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Developmental Antecedents of Friendship Satisfaction in Adulthood

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Cross-sectional studies have shown that greater friendship satisfaction in adulthood is associated with many positive outcomes (Chopik, 2017; Gillespie, Frederick, et al., 2015). However, the developmental antecedents of satisfaction with close friends in adulthood have not been examined using prospective data. We do not know, for example, whether certain key experiences early in life, such as infant attachment security versus insecurity or the quality of maternal sensitivity, prospectively predict the degree of satisfaction with close friends in adulthood. We also do not know whether other salient experiences, such as the degree of peer competence in childhood or friendship security in adolescence, mediate relations between early life attachment and/or maternal sensitivity and adult friendship satisfaction. Leveraging data from the Minnesota Longitudinal Study of Risk and Adaption, we examined four developmental models containing these theoretically relevant antecedents of friendship satisfaction at age 32. The sample was approximately evenly split by gender (female = 82, male = 76), with the following ethnic distribution: White = 67.1%, Black = 8.9%, mixed race = 18.4%, other = 5.6%. All participants were born to mothers living below the poverty line at birth but on average were lower middle class by age 32. We found that the model containing direct paths from infant attachment security versus insecurity and from the quality of maternal sensitivity to friendship satisfaction at age 32 provided the best fit, suggesting that early parent–child relationships provide a foundation for later adult relationships with close friends. The implications of these findings are discussed.


Keywords: friendship satisfaction, attachment, maternal sensitivity, peer competence


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People who have more satisfying friendships in adulthood are, on average, significantly happier and healthier across the life span (Chopik, 2017; Gillespie, Frederick, et al., 2015). This is particularly true if they have better relationships with their closest friends (Demir & Weitekamp, 2007). Furthermore, high-quality friendships in adulthood and later in life may offset the costs of having lower-quality familial or marital relationships (Han et al., 2019). Longitudinal research has linked the presence of higher-quality

adult friendships with better health and greater well-being across the life span, particularly in old age (Béland et al., 2005; Blieszner et al., 2019). Despite these beneficial outcomes, the development of satisfactory adult friendships has received less attention and is less well understood than the development of other types of relationships, especially those with family members or romantic partners. Although research has documented that interpersonal experiences early in life, such as having a secure attachment to one's primary caregiver, have long-term effects on the quality of romantic relationship functioning later in life (Bretherton & Munholland, 2008; Labella et al., 2018; Simpson et al., 2011), little is known about whether or how key interpersonal experiences early in life prospectively predict satisfaction with close friends in adulthood.

The current study fills several important gaps in the existing literature. To our knowledge, no prior empirical research has prospectively examined theoretically relevant predictors of adult friendship satisfaction beginning early in life, including possible mediating variables. Although prior work on romantic relationships and family systems has informed our understanding of how friendship outcomes emerge over the life span, direct tests of adult friendship outcomes across time are relatively rare, especially stretching into middle adulthood (Fingerman & Bermann, 2000). Slightly more research on romantic relationships and family systems has advanced our understanding of how friendships develop during adolescence (Connolly & McIsaac, 2009; De Goede et al.,

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For a full review of the preregistration and changes, see <https://osf.io/t9236/> (Vieth & Simpson, 2022). Interested researchers can contact the authors for the deidentified and securely shared data file used for the analyses.

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2009; Van Doorn et al., 2011). Still, we do not know whether developmental pathways associated with certain experiences that occur earlier versus later in development more strongly forecast outcomes in adult friendships, particularly close ones. How, for example, do early experiences with caregivers compare to later experiences with peers or best friends in forecasting satisfaction with close or best friends in adulthood? Answers to such questions would provide a deeper, more nuanced theoretical explanation of the developmental origins of satisfaction with close friends in adulthood.

Informed by the current theoretical and empirical literature relevant to friendships, we sought to determine whether certain interpersonal experiences early in life prospectively forecast the degree of satisfaction with close friends in adulthood. The primary aim of the current study was to determine whether infant attachment security and/or maternal sensitivity in early childhood jointly or independently predicted satisfaction with best friends in adulthood. The secondary aim was to explore the possible mediation pathways through which these early experiences might be linked to adult friendship satisfaction. In particular, we explored two theoretically relevant variables that might plausibly mediate these connections—the degree of competence with peers in early adolescence and the security of best friendships later in adolescence.

