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ORIGINAL PAPER

Mother-Child Interactions and Preschoolers' Emotion Regulation Outcomes: Nurturing Autonomous Emotion Regulation

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Abstract Emotion regulation is a complex process that begins in infancy and continues through childhood with parents' support. Early parent-child interactions shape the way children learn emotion management. We took a sociocultural and social learning approach to exploring the specific components of mother-child interactions that are related to mothers' perceptions of her child's regulatory ability and the child's observed emotion regulation. Thirty mothers and their preschool children were recruited from two New England urban areas: one community sample and one head start sample. Dyads engaged in a free play session, children completed an observed compliance task, and mothers completed a set of questionnaires assessing their perceptions of their child's regulation. Regression analyses revealed that maternal behaviors during free play predicted child's observed hostility ($F_{(2,29)} = 3.137$, $p < .05$) and mothers' perceptions of her child's regulatory ability predicted observed child compliance ($F_{(2,\ 17)} = 4.990$, $p < .05$). Child behaviors during play significantly predicted child's compliance ($F_{(3,20)} = 4.722$, $p < .05$) and child's hostility ($F_{(1,\ 26)} = 9.220$, $p < .001$). Maternal modeling and intentional scaffolding as well as perceptions of her child's regulatory capacity have a powerful impact on her child's observed regulation. Results indicate that it is particularly important for mothers of preschoolers to support autonomy while guiding socially appropriate behavior. Interventions that target improving mothers' negative perceptions of their children, educating on appropriate preschool expectations, and facilitating preschoolers' mature play may help mothers interact with their children in the ways that foster children's autonomous emotion regulation.

Keywords Emotion lability · Emotion regulation · Compliance · Maternal perceptions · Mother-child interactions

Introduction

Imagine the familiar scenario: As a mother is completing her shopping trip, her preschool-aged child is rummaging through the candy conspicuously placed next to the checkout counter. This mother instructs her child to leave the candy alone and wait patiently in line for the shopper in front of them to finish. In order to comply with her request, her child will need to employ regulation techniques to suppress his or her intense desire for a candy bar, inhibit the impulse to reach out for the candy bar, and focus instead on waiting with socially appropriate patience. This can be a difficult task for young children who are learning to regulate their emotions and their behavior. Research indicates that preschool-aged children make great strides in self-regulation as they face increasingly demanding situations outside the home (Cole et al. 2008; Kopp 1982; Mittal et al. 2013). Mothers and their interactions with their children play a crucial role in their children's ability to adaptively regulate emotions and behavior, a process that begins in early infancy with warmth, sensitivity, and responsivity in the caregiving environment and continues through the preschool years as mothers model and intentionally scaffold regulation strategies for their children (Cassidy 1994; Eisenberg et al. 2001; Jacobsen et al. 1997; Raikes and Thompson 2006; Russell et al. 2013). In particular,

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Vygotsky's sociocultural theory of human development suggests that preschoolers' play provides a valuable context for studying the development of emotion regulation skills (Bodrova et al. 2013; Vygotsky 1967; Vygotsky et al. 1987).

Emotion regulation refers to one's ability to modulate emotional reactivity and emotional expression (Garner and Hinton 2010; Kim-Spoon et al. 2013). One's emotion regulation capacities include how well he or she can employ cognitive strategies to manage his or her internal emotional state and external behavioral responses (Eisenberg and Spinrad 2004). Emotion regulation is relevant to the experience and expression of both positive and negative emotions, becoming more crucial as the intensity of a given emotion increases (Sobanski et al. 2010). The expression of emotion is guided by social norms that vary according to context or culture; children learn these social rules of interaction and first practice them while engaging in nonverbal communication with caregivers (Eisenberg et al. 2010; Matsumoto et al. 2005; Trevarthen and Aitken 2001). Sociocultural theory explains that ideas about culturally accepted behaviors are transmitted through social interactions with experienced partners, often through dialog, in this case with mothers (Tudge and Winterhoff 1993; Vygotsky et al. 1987). Mothers convey meaning to their infants through gestures or expressions, rhythmic exchanges, and mutual regulation of feelings and interests. Such nonverbal meaning making requires great effort on the part of the mother, the more experienced communicator, who must jointly attend to the same stimulus as the child and model or scaffold examples of appropriate responses according to culture-specific or situation-specific expectations (Feldman 2007; Morris et al. 2011; Trevarthen and Aitken 2001; Tronick and Beeghly 2011; Vygotsky 1962). Mothers who can reciprocate their child's emotions, particularly positive emotions, and mutually engage in joint or matched emotional states foster adaptive regulatory abilities in the child (Cole et al. 2003). Eventually, as the child ages and becomes more skilled, the process transforms from one of extrinsic, mutual regulation with the help of a skilled partner to one of self-regulation, intrinsic to the child (Grienenberger et al. 2005).

Young children depend upon their mothers to help them manage strong emotions, as they frequently turn to their mother during episodes of intense emotion, and their mother's reaction to these emotions is crucial to the future development of the child's self-regulation (Eisenberg et al. 2010; Grienenberger et al. 2005). Mothers who are themselves skilled in self-regulation respond to their young children's emotional distress in a way that both mirrors and manages the child's emotional states while modeling effective regulation (Grienenberger et al. 2005). As the more experienced other, mothers scaffold the development of their child's self-regulation by engaging in a joint process of redirecting attention or cognitively reframing emotions (depending on the child's age and skill level), or they may facilitate the use of other coping techniques that help their child modulate their intense emotional experiences (Morris et al. 2011).

As part of the socialization for the expression of emotion, children learn strategies to help them intentionally control their emotions and independently adapt to emotionally arousing situations in socially appropriate ways (Garner and Hinton 2010; Sobanski et al. 2010). These emotion regulation strategies are refined and expanded in the preschool years and throughout childhood, as children come to perceive themselves as competent regulators capable of handling emotionally charged situations that evoke intense emotions, such as fear, anger, and joy, in accordance with social expectations (Kopp 1989). Children learn emotion regulation strategies through explicit dialog with social partners and through implicit observation of modeled behavior, both of which can be intentionally scaffolded by caregivers through responsive interactions in early childhood. Children then practice new regulation skills during daily activities that parents can specifically structure as opportunities to develop and refine children's behavior. For example, parents might select picture books with storylines that include challenging emotions or themes or engage in pretend play with their child, allowing their child to explore new roles, ideas, and behaviors. From a sociocultural perspective, Bodrova et al. (2013) highlighted the importance of children's play in helping to develop self-regulation skills. They cited Vygotsky (1967) as positing that during play "… the child is faced with a conflict between the rule of the game and what he would do if he could suddenly act spontaneously. In the game he acts counter to what he wants … (achieving) the maximum display of willpower" (p. 14).

