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Are differences in early aggressive behavior mediated by attachment processes? The case of adolescent mother-infant dyads

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ABSTRACT

This study examines the possibility that the association between young motherhood and child aggressive behavior is mediated by maternal sensitivity and attachment security. Adolescent ($n = 83$) and adult ($n = 44$) mother-infant dyads were met at home when infants were 6-, 10-, 15- and 18-months-old. Sensitivity (6 and 10 months) and attachment security (15 and 18 months) were assessed based on two sets of 120-minute home observations. Child aggressiveness was reported by mothers at 18 months. Young motherhood was linked to lower levels of sensitivity and attachment security, and greater levels of aggressive behaviors. Sequential mediation analysis revealed mediation by attachment processes, after controlling for infant irritability (6- and 10-months). Discussion focuses on the way results support important postulates of attachment theory and argue in favor of attachment-based intervention and other strategies that addresses other challenges faced by young mothers.

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The rate of adolescent motherhood around the world has decreased over the last 25 years, dropping approximately 36% since 2000, establishing itself at 38.3 births for every 1000 women aged 15 to 19 years worldwide (World Health Organization [WHO], 2024). In many Western or Westernized nations, the rate hovers at or below 10 births per 1000 women (Australia – 6.7; Canada – 4.5; Finland – 3.3; France – 3.5; UK – 8.6; US – 13.5). Nevertheless, adolescent motherhood remains an important public health concern, as the children of adolescent mothers are over-represented in most sectors of special education, medical or social services during childhood and adolescence (Mason-Jones et al., 2023; Powers et al., 2021; Smithbattle et al., 2024). These data testify to the frequently documented finding that the children of adolescent mothers remain at high risk for several types of difficulties that touch on social, emotional and cognitive dimensions of

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development (Cresswell et al., 2022; Jaffee et al., 2001; Spieker et al., 1997). Children of adolescent mothers have been shown to experience more problems with impulsivity, executive functions and emotion regulation (Menon et al., 2020), early cognitive and language development (Baudry et al., 2017), as well as internalizing and externalizing behavior problems (Agnafors et al., 2019; Spieker et al., 1997). Several longitudinal studies demonstrate that these difficulties persist well into adolescence and the adult years (Cresswell et al., 2022; Shaw et al., 2006).

This is perhaps not surprising. The transition to parenthood during adolescence is often characterized by a constellation of risk factors that increase the risk of problematic parenting. These may include: exposure to early trauma and abuse, difficulties in executive functions, emotion regulation, and mentalization processes, poverty, lower levels of education and reduced employment opportunities, more frequent postpartum depression and other mental health issues, and difficulties with social relationships in general, including relationships with the child's father (Agnafors et al., 2019; Demers et al., 2010; Jack et al., 2022; Madigan et al., 2014; Riva Crugnola & Ierardi, 2022; SmithBattle & Freed, 2016; Wong et al., 2020). It is important to underline that, in the current study, it is not the age of mothers per se that is at stake when considering parenting processes. In this specific age group, pregnancy and childbirth are linked to numerous other circumstances that increase parenting risk and provide the opportunity for understanding the contributions of attachment processes in the emergence of aggressive behavior.

Considering aggressive behavior

Aggressive behavior is of particular concern when it comes to the offspring of adolescent mothers. The children of adolescent mothers are at risk for different kinds of externalizing behaviors across development, including aggressive behavior (Lee et al., 2017; Spieker et al., 1999; Tremblay et al., 2004; Yoon, 2022). Research that has examined the emergence of early aggression has mostly focused on the preschool period, although some researchers have identified such behavior in the children of young mothers prior to age 2, a time when infants show aggressive behavior in different contexts (Alink et al., 2006; Côté et al., 2006; Perra et al., 2021). The behaviors that are considered, are similar from study to study (e.g. hitting or kicking others, fighting or hurting animals, expressions of anger, frustration and tantrums). In an important study conducted in the Netherlands, Alink et al. (2006) show that such behaviors are present as early as 12 months, with important increases during the second and third years of life. Tremblay et al. (2004) conducted a longitudinal study of a group of 504 mother-infant dyads where they tracked aggressive behavior at 5, 17, 30 and 42 months after birth. They identified a trajectory of elevated aggressive behavior across these data points, suggesting that as early as 17 months, it is possible to predict the frequency of later aggression. Among the variables that contributed to children being in this high aggression trajectory was maternal young age. Such a finding suggests that differences in emerging aggressive behavior may be detected early and are linked to the risk factors that are part of young motherhood.