Infant Attachment

According to attachment theory, relationships formed with caregivers early in life should shape the quality of later relationships in adolescence and adulthood (Bowlby, 1973; Marvin et al., 2016). As young children interact with their primary caregivers, they develop internal working models (schemas) that generate expectations of what later relationships may be like with future attachment figures. These working models are then carried forward into later relationships (Bowlby, 1973; Dykas & Cassidy, 2011). As specified in the prototype hypothesis, the nature and quality of early experiences with attachment figures (caregivers) ought to have an enduring impact on future relationships, including those with close adult friends.

While virtually all children develop attachment relationships with their primary caregivers, these relationships can be either secure or insecure (Sroufe & Waters, 1977). Across development, working models become organized around the degree to which attachment figures (caregivers) provide sufficient comfort and support, particularly when it is needed (Weinfield et al., 1999). The impact of working models is evident in how secure and insecure children behave toward their caregivers, particularly in stressful situations. When distressed, infants and young children who are securely attached to their caregivers seek them out for safety, comfort, and support, and secure children respond positively (i.e., are soothed and resume normal activity) when their caregivers provide comfort and support. Insecurely attached infants and young children, in contrast, are less inclined to seek comfort and support from their caregivers when distressed, with some children being difficult to soothe and others not approaching their caregivers for comfort (Ainsworth et al., 1978; Marvin et al., 2016). As individuals grow and develop, secure working models become an “inner resource” that provides children (and eventually adults) with the skills and confidence needed to utilize their relationships with close others, not only to manage and reduce distress in stressful situations but also to broaden and build the quality of their subsequent relationships. Those who have confidence in their friends

should be more adept at responding to stressful situations in an effective manner and be better at reaping the benefits of good friendships, such as giving and receiving higher-quality support and experiencing more positive emotions (see Fredrickson, 2001; Mikulincer & Shaver, 2007, 2016).

Consistent with these ideas, attachment security (vs. insecurity) early in life is strongly associated with the quality of relationships that children have with their peers. Early life attachment security, for example, is associated with greater peer competence in childhood (Elicker et al., 1992; Englund et al., 2011; LaFreniere & Sroufe, 1985; Schneider et al., 2001) and having higher-quality peer relationships in adolescence (Doyle & Markiewicz, 2009), a time when competence with peers is especially important developmentally (Furman & Rose, 2015). This has led some to propose that the quality of relationships developed with peers early in life might also be linked to the quality of later adult relationships, including those with close friends (Bagwell et al., 1998; Furman & Collins, 2009). Indeed, a few studies have found that self-reported attachment security with adult romantic partners is associated with higher concurrent friendship quality, and other studies have documented a link between attachment security with parents (assessed by the Adult Attachment Interview) and better friendship quality (Welch & Houser, 2010; Zimmermann, 2004). These studies, however, have not traced the origins of adult friendship satisfaction back to early life attachment relationships with caregivers.

Beyond early peer relationships, secure individuals should also be more likely to develop secure relationships with their best friends during adolescence, in line with their working models that close others, and not just parental figures, are trustworthy and supportive. This should allow secure individuals to anticipate more positive outcomes and both create and sustain greater positive affect in their relationships (Mikulincer & Shaver, 2020). Attachment processes may therefore foster upward spirals that generate more positive emotions, both during friendship interactions and when reflecting on their close friendships. Operating together, these processes might build on each other, resulting in greater friendship satisfaction via the positive emotions generated with and by their friends, especially close ones (Fredrickson, 2001). People who are considered best friends are distinct from less close friends in that they typically provide more support and may be trusted with intimate self-disclosures more than less close friends are (Demir & Weitekamp, 2007). Thus, to the extent that best friends are relied on to serve important attachment-relevant functions more so than less close friendships, an individual’s attachment history should shape the quality of their close friendships in adulthood given that developing secure working models early in life may help individuals to identify, develop, and maintain better, more fulfilling friendships later in life (Demir & Weitekamp, 2007; Mikulincer & Shaver, 2020).

Maternal Sensitivity

Whereas early attachment security versus insecurity develops from an infant’s relationship with their primary caregiver and is correlated with maternal sensitivity (Marvin et al., 2016), the specific behaviors in which caregivers engage with their child might also shape the quality of their later relationships, perhaps independently of attachment security versus insecurity. Given that most primary caregivers of young children tend to be mothers,

which is especially true in well-established longitudinal studies, most longitudinal studies have focused on maternal sensitivity.