In preschool, children face increased social demands, such as classroom rules, expectations of acceptable play, and attending to and persisting in specific tasks (Bulotsky-Shearer et al. 2011; Feil et al. 1995). Children who are skilled in emotion regulation develop self-efficacious beliefs about their abilities, facilitating success in these social situations by allowing them to persist at, and perform better on, difficult tasks, internalize extrinsic standards of conduct, comply with the undesirable requests of authority figures, and appropriately modulate their emotions in the face of particularly intense or negative emotional stimuli (Bandura 1977a, Bandura and Schunk 1981, Kochanska 1993; Kochanska 1995; Zhou et al. 2007). Social learning theory describes children vicariously learning by observing others' behaviors and imitating modeled behavior (Bandura 1977b; Bandura et al. 1963). Bandura (2001) posited that proximal relationships are a more influential context in

which children learn new skills and behaviors than distal relationships, signaling the particular importance of parents as role models in early childhood. Indeed, when mothers engage in mutual regulation with their young children and model effective regulation strategies, children observe and imitate actions that have positive emotional and social consequences, and children become skilled self-regulators themselves (Bandura 1977b; Bandura et al. 1963; Morris et al. 2007).

Developmental scientists and family interventionists can use Vygotsky's (1962) sociocultural lens in conjunction with Bandura's (1977b) social learning theory to understand how preschoolers rely on social influences to learn emotion regulation expectations and the skills used to meet those expectations. Much like Bandura proposed that children are cognitively active in their interactions with behavioral models, Vygotsky's work also emphasized the importance of adult-child dialogs that help children actively navigate social situations to transform interpersonal processes into intrapersonal qualities (Tudge and Winterhoff 1993). This scaffolding, during which parents are responsive to their child by adjusting their level of guidance as the child's needs change, helps children engage in socially appropriate emotion regulation. Previous research has found that parents who scaffold the development of self-regulation by providing positive feedback, directing without controlling or intruding, and respecting the autonomy of their children will have children with an increased capacity for self-regulation, or patience (Russell et al. 2013; Silverman and Ippolito 1995; Silverman and Ragusa 1990). There is evidence that when parents help their children develop emotion regulation by scaffolding their children's regulatory strategies, their children display fewer behavior problems, are better able to delay gratification, enjoy better interpersonal relationships, and show greater academic achievement (Ellis et al. 2014; Russell et al. 2013).

Links between problem behavior, poor academic outcomes, and deficits in related skills, such as attention deployment and task persistence, exist in the preschool settings (Bulotsky-Shearer et al. 2011). Beyond early childhood, emotion regulation is negatively correlated with internalizing symptoms and impulsive tendencies (Kim-Spoon et al. 2013; Spinrad et al. 2006). Individuals who lack emotion regulation strategies may have a high degree of emotion lability, which is characterized by an instability of emotions, often resulting in frequent and/or rapid shifts from one emotion to the next, increased irritability and intensity of emotional experience, or sensitivity to arousing stimuli (Hill and Updegraff 2012; Kim-Spoon et al. 2013; Simons et al. 2009; Skirrow and Asherson 2013). Emotionally labile children likely do not perceive themselves as skilled regulators, lack self-efficacy, and react quickly in the presence of emotional stimuli, often experiencing negative emotions rather than positive emotions (Ellis et al. 2014; Spritz et al. 2010). Bandura (1977a) would explain that children who do not believe they can adaptively regulate their emotions would be less motivated to employ regulation techniques and show less persistence when attempting to regulate their emotions, experiencing little regulatory success and increased negativity as a result. Increased negativity and difficulty containing negative emotions, such as frustration, distress, or disappointment, can be overwhelming and hinder a child's ability to delay gratification and comply with requests for socially acceptable behavior (Kochanska 1993; Mittal et al. 2013; Stifter et al. 1999). As a result, emotionally labile children are likely to display aggression, mood swings, and tantrums given their difficulty in employing socially appropriate regulatory strategies (Spritz et al. 2010). The inability to utilize socially adaptive strategies impacts the child's future social and emotional development, hampering social adjustment in interaction with peers and increasing the risk that the child will develop behavior problems over time (Oliver and Simons 2004; Shields et al. 2001; Supplee et al. 2011).

Children reared in the context of high-risk families are at particular risk for developing ineffective regulatory strategies (Spritz et al. 2010). Shields et al. (2001) assert that children living in poverty are exposed to chronic stress more frequently and have fewer opportunities to practice adaptive emotion regulation strategies with a caregiver. Many factors associated with at-risk families, such as poverty, housing instability, and food insecurity, are also associated with parents displaying negative emotions more frequently than positive emotions (Spritz et al. 2010). Because chronic stress is common in high-risk families, social interactions between the caregiver and child in these families are more likely to be negative and dysregulated (NICHD ECCRN 1997; NICHD ECCRN 1999; Spritz et al. 2010). Caregiving environments characterized by pervasive negativity, particularly negativity or hostility directed at the child, are likely to lead to counterproductive regulatory practices that heighten, rather than moderate, distress (Eisenberg et al. 2001). Children exposed to a great deal of negativity in their caregiving environment see few effective models of positive emotionality, cannot rely on their caregivers for sensitive, contingent responses, and are unlikely to have self-efficacious regulatory beliefs (Eisenberg et al. 2001).

As emotion regulation transforms from an extrinsic, mutual process scaffolded by a skilled other to an intrinsic, independent process within the self, children build their self-efficacy and internalize societal expectations learned vicariously and directly from others in social interaction, increasing their motivation to comply with social standards. Compliance, or the ability to fulfill demands and expectations of parents and others, is considered a "developmental

hallmark" (Kochanska and Aksan 1995, p. 236) for children and a key outcome of their socialization (Kochanska et al. 2001; Volling et al. 2006). Research has shown that compliance (or noncompliance) develops over time and can be influenced by child characteristics, including temperament, and environmental characteristics, including parents' attempts to exert external control (Kochanska 1993; Kochanska and Kim 2013; Kochanska and Aksan 1995; Stifter et al. 1999).

