Clinical Pediatrics
51(11) 1032–1040
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DOI: 10.1177/0009922812441670
http://cpj.sagepub.com
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Joint Attention in Toddlerhood Predicts Internalizing Problems at Early School Age

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Abstract

The authors examined the longitudinal relation between joint attention and socioemotional functioning in a low-risk, typically developing sample of children when the children were toddlers and again during the early school-age years. Fifty-eight mothers and their children were observed in the home or laboratory engaging in 1 unstructured and 4 semistructured tasks designed to assess joint attention episodes when the children were toddlers. Approximately 4 years later, the mother–child dyads were contacted again and mothers completed the Child Behavior Checklist as a measure of their children's socioemotional outcome at the early school years. The authors found that lower frequencies of joint attention episodes at toddlerhood predicted higher internalizing behaviors at early school age. Preliminary findings are discussed in terms of their theoretical implications for work on early mother–child interactions and children's typical and atypical sociemotional development.

Keywords

socioemotional development, internalizing behaviors, externalizing behaviors, mother–child interactions, joint attention

There is a large corpus of research that has highlighted the importance of mother–child interactions for socioemotional development.[1] However, much of this research has focused solely on the behaviors of parents, typically mothers. Recently, there has been an emphasis within the child development literature on using the dyad as the unit of analysis and considering the bidirectional nature of mother–child interactions.[2]

One such measure is joint attention, defined as a state in which both social partners are actively engaged around a particular object, task, or event and are aware of each other's active involvement.[3] The majority of research to date has focused on the role of joint attention in language development and social cognitions in both typical and atypical development.[4-7] However, a number of theories have been developed that propose various mechanisms through which joint attention processes may contribute to later social competence.[8] First, the caregiving/scaffolding model suggests that adults (ie, parents) provide children with responsive and organized social interactions that provide the basis for the development of both joint attention and social competence.[4,10] Second, the social–cognitive model suggests that the development of joint attention skills is associated with children developing the ability to understand other people's thoughts, feelings, and intentions.[11,12] In turn, these capacities play a role in the development of social competence.[13,14] Third, the social motivation theory postulates that individual variability in joint attention skills reflects the degree to which children find social interactions with others rewarding, which leads children to show higher levels of agreeableness, interest, and positive affect in future social situations.[8,15,16] Last, the neurodevelopmental executive model is related to the social motivation and social cognitive theories in that it suggests that joint attention is associated with the development of frontal and temporal cortical and subcortical areas that are associated with attention control and emotion regulation abilities, which help explain individual variability in social competence.[17] As noted by Mundy

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and Sigman,[8] joint attention involves the "integration of social executive and social motivation processes," which suggests a role for joint attention in social competence and developmental psychopathology.

Much of the empirical support for these models to date has come from research focusing on autism.[18-20] However, more recently, researchers have begun to investigate the role of joint attention in later social competence in at risk and typically developing samples in an attempt to better understand the specificity or generalizability of joint attention processes for social competence and developmental psychopathology.

Sheinkopf et al,[21] for instance, investigated the influence of joint attention behaviors on internalizing and externalizing behaviors in children exposed to cocaine in utero. In their study, joint attention behaviors were assessed when children were 12, 15, and 18 months old, and behavioral correlates were assessed when children were 36 months old. The children completed tasks with the experimenter to assess joint attention behaviors. The authors found that higher rates of child responding to bids for joint attention were associated with lower rates of withdrawal behaviors, whereas higher rates of child initiating joint attention were associated with lower rates of disruptive behaviors as assessed by teachers at 36 months of age.

Van Hecke et al[22] expanded on the findings of Sheinkopf et al[21] by investigating the role of joint attention in social competence in typically developing children. The authors found that both child initiating joint attention with the experimenter and child responding to bids for joint attention by the experimenter measured when children were 12 months old were associated with lower parental ratings of externalizing behaviors at 30 months. As well, child initiating joint attention was associated with lower parental ratings of internalizing behaviors at 30 months. These results remained even when parental ratings of temperament, cognition, and language were statistically controlled. In summary, there is preliminary research illustrating that joint attention has a role in the development of social competence in both at-risk and typically developing children.