Maternal sensitivity involves the skill with which mothers detect and respond to their children's needs, particularly when their child is upset, frustrated, or overwhelmed. Children with mothers who are high in maternal sensitivity tend to receive more responsive care that is warmer and tailored to their particular needs in a given situation compared to children with mothers who are low in maternal sensitivity. A high level of maternal sensitivity provides children with a foundation that often results in many beneficial outcomes across the life span, including greater social and academic competence in childhood (Raby et al., 2015), warmer parenting behavior when individuals eventually become parents (Martin et al., 2018; Szepeswol et al., 2015), and lower cardiometabolic risk at midlife (Farrell et al., 2019). Associations have also been found between the quality of caregiving behavior received during childhood and the quality of an individual's relationships and behaviors with romantic partners many years later (Raby et al., 2015; Simpson et al., 2011).

Attachment status and maternal sensitivity early in life are moderately correlated because a parent's ability to provide quality caregiving is one component known to generate securely attached relationships (Ainsworth, 1979; Fearon et al., 2016; Susman-Stillman et al., 1996). Nevertheless, there is a distinction between the quality of care received during childhood and whether attachment security develops with primary caregivers. Whereas maternal sensitivity reflects the behaviors that mothers display toward their children across development, such as the amount of responsiveness and quality care that is provided, attachment security reflects an *internalized* construct and resource that can be drawn upon when individuals become involved in other important relationships later in life (Marvin et al., 2016). Indeed, some children receive lower-quality maternal care but are securely attached because of other environmental factors that instill or maintain security, such as the presence of other highly responsive caregivers or attachment figures. In most prior studies, either maternal sensitivity or early attachment status has been examined in the absence of the other, which has limited our ability to determine which construct is more predictive of adult relationship outcomes.

Potential Mediators

If infant attachment and/or maternal sensitivity prospectively predict satisfaction with close friends in adulthood, what developmental mediators might connect them? Two possible candidates worthy of exploration are the quality of other salient relationships later during childhood and adolescence, to which we now turn.

Peer Competence

Peer competence reflects an individual's interpersonal social skills along with their ability to reap potential benefits in close relationships with peers (Elicker et al., 1992). Beginning in early adolescence, friendships become more central relationships as adolescents start seeking greater independence from their nuclear families. Most friendships during adolescence gradually shift from primarily involving play behavior with friends to being more emotionally intimate relationships built upon mutual trust and personal self-disclosure (Hunter & Youniss, 1982). Furthermore, most adolescents spend more time with their friends than at any other point during their lives, which often makes friendships the most salient

type of relationship during this phase of life (Hartup & Stevens, 1999). Because of their developmental relevance, close adolescent friends—especially best friends—frequently serve as transitional attachment relationships between parents and eventual romantic partners in adulthood (Englund et al., 2011; Fraley et al., 2013; Mikulincer & Shaver, 2007). Beyond the benefit to later relationships, individuals who are competent at one age are also likely to be competent at the next age. As a result, those who are more competent with peers at one point in life are more inclined to remain so in the future, exhibiting greater competence across other types of relationships such as those with romantic partners (Simpson et al., 2007) and coworkers (Collins & van Dulmen, 2006).

As previously noted, attachment status early in life predicts the quality of early peer relationships, with children who are secure usually developing more positive relationships and being more socially competent than their insecure counterparts. Not surprisingly, secure children also tend to be more skilled at developing close and especially “best friend” relationships with particular peers (Englund et al., 2011; LaFreniere & Sroufe, 1985; Raikes et al., 2013; Schneider et al., 2001; Weinfield et al., 1997). Insecure children, on the other hand, tend to have negative or unstable expectations about relationships, have lower self-worth, and frequently develop maladaptive peer relationships that tend to reinforce their insecurity (Elicker et al., 1992). Moreover, the lower-quality caregiving that insecure children typically receive sets the stage for problematic behaviors in later peer relationships given that adolescents typically display the same type and amount of caring toward their peers as they received earlier in life (Sroufe et al., 1999). Even though peer competence reflects behavior toward both friends in general and specific friendships, it reflects processes that contribute to the formation of friendships as well as their maintenance during adolescence. Peer competence, therefore, is a logical stepping-stone between interpersonal experiences that take place early in life and friendship experiences and outcomes that occur later in adulthood.