Attachment processes

Problems in parenting have long been linked to greater levels of aggressive behavior across development. In focusing on the very earliest manifestations of aggression during infancy, the predominant parenting paradigm is that of attachment theory. Attachment theory postulates that the developmental histories of teen mothers (Bailey et al., 2007; Madigan et al., 2014), mental health issues (Deans, 2020; Scorza et al., 2021), and other characteristics of the family ecology that provide the context for the establishment of the attachment relationship, influence parental ability to respond sensitively to infant signals and behaviors (Neuhauser, 2018; Tarabulsky et al., 2005). Such sensitivity in different daily interactions (Pederson et al., 2014), but perhaps more importantly when infants are distressed (Goldberg et al., 1999), are viewed as primary determinants of relationship attachment security (Madigan et al., 2024). Unpredictable and inappropriate parental responses, as well as a lack of availability to help regulate emotions are linked to infant insecure attachment. Attachment insecurity has been linked to a variety of different problematic developmental outcomes, including child externalizing behavior and aggressiveness, at different developmental periods (Deneault et al., 2021). Other studies have shown that maternal sensitivity in and of itself may also predict behavior problems across development (Cooke et al., 2022) indicating that the core attachment processes are involved in the emergence of externalized behavior. Unsurprisingly, numerous studies have documented that adolescent mother-infant dyads experience lower levels of sensitivity in their interactions (Moran et al., 2008; Riva Crugnola et al., 2014; Tarabulsky et al., 2011) and lower levels of attachment security (Flaherty & Sadler, 2011).

Extant theory holds that attachment security contributes to infant ability to regulate emotions during development. Infants who experience caregiving that is sensitive to their needs and signals, especially in times of distress, and who obtain help in regulating emotions at times when they are unable to do so effectively on their own, will form internal working models of available, trustworthy attachment figures that will foster the integration of regulatory strategies (Boldt et al., 2020; Thompson, 2016). Insecure attachment, defined as avoidant, resistant-ambivalent or disorganized-disoriented relationships, has been shown to be associated to problems in regulation in different contexts, to heightened physiological reactivity and to difficulties in regulating anger and frustration, all of which are related to aggressive behavior during childhood (Boldt et al., 2020; Sroufe, 2005).

Mediation by attachment processes

The hypothesis that emerges is that the relation between the psychosocial characteristics of young mothers and infant risk for early aggressive behavior is mediated by attachment-based processes involving maternal sensitivity and attachment security. Two lines of research support this idea. First, by way of longitudinal and cross-sectional studies, the required direct bivariate correlations, helpful for demonstrating mediation, have been established between all variables. Links have been documented between teen motherhood and infant aggressive behavior, between teen motherhood, maternal sensitivity and infant attachment, as well as between attachment-based variables and early aggressive behaviors (Bailey et al., 2007; Cooke et al., 2022; Cresswell et al., 2022; Fearon et al., 2010;

Sroufe, 2005; Ward & Carlson, 1995). Critically, there have been very few studies that have specifically focused on aggressive behavior, considering instead the general category of externalizing behaviors, which also include developmental characteristics linked to attention and activity levels. Moreover, when studies have attempted to document process, they often involved older mothers and older children and frequently found that moderation by attachment classification, rather than mediation, was linked to outcome. Specifically, Dubois-Comtois et al. (2013) found that, while mother-child interactions at 6 years mediated the association between maternal distress during the preschool years and school-age behavior problems, including aggressiveness, attachment classification did not, even though a direct link was found between attachment and aggressiveness. In a rare study involving adolescent mother-infant dyads, Cyr et al. (2014) found that attachment security at 12 months moderated the link between problematic parenting at 4.5 years and aggressive behavior at 6 years. This study establishes the importance of attachment processes in the emergence of school-aged aggressiveness, without testing the theoretical postulate that attachment may mediate the relation between psychosocial context and child aggressive behavior. Many studies have provided similar results, linking attachment to later forms of externalizing behavior during the preschool or school years, without testing basic premises. As far as we know, mediation by sensitivity and attachment linking psychosocial risk to aggressive child behavior has yet to be demonstrated, especially with the earliest markers of aggressiveness.

