Unfortunately, child behavior problems often interact with sensitive caregiving, an ingredient essential to secure attachment relationships, self-regulation, and healthy neurological development, (Bernier et al., 2015; De Wolff & van IJzendoorn, 1997; Halligan et al., 2013; Tottenham, 2012).

Building on evidence of the connections among behavior problems, insensitive caregiving, early attachment insecurity, and later negative outcomes, several treatments

appropriate for toddlers and their families have been developed. Widely used attachment-focused families of early intervention include Attachment and Biobehavioral Catch-Up-Toddler (ABC-T; Dozier & Bernard, 2017; Lind et al., 2017), Circle of Security (COS; Hoffman et al., 2006), Child-Parent Psychotherapy (CPP; Van Horn & Reyes, 2014), and Parent-Child Interaction Therapy-Toddler (PCIT-T; Girard et al., 2018). These family-based interventions all aim to improve the caregiver-child relationship with emphasis on increasing caregiver sensitivity and attunement to child cues. Some models accomplish these goals through behavioral strategies like differential reinforcement and caregiver skills coaching (e.g., PCIT, ABC). Others focus on improving attachment through psychodynamic principles such as examining caregivers' early attachment relationships and changing internal working models (e.g., ABC, CPP, COS). Several studies of these early interventions have demonstrated improvements in child-caregiver attachment security (Bernard et al., 2012; Dozier et al., 2009; Hoffman et al., 2006; Lieberman et al., 1991).

Choosing an Attachment Measure for Toddlers with Behavior Problems

To assess the efficacy of these attachment-focused early interventions accurately, researchers must be able to measure attachment efficiently and consistently across the implicated age ranges: infancy, toddlerhood, and the early preschool years. In choosing an observational measure of attachment for very young children exhibiting externalizing behavior problems, the strengths and limitations of the two most strongly supported measures, the SSP and AQS, make each a compelling choice. When families' time is limited, home-visitation is not possible, or observation of more intense activation of the attachment relationship is preferred, researchers often employ the SSP, even when children mature beyond its validated age range (Clements & Barnett, 2002; Easterbrooks & Goldberg, 1984; Moss et al., 2011; Rosen & Rothbaum, 1993;

Zevalkink et al., 1999). On the other hand, researchers may prioritize using an age-appropriate measure for children older than 18 months, collecting more observational data with greater ecological validity, or repeating attachment assessments more often, subsequently choosing the AQS. Finally, researchers must consider the strengths and limitations of using categorical or continuous data. Although continuous measurement using the AQS more easily captures even small degrees of improvement in attachment security, intervention outcome studies may more plainly convey assessment of clinical significance by demonstrating clear shifts in categorical classifications using the SSP (e.g., improvements from insecure to secure attachment styles).

Broadly, two meta-analyses have reported on convergent validity between the AQS and SSP (Cadman et al., 2018b; van IJzendoorn et al., 2004). Meta-analytic data revealed moderate correlations between the observer-report AQS and SSP across populations for children ages 12-42 months (r = .31, van IJzendoorn et al., 2004; and r = .25, Cadman et al., 2018b). The majority of studies comparing concurrent (e.g., less than 3 months between measures) observer-report AQS and SSP data in non-clinical samples have also demonstrated significantly higher AQS scores for those children classified as secure using the SSP, compared with those in the insecure or disorganized categories (Busch-Rossnagel et al., 1994; Pederson et al., 1998; Seifer et al., 1996; van Bakel & Riksen-Walraven, 2004; Vaughn & Waters, 1990). However, two similar studies revealed non-significant differences in observer-report AQS scores based on SSP classification (low birth-weight infants, Mangelsdorf et al., 1996; non-clinical sample, Posada, 2006). No published research has investigated convergence of the SSP and observer-report AQS in a clinical sample associated with children's mental or behavioral health.

Purpose

The purpose of this study was to evaluate the relative strengths and limitations of two well-established observational methods for measuring toddler-caregiver attachment in the context of externalizing behavior problems. Previous research has investigated how SSP and maternal-/observer-report AQS data relate within non-clinical and other clinical samples (i.e., fostered, adopted, preterm, congenital anomalies, down syndrome, low birth-weight) ranging in age from infancy to preschool. In contrast, this study provides specific information about the utility of the observer-report AQS and SSP for toddlers exhibiting externalizing behavior problems. Effective evaluation of attachment in the toddler population is especially pertinent for researchers measuring a range of outcomes in early intervention work. To this end, the present study examined associations among behavior problems, child age, SSP attachment classifications, and observer-report AQS Security scores in a clinical sample of children in the 14-25 month age range for whom caregivers have reported externalizing behavior problems.

Hypotheses

Behavior Problems and Attachment

Correlation. It was expected that behavior problems would be negatively correlated with attachment security as measured by the AQS. In other words, children with more externalizing behavior problems would have lower attachment scores, indicating less attachment security.

Mean differences. It was predicted that children classified as securely attached (Group B) would have significantly lower mean caregiver-reported externalizing behavior scores than those classified as insecurely attached (Groups A and C combined). Further, it was expected that mean externalizing problem behavior scores would be significantly lower for securely attached children (Group B) as compared with those classified as insecure-avoidant (Group A) or insecure-resistant (Group C), individually.

The broader literature in this area suggests that children from various age groups experiencing behavior problems across populations are less likely to demonstrate attachment security (Carlson et al., 2004; Greenberg et al., 1997; Greenberg et al., 1993; Shaw et al., 1994). Therefore, it was anticipated that data from this clinical sample of toddlers would reflect similar associations.

Convergence of AQS and SSP

Correlation. It was hypothesized that AQS Security scores and SSP classifications would be positively correlated such that children with higher AQS Security scores would be more likely to be classified as securely attached in the SSP.

Data from existing research provide evidence of moderate convergent validity between the two measures across ages and populations (van IJzendoorn et al., 2004; Cadman et al., 2018b). Five studies have found significant associations between concurrent observer-report AQS and SSP assessments in non-clinical samples (Busch-Rossnagel et al., 1994; Pederson et al., 1998; Seifer et al., 1996; van Bakel & Riksen-Walraven, 2004; Vaughn & Waters, 1990), while two similar studies demonstrated non-significant effects (Mangelsdorf et al., 1996; Posada, 2006).

Age as a Moderator of SSP and AQS Ratings. In line with concerns about the validity of SSP for use with children older than 18 months, we predicted that age would moderate the association between SSP classification and AQS Security score. It was expected that younger children would have more closely correlated ratings of attachment using the two measures than would older children.

Previous meta-analysis reveals that, across populations, studies involving children younger than 18 months provided evidence of stronger correlations between SSP and AQS

scores (r = .34; p < .001) as compared with investigations of children between 19 and 30 months of age (r = .22; p = ns; van IJzendoorn et al., 2004). Cadman et al. (2018b) replicated this finding, revealing that, for children from non-clinical and other clinical populations (fostered, adopted, preterm, congenital anomalies, down syndrome, low birth-weight), those younger than 30 months of age demonstrated stronger effects between SSP and AQS scores than did children older than 30 months.

Behavior Problems as a Moderator of SSP and AQS Ratings. It was hypothesized that caregiver-reported externalizing behavior ratings would moderate the association between SSP classification and AQS Security score, with children rated lower in behavior problems demonstrating greater positive associations between attachment ratings. In their meta-analysis of AQS measurement data, van IJzendoorn et al. (2004) found that non-clinical populations had significantly higher correlations between SSP and combined maternal- and observer-report AQS ratings (r = .32; p < .001) than did clinical samples (i.e., preterm, congenital anomalies, down syndrome, low birth-weight; r = .23; p < .05), although both demonstrated significant correlations.

In an updated meta-analysis, Cadman et al. (2018b) discovered that SSP and combined maternal- and observer-report AQS data were significantly correlated for non-clinical samples (r = .23; p < .001), but the effect failed to reach significance for clinical samples (i.e., fostered, adopted, preterm, congenital anomalies, down syndrome, low birth-weight; r = .08; p = n.s.). Theoretically, moderation by behavior problems may apply due to differences in measurement variances captured by the AQS and SSP. A continuous measure of attachment (the AQS) is likely more sensitive to variability in any moderator (Cohen, 1983), in this case the particularly salient variable of externalizing behavior, than is a categorical measure (the SSP).

Method

Study Design

The current investigation used data collected as part of a larger study entitled, "The Karitane 'My Toddler and Me Study': A Randomised Controlled Trial Comparing PCIT-T, COS-P and Waitlist Controls in the Treatment of Disruptive Behaviours in Children Aged 14-24 Months." The ongoing randomized controlled trial (RCT) follows families through treatment after random assignment to one of three groups: PCIT – Toddlers, COS – Parent group, or wait-list control. Eligible families are referred to the Karitane Toddler Clinic for difficulties with child behavior management. Variables of interest in the RCT include pre- and post-treatment measures of behavior problems, attachment security, sensitive caregiving, and emotion regulation, among others. The RCT was designed by primary investigator: Jane Kohlhoff, PhD; Chief Investigators: Cheryl McNeil, PhD, Cathy McMahon, PhD, Susan Morgan, MInfMH, Anna Huber, PhD, and Valsamma Eapen, PhD; with contributions from graduate students: Sara Cibralic, MPsycClin, Corey Lieneman, MS, and Chris Owen, BS. The Karitane Toddler Clinic provides funding for the RCT.