In order for a child to comply with any request, they must control their behavior, but they may also need to control their emotions when the compliance task evokes an emotional response, which is especially common in young children (Rothbart and Derrberry 1981). An emotionally labile child may not have the necessary skills to regulate their behavior or emotions to sustain their attention during tedious or undesirable tasks, resulting in noncompliant or otherwise dysregulated behavior (Kochanska et al. 1998; Stifter et al. 1999). Evidence from early childhood studies indicates significant associations between fewer emotion regulation skills and higher levels of defiance, while children who are low in reactivity (i.e. lower impulsiveness) have stronger emotion regulation skills (Stifter et al. 1999). Additionally, self-regulation, when measured in toddlerhood, is a predictor of children's committed compliance at preschool-age (Spinrad et al. 2012). There are also links between emotion regulation and the ability to persist at a task (Zhou et al. 2007).

Research suggests that future child compliance is predicted by shared positive affect between mother and child, and mothers who showed higher rates of responsiveness to their children had children who displayed greater levels of committed compliance and fewer externalizing behavior problems (Kochanska and Aksan 1995; Kochanska and Kim 2013). Mothers who are responsive to their child and share positive affect with their child also encourage their child to internalize social rules and comply at a higher level, thus minimizing the mother's need to forcefully and intrusively exert control on the child by reasoning, negotiating, or threatening the child (Kochanska and Aksan 1995). Research shows that mothers who use harsher approaches, including strategies of power or punishment, in an attempt to promote child compliance are more likely to have children who exhibit noncompliant behavior, whereas mothers who scaffold their child's behavior through the use of warm, supportive, and guiding strategies that are nurturing and respectful of the child's autonomy are more likely to have young children who employ adaptive regulatory skills and comply with their parents' demands (Bernier et al. 2010; Crockenberg and Litman 1990; Piotrowski et al. 2013, Power and Chapieski 1986). Questions about the specific role parents play in fostering compliant behavior in their children when requested by an authority figure remain, and examinations of the particular parenting behavior and beliefs associated with compliance are warranted.

Based on Bandura's (1977b; 2001) position that behavior modeled through interactions with proximal caregivers has a powerful impact on children's learning compared to more distal social connections, we hoped to further the literature on the nuanced influence of caregiving environments by assessing children's emotion regulation given different socioeconomic conditions, children's vicarious learning through the emotional tone of the parent-child interaction, and the joint attention achieved and sustained by the parent-child dyad. Building on Vygotsky's position that children's play provides an important context for developing emotion regulation skills (Bodrova et al. 2013) and the value sociocultural theory places on dialog between children and their social partners (Vygotsky 1962), we wondered what particular aspects of mothers' behavior during play with their children relates to children's emotion regulation and how mothers' narratives for their strategies to scaffold their children's patience might correlate with children's emotion regulation. In particular, we investigated the dichotomy of mothers respecting their child's autonomy to choose their own behavior (lack of scaffolding) on the one hand and intruding to force behavior desired by the mother (over-scaffolding) on the other hand. We investigated how children's observed mood and persistence were related to their ability to regulate emotions during unstructured, free-play interactions and the unstructured opportunities to observe emotion regulation that may arise (e.g., negativity, persistence, joint attention, and a clean-up task at the end of the session requiring compliance).

We hypothesized the following: Hypothesis 1a: Given the literature on contextual influences from the caregiving environment (Eisenberg et al. 2001; NICHD ECCRN 1997; NICHD ECCRN 1999; Shields et al. 2001; Spritz et al. 2010), we hypothesized that mothers reporting lower SES will have less respect for her child's autonomy, greater intrusiveness, more negative regard for her child, less coherent strategies for intentionally promoting her child's self-regulation, and will be more likely to report her child as emotionally labile. Hypothesis 1b: Mothers reporting lower SES will have children who are less compliant, more hostile and negative, and display less positive mood and task persistence. Hypothesis 1c: Mothers reporting lower SES will have mother-child interactions with less joint attention. Hypothesis 2a: Given the literature on social influences on children's emotion regulation (Bandura 1977b; Bandura 2001; Russell et al. 2013; Silverman and Ippolito 1995; Silverman and Ragusa 1990), we hypothesized that maternal respect for child's autonomy, lack of intrusiveness, and lack of negative regard for her child will be positively related to successful child compliance and lack of child negativity. Hypothesis 2b: Joint attention between mother

and child will be positively related to successful child compliance and lack of child negativity. Hypothesis 3: Given the literature on the importance of dialog with experienced others (Russell et al. 2016; Tudge and Winterhoff 1993; Vygotsky 1962), we hypothesized that mothers with coherent narratives for her strategies to promote emotion regulation will have children who are more compliant and show lower levels of observed negativity. Hypothesis 4a: Given the literature on the relationship between negativity, self-efficacy, and problem behavior (Bandura 1977a; Bulotsky-Shearer et al. 2011; Kochanska 1993; Stifter et al. 1999), we hypothesized that children who show positive mood, lack negative mood, and persist with tasks will show greater compliance and less negativity. Hypothesis 4b: Mothers who perceive their children to be emotionally labile will have children who do not successfully comply and show greater negativity.

Method

Participants

Data from a total of 30 mother-child dyads were collected across two urban communities in New England (15 dyads per site). Site 1 (Community Support sample; C.S.) recruited a sample of mothers and preschool children from a community-organized parenting support group; site 2 (Head Start sample; H.S.) recruited a sample from head start preschools. Participants were recruited through flyers distributed to the local city Mom's club ($24,470 average per capita income and 21 % below poverty level; U. S. Census Bureau 2015) and to local Head Start preschools serving at-risk families (foster families or families that are homeless or below the poverty level of $23,850 per year; Administration for Children and Families 2014). Mothers who responded to recruitment flyers were eligible to participate if they spoke English, were at least 18-years-old, and had a preschool-aged child at the time of data collection. All children were between the ages of 31 months and 57 months with a mean age of 42.43 months. The majority of children were male (18; 60.0 %), and most children (25; 83.3 %) spent at least ten hours per week in childcare outside of the home. Mothers were between the ages of 20 and 47 years, with a mean age of 32.75 years and most (18; 60.0 %) were married. See Table 1 for participant demographic characteristics by site.