Best Friend Security

Because of their developmental relevance and capacity to reinforce prior parent-child attachment patterns, close friendships during adolescence, including both general competence with peers as well as the capacity and skills to form better friendships, could also shape the nature of an individual's best friendships later in adulthood. As children learn to navigate peer groups, best friend relationships assume increasing importance as individuals move into and through adolescence. Friendships that once centered mainly on play begin to shift toward mutual disclosure and support, more similar to adult relationships (Hunter & Youniss, 1982). Attachment security with best friends in high school should reflect not only a continuation of secure working models from earlier in life but also a new, developmentally important relationship that has attachment properties.

Attachment theory posits that attachment security in later close relationships should be facilitated by security in earlier relationships (Ainsworth, 1989; Bowlby, 1969; Waters & Cummings, 2000). The quality of best friendships in adolescence, therefore, might be foundational for the satisfaction of later adult friendships given their capacity to reinforce or challenge working models of close others during adolescence (Collins et al., 2011). Indeed, prior research has linked security with a best friend in high school to

later functioning in adult romantic relationships (Englund et al., 2011; Simpson et al., 2007). Because friendship security in adolescence is associated with romantic relationship functioning and quality in adulthood, it also might serve as a stepping-stone that connects early attachment security versus insecurity or maternal sensitivity to satisfaction with best friends in adulthood. This may be particularly true during adolescence as individuals start to confide more in each other and shift attachment functions from their parental figures to their close friends.

The Current Study and Models

Analyzing data from the Minnesota Longitudinal Study of Risk and Adaptation (MLSRA; Sroufe et al., 2005), we examined whether infant attachment status and/or early maternal sensitivity prospectively predict satisfaction with close friends in adulthood (at age 32). We also explored whether peer competence at age 12 and/or best friend security at age 16 mediated these connections. Four developmental models were examined that differed in utilization of four constructs: infant attachment (assessed in the Strange Situation Procedure at ages 12 and 18 months), early maternal sensitivity (assessed between 3 months and 42 months of age), peer competence (assessed at age 12), and best friend security (assessed at age 16).

Model 1 tested whether an individual's infant attachment security versus insecurity and/or the quality of their early maternal sensitivity predicted their peer competence at age 12, which in turn predicted their security with their best friend at age 16 enroute to predicting their 32-year level of satisfaction with best friends. Model 2 added direct paths from early attachment and maternal sensitivity to 16-year best friend security to explore whether infant attachment and maternal sensitivity had direct effects on best friend security. Model 3 added a direct path from peer competence at age 12 to age 32 friendship satisfaction to explore whether there

was a direct effect of peer competence at age 12 to 32-year friendship satisfaction. Finally, Model 4 added direct paths from maternal sensitivity and infant attachment to age 32 friendship satisfaction, which allowed us to examine whether direct paths from these early life experiences predicted adult friendship satisfaction at age 32.

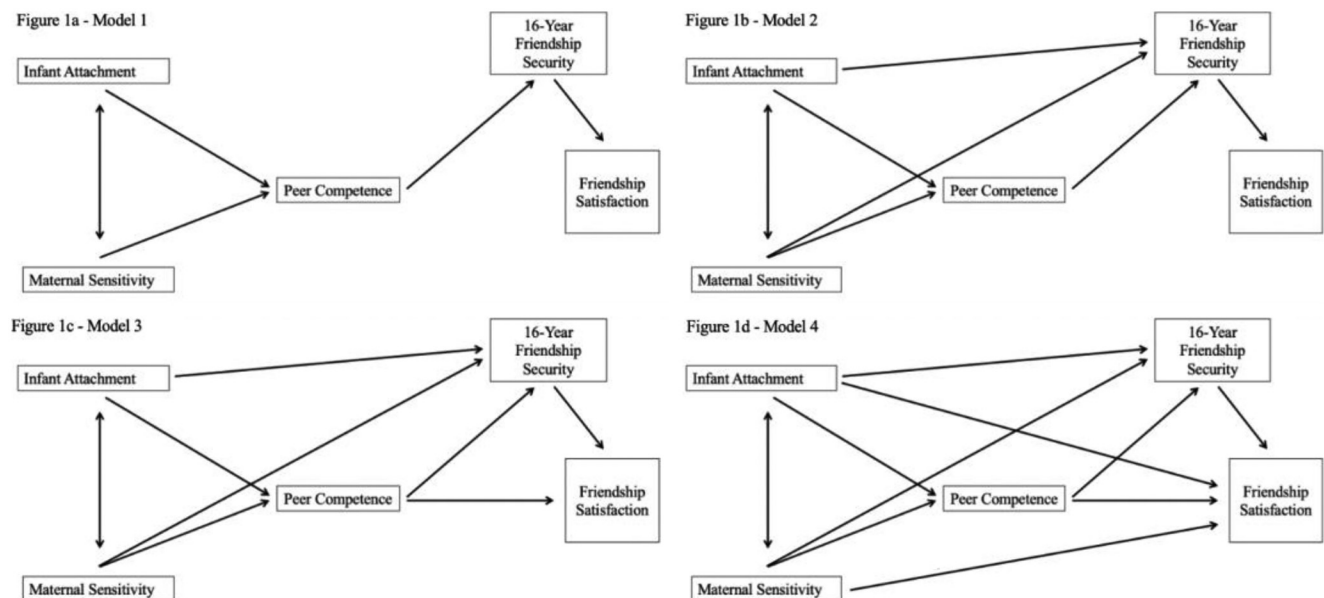
Figure 1 depicts all four proposed models. Examining each one in turn allowed us to determine whether either of the early life predictors are prospectively related to adult satisfaction with close friends and whether either of the two theoretically relevant potential mediators might operate as a pathway linking these variables.