A second set of studies have examined the effects of early attachment-based intervention, aimed at improving parental sensitivity, on the emerging attachment relationship and externalizing behavior. Intervention studies, especially randomized control trials, are particularly powerful tools to illustrate process in that specific variables are manipulated (improvements in sensitivity) and effects in outcomes (attachment security; externalization) should emerge in a way that is coherent with changes in sensitivity, if the theoretical postulates hold true. Several studies have shown parallel increases in parental sensitivity, attachment security and reductions in externalizing behavior when mother-infant/child dyads were exposed to structured attachment intervention strategies (Klein Velderman et al., 2006b; Moss et al., 2011), as well as improvements in emotional regulatory abilities believed to underlie aggressive behavior (Dozier et al., 2018). However, two issues emerge from these intervention studies. The first is that while there is a link between changes in sensitivity and attachment in this work, the association between changes in sensitivity and externalization, or attachment and externalization has been difficult to demonstrate (Moss et al., 2011; Van Ijzendoorn et al., 2023). Moreover, the link between attachment-based intervention and externalizing behavior has varied greatly across studies (Van Ijzendoorn et al., 2023). Finally, many studies that have addressed aggressive behavior more specifically have focused on older children (Klein Velderman et al., 2006a; Moss et al., 2011). The question remains complete with regard to the earliest markers of aggressiveness during infancy and whether attachment processes are involved in mediating the association between adolescent motherhood and early aggressive behavior in offspring.

Study objectives

The purpose of this study is to examine the basic hypothesis that adolescent motherhood is related to early manifestations of aggressive behavior in infants by way of maternal

sensitivity and mother – infant attachment security. To test this hypothesis, serial mediation, involving the three predictors of aggressive behavior (teen motherhood, maternal sensitivity, attachment security) will be used. A group of adolescent mother-infant dyads and a group of adult mother-infant dyads participated in this study to operationalize the psychosocial risk related to young motherhood. Additionally, this study relies on semi-structured home observations for assessments of maternal sensitivity at 6 and 10 months and attachment security at 15 and 18 months, to predict maternal reports of infant aggressiveness at 18 months. Two points require further clarification.

First, home observations of attachment, relying on the Attachment Behavior Q-sort (AQS; Waters, 1995), were used instead of the Strange Situation Procedure (Ainsworth et al., 1978), to obtain a continuous measure of security. This decision was based on Fearon et al.'s meta-analysis (2010) which revealed greater effect sizes linking attachment and externalizing child behavior when the AQS was used. Furthermore, in a recent meta-analysis of the sensitivity-attachment association, Madigan et al. (2024) found that greater associations were found when the AQS and the Maternal Behavior Q-Sort (MBQS; Pederson & Moran, 1995) were used in the same study, hence our choice to use these measures in the context of home observations to test for serial mediation.

Second, we chose to control for infant temperamental irritability. Negative infant affect and irritability have often been linked to early manifestations of aggressive behavior and externalization (Bradley & Corwyn, 2008; Ryan & Ollendick, 2018). To more accurately draw out attachment processes that may be involved, maternal reports of temperament at 6 and 10 months were statistically controlled in the prediction of aggressive behavior.

Method

Participants

One hundred and forty-four mother-infant dyads participated in this study. Complete data were available for 127 dyads. At the time of recruitment, dyads were proposed to participate in the study if infants were born weighing more than 2,500 grams without physical or congenital anomalies. Mothers of preterm infants, born after 34 weeks of pregnancy, were invited to participate in the study in the absence of any other medical complications.