Analyses and coding completed as part of the current study will serve as a portion of the baseline measures for the larger RCT. Design of the present study, including inclusion of the AQS, research questions, and analyses, were completed by Corey Lieneman, MS and Cheryl McNeil, PhD. The Karitane Toddler Clinic and Doctoral Student Research Grants from the Department of Psychology, Office of Academic Affairs, and Provost at West Virginia University provided funding for SSP coding training and travel for the current study.

Participants

Participating families were recruited from the pool of new referrals to the Karitane Toddler Clinic in Carramar and Camden, New South Wales, Australia. The Karitane Toddler Clinic is a no-cost, short-term, outpatient behavioral health clinic treating families of children ages 15 months to 4 years of age. Sixty-nine mother-child dyads were enrolled in the study. To ensure consistency across families and because mothers were most often the children's primary caregivers in this sample, only mothers were included. To be eligible, the identified child must have been between 14 and 24 months of age at the time of referral, and the child's mother must have answered "yes" to the following screening questions: (1) "Do you have concerns about your child's behavior?," and (2) "Do you have difficulties managing your child's behavior?". (One family had a child who was 24 months at the time of enrollment but turned 25 months old before the first assessment.) Within these criteria, all families deemed appropriate for Karitane-based therapy services were also eligible for the study.

Karitane typically postpones treatment and refers families to other services if they present with more immediate and severe needs that would likely impede treatment progress (e.g., active maternal substance abuse, recent maternal hospitalization for mental health concerns, unstable child custody placement). Because the proposed study was part of a larger treatment outcome study, families deemed ineligible for Karitane-based therapy services were also excluded from the present investigation.

Measures

Attachment Q-Set

The observer-report Attachment Q-Set (AQS; Waters, 1987) is a Q-sort procedure designed to assess attachment security in naturalistic settings and has been validated for children 12-48 months of age. Assessment begins by conducting a 60-90-minute child-caregiver

observation, usually in the home. Later, a trained and reliable coder sorts 90 cards labeled with various descriptors of attachment-related child behavior and "filler" items (e.g., related to temperament and sociability) into 9 piles of 10 cards each, labeled "most characteristic" to "least characteristic" of the child being rated.

AQS items focused on attachment-related behavior target constructs like affective sharing (e.g., "When child finds something new to play with, he carries it to mother or shows it to her from across the room."), resistance (e.g.., "When child returns to mother after playing, he is sometimes fussy for no clear reason."), ambivalence (e.g., "Child sometimes signals mother [or gives the impression] that he wants to be put down, and then fusses or wants to be picked right back up."), and proximity-seeking/contact maintenance (e.g., "Child often hugs or cuddles against mother, without her asking or inviting him to do so."), among other variables. Filler items are included to help make attachment-related items easier to sort and to increase placement options for attachment-related cards. Judgement of any item related to content not directly observed during the home visit (e.g., "Child cries when mother leaves him at home with babysitter, father, or grandparent.") is inferred based on other observed behavior, or the item sorted toward the center pile by the trained AQS coder.

Following sorting, a correlation (q) is calculated relative to a criterion sort of a prototypical securely attached child. The resultant dimensional attachment security score ranges from -1.0 (very insecure) to +1.0 (very secure). Subscale or sub-criterion sorts include attachment security, dependency, sociability, and desirability (Waters & Deane, 1985). Because reliability and validity evidence is generally stronger for the observer-report AQS than for the maternal-report version (van IJzendoorn et al., 2004), the former was used in this study.

Construct validity for the AQS has been established through evidence of cross-cultural validity (Posada et al., 1995), predictive validity with caregiver sensitivity, and discriminant validity with temperament (Cadman et al., 2018b; van Bakel & Riksen-Walraven, 2004; van IJzendoorn et al., 2004; Waters & Deane, 1985). Convergent validity with the SSP has been demonstrated for non-clinical samples and a small group of other clinical populations (i.e., fostered, adopted, preterm, congenital anomalies, and down syndrome). Inter-observer agreement has been measured at greater than 85% (Clements & Barnett, 2002; van Bakel & Riksen-Walraven, 2004; Vaughn & Waters, 1990). Meta-analytic evidence of test-rest reliability for the AQS demonstrates an average effect size of $r = .50$ with stronger effects for ratings closer in temporal proximity (Cadman et al., 2018b).

Demographic Form

The demographic form included the following information: child's date of birth and gender, mother's date of birth, years of education, and ethnicity, father's date of birth, years of education, and ethnicity, parents' relationship status, languages spoken in the home, and family income.

Child Behavior Checklist

The Child Behavior Checklist for Ages 1 ½ to 5 (CBCL/1½-5; Achenbach & Rescorla, 2000) is a 100-item caregiver-report questionnaire which assesses various indices of young children's internalizing and externalizing behavior. For each item, a caregiver reports on how true a statement is in describing his or her child over the past two months, selecting responses from "*not true"* (0), "*somewhat or sometimes true"* (1), or "*very true or often true"* (2). Of the three major subscales assessed by the CBCL (i.e., Internalizing, Externalizing, and Total Problems), this study will focus on Externalizing Problems score. The Externalizing Problems

Scale quantifies a caregiver's ratings of the identified child's behavior problems related to aggression, noncompliance, and attention.

Studies around the word have demonstrated strong psychometric properties for the CBCL/1½-5 (de la Osa et al., 2016; Ivanova et al., 2007; Kariuki et al., 2016; Kristensen et al., 2010; Tan et al., 2007). In its validation study, the CBCL/1½-5 showed good test-retest reliability (r = .87 for Externalizing Problems) and adequate inter-caregiver agreement (r = .67; Achenbach & Rescorla, 2000). CBCL/1½-5 scores can also be used to discriminate between clinical and nonclinical referral samples (p < .01; Achenbach & Rescorla, 2000). Internal consistency for the CBCL/1½-5 has been measured at α = .95 (Kariuki et al., 2016). In addition, Externalizing Scale scores have demonstrated strong correlations with child conduct problems and externalizing behavior disorders (Achenbach & Rescorla, 2000).

Strange Situation Procedure

The Strange Situation Procedure (SSP) is an observational measure of child-caregiver attachment conducted in a laboratory setting (Ainsworth et al., 1978). During 8, 1- to 3-minute episodes, researchers observe from behind a two-way mirror as a child, caregiver, and research assistant interact in a variety of combinations. (See procedure section for more details). Coders rate children's behavior during the SSP on a seven-point scale for each of the following: (1) proximity and contact seeking, (2) contact maintenance, (3) resistance, and (4) avoidance, with higher scores indicating more frequent or intense behavior. Based on these four ratings, the coder determines a final attachment classification. Generally, those children with low avoidance and resistance scores are classified as secure (Group B), whereas children with either high avoidance or high resistance scores are classified as insecure-avoidant (Group A) or insecure-resistant (Group C), respectively (Sroufe & Waters, 1977).

The SSP has demonstrated strong reliability at the levels of overall attachment security classification and interactive behavior category (proximity seeking, contact maintenance, avoidance, and resistance), but not at the level of discrete behavior codes (e.g., hold on, approach, glance). Waters (1978) measured inter-observer agreement at the overall classification level at $\kappa = .92$; $p < .001$, and coders' scores for interactive behavior categories strongly correlated ($r = .81$) with an expert coders' ratings, on average. At the level of discrete behavior codes, though, only 16% of categories assessed were significantly correlated among raters, representing a measure of specificity which Waters (1978), equated to item-level analysis.

Regarding validity, much evidence exists in support of the SSP. Waters (2002) asserted that, in accordance with attachment theory, the following established evidence supports the construct validity of the SSP: (1) associations among SSP classifications and maternal care (De Wolff & van IJzendoorn, 1997), (2) changes in SSP attachment classifications correlated with changes in maternal care (Bernard et al., 2012; Dozier et al., 2009), (3) appropriate associations among repeated longitudinal SSP classifications (Fraley, 2002), and (4) links among SSP classifications and a variety of psychosocial outcomes (Fearon et al., 2010). Solomon and George (2008) pointed out additional components of the SSP's construct validity as demonstrated by evidence of cross-cultural measurement (Posada & Jacobs, 2001) and discriminant validity (Groh et al., 2017; Sroufe, 1985), in line with Nunnally's model (1978).

Procedure

New families referred to services at the Karitane Toddler Clinic were introduced to the larger RCT during their initial phone screener for services. Families were deemed eligible if (1) they had a child between the ages of 14 and 24 months, and (2) they reported having concerns

with or difficulty managing their child's behavior. Interested and eligible families were scheduled for intake appointments at the Karitane Toddler Clinic.

Families attended a pair of intake interview and observation appointments, the first being held at a Karitane Toddler Clinic and the second in the family home. The clinic visit began with a review of study involvement and informed consent procedures. Consent forms stated that, in addition to use by investigators at the University of New South Wales, researchers at West Virginia University would also analyze the data. After signatures were obtained, caregivers were provided with a packet of assessments to be returned at the following appointment, including the CBCL/1 ½-5 and demographic form. Then, caregivers participated in a clinical interview assessing family background, developmental history of the child, history of behavior problems, and other relevant environmental variables; this interview lasted about 1 hour. Next, the mother and child took part in a series of assessments, which began with the SSP.