Method

Participants

Data came from the MLSRA, an ongoing longitudinal study of first-born individuals whose mothers were below the poverty line at their birth (Sroufe et al., 2005). The original sample consisted of 267 expecting mothers who, while receiving prenatal care at Minneapolis public health clinics, were recruited to participate in the study in 1975–1977. The current sample consisted of 158 children (female = 82, male = 76) of mothers in the original sample, all of whom completed a friendship interview when they were 32 years old. Comparisons between the original (initial) sample and the sample that completed the 32-year interview revealed no statistically significant differences on demographic variables collected at or near the start of the study, including family socioeconomic status (SES) and ethnicity (Farrell et al., 2017; Sroufe et al., 2005). The current sample was predominantly White (White = 67.1%, non-White = 32.9%). An internal preregistration was submitted to the principal investigators of the MLSRA for approval prior to examining and analyzing any of the data. The preregistration included all of the exploratory models and hypotheses

Figure 1
Four Theoretical Models



presented in the introduction. Minor adjustments were made to the exploratory mediators based on reviewer feedback. The study's design was preregistered; see https://osf.io/t9236/?view_only=b2e8fa995363488682f27f6f1f38ea93. Interested researchers can contact the lead author for the de-identified, securely shared data file used for the analyses. This study was approved by the University of Minnesota Institutional Review Board (title: "Early Life Stress, Developmental Processes, and Adult Health"; protocol number: 1104S98312).

Measures

Infant Attachment—Strange Situation

Infant attachment was measured using Ainsworth's Strange Situation Procedure (SSP; Ainsworth & Wittig, 1969). At both 12 and 18 months, participants (at the time infants in the MLSRA) and their mothers completed the SSP laboratory procedure, which involves a series of separations and reunions. Infants' reactions to separation and then reunion with their caregivers at each assessment were classified by trained coders into one of three categories: secure, insecure avoidant, or insecure resistant. Interrater reliability of attachment classifications was high at both times: 89% at 12 months and 93% at 18 months (Egeland & Farber, 1984). Those ($N = 189$) who completed the SSP at both time points were then coded based on the percentage of times they were classified as secure or insecure across the two SSP assessments (.0, .5, 1.00). For instance, an infant who was classified as secure at both time points was given a score of 1.0, an infant who was classified as secure at one time point and insecure at the other was given a score of .5, and an infant who was classified as insecure at both time points was given a score of 0 (see also the online supplemental materials).

Early Maternal Sensitivity

A composite score of early maternal sensitivity was compiled using codes from videotaped mother-child interactions completed when participants were 3, 6, 24, and 42 months old (Raby et al., 2015). All measures of maternal sensitivity across the four time points were z scored and then averaged to create a composite score.

At 3 months, codes from an infant-mother feeding situation that occurred at home were used. How sensitive to the child's needs the mother was when feeding them and how responsive the mother was toward the child in general were used to create a measure of general sensitivity (i.e., the overall level of general sensitivity toward the infant the mother displayed during the interaction). Interrater agreement for the 3-month assessment was calculated using the Lawlis-Lu index (Tinsley & Weiss, 1975), with agreement defined as a discrepancy of 2 points or less on the 9-point rating scale. The Lawlis-Lu χ^2 was significant at $p < .05$, with a T value of .75, indicating moderate-to-high agreement.