Adolescent mothers ($n = 83$), aged 20 years or less at the birth of their child, and adult mothers ($n = 44$), older than 20 years, were recruited with the help of maternity ward nurses in two hospitals in Trois-Rivières and Québec City, Canada. Adolescent mothers were aged 18.07 years ($SD = 1.25$) and had just under 10 years of schooling (9.92; $SD = 1.72$) at the beginning of the study. Mean annual income was at the lowest echelon of a 5-point scale (between 0 and 15 000\$), well below the local poverty level. All were White and French-speaking. Sixty-four percent of mothers were either married or cohabiting with the biological father of the infant at the beginning of the study. All but 9 infants were born after 37 weeks of pregnancy. The 9 infants were born at 35 and 36 weeks. Mean infant birth weight was 3,348.76 grams ($SD = 487.79$) and the sample was made up of 41 boys and 42 girls.

Low-risk, adult mothers were aged 28.80 years ($SD = 4.66$) and had 14.36 years of schooling on average ($SD = 3.54$), equivalent to 2 or 3 years of postsecondary education. All but one were White and French-speaking. Forty of the forty-four mothers were

married or cohabiting with the biological father of the child. Forty infants were born after 37 weeks of gestation, while 4 others at 35 or 36 weeks. Birth weight was 3,667.95 grams ($SD = 767.95$) and the sample was composed of 26 boys and 18 girls.

Ethics approval was obtained from the ethics committees of the University of Québec at Trois-Rivières and Laval University in Québec City. All participants provided appropriate informed consent. The first home visit conducted at 6 months provided an opportunity to explain the project fully and answer any questions that participants may have had.

Measures

Adolescent motherhood

All participants received a score of 0 or 1 as a function of maternal age at infant birth to operationalize developmental risk linked to young motherhood. Teen mothers were given a score of 1.

Maternal sensitivity

The MBQS (Pederson & Moran, 1995) is a 90-item instrument for measuring maternal responses to infant needs, signals and interactive initiatives during habitual interactions in the home. Following a 120-minute, semi-structured home observation procedure, items from the measure are sorted as being most-like, neutral or unlike the observed mother in her responses to her infant. Items are first sorted into three groups, then into nine groups to determine item scores, which range from 1 to 9 as a function of the group where the item is sorted. Items in the first cluster, most like the observed mother, are assigned a score of 9; items in the second group receive a score of 8, and so on. Sensitivity scores are derived from correlations calculated between observer sorts and a criterion sort for the prototypically sensitive mother provided by the developers of the instrument. Scores vary from -1.0 (least sensitive) to 1.0 (prototypically sensitive).

The MBQS was developed based on Ainsworth's descriptions of sensitivity and is grounded in empirical work conducted with different groups of parents (Ainsworth et al., 1978; Pederson et al., 2014). The developers of this measure have provided detailed descriptions of its origins, as well as validity and reliability information (Pederson & Moran, 1995; Pederson et al., 1998, 2014). The longitudinal studies of these authors have shown that the MBQS predicts infant attachment security and disorganization in both high- and low-risk groups (Bailey et al., 2017; Moran et al., 2008), is useful in predicting several aspects of infant development (Lemelin et al., 2006; Matte-Gagné et al., 2024; Moran et al., 1992) and is linked to maternal states of mind about attachment (Atkinson et al., 2005; Pederson et al., 1998). MBQS assessments of sensitivity converge with other assessments of maternal sensitivity (Bohr et al., 2018) and the Ainsworth scales (Pederson & Moran, 1995).

In the current study, MBQS data is derived from two home visits conducted when infants were 6 and 10 months old. The MBQS was completed following each visit and the mean sensitivity score is used in the analyses. Inter-rater reliability was established for a subset of 17 dyads at 6 months and 29 dyads at 10 months and was found to be $r_i = .91$ ($p < .0001$) and $.86$ ($p < .0001$), respectively. Stability in maternal sensitivity between the 6- and 10-month assessments was found to be $r = .43$ ($p < .001$). The mean aggregate MBQS score was $.40$ ($SD = .34$).