Table 1 Participant demographics

	Variable	Site 1	Site 2
Children	Average age (months)	38.5	46.4
	Male	9 (60 %)	9 (60 %)
	Female	6 (40 %)	6 (40 %)
	10+ Hours in care outside home	10 (67 %)	15 (100 %)
Mothers	Average age (Years)	34.2	30.8
	Married	15 (100 %)	3 (20 %)
	Single (never married)	0 (0 %)	12 (80 %)

Procedures

The Institutional Review Boards of the two universities where this study took place approved all study procedures and materials. Mothers and children who expressed interest in participating came to the university lab (a playroom equipped with a couch, table, chairs, and toys and books appropriate for preschoolers) for a single visit. First, participants gave consent. Then, in accordance with sociocultural theory's assumption that play is an important context in which children learn self-regulation (Bodrova et al. 2013; Vygotsky 1967; Vygotsky et al. 1987), the participating dyad was left alone in the room to "play as they normally would at home" for ~20 min. Mothers and children were free to utilize the room as they liked. In addition to books, puppets, and puzzles, there were two large photographs mounted on cards showing a castle made of wooden blocks and a Lincoln log town with a train track each on display next to the respective building materials. These scenes were designed to be optional challenge tasks, as recreating the castle and the railroad tracks would be difficult tasks for a preschool-aged child and would require assistance from his or her mother to successfully accomplish.

After the free play session, members of the research team re-entered the room and solicited the child's help in cleaning the playroom as a compliance task while mothers completed questionnaire data. All participants were given a gift card in recognition of the time and effort taken to participate. Participation lasted for 45–60 min for each dyad; however, mothers and children were free to terminate their participation at any point during the study. All lab visits were video recorded and parent-child interactions subsequently coded as described below.

Measures

In addition to a brief demographic survey, data for this study included the following measures:

Maternal Scaffolding Strategies

The parental interview on caregiving (PICI) was authored for this study to assess how mothers scaffold emotion regulation strategies for their children. The survey was developed using a process consistent with accepted guidelines for

the development of participant-reported experiences (i.e., measure creation recommendations by U.S. Food and Drug Administration 2009). A literature review guided the initial draft of measure items, which were reviewed by two independent experts in child development and family science. The draft measure was piloted with a group of 18 parents of children younger than five-years-old (ergo members of the target population and the "Interview" descriptor in the measure's name). Concurrent testing for usability with cognitive debriefing, a semi-structured interview process to obtain qualitative feedback from participants about their understanding of material (e.g., whether a participant reads a survey question to mean what the author intended), confirmed the survey captured the desired information. Then, the pool of draft items was reviewed for any needed revision, leading to the final instrument. Because the measure was designed for use at a single point in time and not intended to measure change, there was no quantitative validation of test-retest reliability.

This study focuses on parents' reports of their efforts to scaffold their child's self-regulation in a particular setting. The PICI presents a jargon-free, open-ended question and asks parents "Do you teach your child specific strategies for being patient or waiting? If yes, please describe." Responses to this question could include a wide range of actions used to support children's regulation, including scaffolding efforts that reflect mothers' awareness of her child's current abilities. Narrative answers to this open-ended question were coded based on Fiese and Sameroff's (1999) description of narrative coherence regarding children's regulation abilities and the strategies mothers intentionally use to support children's regulation. The coherence code assesses the degree to which mothers understand their child's ability to regulate and have a clear set of practices or strategies they purposefully use to model or scaffold their child's self-control on the one hand (example response: "I try to distract him with an activity he enjoys"), or let their child find their own style, approach, and ways to cope independently on the other hand (example response: "I explain to him he needs to be patient and tell him to wait"). The code is based upon the degree to which the mother answered the question with clear strategies and a familiarity with her child's ability, not the degree of linguistic sophistication in the mother's response. For example, a mother who responds with "take a deep breath" would be considered more coherent than a mother who responds, "I don't ask twice; no means no." The first response is no more eloquent than the second, but taking a deep breath is a viable regulation strategy and this mother shows a greater understanding of how to help scaffold her child's skills.

In accordance with Eisenberg and Spinrad's (2004) conceptualization of emotion regulation as a set of strategies that manage emotion, cognition, and/or behavior in the face of arousing stimuli, the PICI question was created to assess all types of strategies that mothers use to support their child's regulation. Mothers may offer strategies that impact cognition, emotion, behavior, or a combination of the three, all of which are considered emotion regulation strategies. Given the small sample size of this preliminary study, no attempt was made to code the content of the strategies into these subcategories, as group sizes would not be large enough to yield meaningful results; therefore, we only coded the coherence of mothers' narratives in the present study. The 4-point coherence scale ranges from incoherent (1) to clearly coherent (4). Inter-rater reliability was high ($k = .968$, $p < .01$) as determined by blinded coding of 12.5 % of the data.

Emotion Lability

Children's emotion regulation and emotion lability were assessed via the lability scale of the Emotion Regulation Checklist (ERC; Shields and Cicchetti 1997), an other-report questionnaire with items scored on a 4-point Likert scale (1 = never; 2 = sometimes; 3 = often; 4 = almost always). The emotion lability/negativity subscale consists of 15 items assessing the child's mood swings, anger, and intensity of emotions. Some example items from this subscale include: "How often does your child quickly change their mood or experience mood swings?"; "How often is your child easily frustrated?"; "How often is your child prone to angry outburst or tantrums?" A higher score in the possible range of 15–60 indicates greater emotion dysregulation, or greater emotion lability. The internal consistency for the emotion lability/negativity subscale is reported with a Cronbach's alpha of .96 and discriminant validity with an ego resilience Q-Sort and an autonomy Q-Sort are also high (Shields and Cicchetti 1997). In the current study, internal consistency for the emotion lability/negativity subscale was adequate with a Cronbach's alpha of .78.

Mother and Child Behavior During Free Play

Maternal, child, and dyadic behavior during free play were assessed using the parent-child interaction rating scales (PCIRS; Sosinsky et al. 2004). The PCIRS is based on previously validated schemes for coding mother-child interactions on a 7-point Likert scale (1 = very low to 7 = very high; Clark 1999; Owen 2009; Tamis-LeMonda et al. 2001). It consists of a Dyadic Rating scale containing 4 items (such as join attention), a Child Rating scale containing 9 items (such as persistence with tasks, hostility towards mother, negative mood, and positive mood), and a parent rating scale containing 11 items (such as negative regard for child, respect for child's autonomy, and

intrusiveness). The parent items used in the analysis below assess how mothers model positive or negative emotion in interactions with their children (i.e., negative regard for the child) and whether mothers are appropriately scaffolding regulation or intervening without allowing the child to develop effective self regulatory techniques (i.e., respect for child's autonomy and intrusiveness). Two researchers coded 13 % of the videotaped free play sessions blind to the other's coding; inter-rater reliability as measured by Cohen's kappa was high ($k = .833$, $p < .001$).