The 6-month interaction consisted of two feeding situations and one play situation that were observed at home but on separate days. During the play interaction, mothers played with their child both with no toys and with a provided set of standard toys. Coding of these assessments was completed using Ainsworth's sensitivity scale (Ainsworth et al., 1978). The sensitivity scale captures a mother's ability to perceive, properly interpret, and effectively respond to their infant's signals in a timely manner. For the 6-month feeding and play interactions, interrater reliability was high

(intraclass correlation coefficient [ICC] = .89). Thus, the ratings of both maternal sensitivity during feeding and play interactions were averaged ($\alpha = .87$).

At 24 months, mother-child interactions were observed in the lab. Mothers were instructed to complete a tool task consisting of four separate activities that increased in complexity from a problem that most 2-year-olds could complete by themselves to more complex tasks that required assistance from their mother. Mothers were instructed to let their child attempt to solve the problem independently first and to offer help only when their child needed it (for additional information, see Erickson et al., 1985). Maternal sensitivity was assessed using a rating scale of each mother's supportive presence during the tasks. This scale measures the mother's ability to be emotionally supportive to their child's distress and to facilitate the completion of the tasks in a positive manner. The reliability of these measures was high (ICC = .85).

At 42 months, children and their mothers returned to the lab to complete a teaching task that increased with complexity as the child worked through a set of tasks. The tasks were intentionally designed to be too difficult for the child to complete alone, thus requiring the mother to instruct and teach their child how to complete the tasks. Each mother's supportive presence was assessed by how well they provided appropriate instructions to their child, provided encouragement and support when their child was having difficulty, and expressed confidence that their child would be able to complete the task. Trained coders rated the supportive presence of the mother with high reliability (ICC = .87). Based on these four measures, a composite score of early maternal sensitivity was created by standardizing and then averaging them to create a single composite index of early maternal sensitivity ($\alpha = .67$; see Raby et al., 2015).

Peer Competence

At sixth grade (approximately age 12), peer competence was assessed by having each participant's primary classroom teacher report the participant's percentile rank in terms of their competence with peers compared to other students in the class. Teachers were given a list of the number of students in their class and were asked to report where the MLSRA participant was compared to their peers. Before making the ranking, each teacher was given a definition of peer competence, which was defined as an individual's sociability (e.g., how frequently they interact with peers), their popularity (e.g., their degree of acceptance among their peers), the quality of their friendships (e.g., the existence of close, one-on-one relationships with peers, including best friendships), and their general social and leadership skills. Those who score high in peer competence tend to understand their peers' perspectives and utilize effective communication when speaking with classmates, including their close classmate friends. They also are desired to be around by their peers and are perceptive of the needs of their peers (Collins & Van Dulmen, 2006). To obtain a percentage score of peer competence, once teachers ranked the MLSRA participant relative to their peers in the class, the number of peers at or below that score was divided by the total class size to create a percentage score. Therefore, peer competence scores could range from 0 to 100, with higher scores indicating greater peer competence.

Friendship Security

Friendship security with best friends was assessed at age 16 by a comprehensive friendship interview that was transcribed for coding purposes. In the interview, participants were asked to describe their close friendships, particularly their relationship with their best friend. Participants described the extent to which they disclosed behaviors and feelings that indicated trust and authenticity with and toward their close friends. The interview also inquired about the degree to which the participant felt comfortable disclosing private information to their close friends, how their friends responded to these disclosures, and the degree to which they felt close to friends, especially their best friend. Two trained coders then rated each interview transcript for global friendship security on a 7-point scale, which reflected the degree to which each participant reported feeling that they could be themselves in their close friendships, expected their friends to be available and supportive, and could mutually (jointly) share both positive and negative emotional and interpersonal experiences with their close/best friends. The interrater reliability (ICC) of this scale was .59; the Spearman–Brown correction was .74.