Infant attachment security

The AQS (Waters, 1995) is composed of 90 items that describe different types of infant attachment behaviors. As with the MBQS, but with the focus on infant behaviors, items are first sorted as being most-like, neutral or unlike the infant under observation, creating three groups of items. These are sorted again to yield 9 groups of items, from which scores for each item are derived and correlated with criterion scores for the typically secure infant. As with the MBQS, scores vary from least (−1.0) to most (1.0) secure.

Two different meta-analyses have shown the validity of AQS security scores, linking them to Strange-Situation assessments of attachment security (Cadman et al., 2018; Van Ijzendoorn et al., 2004). Different studies have also shown AQS security scores to be linked to concurrent and subsequent indices of infant and child socioemotional development (Groh et al., 2014; Thompson, 2016; Van Ijzendoorn et al., 2004).

Presently, AQS scores are derived from home visits conducted when infants were 15 and 18-months-old. Inter-rater reliability was established for a subset of 20 dyads at 15 months and 13 dyads at 18 months and was found to be $r_t = .87$ ($p < .0001$) and $.89$ ($p < .0001$), respectively. Stability in security between the 15- and 18-month assessments was found to be $r = .51$ ($p < .001$). The mean aggregate AQS score was $.19$ ($SD = .26$).

Infant aggressiveness

The aggressive behavior scale of the Child Behavior Checklist 1.5–5 (Achenbach & Rescorla, 2000) was completed by mothers at 18 months. The CBCL is a 99-item measure that provides three broadband scales (internalizing, externalizing and total problems) as well as seven syndrome scales (emotionally reactive, anxious/depressed, somatic complaints, withdrawn, sleep problems, attention problems, aggressive behavior). The aggressive behavior scale has often been used with preschoolers, though somewhat less frequently with infants 2 years or younger, to identify behaviors linked to different forms of aggression. Parents are asked to rate behaviors where their child “provokes,” “destroys his own things,” “often fights with others,” “hits others,” “is cruel towards animals,” etc. Items are scored on a 0 (not true) to 2 (often true) scale. The scale contains 19 items often shown to achieve high reliability standards, Cronbach’s alpha regularly being above $.80$ (Cyr et al., 2014; Kim et al., 2012). In the current study, reliability was $.82$.

The aggressive behavior scale has often shown construct validity, scores being linked to different aspects of family socioeconomic context, parental characteristics, or other dimensions of development in either cross-sectional or longitudinal research (Colins et al., 2025; Hay et al., 2021; Kim et al., 2024; Tick et al., 2007).

Infant temperament

The Infant Characteristics Questionnaire (ICQ; Bates et al., 1979) is composed of 16 items and mainly assesses infant irritability or fussiness (Bates, 1992). The ICQ is made up of 4 subscales: fussy difficult, unadaptedness, dullness of expression, and unpredictability. A global irritability score, used in this study, is calculated based on the scores from the four subscales with greater scores indicating greater irritability. The ICQ was completed by mothers when infants were 6- and 10-months-old. Aggregate scores across both data points ranged from 8.00 to 43.50, with the mean being 23.29 ($SD = 8.30$). Cronbach’s alpha was $.76$ at both data points.

Procedure

Two trained research assistants conducted 120-minute home observations based on procedures developed by Pederson and Moran (1995). Training involved the three following components: 1) seminars on early mother-infant interaction that addressed the theoretical aspects and included viewing numerous video segments; 2) practice coding tapes with the MBQS and the AQS; 3) between 7 and 10 practice home visits, followed by a post-visit debriefing with the first author. Each home visit involved a visit leader who was mostly responsible for engaging with the mother. The visit leader was also responsible for completing the MBQS or the AQS after the completion of the visit. The other assistant was mainly responsible for preparing and manipulating the different materials involved.

Home visits included an interview with the mother, a developmental assessment of the infant, a brief 5–10 minute free-play session with toys brought by the research assistants and a series of questionnaires completed by the mother (in which were the ICQ at 6 and 10 months and the Aggressive behavior scale at 18 months). Home visitors who provided observational data at one time point did not do so at any other time point.