Compliance

When applicable, researchers solicited the child's help at the end of the free play session in cleaning the toys used during play (if a mother and child had used their free play time for verbal rhyming games or to read a book, no cleanup was needed and the task was coded as not applicable). In some instances ($n = 3$), the compliance task was not possible because mother and child had already cleaned the toys during free play, a situation that was not coded because it was different from compliance requested by the researcher. When mothers requested help in cleaning toys, mother-child play ceased and mothers required compliance before play could resume. Such forced compliance made continued play contingent upon cleanup, stakes that were not present in the researcher-prompted compliance task that clearly marked the end of the lab visit. If children did not respond to the researcher's cleanup request, no more than three attempts were made to encourage compliance. Researchers coded the cleanup task based on a 5-point compliance scale with higher scores indicating greater compliance (1 = defiance, 2 = refusal, 3 = hesitant compliance, 4 = situational compliance, 5 = committed compliance) as described by Kochanska and Aksan (1995). Raters were in 100 % agreement on 16 % of the data coded for reliability ($k = 1.000$, $p < .001$).

Results

Means and Site Differences

As a whole, mothers in this sample reported that their preschool children were well regulated and low in emotion lability, with a mean perceived emotion lability score of 30.60 ($SD = 5.164$; range of 22–47). There was a significant difference in maternal perception of children's lability based on mother's marital status dichotomized to indicate whether the mother was married or unmarried. Unmarried mothers reported their children to be significantly more labile than did married mothers ($t_{(28)} = 2.037$, $p = .05$). There were no differences in perceived emotion lability based on any other demographic variables, including mother's age, child's age, or child's gender. There was, however, a trend in maternal perception of children's lability based on site, as mothers from the H.S. sample reported their children to be more labile than mothers recruited from the C.S. sample ($t_{(28)} = 1.84$, $p < .1$).

Table 2 Descriptive and group difference results for variables of interest

Variable	Range	n	Mean (SD)		t
			C.S. sample	H.S. sample	
Perceived emotion lability	15–60	30	28.93 (3.28)	32.37 (6.20)	ns
Respect for autonomy	1–7	30	5.67 (1.18)	4.13 (1.64)	2.94**
Intrusiveness	1–7	30	2.73 (1.49)	3.93 (1.62)	2.11*
Negative regard for child	1–7	30	1.53 (.64)	2.53 (1.46)	2.43*
Positive mood	1–7	30	5.20 (1.21)	5.20 (1.66)	ns
Negative mood	1–7	30	1.87 (1.25)	1.73 (1.10)	ns
Hostility toward mother	1–7	30	1.40 (.51)	1.47 (.64)	ns
Persistence with tasks	1–7	30	5.60 (.51)	5.07 (.88)	2.03*
Joint attention	1–7	30	5.80 (1.27)	5.20 (1.20)	ns
Coherence	1–4	24[a]	3.07 (.62)	2.25 (.97)	2.63*
Compliance	1–5	24[a]	2.20 (.79)	2.50 (1.61)	ns

*p<.05, **p<.01, ***p<.001

[a] For mothers who did not report teaching regulation strategies to their children, measures of coherence were not possible. Similarly, a researcher-initiated compliance task was not always possible, for no cleanup was required in some instances ($n = 3$) and mothers requested clean up before the end of the play session in other instances ($n = 3$)

In addition to site differences in maternal perceptions of children's lability, there were also site differences in observations of mothers' and children's interactions during free play (see Table 2 for site differences). For example, mothers from the H.S. sample had less respect for their child's autonomy ($t_{(28)} = 2.94$, $p < .01$), were more intrusive ($t_{(28)} = 2.11$, $p < .05$), and had more negative regard for their child ($t_{(28)} = 2.43$, $p < .05$) than mothers from the C.S. sample. Similarly, children from the H.S. sample displayed less persistence with tasks than did their peers from the C.S. sample ($t_{(28)} = 2.03$, $p = .05$). There were no differences in children's positive mood, negative mood, and child's hostility toward mother based on site, nor were there differences in dyadic joint attention between mother and child based on site. The significant differences that do exist in parent-child interactions between sites indicate that mothers from the C.S. sample provide more autonomy to their preschool children, have more positive perceptions of their preschool children, and have preschool children who are

Table 3 Correlations for variables of interest

Variable	1	2	3	4	5	6	7	8	9	10
1. Perceived emotion lability										
2. Respect for autonomy	−0.13									
3. Intrusiveness	0.13	−0.86**								
4. Negative regard for child	0.08	−0.56**	0.44*							
5. Positive mood	−0.18	0.30	−0.16	−0.40*						
6. Negative mood	0.47**	0.10	−0.11	0.20	−0.44*					
7. Hostility toward mother	0.40*	−0.03	0.06	0.43*	−0.37*	0.71**				
8. Persistence with tasks	−0.24	0.23	−0.06	−0.24	0.32	−0.08	−0.03**			
9. Joint attention	−0.29	0.68**	−0.64**	−0.26	0.41*	−0.17	−0.02	0.33		
10. Coherence	−0.45*	0.29	−0.11	−0.16	−0.03	−0.06	−0.31	0.31	−0.05**	
11. Compliance	−0.38	−0.33	0.20	0.09	−0.11	−0.44*	−0.16	0.17	0.08	−0.22

more persistently engaged in tasks than mothers from the H.S. sample. Children who spent fewer than ten hours per week in childcare outside of the home showed greater joint attention during free play with their mother than did children who spent more time in childcare outside of the home ($t_{(28)} = 2.306$, $p < .05$), such that preschool children who spent more time with their mothers were more likely to be mutually engaged in shared activities with their mothers than were children who spent less time with their mothers. Observed mother and child behaviors did not differ based on other demographic variables.