Friendship Satisfaction

An audio-recorded friendship interview conducted at age 32 assessed satisfaction with participants' best friends. The interview asked questions about each participant's relationship with their closest or best friend among all of their friends. Even though the interview focused mainly on one close/best friend, it also assessed their level of satisfaction with friends more broadly. Individuals who report lower-quality best friends have friendship networks that contain lower-quality friendships in general. Moreover, individuals who have one high-quality best friend usually have at least one highly satisfactory friend in their network, as judged by coders. Participants were asked how they met their closest friend, how long they have known each other, how often they spend time together, and what they typically do when together. Participants also reported on how close they felt to this friend and how much they could be themselves with them. Participants also indicated whether any conflict was present in the friendship and, if so, how frequent it was and how well conflicts tended to be resolved.

Trained coders listened to each friendship interview and rated best friend satisfaction on a scale from 1 to 7 based on each participant's answers to all of the questions. Coders were trained to take several friendship quality and satisfaction factors into account when making their ratings. Participants who had the highest friendship satisfaction (7) described their friendships as fulfilling and enjoyable and did not report any major conflicts. If any complaints about the friendship existed, they involved matters not associated with the friend per se but with issues outside the friendship, such as work demands making it difficult to see each other as much as both partners would like. Those with the lowest friendship satisfaction (1) had friendships that were not fulfilling, they complained about the friend for most of the questions, they reported low levels of closeness with their friend, and they reported high levels of conflict that made the friendship distressing or painful. Interrater reliability was good ($\alpha = .80$).

Analytic Method

To examine relations between early life infant attachment status and maternal sensitivity, peer competence in Grade 6, best friendship

security at age 16, and friendship satisfaction at age 32, path analyses were conducted using Mplus Version 8. We tested four hierarchically nested models that included the developmental pathways that could impact friendship satisfaction at age 32 (see Figure 1).

We first examined the indirect effects of infant attachment and maternal sensitivity through peer competence at age 12 and then through friendship security at age 16 on friendship satisfaction at age 32 (Model 1). Thus, Model 1 was a purely mediational model as all effects on age 32 friendship satisfaction from the early life predictors were mediated through peer competence and friendship security. Model 2 added a direct path from maternal sensitivity and infant attachment to 16-year friendship security. Thus, while the two early life predictors could now have direct effects on 16-year friendship security, there were no direct paths to age 32 friendship satisfaction except via 16-year friendship security. Model 3 added a direct path from peer competence to friendship satisfaction at age 32, allowing for direct effects from both peer competence and friendship security. Finally, Model 4 added direct paths from infant attachment and maternal sensitivity to 32-year friendship satisfaction, permitting direct effects from the early life predictors rather than the mediators. Given prior research on gender differences in friendships (e.g., Hall, 2011), gender was included as a covariate and controlled in all models.

Following guidelines for structural equation modeling, the current sample is sufficient for a simple path analysis (Cohen, 1992; Kline, 1998, 2010). Model fit was determined by applying the comparative fit index (CFI) and the root mean square error of approximation (RMSEA). Following standard guidelines (Hoyle, 1995; Hoyle & Panter, 1995; McDonald & Ho, 2002), a CFI of .90 or above is considered acceptable model fit, and a CFI of .95 or above is a good fit. RMSEA values of .08 or below are considered an acceptable fit, and those below .05 are a good fit. To compare models, we utilized chi-square difference testing (Muthén & Muthén, 1998–2010).

Missing Data

To be included in the analyses, participants had to have a friendship satisfaction score at age 32 ($n = 158$). Missingness ranged from 0% to 9% for all of the predictors. The average rate of missing data across all predictor variables was 5.32%. We compared the means of all predictors of participants in the current sample with the means of participants in the original (initial) sample. No significant mean differences were found for any of the predictors. Maximum likelihood estimation was used in Mplus (Version 8; Muthén & Muthén, 1998–2010).

Results

Descriptive Analyses

The sample was approximately evenly split by gender (female = 82, male = 76) and predominantly White (White = 67.1%, non-White = 32.9%). Descriptive information and correlations for all of the primary variables are shown in Table 1. In general, most of the correlations between the predictor variables and adult friendship satisfaction were positive. For example, participants who were securely attached in early childhood and were more competent in sixth grade had more satisfying close friendships at age 32. Neither

Table 1
Means, Standard Deviations, and Pearson Correlations for All Measures

Variable	Minimum	Maximum	M	SD	Correlations			
					Infant attachment	Maternal sensitivity	12-year peer competence	16-year friend security
Infant attachment	0	1	0.5609	0.4009	1	—	—	—
Maternal sensitivity	-1.92	1.31	0.0647	0.6197	0.284**	1	—	—
12-year peer competence	0	100	55.49	28.88	0.202	0.228**	1	—
16-year friend security	1	7	4.262	2.042	0.249**	0.138	0.141	1
32-year friendship satisfaction	1	7	5.81	1.112	0.254**	0.145	0.208*	0.11

* $p < .05$. ** $p < .01$.

maternal sensitivity nor best friend security at age 16, however, was significantly correlated with adult friendship satisfaction.