SSP

Before beginning this task, researchers briefly described the procedure to caregivers and provided the mother with an electronic bug-in-the-ear to facilitate communication during the SSP. Researchers observed from behind a two-way mirror as the child, mother, and research assistant interacted in a variety of situations. Each SSP was video-recorded and lasted for about 20 minutes.

Situation One. First, an experimenter introduced the mother and child to a small playroom with a set of developmentally appropriate toys (i.e., a doll, four toy animals, an electronic piggy bank with large coins, a ring-stacking toy, and a toy car with light-up buttons) on a round playmat on the floor. The mother-child dyad were naïve to the room. The

experimenter told the mother to sit in one of two chairs and read a magazine. This situation lasted for 1 minute and ended when the experimenter left the room.

Situation Two. Experimenters instructed the mother to introduce the child to the toys quickly to get him or her settled but to try to sit in the chair as soon as was feasible. She was encouraged to respond if the child approached or called to her. This warm-up period lasted for 3 minutes.

Situation Three. Next, a female research assistant entered saying, "Hello. I am the stranger." The stranger sat quietly reading a magazine in the chair next to the mother for 1 minute. Then, the stranger began a conversation with the mother. They made small talk or discussed the next task in the procedure for 1 minute. Finally, the stranger attempted to engage the child by playing next to him or her with toys on the floor for 1 minute.

Situation Four. To begin the first separation, the mother was instructed via wireless ear piece to leave the room promptly and tell the child "bye-bye" on the way out. The child and stranger remained in the room together for up to 3 minutes. If needed, the stranger attempted to comfort the child by rocking, distracting with toys, and reassuring him or her that the mother would be right back. If the child was reasonably settled, the stranger returned to her chair to read a magazine for the remainder of the 3 minutes. If the child could not be settled after 1 minute, the mother was instructed to return to the room.

Situation Five. During this first reunion, the mother was directed to knock on the door, call the child's name once, and pause at the open door before entering the room. The stranger turned her back to the child and was non-responsive during reunion. After the mother and child regained contact, the stranger quietly left the room. The mother and child remained in the room

alone together for the remainder of the 3 minutes. The mother was told to try to get the child back to play and then return to her chair to read a magazine if possible.

Situation Six. To initiate the second separation, the mother was again instructed via wireless ear piece to promptly leave the room, saying "bye-bye" as she left. The child was left alone in the room for up to 3 minutes. If the child did not settle after about 30 seconds, this situation was truncated. If the child was relatively calm, he or she remained alone in the room for the full 3 minutes.

Situation Seven. The stranger spoke the child's name outside the closed door and paused at the open door before entering the room. If necessary, she again attempted to calm the child by holding him or her, distracting with toys, reassuring the child that the mother would be right back, etc. If the child was reasonably settled, the stranger returned to her chair to read a magazine for the remainder of the 3 minutes. If the child could not be settled after 1 minute, the mother was instructed to return to the room.

Situation Eight. For the final reunion, the mother was directed to open the door and pause there before entering the room. She was encouraged to greet the child and comfort him or her for the remainder of the 3 minutes, if needed, or return to play with the child as she normally would. This final situation lasted for 3 minutes.

Coding. This researcher is certified in the coding of A, B, and C attachment classifications using the SSP and coded all video recordings. To meet certification criteria, this researcher and a secondary coder attended a 40-hour training led by expert developers of attachment security coding. In addition, coders passed (80% or better) a reliability test which included the coding of 35 video-recorded SSPs. The secondary certified coder double-coded 28% of all SSP videos. Coders achieved 79% inter-observer agreement on ABC classifications

and 95% agreement on insecure-secure classifications. Coding disagreements for four videos were resolved after conference and joint review of the recordings in question. Most disagreements occurred in relation to videos which were considered "difficult" to code including potentially elevated levels of resistant, avoidant, and disorganized behavior. Double-coding increased from a proposed 20% to 28% of videos to ensure greater confidence in codes, given the difficulty of this sample of videos.

Home Visit

The second intake appointment and observation occurred in the family home. The main component of this assessment was the AQS observation. Home visits were scheduled for times when the child was typically awake and there were minimal distractions in the home (e.g., siblings and other caregivers were away). At the start of the visit, researchers asked mothers to turn off screens, put pets in another room, and mute mobile devices.

Observer-Report AQS. During this 60-90-minute observation, a variety of semi-structured tasks were arranged to elicit a range of behavior pertinent to sorting the AQS items. Mothers were aware that video-recording would begin immediately in order to capture the child's initial reactions to the home visitor's arrival.

Competing Attention Task. (5 minutes) First, the home visitor asked the mother to complete a questionnaire. This situation targeted the child's behavior when the mother was engaged in a task, which competed with the child for her attention.

Free-play, No Toys. (5 minutes) Next, the home visitor stated the following: "We are interested in learning how you and your child normally interact with one another both with interesting toys and in the absence of toys. Play with [child's name] as you might at any time during the course of a normal day without toys."

Free-Play, Novel Toys. (10 minutes) In this situation, the home visitor introduced a bag of new toys, which included a set of stacking cups, a puppet, two puzzles, and a large ball, saying, "Here is a bag of toys that you may like to have a look at together. Play together as you normally would for the next 10 minutes or so."

Challenging Toy Play. (5 minutes) Then, the home visitor introduced two new toys intended to the challenge the child, a shape sorter and a ring-stacking toy. The visitor gave the following instructions: "Here is another new toy for you to play with together. This one may be a bit tricky for [child's name] to manage. Feel free to assist him/her in any way that you might normally."

Picture Book Task. (5 minutes) Next, the home visitor provided the dyad with a picture book with no words. She stated these instructions: "Here is a book for you to look at together. Just read or look at the book in the way you would normally do together."

Clean-Up Task. (3-5 minutes) The home visitor told the mother: "Now it's time to pack up the toys. Please try to get [child's name] to put the toys back in the bag/box."

Structured Interview. (10 minutes) This was another competing attention task in which the home visitor asked the mother to answer structured interview questions about her child (e.g., "Tell me about a problem you had with your child recently and how you dealt with it.").

Feeding Episode. (30 minutes) The home visitor observed mother-child interactions during a meal or snack break. If the child finished eating before the end of the 30-minute period, he or she was allowed to play freely.

Observer-Child Interaction. (5 minutes) During this task, the home visitor produced a play tea set and attempted to engage the child in playing "tea party." There were no specific instructions given to the child.

Trained and reliable AQS coders coded all home visit recordings. Although there is no standardized training associated with the AQS, the lead coder for this study was trained by expert AQS coders and researchers at the University of Western Ontario. She was mentored, received feedback on coding of video-recordings over a period of months, and demonstrated at least 80% inter-observer agreement with an expert coder. The lead coder and her team coded videos collaboratively until 80% reliability was achieved. The lead coder provided ongoing supervision and random checks as coding progressed. Overall, 20.3% of AQS videos were double-coded. Inter-rater agreement was good; the average ICC was .799 with a 95% confidence interval from .375 to .936; F (13, 69) = 4.983, p = .003.

Incentives

For their participation in the study, families received free developmental assessments of their identified child using the Mullen Scales of Early Learning (MSEL; Mullen, 1995). Participating children were screened for autism spectrum disorder using the Modified Checklist for Autism in Toddlers, Revised (M-CHAT-R). Children whose scores indicated moderate risk were followed with the Modified Checklist for Autism in Toddlers, Revised with Follow-Up (M-CHAT-R/F; Robins et al., 2009). If scores indicated high risk on the M-CHAT-R or more than one "fail" item on the M-CHAT-R/F, families were offered a free diagnostic evaluation using the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord et al., 2012) and the Vineland Adaptive Behavior Scales, Third Edition (Sparrow et al., 2016).

All assessments were completed by researchers associated with the larger RCT who were trained in their administrations. Following baseline assessment, caregivers received feedback and a copy of their child's assessment report from a licensed psychologist. Finally, families received a $25 gift card and a small toy (i.e., a $2-5 value) for completing baseline assessments. Participants were also eligible to receive another $25 gift card and small toy for participation in

assessment at each of the larger RCT's data collection time points (i.e., mid-treatment, post-treatment, and follow-up).

Data Sharing

The primary investigator at the University of New South Wales and this researcher at West Virginia University transmitted data electronically through a high security file-sharing system, CloudStor, for coding and analysis. IRB approval from both institutions is on file.

Results

Power Analyses

Although sample size for this investigation was fixed by the timetable of this project in relation to the larger RCT, a priori power analyses were conducted to provide context around results. Power analyses conducted using G*Power 3.1.9.4 (Faul et al., 2007) revealed that, to achieve 80% power in detecting a medium effect (i.e., $\rho = .30$) using a point biserial correlation, a sample of 64 mother-child dyads would have been required. Further, to conduct an independent samples *t*-test comparing two group means, a sample size of 102 would have been needed to detect a medium effect ($d = .50$) with 80% power. To detect a medium effect ($f = .25$) among 3 groups using a fixed effects, one-way ANOVA with 80% power, a sample of 159 would have been needed. Finally, using a linear regression, a sample of 68 dyads would have been required to detect a medium effect ($f^2 = .15$) with 80% power. Due to aforementioned limitations, a final sample size of 69 families was included with the understanding that more complex analyses would lack sufficient power to detect smaller effects.