One limitation of these studies is that experimenter–child and not parent–child joint attention was measured. The studies used a structured task that was completed between the child and the experimenter and solely assessed children's joint attention behaviors. Although a strength of this approach is that testing was standardized, the limitation of this approach is that it is low on ecological validity, given that the design ignores the contextualized role of parent–child interaction in early socioemotional development generally, and more particularly, that the ability for joint attention develops *within* and *out of* parent–child interactions beginning from early infancy with parent–infant face-to-face interaction. Also, in using an experimenter–child design, the implication is that joint attention is something *in* the child and not something that occurs *between* social partners through effortful and intentional negotiation of attention. Finally, joint attention typically occurs within the context and familiarity of parent–child interactions.

It is also important to note that these studies investigated joint attention behaviors, not joint attention episodes. As discussed by Tasker and Schmidt,[23] there is a dual-usage problem in the joint attention literature in that there is a lack of differentiation between joint attention behaviors and joint attention episodes. Consequently, the term *joint attention* is often used to describe both joint attention behaviors and episodes, although these are not synonymous. For instance, a child may engage in an initiation act (a joint attention behavior), but if the mother fails to respond to the initiation act, the dyad will not establish a joint attention episode. Thus, joint attention behaviors are necessary, but not sufficient, for a joint attention episode to be established.

According to the caregiving/scaffolding model, joint attention episodes provide an opportunity for children to learn, among other things, social skills such as turn taking and emotion regulation.[21,24,25] Thus, it is not just initiating or responding to bids for joint attention that are important for socioemotional development but also the establishment of joint attention episodes. The majority of studies that have assessed joint attention using experimenter–child tasks have focused specifically on joint attention behaviors without much consideration of joint attention episodes. In addition, to the best of our knowledge, no studies have investigated the relation between joint attention (behaviors and episodes) and socioemotional outcome at later ages (ie, the early school-age years) in typically developing children.

We investigated the influence of joint attention on socioemotional development in typically developing children. We used direct observations coded from mother–child interactions to measure the establishment of joint attention episodes when children were between the ages of 18 and 37 months. Approximately 4 years later, mothers completed self-report ratings of their children's internalizing and externalizing behaviors. We predicted that dyads that established fewer joint attention episodes at toddlerhood would have higher internalizing and externalizing behaviors at early school age.

Method

Overview and Participants

Fifty-eight mothers and their children came to the laboratory (n = 31) or were visited at home (n = 27) when children were between 18 and 37 months old (mean age = 25.10 months, SD = 5.64). Mothers and their children were observed and videotaped in an unstructured free play joint attention task and 4 semistructured joint attention tasks. Lab and home procedures were identical. There were no statistically significant differences on any of the demographic, joint attention, or questionnaire measures between those dyads that completed the first visit at home and those that completed the first visit in the laboratory. Therefore, we combined the 2 groups into 1 group.

An average of 4 years later, the mothers were contacted again and asked to participate in a follow-up that consisted of completion of a questionnaire package. Thirty-one (53%) mothers who were successfully contacted agreed to have the questionnaires sent to them (the other families had moved, and we were unable to obtain new contact information for them), and 30 (97% of contacted) mothers completed and returned the questionnaires. There were no statistically significant differences on any of the demographic, joint attention, or questionnaire measures between the dyads that participated in the follow-up study and those who did not. Therefore, the demographic information presented was based on the 30 (52%) dyads who participated in the lab/home visit and the follow-up assessment. All study procedures were approved by the McMaster University Research Ethics Board. All mothers were briefed about the procedures and provided written consent.

The average age of the 30 children (18 males, 12 females) during the first visit was 24.57 months (range = 18-37 months, SD = 4.92). All the children were from 2-parent families, and the average age of their mothers was 33.27 years (range = 24-43 years, SD = 4.51). Fifteen (50%) children attended preschool for an average of 3.07 days per week (range = 1-5, SD = 1.39) and 6.47 hours per day (range = 1-9.50, SD = 2.97). The majority of mothers (68%) had a college or university education. English was the first language spoken in all the homes.