The majority of mothers ($n = 26$, 86 %) reported that they teach their preschool children regulation strategies. As a whole, mothers were fairly coherent when describing the strategies used to scaffold their child's patience, with a mean coherence score of 2.69 ($SD = .88$) on Fiese and Sameroff's (1999) 4-point scale. Married mothers were significantly more coherent than single mothers ($t_{(24)} = -2.10$, $p < .05$). Further, mothers from the C.S. sample were significantly more coherent in their reported strategies than mothers from the H.S. sample ($t_{(24)} = 2.63$, $p < .05$). There were no other significant differences in maternal narrative coherence based on demographic variables. The differences that do exist indicate that married mothers and mothers from the C.S. sample have clear ideas of their child's regulatory abilities and of how to scaffold their child's attempts to adaptively regulate their emotions.

Children were fairly compliant during the researcher-initiated cleanup task: 80 % of children scored a 3 or higher on the 5-point scale, indicating at least hesitant compliance, or compliance after several prompts as described by Kochanska and Aksan (1995). Average compliance scores were 3.63 ($n = 24$; $SD = 1.31$). Compliance did not differ based on any mother or child demographic variables or based on site. These compliance results indicate that, as a whole, the preschool children in this sample were able to obey an authority figure to socially acceptable standards the majority of the time. Researcher-initiated compliance data do not exist for six children, as three children did not engage in activities that required cleaning and three children completed a mother-requested compliance task during the play session.

Correlations

Significant correlations between the variables exist. For example, mother's respect for her child's autonomy was strongly negatively correlated with mother's intrusiveness ($r = -.861$, $p < .001$) and with mother's negative regard for child ($r = -0.563$, $p < .001$) and strongly positively correlated with dyadic joint attention ($r = .687$, $p < .001$). Similarly, mother's intrusiveness was strongly negatively correlated with dyadic joint attention ($r = -.635$, $p < .001$). See Table 3 for all significant correlations. Correlations indicate that positive maternal behaviors, such as respect for child's autonomy, lack of intrusiveness, lack of negative regard for the child, and joint attention with the child tend to coexist. Correlations involving maternal perceptions of child's lability indicate that mothers' impressions of their child's mood are related not only to the child's behavior, but also to mothers' ability to clearly conceptualize their child's regulatory abilities.

Hypothesis Testing

The site differences reported above indicate support for hypothesis 1a in that mothers from the low-SES sample do behave differently in free play with their children than their higher-SES counterparts from the C.S. sample. Aside from greater task persistence in children from the higher income sample, site differences do not support hypotheses 1b and 1c, as SES had no implications for child and dyadic

behavior in this study. A series of regression analyses were conducted to test the remaining study hypotheses. To start, we investigated the impact of maternal behaviors in interactions with children, then assessed mothers' strategies and perceptions of her child's regulatory ability, and finished by determining the child behaviors that predict his or her emotion regulation.

Associations Between Maternal Behaviors and Child's Emotion Regulation

To test the hypotheses that maternal behaviors related to the presence or absence of scaffolding (such as respect for autonomy and intrusiveness) and the quality of proximal social interactions (such as negative regard for child and joint attention) are related to child's emotion regulation, we ran a series of regressions to predict child's observed compliance and observed hostility using maternal behaviors as predictors. Though no aspects of mothers' behavior significantly predicted child's compliance, maternal behaviors do predict child's hostility toward his or her mother during mother-child interactions: Maternal negative regard for her child, maternal respect for her child's autonomy, and maternal intrusiveness significantly predict child's hostility ($F_{(2,\ 29)} = 3.137$, $p < .05$) and explains 18 % of the variance in observed child hostility. This regression indicates that children are more hostile in social interactions with their mother when their mother regards them more negatively and when she grants the child more autonomy. Joint attention is not a significant predictor of child's regulation; however, mother and child behaviors both predict dyadic joint attention during free play interactions. For example, the regression model including maternal negative regard, maternal respect for child's autonomy, and maternal intrusiveness significantly predicts join attention ($F_{(3,26)} = 8.268$, $p < .001$) and explains 43 % of the variance in joint attention. Though the regression model including only child behaviors as predictors of dyadic attention is not significant ($F_{(3,26)} = 2.278$, $p = .103$), a model combining maternal intrusiveness and child's persistence with tasks reveals that both predict joint attention ($F_{(2,\ 27)} = 12.739$, $p < .001$) and explain 45 % of the variance in observed joint attention. These results indicate that dyadic joint attention is a product of each partner's behavior in the interaction.

Mothers' Perceptions of Her Child's Behavior

No significant correlations exist between maternal coherence and child's compliance or child's observed hostility, which fails to support our third hypothesis that mothers' narrative coherence is related to child's regulation. We took this a step further to investigate how mothers' perceptions of her child's regulatory ability impact the child's observed regulation. Based on the way we have conceptualized narrative coherence to consider mothers' perceptions of her child's ability and the maternal report nature of the emotion lability measure, both coherence and lability offer insights into how mothers perceive their child's regulatory skills and behaviors, and the two constructs are negatively correlated such that mothers who perceive their child to be labile are likely to struggle with regulation coherence ($r = -.450$, $p < .05$). Mothers' perceptions of her child's abilities do not predict child's hostility, but regression analysis does reveal that mothers' coherence and perceptions of child's emotion lability significantly predict observed child compliance ($F_{(2,\ 17)} = 4.990$, $p < .05$) and explain 30 % of the variance in child's compliance. Mothers who perceive their children to be well regulated and yet struggle to coherently describe the way they scaffold their children's regulation strategies have children who are more successful in complying with authority figures. Combining maternal behaviors during mother-child interactions and maternal perceptions of regulatory abilities to predict emotion regulation yielded significant results as well. Regression analysis indicates that maternal perceptions of child's emotion lability and observed maternal respect for child's autonomy significantly predict child's compliance as measured by the cleanup task ($F_{(2,\ 21)} = 3.967$, $p < .05$). This model predicts 21 % of the variance in child's compliance. Mothers who perceive their children to be well regulated and who grant less autonomy to their children have children who are more compliant with authority figures.

To determine whether or not mothers' reports of their child's behavior are in line with researchers' observations of children's behavior, we ran a series of analyses to predict maternal perceptions of child's negativity from observed child behaviors. Correlation results reveal that perceptions of lability are positively correlated with observed hostility toward mother ($r = .402$, $p < .05$), and regression analysis reveals that observations of child negative mood and observed child hostility toward mother are significant predictors of maternal perceptions of child's lability ($F_{(2,\ 27)} = 3.953$, $p < .05$). This model predicts 17 % of the variance in maternal perceptions of child's lability and indicates that mothers report on their child's lability in ways that are similar to researcher observations of their child's negativity.