Results

Results are carried out in three steps. First, descriptive statistics are presented, followed by bivariate correlations. In the third step, serial mediation analysis is carried out. All analyses are conducted using SPSS version 30.

Descriptive statistics

Table 1 illustrates the means and standard deviations of all variables involved in the current analyses for both adolescent and adult mothers. Of note, t-tests revealed that all variables differ as a function of maternal age except for irritability.

Ten infants were born at 36 weeks of pregnancy and 3 at 35 weeks. All infants had a birthweight of 2,500 grams or more. Preliminary comparisons were conducted to ensure that data did not differ as a function of prematurity. T-tests were conducted comparing the 13 dyads involving premature infants to the others for irritability, sensitivity, security and aggressive behavior. None of these results approached significance.

Table 1. T-tests for study variables.

	Adolescent		Adult	
	Mean (<i>n</i> = 83)	SD	Mean (<i>n</i> = 44)	SD
Irritability	23.46	7.72	22.95	9.44
Maternal sensitivity**	.29	.35	.60	.28
Attachment security**	.13	.25	.33	.23
Aggressive behavior**	16.56	7.09	13.41	5.44

***p* < .001.

Bivariate correlations

Table 2 presents Pearson correlations between all study variables, with point biserial correlations for associations involving adolescent mother status. Of note: all variables that will be tested in the sequential mediation analysis are significantly correlated (adolescent mother status, maternal sensitivity, attachment security, aggressive behavior), conditions that, while not essential, are helpful in the test for mediation (Hayes, 2018).

Sequential mediation

Conceptually, the suggestion that emanates from attachment theory is that psychosocial risk is linked to the quality of maternal sensitivity in the context of daily interactions and that sensitivity is associated with developing attachment security. In turn, the regulatory lessons learned in the context of this relationship are associated with emerging levels of aggressive behavior. This sequential mediation model was tested. As well, other mediation models were simultaneously examined. Indeed, it is possible that the association between adolescent mother status and infant aggressive behavior is mediated by only one of the two attachment process variables. It is also possible for different mediated paths to co-exist.

We used the SPSS plug-in Process Model 6 (Hayes, 2018). All scores were standardized. All analyses controlled for infant temperamental irritability, but the analyses also tested whether the covariate contributed to infant aggressive behavior. The predictor variable was adolescent mother status; the dependent variable was infant aggressive behavior and the serial mediating variables were maternal sensitivity and attachment security. Indirect, mediated effects were tested using 5,000 bootstrap samples with bias-corrected 95% confidence intervals.

Table 3 summarizes the series of multiple regressions that were carried out. Figure 1 lays out a summary of the mediation models that were tested. Results reveal three noteworthy findings: 1) sequential mediation is significant as the tested path between adolescent motherhood and early aggressive behavior is mediated by sensitivity and security in sequence (Boot LLCI: .0122; Boot ULCI: .0697); 2) a second mediated path emerged where the adolescent motherhood-aggressive behavior link is mediated solely by attachment security (Boot LLCI: .0148; Boot ULCI: .1366); 3) when considering all variables, infant irritability contributes to predicting aggressive behavior (Boot LLCI: .0956; Boot ULCI: .2517). The direct association between adolescent mother status and early aggressive behavior is no longer significant in the final analysis.

Table 2. Bivariate correlations.

	1.	2.	3.	4.
1. Adolescent/Adult mothers ^a				
2. Irritability	.03			
3. Maternal sensitivity	-.42***	-.01		
4. Attachment security	-.36***	-.01	.38***	
5. Aggressive behavior	.23**	.19*	-.24**	-.35***

^aPoint biserial correlations. Adolescent mother dyads = 1; Adult mother dyads = 0.

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

Table 3. Summary of multiple regression equations for maternal sensitivity, attachment security and aggressive behavior.