At the second visit, an average of 50.50 months (range = 46-62, SD = 2.66) after the first visit, the mean age of the children was 74.73 months (range = 69-88, SD = 5.02). All the children attended school, with 12 (40%) attending junior or senior kindergarten, 15 (50%) attending grade 1, and 3 (10%) attending grade 2. Twenty-eight (93%) children were from 2-parent homes, and 2 (7%) children were from single-parent homes. The mean age of the mothers was 37.30 years (range = 29-47, SD = 4.60). The majority of mothers (60%) were college or university graduates. One (3%) mother endorsed a family income (in Canadian dollars) between \$15,000 and \$30,000, 1 (3%) endorsed a family income between \$30,000 and \$45,000, 7 (23%) endorsed a family income between \$60,000 and \$75,000, 6 (20%) endorsed a family income between \$75,000 and \$90,000, and 12 (40%) endorsed a family income that was greater than \$100,000. Three (10%) mothers did not report their family's income. Family arrangement and income were not significantly related to the outcome variables.

Procedure

The procedure for assessing joint attention is detailed elsewhere.[23,26] Briefly, the mother–child dyads were seated on the floor surrounded by a standardized set of toys that have been shown in previous studies to elicit joint attention behaviors. The dyads were observed and videotaped in the laboratory or in their homes interacting in a free play task (5 minutes) and in 4 semistructured tasks, including blowing bubbles (3 minutes), presentation of a laser pointer on the floor (1 minute), playing with a mechanical ball that bounced around and made noises (1 minute), and reading/looking at picture books (3 minutes).

Immediately following the mother–child interaction tasks, the mother was asked to complete the Caregiver Perception Rating questionnaire from the Communication and Symbolic Behavior Scale[27] to ascertain that the child's behavior during the free play and semistructured tasks was typical and was not influenced by the presence of the camera or the experimenter. The mother rated the typicality of her child's behavior during the interaction on a 3-point scale (1 = *less than usual*, 2 = *typical*, 3 = *more than usual*) on the following items: alertness, emotionality, interest and attention, comfort, activity, communication, and play. All the mothers rated their children's behaviors during the observation task as typical on all 6 items.

As described above, approximately 4 years after the first testing, mothers were contacted for a follow-up study and, if they agreed to participate, were sent a package of questionnaires that consisted of a standard demographic questionnaire and the Child Behavior Checklist (CBCL).[28] The CBCL/4-16[28] is a widely used questionnaire that assesses problem behaviors in children between the ages of 4 and 16 years. The CBCL[28] consists of 112 items focusing on various problem behaviors, including anxiety, depression, attention, aggression, and delinquency. The respondent, in this case the mother, is asked to rate the extent to which the child has shown the target behaviors in the past 6 months on a scale of 0 (*not true*) to 2 (*very true*). The 112 items on the CBCL[28] can be reduced to 2 global measures: (*a*) Internalizing and (*b*) Externalizing. In the present study, the global measures showed adequate internal consistency with Cronbach α values of .66 (Internalizing) and .92 (Externalizing).

Behavioral Coding

Videotaped interactions were transcribed in real time for verbal and nonverbal communicative acts to provide a running record of the mother–child interaction. Incidences of initiation acts, established joint attention (EJA), and termination of joint attention were coded and transcribed verbatim in real time from the videotaped mother–child interactions. Transcriptions were then used to categorize the following joint attention variables: maternal initiation acts (MIAs) and child initiation acts (CIAs), EJA, and maternal and child termination acts. A detailed description of the joint attention–coding protocol is provided elsewhere.[23]

Initiation acts. Tasker and Schmidt[23] conceptualized initiation acts as active verbal or nonverbal behaviors not part of the current focus of interaction and directed toward a social partner in order to direct the social partner's attention to an object or event on which the social partner was not currently focused or in order to share in the social partner's current focus of attention. Initiation acts were considered "successful" when the social partner to whom the initiation act was directed responded within 5 seconds. Both "successful" (ie, those that were responded to) and "unsuccessful" (ie, those that were not responded to) initiation acts were coded. Two types of initiation acts were coded: (*a*) MIAs and (*b*) CIAs depending on who performed the initiation act (ie, mother or child, respectively).