Preliminary Analyses

Preliminary analyses evaluated primary variables for missingness, revealing no missing data except in response to CBCL Externalizing Scale items; 62 participants (89.9% of the sample) had no missing data, 4 (5.8%) had 1 missing item, 2 (2.9%) had 2 missing items, and 1

(1.4%) was missing all items. Little's MCAR test was not significant (p = .472), so data were considered to be missing completely at random. Individual participants' mean scores were imputed when computing partially incomplete CBCL Externalizing Subscale scores. Data from the participant missing all CBCL items were not included in analyses evaluating externalizing behavior. There were no problems regarding outliers, normality, homogeneity, or multicolinearity.

Descriptive Analyses

Descriptive statistics for demographic variables are reported in Table 1. For this sample, English was the most popular primary language spoken in the home (48 families) while remaining families reported speaking 10 different primary languages. In addition, 17 families reported speaking 14 different secondary languages other than English in the home. All mothers who participated in the SSP were the biological mothers of participating children. Mothers described their relationship statuses as married (n = 39, 56.5%), single (n = 12, 17.4%), separated (n = 6, 8.7%), or de-facto (n = 4, 5.8%), with (n = 8, 11.6%) not specifying relationship status. Only one family reported previous involvement in the foster care system for a participating child. Statistics describing children's developmental levels (MSEL scores), autism symptoms (M-CHAT, R/F scores), attachment security scores (SSP and AQS), and disruptive behavior problems (CBCL Externalizing scores) are reported in Table 2. Associations among these variables were also analyzed and are reported in a correlation matrix; see Table 3.

Some patterns of scores presented in Table 2 deviated from norms for this age range. MSEL scores indicated a higher proportion of developmental delays than would be expected in a normative sample (Mullen, 1995). The percentage of children whose subscale or overall development scores fell below one standard deviation below the mean ranged from 17-55% of

the sample, with receptive language representing the most common area of delay. In addition, rates of positive screens for autism symptoms were higher than would be expected in a non-clinical sample (Robins et al., 2014). The following percentages indicate comparisons between the present sample and the M-CHAT's non-clinical validation sample respectively: (1) screened positive for ASD risk on M-CHAT-R (27.5% of present sample, 7.2% of validation sample); (2) screened positive for ASD risk on M-CHAT-R/F (43.8% of those screened in present sample, 30.1% in validation sample); (3) scored in range indicative of ASD on diagnostic measure (72.7% of those tested in present sample; 47.5% in validation sample; Robins et al., 2014).

Primary Analyses

Behavior Problems and Attachment

Correlation. The correlation between CBCL Externalizing Problem Scale scores and AQS Security scores was analyzed using Pearson's *r*. It was expected that children's caregiver-reported scores of behavior problems would be negatively correlated with AQS Security scores. As expected, AQS Security scores were moderately correlated with CBCL Externalizing score, $r = -.45$, $p < .001$, such that those children with higher attachment security were less likely to have caregiver-report externalizing behavior problems.

To understand this relation further, a between groups, one-way ANOVA was carried out to compare AQS Security scores among those whose CBCL Externalizing scores fell in the "normal," "borderline," and "clinical" ranges. AQS Security scores were significantly different among the three categories; $F(2, 67) = 9.27$, $p < .001$. Post-hoc tests (Fisher's LSD) revealed significantly lower AQS Security scores for those who scored in the clinical range compared with those in the borderline range and with those in the normal range on the CBCL Externalizing Scale. All other post-hoc comparisons were non-significant.

Mean Differences. SSP classifications were dichotomized as either insecure (Group A [insecure-avoidant] and C [insecure-resistant]; 0) or secure (Group B; 1). It was predicted that, using an independent samples *t*-test, children classified as securely attached (Group B) would have significantly lower mean caregiver-reported externalizing behavior scores than those classified as insecurely attached (Groups A and C combined). Contrary to hypothesis, results indicated that those children classified as secure using the SSP (n = 28) did not have significantly different externalizing scores (M = 22.4, SD = 9.6) from those from the insecure group (n = 40, M = 21.3, SD = 10.5), t (67) = -0.4, p = .515. As proposed, because this *t*-test did not reveal significant two-group differences, no further analyses (i.e., an additional fixed effects one-way ANOVA) were run to compare externalizing behavior scores for Groups A, B, and C separately.

Convergence of AQS and SSP

Correlation. The associated between AQS Security scores and dichotomous SSP scores was analyzed using a point biserial correlation. It was hypothesized that those with higher observer-reported AQS scores would be significantly more likely to be classified as securely attached as measured by the SSP. Unexpectedly, the correlation between the two attachment measures was non-significant, r_{pb}= .07, p = .574.

Age as a Moderator of SSP and AQS Ratings. Child age was investigated as a moderator of the association between SSP and AQS Security scores. It was expected that age would moderate the association between dichotomous SSP security classifications and AQS Security scores such that younger children's scores would be more strongly correlated than would older children's scores. Figure 1 represents the hypothesized moderation model.

A moderation analysis was completed using the PROCESS macro for SPSS version 3.4, model 1 (Hayes & Little, 2018), applying 5,000 bootstrapping resamples with confidence

intervals set at 95%. Our moderation analysis tested the utility of an interaction between continuous child age and dichotomous SSP security scores to predict AQS Security scores. Results indicated that neither the overall model (R^2 = .05, $F(3, 65) = 1.14$, p = .341) nor the interaction was significant, b = .055, *s.e.* = .035, p = .118, suggesting that the relationship between the AQS and SSP did not vary as a function of child age.

Correlation by Age Group. To investigate the connections among our attachment measures and child age in the absence of a significant moderation, a post-hoc exploration of correlational analyses was conducted. Because the SSP has not been validated for children over the age of 18 months, data from this sample were further analyzed dichotomously (i.e., 18 months and younger, n = 31; 19 months and older, n = 38). In line with the proposed moderation hypothesis, it was expected that children younger than 19 months would demonstrate better convergence between SSP and AQS Security scores than would children 19 months and older.

Contrary to hypothesis, but as reflected in the larger sample, children 18 months and younger demonstrated no significant correlation between dichotomous SSP and AQS Security scores, r_{pb}= -.25, p = .185. However, dichotomous SSP and AQS Security scores for those children 19-25 months of age demonstrated a significant correlation, r_{pb}= .32, p = .048, such that children classified as secure using the SSP had higher AQS Security scores than those classified as insecure on the SSP. Children in the two age groups did not differ significantly by gender, SSP classifications, AQS scores, externalizing behavior problems, or M-CHAT-R scores (See Table 4).

Behavior Problems as a Moderator of SSP and AQS Ratings. It was also hypothesized that externalizing behavior problem severity would moderate the association between dichotomous SSP classification and AQS Security scores. It was expected that children

with more caregiver-reported externalizing problems would have weaker correlations between attachment ratings than children with fewer behavior problems. See Figure 2 for a graphic representation of the model.

Again, moderation analysis was conducted using the PROCESS macro to test whether an interaction between CBCL Externalizing Problems and dichotomous SSP would predict AQS Security scores. Results indicated that the overall model explained a significant portion of the variance in predicting AQS Security scores (R^2 = .216, F (3, 64) = 5.87, p = .001), but the interaction between SSP security scores and externalizing problems was not significant, b = -.001, *s.e.* = .010, p = .944. This suggested that the association between AQS and SSP did not vary as a function of child externalizing problems.

Discussion

This study provides descriptive and correlational data regarding a clinically-referred sample of toddlers whose caregivers reported problems managing their behavior. Overall, larger proportions of this sample were classified as having externalizing behavior problems, insecure attachment in the two-way SSP classification, insecure-resistant (Type C) in the three-way SSP classification, and insecure attachment as measured by the AQS, as compared with non-clinical samples in this age range. In accordance with hypothesis, externalizing behavior problems were associated with attachment insecurity when measured using the AQS. Contrary to hypothesis, SSP security classifications were not significantly associated with externalizing behavior problems or with AQS Security. The high prevalence of behavior problems and overlapping variance between AQS Security may have influenced this lack of convergence. Finally, moderation analyses of the relationship between SSP and AQS scores provided no significant

evidence of moderation by child age or by externalizing behavior problems, although power may have impacted our ability to detect smaller effects.

Clinically-Referred Toddler Sample Description

Attachment as Measured by the SSP

In our sample of clinically-referred toddlers, attachment insecurity as measured by the SSP was much higher than rates reported in non-clinical samples (33%; van IJzendoorn et al., 1992). Rates of insecurity were slightly higher in our sample, even, than levels demonstrated in previous research conducted on clinical samples in Australia. Over half of the toddlers in our sample were rated as insecurely attached (59.1%) using the SSP. Two other samples of Australian toddlers who were clinically-referred for behavioral and emotional difficulties have also demonstrated increased rates of insecure attachment (i.e., 43.6% insecure, Huber et al., 2015; 38% insecure, Kohlhoff et al. 2019) as compared with rates typically measured in non-clinical samples. In their study of Australian toddlers who had experienced feeding and settling difficulties after birth, McMahon et al. (2006) classified 46.8% of children as insecurely attached. In their United States-based investigation, Cohen et al. (1999) classified 77% of clinically-referred toddlers (e.g., for problems with feeding, sleep, behavior, bonding, maternal depression) as insecurely attached. Overall, as compared with rates of insecure attachment reported in combined clinical and non-clinical samples worldwide (35%, van IJzendoorn & Kroonenberg, 1988), our data supports previous findings demonstrating higher rates of insecure attachment in toddlers clinically-referred for behavior problems.