Dependent variable	Predictors	β (SE)	R	R ²	F
Maternal sensitivity	Adolescent mother status	-.37 (.05) ***	.41	.17	13.45***
	Irritability	-.02 (.08)			
Attachment security	Adolescent mother status	-.24 (.05) *	.48	.23	13.47***
	Irritability	.00 (.08)			
Aggressive behavior	Maternal sensitivity	.35 (.07) ***	.41	.17	6.88***
	Adolescent mother status	.08 (.09)			
	Irritability	.19 (.08) *			
	Maternal sensitivity	-.09 (.10)			
	Attachment security	-.28 (.09) **			

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

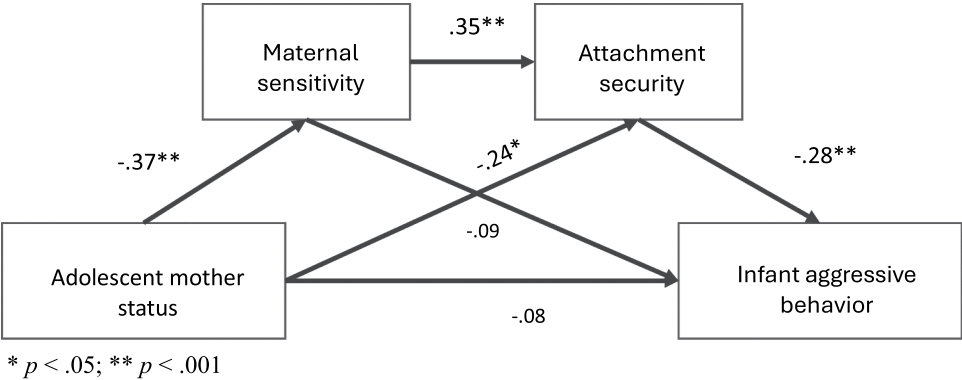


Figure 1. Sequential mediation model summary.

Discussion

Despite the changes in the prevalence of adolescent motherhood, the children of adolescent mothers are at greater risk of many developmental challenges, including high levels of aggressive behaviors. Some studies had suggested that these behaviors are identifiable early in development (Alink et al., 2006; Tremblay et al., 2004) but the predictors of early manifestations of such behaviors are not well understood. The current study proposed to test the attachment theory-based hypothesis that the set of risk factors that are part of the transition to adolescent motherhood leads to lower levels of maternal sensitivity and attachment security to create the conditions for the emergence of greater levels of early aggressive behavior. The results of this study highlight four major points.

First, and perhaps as empirical support for what has only been found a handful of times with groups of adolescent mothers, it is possible to see early differences in the aggressive behaviors of their offspring in comparison to that of lower risk groups. The present study finds such differences as early as 18 months, even though irritability measures, taken at 6 and 10 months, which are similarly reported by mothers, do not show such differences when compared to the children of adult mothers. This study, as others, suggests that it is possible to screen for aggressive behavior early in development.

Second, differences in attachment-based variables between the two groups are observed at all time points. Such differences set the conditions for testing the mediation hypothesis at the heart of the current study. However, the early differences between a high and low risk group deserve attention. It is not possible, based on the current study, to state that it is maternal age per se that is the driving wedge between the two groups and indeed, much research suggests that this is not the case (SmithBattle & Freed, 2016). Rather, the developmental ecology in which adolescent mothers develop and which provides the context for the development of their offspring, characterized by a cluster of risk factors, has long been believed to contribute to the numerous difficulties that these young women encounter (Smithbattle et al., 2024). The current results suggest that the cumulative effect of the psychosocial differences between adolescent and adult mother-infant dyads are linked to differences in the relationship-based experiences of the child.

The third point, at the heart of the current research questions, is that differences in attachment processes mediate the association between adolescent mother status and early aggressive behavior. This finding supports the attachment theory postulate that differences in emotion regulation attributable to experiences in the first, dominant relationships, early in life, contribute to the difficulties of regulation that are part of aggressiveness in early childhood. Such proposals have been made before (Sroufe, 2005) and the association between attachment and externalization in general (Cyr et al., 2014; Fearon et al., 2010), as well as aggressiveness (Boldt et al., 2020), has been demonstrated. However, to our knowledge, this is the first demonstration of sequential mediation by attachment variables in the prediction of early aggressive behavior.