Established joint attention. Joint attention was considered established when the following sequence of on-topic communicative exchanges occurred: (*a*) the mother or the child performed an initiation act as defined above, (*b*) the social partner provided an on-topic verbal or nonverbal response within 5 seconds and the response lasted for a minimum of 3 seconds, (*c*) the social partner who initiated provided a verbal or nonverbal response to indicate his or her awareness of the shared attention, (*d*) the social partners remained visually focused on the object, activity, or event and communicated around it through the exchange of smiles, verbalizations, and vocalizations.[23] The present study had two EJA variables based on which social partner *initiated* the interaction that resulted in EJA: maternal established joint attention (M-EJA) and child established joint attention (C-EJA). Total scores for each were based on frequency counts. Separate total scores were calculated for the free play and the semistructured tasks.

Joint attention was considered terminated when one or both of the social partners performed a termination act and remained off topic for more than 5 seconds. Termination acts included the initiation of a new topic of focus[29,30] or showing disinterest in the current focus through behaviors such as yawning, visually looking away, physically moving their bodies away from the interaction, squirming, focusing on a different object, examining body parts such as fingers or belly button, thumb sucking, arching the back, or vocalizations of frustration.[31-33] It is important to note that the performance of a termination act signaled the possibility of the termination of a joint attention episode but was not sufficient for the joint attention episode to be considered terminated. That is, if the social partner's attention was regained to the current focus of attention within 5 seconds of the performance of the termination act, the joint attention episode was not considered terminated.

The dyads were observed in the interaction protocol for a total of 13 minutes. However, there was some variability among dyads in the amount of time they were observed because of experimenter error and the mothers terminating the bubbles task before they were instructed to do so. To prevent this variability from confounding the results, the total amount of time spent in the interactive episodes was controlled for in the analyses.

Behavioral coding reliability. To assess interobserver reliability, a secondary coder coded 6 (21%) randomly selected dyads. Cohen's kappa coefficients computed for CIAs and MIAs as well as C-EJA and M-EJA were good: range = .73 (CIAs) to .87 (EJA through CIAs).

Statistical Analyses

None of the joint attention variables showed deviations from normality. The CBCL Internalizing and CBCL Externalizing variables were positively skewed. However, this is typical when using these measures with a normal, low-risk population. Log transformations of the CBCL internalizing and externalizing variables established normal distributions. Though our results did not differ when we used the log-transformed or the nontransformed CBCL variables, we decided to use the nontransformed variables in our analyses.

There were no statistically significant Pearson product–moment correlations between child's age and the joint attention or CBCL measures. Independent-samples t tests showed that males (M = 1.00, SD = 1.03) were statistically significantly lower than females (M = 2.08, SD = 1.00) on C-EJA during the semistructured tasks, $t(28) = -2.86$, $P < .01$. As expected, there was also a statistically significant positive correlation between CBCL Internalizing (M = 3.82, SD = 3.09) and CBCL Externalizing: M = 9.07, SD = 7.89, $r(27) = .60$, $P < .01$.

Table 1. Zero-Order Correlations Between the Joint Attention Measures Assessed When Children Were Between 18 and 37 Months Old (N = 30)

Joint Attention Behaviors	Free Play M-EJA	Free Play C-EJA	Semistructured M-EJA	Semistructured C-EJA
Free Play M-EJA	1.00	−0.24	−0.25	0.19
Free Play C-EJA			−0.08	0.34
Semistructured M-EJA				0.44[a]

Abbreviations: M-EJA, maternal established joint attention; C-EJA, child established joint attention.
[a]$P < .05$.

Two hierarchical linear regressions were conducted to analyze the influence of joint attention on internalizing and externalizing behaviors. The following variables were inserted into the hierarchical regression analysis predicting internalizing behaviors: Step 1 = time between laboratory/home visit and follow-up, child sex, total interaction time, and CBCL Externalizing; Step 2 = Free Play C-EJA, Free Play M-EJA, Semistructured M-EJA, and Semistructured C-EJA. The following variables were inserted into the hierarchical regression analysis predicting externalizing behaviors: Step 1= time between laboratory/home visit and follow-up, child sex, total interaction time, and CBCL Internalizing; Step 2 = Free Play C-EJA, Free Play M-EJA, Semistructured M-EJA, and Semistructured C-EJA.