More specifically, with regard to the subtypes of insecurely classified children in the current sample, nearly half (48.5%) of the overall sample was classified as insecure-resistant (C), and only 10.6% were classified as insecure-avoidant (A). In other words, nearly half of children

in the sample displayed ambivalent or angry behavior upon reunion, while only one-tenth limited emotional expression or ignored caregivers during reunion. This large resistant to avoidant ratio is unusual in the attachment literature. More commonly, those children classified as insecurely attached are rated as insecure-avoidant (A) rather than resistant (C), even in samples with high rates of insecurity (van IJzendoorn et al., 1999). For example, in a sample of Canadian child welfare-involved toddlers, Moss et al. (2011) classified 31.3% of children as insecure-avoidant and only 1.3% as insecure-resistant. Similarly, in a sample of low-SES, recent Latin American immigrants to the United States with an overall insecurity rate of 63.4%, Lieberman et al. (1991) classified 42.9% as insecure-avoidant and only 8.6% as insecure-resistant.

The high frequency of insecure-resistant cases in this sample may be a function of the population of children clinically-referred for treatment of behavior problems. Previous research connected externalizing behavior problems, insecure-resistant (Type C) classifications, and negative affect-related temperamental characteristics (Groh et al., 2017; Martel et al., 2012; Singh & Waldman, 2010). Behaviors common to both the SSP resistance coding scheme and disruptive behavior problems (e.g., hitting the parent, aggressive behavior, angry screaming, kicking, throwing, and resistance to interference) are common in this population. However, externalizing behavior problems were not significantly higher for insecure-resistant children than for other groups within the sample. That is to say, while our overall sample was high in both insecure-resistant classifications and externalizing behavior problems, classifications did not vary based on level of externalizing problems *within* the sample. The lack of a correlation here may be impacted by differences between caregiver and observer reports and differences in children's behavior at home versus during the SSP.

On the other hand, the overall low rate of insecure-avoidant classifications in our sample may be better understood through a cultural lens. Australian parents spend more time with their children during the growing up years than do parents from all 21 other countries providing data, including the United States and Canada, according to recent reports (OECD, 2015; ARACY, 2018). Australian mothers are also some of the most likely to believe that mothers of young children should not work outside of the home compared with mothers from other countries (OECD, 2016). Fittingly, a larger proportion of mothers in this study identified as being unemployed or stay-at-home-mothers (27.5%) than any other occupation. Breastfeeding is also common, with Australia ranking in the top 25% of countries where nursing exclusively persisted for infants at 6 months of age (OECD, 2009). Finally, legally-mandated, government-funded maternity leave in Australia makes it more desirable for mothers to serve as primary caregivers to their infants. Australian new mothers are guaranteed 12 months of maternity leave with the first 18 weeks being paid by the government (Services Australia, 2020). The United States, in contrast, mandates only 12 weeks of unpaid leave for most new mothers working in larger companies (Family and Medical Leave Act of 1993). Policies supporting longer maternity leave durations have been associated with increases in time mothers and children spend together as well as in quality and duration of breastfeeding (Baker & Milligan, 2008). All of these factors provide plentiful opportunities for infants to achieve proximity and contact with their mothers, two constructs expected to be rated lower in children classified as insecure-avoidant.

From an attachment perspective, insecure-avoidant attachment develops in relationships when a caregiver is emotionally unresponsive to or rejecting of the child, whereas insecure-resistant attachment develops in relationships in which a child experiences inconsistent responsiveness and support from their attachment figure (Ainsworth et al., 1978). Based on the

cultural importance of spending time together, nursing, and prioritizing primary caregiving, Australian mothers of insecurely attached children in our sample may have been more likely to provide inconsistent responsiveness than consistent unresponsiveness.

From a behavioral perspective, more experience with receiving reinforcement (e.g., breast milk, physical contact, assistance) from a mother who is physically available should increase the likelihood of these behaviors occurring in the future. Therefore, it is plausible that children who develop insecure attachment styles in cultures where mothers often provide close proximity and contact would be more likely to engage in insecure-resistant strategies than insecure-avoidant strategies.

The low levels of insecure-avoidance in our sample mirror those of previously studied Asian samples. Citing the influence of *maternal dew*, a Korean mother's belief in a strong bond between mother and child, which may have healing properties, Jin et al. (2012) found only 1% of Korean infants to be insecure-avoidant, while 21% were classified as insecure-resistant. This low rate of infant avoidance was attributed to the high proportion of time that Korean mothers spend with their infants. Along the same lines, the Japanese concept of *amae* (e.g., a degree of psychological dependence and indulgence) and the close proximity in which infants and mothers spend the first year of life are thought to contribute to similar attachment classifications in Japanese SSP research. Takahishi (1986) famously classified 0% of infants as insecure-avoidant and 32% as insecure-resistant, while Kondo-Ikemura et al. (2018) measured 2.2% insecure-avoidance and 10% insecure-resistance in their Japanese samples. Finally, Archer et al. (2015) showed comparable ratios of insecure-avoidance (9.2%) to insecure-resistance (20.9%) in a Southern Chinese sample, a group for which interdependent relationships represent an important cultural value. Connections between cultural values and higher ratios of insecure-resistant to

insecure-avoidant classifications using Asian samples have been clearly established in the literature. It is likely that the breakdown of classifications in our Australian sample can be partially explained by cultural values as well.

Attachment as Measured by the AQS

Regarding AQS Security scores, results from the current sample demonstrate lower mean security scores with greater variability (0.05, 95% CI [-0.06, 0.16]) than those reported by meta-analytic data worldwide (0.35, 95% CI [0.34, 0.37], Cadman et al., 2015; 0.31, 95% CI [0.30, 0.32], van IJzendoorn et al., 2004). AQS Security scores from the current sample were also lower and more variable than those reported for the clinical subsamples from meta-analytic AQS data; Cadman et al. (2015) reported M = 0.28, 95% CI [0.24, 0.32], and van IJzendoorn et al. (2004) reported M = 0.21, 95% CI [0.20, 0.22]. These data comparisons suggest that within the population of toddlers referred for behavior problems, very low ratings of attachment security are common, but higher ratings of attachment security are also represented.

Behavior Problems

Behavior problems as reported by caregivers on the CBCL Externalizing Scale in this study were higher than would be expected in non-clinical samples (Achenbach & Rescorla, 2000) and comparable to other reports of behavior problems in clinically-referred toddler samples (Karabekiroglu & Aman, 2009; Karabekiroglu et al., 2010; Kohlhoff et al., 2019; Kohlhoff et al., 2020). Likewise, externalizing problems reflected scores from other samples of children experiencing attachment problems (Kohlhoff et al., 2019; Spieker et al., 2011). The higher prevalence of symptoms concerning for autism spectrum disorder and developmental delay in the current sample have implications for behavior problems as well, with the presence of

problems in one of these three areas increasing risk for comorbidities in the others (Baker et al., 2003; Fodstad et al., 2012; Swineford et al., 2015)

Behavior and Attachment Problems

Hypotheses regarding negative correlations between behavior problems and attachment security were differentially supported, depending on which attachment measure was employed. First, in support of hypothesis, a significant, small to medium, negative association between attachment (as measured by the AQS Security score) and externalizing behavior problems was found. In other words, children who had better attachment security were less likely to demonstrate behavior problems. This finding is supported by previous literature and theory. For example, Madigan et al. (2016) demonstrated a meta-analytic effect size of d = .49 between insecure attachment (assessed by various measures) and externalizing behavior problems. Fearon et al. (2010) also found a small to medium effect between the two constructs in their meta-analysis (d = .31, p = < .01). Further, Fearon et al. (2010) demonstrated significantly higher correlations between attachment and externalizing behavior ratings in clinical samples (d = .49, p = < .01) as compared with non-clinical samples (d = .26, p = < .01). Results from other research comparing AQS scores and externalizing problems are presented in Table 5; significant correlations range from very small to large. Second, in contrast to hypothesis, neither three-way nor dichotomous SSP security ratings were significantly associated with externalizing behavior ratings in this sample. This opposes previous literature demonstrating overall significant correlations between the two constructs.

While these differential correlations between externalizing behavior and the two attachment measures were unexpected, a more detailed examination of the previous literature uncovered a similar discrepancy. Within the Fearon et al. (2010) meta-analysis, those studies

measuring attachment using the SSP resulted in significantly weaker correlations between attachment security and externalizing behavior (d = .18, p = < .01) than did those using the AQS (d = .70, p = < .01), and the difference could not be explained by age of assessment. These effects largely represent the ability of attachment styles to predict *later* externalizing behavior problems. Consequently, few studies have examined the *concurrent* association between SSP Security scores and externalizing behavior in clinically-referred samples, samples with high levels of reported externalizing behavior problems, or samples with high percentages of insecure-resistant classified children (Kohlhoff et al., 2019).