A second mediated path was also identified, linking adolescent mother status to infant aggressive behavior by way of attachment security only, in the absence of a similar sensitivity-based mediation. Two methodological reasons may underlie this finding. First, the AQS focuses on child behaviors which are conceptually closer to those that are addressed in the CBCL Aggressive behavior syndrome scale. This methodological similarity may be behind the somewhat more important bivariate correlation, creating a greater likelihood of mediation than for the sensitivity score. Second, the attachment score partially overlaps with the aggressive behavior score from a temporal perspective, which may, again, contribute to greater bivariate association.

A fourth element to these results, somewhat in a minor key, is that in the final analysis, irritability contributes to predicting aggressive behavior above and beyond what was predicted by attachment-based variables. Irritability was included in the analyses as a function of research that suggested that it was predictive of later aggressiveness (Bradley & Corwyn, 2008; Ryan & Ollendick, 2018) and bivariate associations were significant. That both the mediated, attachment-based path and infant irritability contribute to later aggressive behavior supports the perspective, often underlined in attachment research, that both categories of variables are somewhat orthogonal, but nevertheless together contribute to later development (Groh et al., 2017). This finding suggests that to more accurately draw out the contributions of early irritability to development, it may be necessary to statistically account for the important socializing forces that are attachment processes (Deans, 2020).

Study limits and strengths

The limits of the current study characterize many studies that focus on high-risk and otherwise vulnerable families. The numbers of participants are relatively low and, despite significant results, raise questions regarding the statistical power that is necessary to fully test all hypotheses. A greater number of participants would have permitted more sophisticated model building that might have taken into account variations in the risk factors that are part of the adolescent mother experience, as well as variations in risk that may also be present in less vulnerable groups such as the adult mother-infant dyads of the current study. Adolescent mother-infant dyads are a heterogeneous group (SmithBattle & Freed, 2016). The specific experiences of different dyads require greater attention. Such variables as poverty and trauma experience and social support, father involvement and extended family considerations, should be part of a more exhaustive analysis (Bailey et al., 2007, 2017; Madigan et al., 2014). Moreover, other variables involved in attachment processes, such as attachment state of mind, mentalization processes and mind-mindedness as well as mental health and emotion regulation might also be considered within future research as these may contribute to the mediation of the link between psychosocial vulnerability and early indices of aggressive behavior (Riva Crugnola & Ierardi, 2022; Tarabulsy et al., 2005).

To compensate for lack of power, the present study has as a strength that two assessments, 3 or 4 months apart, of three of the core variables were used in the analyses. The use of the AQS and the MBQS is grounded in numerous studies showing that effect sizes are greater when these measures are used together with the home visiting procedure described by Pederson and Moran (1995) to address the key concepts of maternal sensitivity and attachment security (Deneault et al., 2021). In the present study, the assessment of maternal sensitivity and attachment security are each based on approximately 4 hours of observation to obtain the scores that are used in analyses.

Conclusion

One of the strengths of the current study is that by using repeated measures, and well-validated observational strategies, a demonstration is made regarding how attachment processes may be involved in translating personal, contextual and socioeconomic risk into developmental difficulties for children. These attachment processes may be targeted for effective intervention and prevention efforts. Since the early 2000s, several well-documented, attachment-based intervention strategies have been devised that specifically address the relational and parenting issues that are described in the current study (e.g. Dozier et al., 2018; Moss et al., 2011; Van Ijzendoorn et al., 2023). Moran et al. (2005) conducted such an intervention study with adolescent mother-infant dyads with some measure of success, with results pointing to the need to foster intervention strategies that can address trauma and socioeconomic issues in young mothers' lives. Similarly, Riva Crugnola et al. (2021) used a video-feedback intervention that improved the quality of interactions and features of maternal mind-mindedness with young mothers. The results of the present study are encouraging in that they emphasize that targeting attachment process may be helpful for both maternal and child outcomes.

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