Results

Table 1 illustrates the zero-order correlations between the joint attention variables and the CBCL internalizing and externalizing subscales. The change in the predictive value of the regression equation predicting internalizing behaviors was significant at step 1 $\Delta F(4, 23) = 3.16$, $P = .03$ with $\Delta R^2 = .36$ and at step 2 $\Delta F(4, 19) = 2.82$, $P = .05$ with $\Delta R^2 = .24$ (see Table 2). With regard to the joint attention variables, the Semistructured M-EJA ($\beta = -.46$, $P = .02$) made a statistically significant contribution to the prediction of mother-rated internalizing behaviors, whereas the Free Play M-EJA ($\beta = -.44$, $P = .08$) approached statistical significance. That is, children who experienced higher frequencies of M-EJA across the semistructured tasks between the ages of 18 and 36 months were rated by their mothers as lower on internalizing behaviors between the ages of 69 and 88 months.

The change in the predictive value of the regression equation predicting externalizing behaviors was significant only at step 1 $\Delta F(4, 23) = 3.08$, $P = .04$ with $\Delta R^2 = .35$ (see Table 3). The equation was not statistically significant at step 2 $\Delta F(4, 19) = .44$, $P = .78$ with $\Delta R^2 = .06$, thus suggesting that joint attention behaviors did not contribute to the prediction of externalizing behaviors,

Table 2. Hierarchical Linear Regression Predicting Internalizing Behaviors When Children Were Between 69 and 88 Months Old (N = 30)

Variable	B	SE B	β
Step 1			
Time between lab and follow-up	−0.003	0.21	−0.003
Child gender	−0.15	1.11	−0.02
Total interaction time	−0.003	0.01	−0.09
CBCL Externalizing[b]	0.32	0.09	0.58
Step 2			
Time between lab and follow-up	0.01	0.20	0.01
Child gender	−1.37	1.25	−0.22
Total interaction time	0.002	0.008	0.06
CBCL Externalizing[b]	0.26	0.08	0.48
Free Play C-EJA	−0.04	0.56	−0.02
Free Play M-EJA	−0.44	0.24	−0.44[a]
Semistructured M-EJA	−0.77	0.30	−0.44[a]
Semistructured C-EJA	−0.23	0.65	−0.08

Abbreviations: CBCL, Child Behavior Checklist; M-EJA, maternal established joint attention; C-EJA, child established joint attention.
[a]$P < .10$.
[b]$P < .05$.

over and above child gender. Only the internalizing subscale ($\beta = .58$, $P < .01$) made a significant contribution to the prediction of mother-rated externalizing behaviors. That is, those children who were rated higher on the CBCL internalizing subscale were also rated higher on the CBCL externalizing subscale.

Discussion

We investigated the longitudinal relations between joint attention and socioemotional development in a typically developing sample of children. We found that M-EJA (a measure of the frequency with which joint attention was established through MIAs) during the semistructured tasks predicted internalizing behaviors. That is, children who, at 18 to 37 months of age, were in dyads that engaged in higher frequencies of established joint attention episodes through MIAs during the semistructured tasks were rated lower on internalizing behaviors when they were between 69 and 88 months of age (ie, 5.5-7.1. years old). Contrary to previous research, none of the joint attention measures predicted externalizing behaviors.[21,22]