There are several possible reasons that the AQS might correlate more highly with externalizing problems than does the SSP. First, some of the discrepancy in significance may be explained by the continuous versus categorical nature of the two attachment measures. The dichotomous data resulting from SSP coding likely decreases the chance of finding a significant effect in comparison to a continuous measure (Cohen, 1983). Still, attachment as a construct should demonstrate low levels of convergence with measures of externalizing behavior (Nunnally, 1978; Sroufe et al., 1999). Our results suggest that attachment security, as measured by the AQS, samples more of the variance affected by externalizing behavior than does the SSP. Significant correlations between a total of 14 of the 24 specific items from the CBCL Externalizing Scale and AQS Security scores lend support to this notion. These correlations included items related to caregiver ratings of the child problems with concentration, sitting still, waiting, demanding, destroying others' things, disobedience, frustration, fighting, angry moods, punishment insensitivity, screaming, stubbornness, temper, and lack of cooperation. It is logical that problems in these areas of child behavior would influence and be influenced by the

caregiver-child attachment relationship (Cicchetti et al., 1995; Kochanska & Kim, 2013; Madigan et al., 2007; Ramsauer et al., 2014; Shaw et al., 1994).

This evidence presents in stark contrast to our data showing that none of the individual items on the CBCL correlated significantly with SSP Security scores. As suggested by others, it could be that, while both SSP and AQS target the underlying construct of attachment, they measure it through slightly different intervening variables, ultimately capturing different parts of the attachment variance (Posada, 2006; Solomon & George, 2008). If the SSP primarily captures the more heightened activation of attachment system, reflecting a child's need to seek safety in response to a perceived threat and to return to a state of exploration, it is possible that this response is less impacted by the propensity to express externalizing behavior problems in the child-relationship. Conversely, if the AQS targets the latent construct of attachment through a wider variety of intervening variables (e.g., proximity, contact, fussiness, affective sharing, compliance) within the less activating environment of the home, perhaps externalizing behavior problems play a bigger role in determining these variables.

Convergence of AQS and SSP Scores

Contrary to hypothesis, AQS Security scores and SSP classifications were not significantly associated in this sample. Mean AQS Security scores were not significantly different between those in the secure and insecure groups nor among those in the A, B, and C groups as classified by the SSP. While lack of significant association between these two gold-standard attachment measures contradicts findings from previous meta-analyses (Cadman et al., 2015; van IJzendoorn et al., 2004), again, clues from this meta-analysis's findings on moderator variables are helpful in understanding our non-significant results. Within the Cadman et al. (2015) meta-analysis, studies including non-clinical samples demonstrated significant

correlations between SSP and AQS scores, whereas those using clinical samples resulted in an overall non-significant correlation. Though these clinical samples (e.g., congenital anomalies, down syndrome, low birth weight, pre-term birth, and adopted children) were not considered clinical in terms of reported child behavior problems, there may be parallels in the way they differed as a whole from non-clinical samples.

The lack of correlation among SSP and AQS Security scores in our sample can likely be explained by the strong influence of behavior problems on AQS score. Given the moderate correlation between externalizing behavior and AQS Security scores, lack of significant correlation between externalizing behavior and SSP Security scores, and the high prevalence of externalizing behavior in this sample, it makes sense that the two attachment measures are not as closely related as in other samples, especially non-clinical samples.

Age as a Moderator of SSP and AQS Ratings

The most curious findings from the current investigation pertain to the associations among child age and the two measures of attachment. First, our hypothesis regarding moderation of the association between attachment measures by child age was not supported. While previous literature in this area has suggested that younger children demonstrate greater convergence between AQS and SSP Security scores than older children (van IJzendoorn et al., 2004), results from the current investigation found no evidence of a significant interaction. One possible explanation is that our sample size resulted in limited power to detect a small effect.

Further complicating the interpretation of our results, a significant medium correlation between AQS and SSP Security scores was found for older children (i.e., ages 19-25 months) but *not* for younger children (i.e., ages 14-18 months). More specifically, the effect for older children was such that those with higher AQS Security scores were more likely to be rated as securely

attached using the SSP. It is important to note that fewer children (n = 31) fell in the younger child age range compared to the other child age range (n = 38), which limited our power to deter an effect. While this correlation for older children may appear to provide new validity evidence for use of the SSP in children over 18 months, the lack of overall correlation between the two attachment measures in the sample as a whole calls this theory into question. Rather, it may be that older children, being less activated by the stress of the Strange Situation, demonstrated behavior more similar to home behavior exhibited during the AQS. Because externalizing behavior problems had such an influence on AQS Security scores, it is possible that behavior problems more strongly influenced behavior for older children during the SSP than for younger children. However, SSP scores and behavior problems were not significantly correlated for older children. Another explanation is that older children's lower levels of activation during the Strange Situation may render the current classification system inadequate in determining important security distinctions (Solomon & George, 2008).

Externalizing Problems as a Moderator of SSP and AQS Ratings

Hypothesis regarding moderation of the association between attachment measures by externalizing behavior was also not supported. Given stronger meta-analytic correlations among the two attachment measures in non-clinical versus clinical samples, this finding contradicts previous literature (Cadman et al., 2018b; van IJzendoorn et al., 2004). It is important to note, though, that clinical categorization in meta-analysis did not refer to child behavior problems. Rather it included samples of children affected by medical conditions and other family-related variables. In addition, our sample may have been underpowered to detect a small effect in a moderation model.

According to the correlation matrix from the present study (see Tables 6 & 7), differential associations among variables included in the externalizing behavior moderation model emerged. First, a significant association between AQS and externalizing scores was revealed only for older children (i.e., ages 19-25 months), such that those with lower AQS scores were more likely to have caregiver reported behavior problems, an effect mirrored by our sample as a whole. These results align with the overwhelming majority of previous studies (see Table 5) and meta-analytic evidence of correlation between AQS Security and externalizing behavior problems in children ages 18 months to 8 years (Fearon et al., 2010). Again, it is important to note that our measure of externalizing problems (CBCL) has not been validated for children in our younger age group. It could be that developmentally, children younger than 18 months do not express externalizing behavior problems in the same ways as do older children. Alternatively, the items on the CBCL Externalizing Scale may not accurately assess the types of behavior problems exhibited by children under 18 months. Whether or not the association between AQS and behavior problems would extend to children younger than 18 months when using a more valid measure of behavior problems in this age range, is a question for further empirical study.

Choosing an Attachment Measure for Toddlers with Behavior Problems

AQS

For researchers considering using AQS to assess attachment security in toddlers clinically-referred for behavior problems, several advantages specific to this population emerge. First, for children older than 18 months, the SSP may not be distressing enough to activate the attachment system (Cicchetti et al., 1990). As a result, a broader variety of behaviors should be measured to assess attachment security accurately, as behavior during less activated observation periods more closely reflects child behavior in the home (Ainsworth et al., 1978; Solomon &

George, 2008; Vaughn & Waters, 1990). Second, for those researchers attempting to capture recent changes in the attachment relationship, the AQS's sampling of home-based behavior may be more representative. Ainsworth et al. (1978) found that recent changes in maternal sensitivity were better captured by home-based observations than by those made during the SSP, which were impacted to a large extent as more time passed (Solomon & George, 2008). Third, use of the AQS circumvents both theoretical and statistical problems embedded in the categorical approach to measuring attachment (Fraley & Spieker, 2003; Solomon & George, 2008; Waters & Beauchaine, 2003). Additionally, because our data suggest that AQS (but not SSP) scores correlated moderately with externalizing behavior problems in our clinically-referred sample, researchers should consider theory in relation to these constructs. If the variance of the attachment relationship affecting and affected by externalizing behaviors is of interest, the AQS may better capture it.

SSP

On the other hand, researchers may also find several advantages to measuring attachment using the SSP, unique to the population of toddlers clinically-referred for behavior problems. Using the SSP decreases issues of confounding externalizing behavior problems with secure base behavior (Carlson & Harwood, 2003). Indeed, results from the present investigation support the idea that AQS scores are more highly correlated with externalizing behavior problems than are SSP scores in this population. If researchers are interested in sampling the variance of attachment related to secure base behavior, independent of the association with externalizing behavior problems, the SSP would be an appropriate choice. Along these same lines, SSP scores are less likely to be influenced by temperamental variables (e.g., sociability, reactivity) which can be seen as extraneous to the attachment relationship (Cadman et al., 2018b; Groh et al., 2017;

Vaughn & Bost, 1999). These temperamental variables are likely to be more salient in samples clinically-referred for behavior problems, lending support to the use of the SSP over the AQS to assess attachment accurately. Similarly, SSP scores are less likely to be influenced by maternal behavior during observation, as mothers' behavior is more tightly constrained by experimenters. This may limit bias in coders' assessment of child behaviors (Solomon & George, 2008).

For Clinicians

When treating toddlers with caregiver-reported behavior problems, results from this study may inform clinicians in several domains. Clinicians should expect a higher proportion of children to demonstrate attachment insecurity, particularly within the insecure-resistant classification as compared with children exhibiting lower levels of externalizing concerns. Bolstering the caregiver-child attachment relationship could be an important treatment goal to consider. Clinicians should also carefully assess for developmental delays and symptoms of ASD, as this study revealed higher rates of these symptoms in our sample. Understanding the function of disruptive behavior (e.g., communication in the context of low receptive language skills) is key in treating it.