Associations Between Child Behavior and Emotion Regulation

To test whether child behaviors predict child's regulatory ability, we ran regressions using observed child negative mood, positive mood, and persistence with tasks as predictor variables. A regression model including all three child behaviors significantly predicts child's compliance ($F_{(3,\ 20)} = 4.722$, $p < .05$), explaining 33 % of the variance

in compliance. Similarly, child's negative mood, positive mood, and task persistence significantly predicts child's observed hostility toward mothers ($F_{(1,26)} = 9.220$, $p < .001$), explaining 46 % of the variance in observed hostility. These results indicate that observations of children's behavior during free play with mothers are predictive of the child's regulatory ability.

Discussion

This study provided a unique opportunity to not only study preschoolers' emotion regulation, but also to use a mixed-method design to explore differences between high-risk mother-child dyads and lower-risk dyads, although we often encountered obstacles recruiting high-risk families through the H.S. program. Despite the small sample size, we found a number of significant site and demographic differences regarding maternal behaviors during dyadic interactions. Dyads recruited from the H.S. sample had mothers who were less respectful of their child's autonomy, were more intrusive, and had more negative regard for their child. Head Start programs specifically serve low-income, high-risk families, whereas community support groups like those used for recruitment from the general population for the C. S. sample have no such inclusion criteria. Low income is frequently found to be a risk factor for less than optimal parenting practices (Bøe et al. 2013; Fallon et al. 2011). Low-income mothers experiencing a high degree of stress have less positive parent-child interactions and are less able to engage in the types of supportive interactions that scaffold regulatory behaviors than mothers with a higher SES (Clausen et al. 2012; Dawson et al. 1999; Feldman 2007; NICHD ECCRN 1997; NICHD ECCRN 1999; Raikes and Thompson 2006; Shields et al. 2001; Spritz et al. 2010). The same may be true for unmarried mothers frequently recruited from our H.S. site who may have fewer resources available to them and more demands on their time than married or partnered mothers (Radey and Padilla 2009). Mothers who must negotiate a number of stressors in their own life and struggle to regulate their own emotions are likely to model ineffective regulatory strategies for their children (Spritz et al. 2010). From a social learning perspective, one might expect these mothers to have children who vicariously learn the behaviors modeled by their mothers and imitate failed regulation attempts, showing a greater degree of emotion lability as they similarly struggle to manage their emotions (Bandura 1977b; Bandura et al. 1963; Bernier et al. 2010; Cassidy 1994; Kaplan et al. 2008; Raikes & Thompson 2006).

Regardless of site differences, results from this study indicate that maternal beliefs about her child's regulatory abilities have a powerful impact on her child's observed regulation during free play. Results suggest partial evidence for our hypotheses in that maternal respect for child's autonomy and maternal coherence in mother's regulation strategies for her child are significantly associated with the child's observed compliance with authority figures; however, the direction of the effect is counter to that found in previous research. Prior literature indicates that parents who nurture their child's autonomy have children who are able to employ regulatory strategies and engage in socially appropriate behavior (Bernier et al. 2010; Piotrowski et al. 2013). The current results indicate that mothers who respect their child's autonomy have preschool children who engage in less regulated behavior, such as noncompliance or hostility in social interactions. It is likely that we were unable to replicate results from previous literature because we focused on the development of regulation in preschool-aged children (average age 3.5 years) as opposed to previous studies that included children from toddlerhood in once case, and a wide range of ages from 2–8 years in another. During the preschool years, children face increasing social demands and develop language skills that facilitate cooperative dialog (Cole et al. 2008; Kopp 1982; Mittal et al. 2013; Russell et al. 2016), indicating this is a prime time to benefit from maternal responsivity and dialog that scaffolds regulation development. Indeed, Crockenberg and Litman (1990) emphasized that parental control, rather than autonomy granting, may actually foster compliance in young children when it is paired with guidance. It may be that when parents give preschoolers the opportunity to choose their own behavior without exerting much needed control, children are likely to take advantage of the autonomy they are granted and choose instantly gratifying behaviors such as play, rather than internalizing messages of socially appropriate, regulated behavior.

Though allowing children the opportunity to be autonomous individuals, particularly as they approach the preschool age, is often conceptualized as an adaptive parenting practice, it is important that parents still guide their children's behavior so that it aligns with socially appropriate expectations when necessary and scaffold expectations for regulated behavior that are developmentally appropriate. Even when parents have a coherent set of ideas for promoting regulation strategies in their 3.5-year-olds, children may still choose to internalize the message to assert their autonomy, rather than to behave with social appropriateness. Therefore, parents must carefully balance these seemingly contradictory ideas of granting autonomy and guiding regulatory behavior while keeping in mind that behavior will likely improve as the child ages. Future research would benefit from gaining a more nuanced understanding of this dichotomy by determining just what the appropriate balance may be for children at different ages. For example, preschoolers turning 3-years-old as they

enter an early childhood program are quite different from the 4-year-olds who may have a year's experience in the program, and both are different from 5-year-olds preparing to transition to primary school. Each might benefit from having skilled caregivers who slowly transfer autonomy to the child, decrease direct scaffolding based on the child's regulatory skills, and continue to guide children by enforcing consequences for engaging in socially inappropriate and dysregulated behavior.

Current results indicate that when mothers perceive their child's behavior more positively, the child is more successful in complying with authority figures, thus behaving in ways that are expected of them. Based on free play observations, mothers' reports of her child's emotional lability are in accordance with researcher observations of their child's negativity, as children whose mothers perceived more child lability also scored high on observer ratings of negative affect and hostility in social interactions with mother. Observed maternal negative regard for the child and observed child hostility toward the mother were highly correlated, but it is impossible to determine causality for the emotional tone of the interaction. It is likely that both parties contribute to the negativity in the interaction, as parents influence their children and children influence their parents, forming a bidirectional and interdependent relationship system (Hane et al. 2006; Leerkes and Crockenberg 2003; Luebbe et al. 2011). Social interactions are important contexts for the development of regulation, and Bandura (2001) highlights proximal caregiver interactions as being particularly crucial. Caregivers must have an insightful understanding of their preschooler's capacity to regulate and convey a sense of confidence to the child. Mothers who do so will foster self-efficacy in their children, who will in turn be motivated to meet their parents' high expectations and successfully engage in regulated behavior (Bandura 1977b).