A number of factors may explain this pattern of results. First, the children in our study were significantly older at follow-up (ie, 5.5-7.1 years old) compared with children in previous studies, who were 30 to 36 months old.[21,22] Second, the measurement of joint attention in the present study differed from that of previous research. Unlike previous studies, which have used experimenter–child paradigms to measure joint attention behaviors, the present study used mother–child interactions for the measurement of joint attention episodes. Thus, the present study focused on the dyad as the unit of analysis rather than the child and focused on the child's interactions with the mother rather than with an experimenter to assess joint attention episodes. For instance, the variable M-EJA assessed (*a*) the mother's ability to initiate joint attention episodes, (*b*) the child's ability to detect and respond to the mother's bid for attention, and (*c*) the mother's ability to detect and respond to the child's response. Similarly, the variable C-EJA assessed (*a*) the child's ability to initiate joint attention, (*b*) the mother's ability to detect and respond to the child's initiation, and (*c*) the child's ability to detect and respond to the mother's response. Furthermore, we assessed joint attention episodes rather than joint attention behaviors, given that joint attention episodes are the manner through which children learn skills such as emotion regulation, turn taking, theory of mind, and social play. Given that joint attention episodes typically occur within the context of mother–child interactions, this increased the ecological validity of the present study as it provided insight into the relation between everyday joint attention episodes and children's internalizing and externalizing behaviors.

Contrary to expectations, C-EJA during both the free play and semistructured tasks did not predict future internalizing or externalizing behaviors. It is important to note that C-EJA occurred less frequently than M-EJA across both the free play (M = 1.64, SD = 1.29 vs M = 4.75, SD = 3.19) and the semistructured tasks (M = 4.00, SD = 1.38 vs M = 9.00, SD = 4.62). Given that all mothers reported their children's behaviors as typical, it is likely that the observed mother–child interactions in the present study were consistent with the manner in which mothers and their children typically engaged when playing. Therefore, our results suggest that in the context of mother–child interactions, children exhibit a lower frequency of initiation acts compared with their mothers. This finding is consistent with the caregiving/scaffolding model of joint attention, which emphasizes the important role of the parent in shaping the social interaction and providing a context for the parent and child to focus on the same topic, idea, or event and for the transmission of information to occur.

Table 3. Hierarchical Linear Regression Predicting Externalizing Behaviors at Between 69 and 88 Months (N = 30)

Variable	B	SE B	β
Step 1			
Time between lab and follow-up	−0.07	0.39	−0.03
Child gender	0.22	2.04	0.02
Total interaction time	−0.003	0.01	−0.05
CBCL Internalizing	1.06	0.31	0.58[a]
Step 2			
Time between lab and follow-up	−0.18	0.44	−0.08
Child gender	0.62	2.87	0.05
Total interaction time	0.001	0.02	0.03
CBCL Internalizing	1.30	0.41	0.71
Free Play C-EJA	−0.86	1.22	−0.21
Free Play M-EJA	0.13	0.57	0.07
Semistructured M-EJA	0.72	0.75	0.23
Semistructured C-EJA	0.72	1.43	0.14

Abbreviations: CBCL, Child Behavior Checklist; M-EJA, maternal established joint attention; C-EJA, child established joint attention.
[a]$P < .01$.

Our results also point to mothers' perceiving or assessing their children's *responsiveness* to maternal bids for attention as the defining indicator of internalizing behavior rather than their children's bids for their mothers' attention. This suggestion has implications for how we measure, think about, and talk about internalizing behavior in young children.

The present study did not investigate the mechanisms through which joint attention episodes may influence socioemotional development. However, based on the models reviewed, a number of mechanisms may be hypothesized to explain the role of M-EJA episodes in predicting internalizing behaviors. First, the social cognitive model suggests that through joint attention episodes, children begin to understand others' thoughts, feelings, and intentions, which then influences their later social competence.[11,13] Recent studies have found that children rated higher on internalizing problems exhibit information-processing biases.[34] Consequently, one proposed mechanism may be that joint attention episodes enable children to better understand others' behaviors and emotions, thus enhancing their confidence and performance in future social situations. Related to this, the neurodevelopmental executive model postulates that joint attention plays a role in the development of frontal and temporal cortical and subcortical brain areas involved in attention control and emotion regulation. Individuals with internalizing disorders often experience difficulties regulating feelings of fear and anxiety and their associated thoughts. Thus, joint attention episodes may be one mechanism through which children may better develop their emotion regulatory skills. Furthermore, joint attention episodes provide an opportunity for children to learn new information and to be exposed to new situations, objects, or people. Thus, engagement in more joint attention episodes may lead children to view novel situations, objects, or people more positively and to be more likely to approach these situations, thus decreasing their internalizing behaviors. Our results might also point to a conditioning model of maternal perception or assessment of child internalizing behavior or, indeed, of de facto and measurable internalizing behavior in children. Mothers might perceive or interpret their children's responsiveness to maternal bids for joint attention (and how hard they, as mothers, had to "work" to elicit and engage their child's attention) to indicate child sociability as a toddler. Lower ratios of maternal bids for attention to child responses are likely to be experienced as nonreinforcing for mothers, and this may lead to a drop-off in maternal effort to elicit and engage their child's attention. Over time, this dyadic pattern of interaction might at least contribute to and explain maternal perception and report of child internalizing behavior as a function of child *responsiveness* to bids (vs child *initiation* bids for) joint attention and social interaction. There is a need for future research to investigate the mechanisms through which individual variability in joint attention may predict later social competence.