If clinicians plan to assess attachment in this population before and after treatment, the age of the child at these time points may dictate which attachment measure is most appropriate. If the child will age beyond 18 months, the SSP may not meaningfully capture differences among classifications using the infant scoring scheme at post-treatment. Repeated measures of attachment may also invalidate the use of the SSP, if it is repeated too frequently or in close succession. Of course, training, time, and travel requirements should be considered when choosing an attachment measure in the clinical context as well. Finally, this study provides important information about the shared variance between attachment and caregiver-reported

externalizing behavior. Clinicians who wish to capture the attachment relationship while considering its interdependence with behavior problems would be wise to choose the AQS. Clinicians who aim to assess attachment more independently of temperament and behavior problems should consider the SSP.

Limitations and Future Directions

Several limitations of the current investigation should be considered when interpreting results and designing future research projects. First, SSP data were organized under the three-way (ABC) classification system (Ainsworth et al., 1978) given the limited scope of funding for advanced coders on this project. Future inclusion of coding for disorganized attachment may alter conclusions regarding correlations among attachment measurement and problem behavior scores. A higher proportion of participants in this sample would likely have been classified as having insecure attachment styles, had disorganization been considered. In accordance with other clinically-referred samples (Cohen et al., 1999; Huber et al., 2015), it is estimated that our sample is high in disorganized attachment. With regard to associations between SSP classifications and externalizing problems, a previous meta-analysis demonstrated no significant difference in effect sizes for studies coding attachment using the three-way or four-way classifications (Fearon et al., 2010).

Second, our measure of child behavior problems, the CBCL/1½-5 (Achenbach & Rescorla, 2000) has not been validated for children younger than 18 months of age. Given that 25 children (36.2%) from our sample fell in this age range, conclusions drawn about relations among externalizing behavior and other variables of interest may not apply equally to our younger children. Future research should employ a more valid measure of externalizing behavior

problems for children under 18 months to further understand how behavior problems relate to attachment in young children.

Third, unique characteristics of this sample may limit the generalizability of results to other groups of toddlers clinically-referred for behavior problems. Children assessed in this study demonstrated a higher proportion of positive screenings for symptoms of autism and of developmental delays, particularly in the domain of receptive language. In addition, the influence of Australian societal and cultural norms on families in this study may explain unique associations among variables of interest. Diversity in ethnicity, languages spoken, education, and income for families in this sample is a strength of the study but has implications for how results may or may not generalize to other, more homogenous groups.

Fourth, a small number of children in our study may have been primarily attached to their fathers or other caregivers. Relying solely on mothers as caregivers in our attachment measurements could have confounded results in this small minority of cases. While the decision to use only mothers reduced a number of other confounds, the potential effect of fathers as primary attachment figures should be considered when interpreting results. Future research should assess child attachment relationships in these analyses using a variety of caregivers.

Finally, the sample size available within the time constraints of this project limited our power to detect small effects. Especially regarding more complex analyses (e.g., moderation, ANOVA) and correlations among smaller subsamples (e.g., younger children), our conclusions may inaccurately describe effects that could have been revealed with more families enrolled. Future research should replicate these analyses with larger samples to better understand the validity of the current findings.

Conclusion

Results from the current investigation are important for informing future intervention work and outcomes research involving clinically-referred young children with attachment and/or behavior problems. The AQS takes into account the effect of behavior problems on the attachment relationship and captures a larger sample of behavior with greater ecological validity. The SSP is weighted less by behavior problems, relies on a smaller sample of behavior, and activates children less with age. Based on these findings, future researchers should carefully consider the advantages and disadvantages of capturing the impact of behavior problems on attachment.

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Table 1
Demographics

		Variable	*n*	%	*M*	*SD*
Child Variables		Age in Months (Range = 14 – 25)	69	100	19.2	3.1
		Children Older than 18 Months	38	55.1		
		Gender (Male)	34	49.3		
Maternal Variables		Age in Years (Range = 19 – 45)			32.0	5.2
	Race/ Ethnicity	Caucasian	26	37.7		
		Asian	10	14.5		
		Middle Eastern	7	10.1		
		European	5	7.2		
		Hispanic/Latino	3	4.3		
		Aboriginal/Torres Strait Islander	3	4.3		
		Other/Not Reported	15	21.7		
	Years of Education	Completed Year 10	5	7.2		
		Completed Year 12	5	7.2		
		TAFE/Other	19	27.5		
		Undergraduate Degree	25	36.2		
		Graduate Degree	5	7.2		
		Not Reported	10	14.5		
Paternal Variables		Age in Years (Range = 24 – 49)			34.9	6.4
	Race/ Ethnicity	Caucasian	23	33.3		
		Asian	9	13.0		
		Middle Eastern	9	13.0		
		European	5	7.2		
		Hispanic/Latino	1	1.4		
		Other/Not Reported	22	31.9		
	Years of Education	Completed Year 10	4	5.8		
		Completed Year 12	4	5.8		
		TAFE/Other	17	24.6		
		Undergraduate Degree	13	18.8		
		Graduate Degree	8	11.6		
		Not Reported	23	33.3		
Familial Variables	*Annual Household Income in AUD*	<$50,000	16	23.2		
		$50,000-75,000	8	11.6		
		$76,000-100,000	5	7.2		
		$101,000-150,000	22	31.9		
		>$150,000	10	14.5		
		Not Reported	8	11.6		
		Number of Individuals in the Home			3.6	1.0

Note. AUD = Australian Dollars; TAFE = Technical and Further Education

Table 2

Observational and Caregiver-Reported Child Measure Descriptive Statistics

Measure	*n*	% of Sample	*M*	*SD*
MSEL *T*-Scores				
Expressive Language			41.7	11.9
Receptive Language			38.9	14.9
Visual Reception			46.6	14.1
Fine Motor			46.8	13.3
Gross Motor			53.9	14.4
MSEL Composite Standard Score			88.9	20.9
M-CHAT-R Score				
Low-Risk	50	72.5		
Medium-Risk	16	23.2		
High-Risk	3	4.3		
M-CHAT-R/F Score (*n* = 16)				
Pass	9	13.0		
Fail	7	10.1		
ADOS Toddler Score (*n* = 10)				
Little-to-No Concern	2	2.9		
Mild-to-Moderate Concern	1	1.4		
Moderate-to-Severe Concern	7	10.1		
ADOS Module 2 Score (*n* = 1)				
Non-Spectrum	1	1.4		
Autism Spectrum				
Autism				
SSP Classification				
Secure	29	42.0		
Insecure	40	58.0		
Insecure-Avoidant (Type A)	7	10.1		
Secure (Type B)	29	42.0		
Insecure-Resistant (Type C)	33	47.8		
AQS Score (range = -.64 – .80)	69		0.07	0.44
CBCL Externalizing Scores			21.7	10.1
Normal Range	30	43.5		
Borderline Range	8	11.6		
Clinical Range	30	43.5		

Note. AQS = Attachment Q-Set; CBCL = Child Behavior Checklist; M-CHAT-R = Modified Checklist for Autism in Toddlers, Revised; M-CHAT-R/F = Modified Checklist for Autism in Toddlers, Revised with Follow-Up; MSEL = Mullen Scales of Early Learning; SSP = Strange Situation Procedure

Table 3

Correlation Matrix Among Variables of Interest

	Correlations (Pearson's r, r_{pb})			
Variable/Measure	CBCL Ext.	AQS Score	SSP – Secure/Insecure	Child Age
CBCL Ext.	--			
AQS Score	-.45**	--		
SSP – Secure/Insecure	.05	.07	--	
Child Age	-.02	-.08	.19	--

Note. *$p < .05$, **$p < .01$; AQS = Attachment Q-Set; CBCL Ext. = Child Behavior Checklist; SSP = Strange Situation Procedure

Table 4

Descriptive Statistics by Age Group

	Younger Children (14-18 Months) $n = 31$		Older Children (19-25 Months) $n = 38$		t
Variable	*m*	*sd*	*m*	*sd*	
AQS Score	.16	.41	.00	.46	.14
CBCL Externalizing Scores	20.63	9.67	22.61	10.43	.14
M-CHAT-R Score	.35	.61	.29	.52	.43
	n	% of Age Group	*n*	% of Age Group	X^2
Low-Risk	22	71.0	28	90.3	
Medium-Risk	7	22.6	9	29.0	0.60
High-Risk	2	6.5	1	3.2	
Gender					
Male	12	38.7	23	74.2	2.51
Female	19	61.3	15	48.4	
SSP Classification					
Secure	20	64.5	21	67.7	0.61
Insecure	11	35.5	17	54.8	
Insecure-Avoidant (Type A)	3	9.7	17	54.8	
Secure (Type B)	12	38.7	4	12.9	0.33
Insecure-Resistant (Type C)	16	51.6	17	54.8	

Note. $*p < .05$, $**p < .01$; AQS = Attachment Q-Set; CBCL = Child Behavior Checklist; M-CHAT-R = Modified Checklist for Autism in Toddlers, Revised; SSP = Strange Situation Procedure