Given the associations between maternal perceptions of negativity, noncompliant behavior, and child's observed negativity, interventions aimed at improving mothers' negative perceptions of their children may help children behave in more adaptive ways. Shifting mothers' perspectives to be more strength-based and encouraging positive perceptions of children's regulatory ability may also help to promote positive, well-regulated child behavior. Mothers who believe in their child's ability to regulate not only foster a sense of self-efficacy for the child, but are also more likely to scaffold in ways that are characterized by positivity and joint attention as opposed to hostility, which we have seen undermines children's regulatory behavior. Improving mothers' negative regard for their children would likely improve the emotional tenor of mother-child interactions and may decrease children's hostility. Interventionists may also seek to educate mothers in emotional competence and emotion development in order to promote positive perceptions and facilitate positive child engagement and affection. Promoting mothers' constructive reappraisals, shared positive affect, and supportive responses to children's distress may act as a buffer against child negativity and hostility (Hane et al. 2006; Hurrell et al. 2015, Luebbe et al. 2011). Mothers could also learn to provide opportunities for children to engage in the type of mature pretend play that fosters the development of regulation (Bodrova et al. 2013; Vygotsky 1967; Vygotsky et al. 1987). Children who learn through play to inhibit impulses in order to comply with the rules of a game are able to practice modulating behaviors to achieve a goal and have more success regulating behavior and emotions in non-play situations.

Interventions could also focus on educating mothers about appropriate regulation strategies that their preschool child can effectively use. Mothers who believe their children have the capacity to engage in a behavior would be more likely to have children who learn, practice, and achieve such skills. Interventionists can help mothers understand the importance of scaffolding regulation strategies for their preschool children and having expectations that their children engage in socially appropriate behaviors, even at a young age. Additionally, parent educators can hold mother-child workshops that allow parents and children the opportunity to put these regulatory strategies (e.g., having a child count to 10 to calm themselves down, taking deep breaths) into practice. It may also be beneficial to encourage mothers to model regulation by using more positive behaviors in front of their children. Mothers could model and help their children learn how to cognitively reappraise a situation, or change the way that they think before engaging in a response, which generally results in a more positive outcome (Gross and John 2003; Ray et al. 2010). Encouraging positive interactions between mothers and preschoolers that are characterized by joint attention, positive mood, respect for the child's autonomy, and positive regard for the child may promote emotion regulation and compliance in preschool children.

Limitations of the current study include missing SES information not collected from the C.S. dyads due to IRB concerns regarding the confidentiality of the participants drawn for small pilot studies. Even so, reasonable inferences can be made regarding the SES of the participants, providing important contextual information. Census data indicates that the C.S. sample comes from a city with an average per capita income of $24,470, and 21 % of the city's residents are below poverty level (United States Census Bureau 2015). It would be important to replicate this study with a greater number of mother-child dyads from a wider range of demographic backgrounds to determine whether the pattern of associations from this study holds true in a greater variety of families and to be able to describe

with more nuance any indicators of risk (i.e., unemployment, number and types of subsidies accessed by families, or involvement in child protection services).

The results presented here relate to the 30 mother-child dyads who participated in this study, which excluded fathers-child dyads. Parenting research tends to focus on mothering as opposed to fathering, a bias that warrants remedy given the fathering literature that indicates paternal behaviors have a unique influence on children's dysregulated behavior. For example, Stevenson and Crnic (2013) found that fathers' intrusiveness over and above mothers' intrusiveness predicted children's dysregulated behavior; while, Cabrera et al. (2007) found that paternal supportiveness, and not maternal supportiveness, was positively related to children's emotion regulation at two-years-old. There is also evidence that fathers' unsupportive behaviors are linked to child negativity (Hurrell et al. 2015). In low-income families in particular, fathers' compliance strategies predict children's attention and fathers sensitivity and regulatory language predicts children's emotion regulation (Malin et al. 2014; Owen et al. 2013). Including fathers in larger studies of children's developing emotion regulation could yield important and interesting associations that are not evident in mother-child dyads.

The psychometric properties of the Emotion Regulation subscale of the ERC ($\beta < .6$) were not on par with previous studies (Shields and Cicchetti 1997; Shields and Cicchetti 1998), which prohibited us from using maternal perceptions of emotion regulation and led us to rely solely on observed measures of regulatory skill (i.e., compliance task). Further, we struggled with a lack of variability in a number of measures, as the sample consisted of generally well-functioning mother-child dyads. We were interested in exploring any variability in dyadic interactions related to the contextual risks of poverty, yet in the end drew a sample of dyads that look fairly capable in most regards. For example, most mothers were relatively coherent when describing the strategies they use to support their children's regulation, and mothers rated most children to have a low degree of lability. Future research should seek to replicate these results in a sample of families that show a higher degree of risk as measured by mother-child interactions, perhaps by recruiting a sample of high-risk families who do not receive the types of wrap-around services that characterize H.S. support.

Perhaps the most significant challenge we faced was in regards to recruitment, particularly of high-risk families. We partnered with a H.S. program to help gain access to high-risk families, but challenges remained, particularly with regard to a disheartening number of missed appointments. It is possible that those families who are less well-functioning, and thus more at risk for maladaptive regulation and negative parent-child interactions chose not to participate in the study. Low-income families face a greater number of stressors and challenges and have few resources, and making time to participate in a research study that provides little direct benefit to them is likely not high on their list of priorities (Bernier et al. 2010). It is not uncommon for low-income families to agree to participate in a research study but not keep the scheduled appointment, and follow-through on appointments was certainly a challenge in the present study despite providing participants with a small gift card incentive in thanks for their participation. Low-income families may experience frequent changes to contact information, time conflicts (having to work, for example), struggle to find transportation to a research site, lack childcare for other children not participating in the study, or mistrust the researchers or their agenda, all leading to missed appointments and taxing study resources (Brannon et al. 2013; El-Khorazaty et al. 2007; Rdesinski et al. 2008). Recruitment of low-income families is a challenge that is often discouraging, but researchers must persist in efforts to include often-unavailable samples to best capture the range of children's early experiences as they internalize a system of social behavior; our results underscore this need, as even this small pilot study produced significant results with important intervention implications.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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