Strengths and Limitations

This study has a number of strengths that need to be highlighted. First, we used a modified coding protocol that focused on the dyad as the unit of analysis and that considered the intricate back and forth communicative acts between the mother and child. To the best of our knowledge, this was the first study conducted to date to investigate the effects of joint attention on socioemotional development using a bidirectional coding protocol that involved interactions between the mother and child rather than an experimenter–child paradigm. This coding protocol provides insight into the processes underlying mother–child interactions and, more specifically, joint attention, by acknowledging the complexity of social interactions. Second, given that we assessed both internalizing and externalizing behaviors, we were able to investigate the correlations between internalizing and externalizing behaviors and statistically control their influences to ensure that the relations were specific to each individual dimension and not influenced by the shared variance of the two dimensions. Third, to the best of our knowledge, this was the first longitudinal study to investigate the role of joint attention episodes in predicting socioemotional development during early school age using a low-risk, typically developing sample of children.

Despite the aforementioned strengths, there are also a number of limitations that need to be acknowledged. First, the present work had a small sample size, which decreased our power to detect statistically significant hierarchical regressions. Second, we assessed socioemotional development through maternal report. Research has shown that maternal report of child behaviors has both a subjective component, based on maternal factors such as beliefs and expectations, parity, age, personality,[35] and maternal mental health,[36] and an objective component based on the child's actual behaviors.[36,37] Future studies using multiple respondents such as mothers, fathers, and teachers or observational approaches can further clarify the relations between joint attention and socioemotional development. Third, although the utilization of mother–child interactions for the measurement of joint attention increases ecological validity, it also creates potential confounds due to variability between mothers in terms of the manner in which they engage and interact with their children as well as variability in maternal characteristics, such as mental health,[38,39] the dyads' attachment status, and the mothers' stress levels.[40] In the present study, we did not assess for these possible confounds.

Conclusion

The present work provided a preliminary investigation of the contributions of joint attention to internalizing and externalizing behaviors at early school age in a nonclinical, low-risk sample of typically developing children. We found that the frequency with which maternally initiated joint attention was established between mothers and their 18- to 37-month-old children predicted variability in internalizing behaviors when children were between 69 and 88 months, thus providing some preliminary suggestions that joint attention may be especially important with regard to the development of internalizing behaviors. It is important to remember that development is a complex process that includes a multitude of factors, and the present study only focused on one possible factor: joint attention. Nevertheless, the present work provides a preliminary assessment of the role that mother–child interactions may play in typically developing children's socioemotional development. Further research that investigates the mechanisms through which joint attention influences children's development will aid in further refining our understanding of how joint attention influences children's development.

Authors' Note

Portions of data for this article were based on the first and second authors' doctoral work conducted under the direction of Louis A. Schmidt and submitted to the School of Graduate Studies at McMaster University.

Acknowledgments

The authors would like to thank the parents and their children for their participation in the study as well as Celia Hsiao and Danielle Major for their assistance with behavioral coding.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by a graduate scholarship from the Social Sciences and Humanities Research Council (SSHRC) of Canada and an Ontario Graduate Scholarship awarded to the first and second author and an operating grant from SSHRC to the third author.

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