Table 5

Externalizing Behavior and AQS-Related Measures

	Correlations		
Study	Clinical	Non-Clinical	Notes
Boldt et al. (2014)		-.17	*AQS with fathers (25 months old); Dominic-R (100 months old)*
		-.12	*AQS with mothers (25 months old); Dominic-R (100 months old)*
Buyse et al. (2011)		-.27**	*CBS: Aggress. Teacher-Report at kindergarten follow-up, AQS in preschool*
Caughy et al. (2009)		-.21**	*AQS at 16-18 months old, CBCL Ext. at 34-37 months old*
		-.45**	*Both AQS and CBCL Ext. at 34-37 months old*
Cohen & Farnia (2011)	Girls Adopted from China to Canada -.17 to -.67**	Matched Canadian Controls -.07 to -.59**	*ASQ at 8-21 months old; ASQ and CBCL Ext. at 6, 12, and 24 month follow-ups*
DelCarmen-Wiggins et al. (2000)		-.50**	*Paternal-Sort AQS & CBCL Paternal Report at 3 years old*
		-.55**	*Maternal-Sort AQS & CBCL Maternal-Report at 3 years old*
Klein Velderman et al. (2006)		-.21*	*AQS & CBCL Ext. at 40 months old*
Laible & Thompson (1998)		-.41**	*AQS & CBS: Aggress. at 3-5 years old*
LaMont (2011)	Developmental Delay -.33**		*AQSQ at 18-24 months old; CBCL Ext. at 1 year follow-up*
Lavigne et al. (2012)		-.25**	*AQS & CSI: ODD at 4 years old*
		-.26**	*AQS & ECBI at 4 years old*
Monteiro et al. (2008)		-.10	*AQS with Mother & SCBE: Aggress. at 29-38 months old*
		-.08	*AQS with Father & SCBE: Aggress. at 29-38 months old*
Moss et al. (2006)		-.20*	*AQS & CBCL Ext. at 33-56 months old*
Oosterman & Schuengel (2008)	Foster Children -.26*		*AQS & CBCL Ext. Mother-Report at 26-88 months old*
	-.39**		*AQS & CBCL Ext. Teacher-Report at 26-88 months old*

Roskam et al. (2011)	Behavior Problems -.25-.29**		*AQS & PSA at 4-6 years old*
Schaaf et al. (2008)		-.44**	*AQS & CBCL Total at 3-5 years old*
Smeekens et al. (2009)		-.22*	*AQS at 15 months old; CBCL Ext. at 5 years old*
Spieker et al. (2011)	Early Head Start -.64**		*TAS & BITSEA: Problem at 18-36 months old*
Spieker et al. (2012)	Removed from Homes -.30**		*TAS & CBCL at approx. 19-33 months old*
Tornello et al. (2013)	"Fragile Families" Study -.31**		*TAQ & CBCL: Ext at 3 years old*
	-.10**		*TAQ at 3 years old & CBCL: Ext at 5 years old*
Walker et al. (2014)	Children of Caregivers with Recent Military Hospitalization -.35*, -.37*		*AQS & SCBE: Aggress. at 2-8 years old*

Note. *$p < .05$, **$p < .01$; AQS = Attachment Q-Set; AQSQ = Attachment Q-Set Questionnaire; ASQ = Attachment Security Questionnaire; BITSEA: Problem = Brief Infant Toddler Social Emotional Assessment Problem Scale; CBCL Ext. = Child Behavior Checklist Externalizing Scale; CBS = Child Behavior Scale: Aggression Subscale; CSI: ODD = Child Symptom Inventory: Oppositional Defiant Disorder Symptom Scale; ECBI = Eyberg Child Behavior Inventory; PSA = Profil Socio-Affectif; SCBE: Aggress. = Social Competence and Behavior Evaluation Aggression Scale; SSP = Strange Situation Procedure; TAQ = Toddler Attachment Q-Sort; TAS = Toddler Attachment Sort-45

Table 6

Correlation Matrix for Younger Children (Ages 14-18 Months)

	Correlations (Pearson's *r*, r_{pb})		
Variable/Measure	CBCL Ext.	AQS Score	SSP – Secure/Insecure
CBCL Ext.	--		
AQS Score	-.21	--	
SSP – Secure/Insecure	.36	.23	--

Note. $*p < .05$, $**p < .01$; AQS = Attachment Q-Set; CBCL Ext. = Child Behavior Checklist Externalizing Behavior Scale; SSP = Strange Situation Procedure

Table 7

Correlation Matrix for Older Children (Ages 19-25 Months)

	Correlations (Pearson's *r*, r_{pb})		
Variable/Measure	CBCL Ext.	AQS Score	SSP – Secure/Insecure
CBCL Ext.	--		
AQS Score	-.60**	--	
SSP – Secure/Insecure	-.18	.32*	--

Note. $*p < .05$, $**p < .01$; AQS = Attachment Q-Set; CBCL Ext. = Child Behavior Checklist Externalizing Behavior Scale; SSP = Strange Situation Procedure

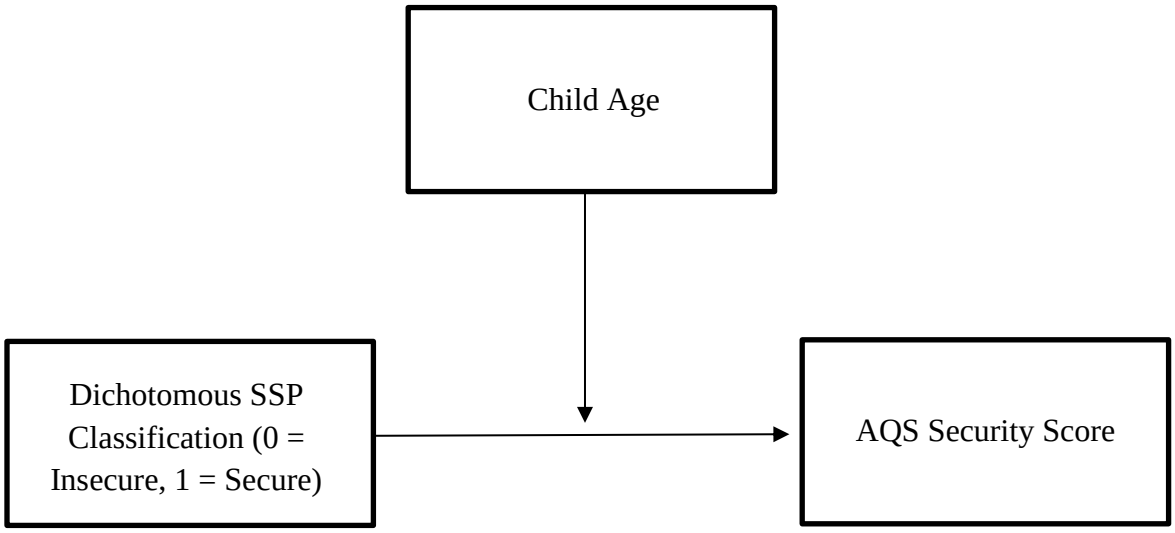

Figure 1. Hypothesized moderation model. AQS, Attachment Q-Set; SSP, Strange Situation Procedure.

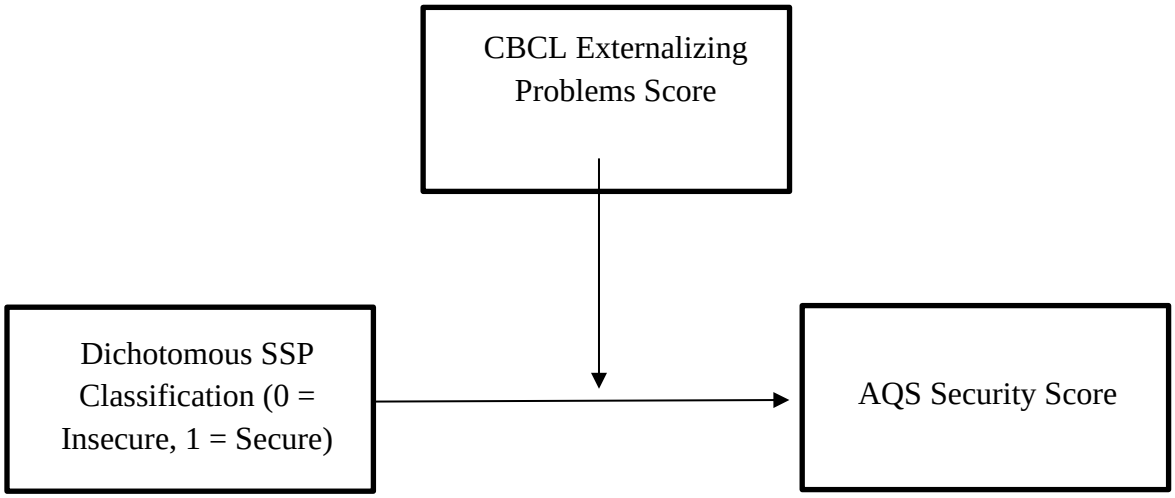

Figure 2. Hypothesized moderation model. AQS, Attachment Q-Set; CBCL, Child Behavior Checklist; SSP, Strange Situation Procedure.