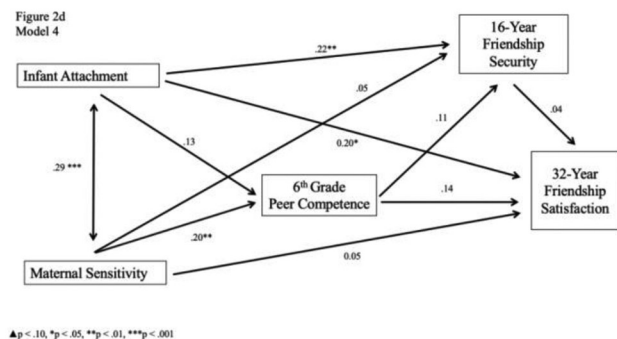
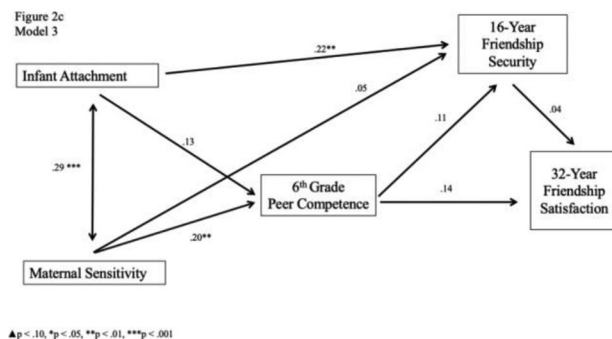
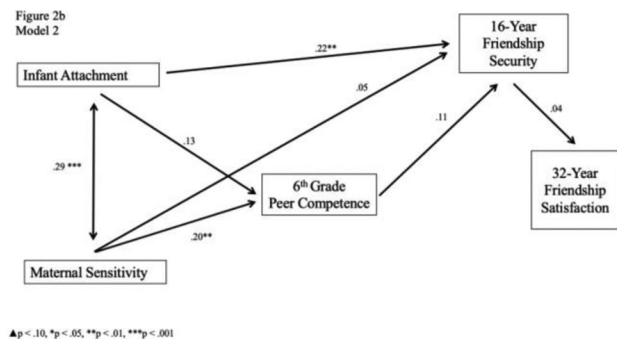
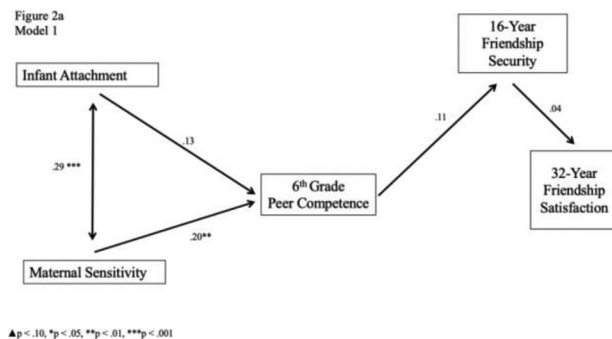
Path Model Analyses

Results for each of the four path models are shown in Figure 2. Chi-square difference testing revealed that Model 4, which contains direct pathways from infant attachment and maternal sensitivity to 32-year friendship satisfaction, was the best-fitting model among all models (see Table 2 and Figure 2d). Model 4 was fully saturated and therefore had a CFI of 1.00 and an RMSEA of .00. Although Model 4 was the best-fitting model, Model 3 (see Table 2 and Figure 2c) had a better fit than Model 2 (see Table 2 and Figure 2b), with a CFI of .88 and an RMSEA of .08. Model 1 and Model 2 did not differ significantly despite Model 1 having the lowest CFI (.58) and RMSEA (.11). Model 4 explained approximately 9% of the variance in 32-year friendship satisfaction ($r^2 = 9.40\%$). See Table 3 for parameter estimates of each variable contained within Model 4.

The earliest predictor variables were the best in predicting adult friendship satisfaction, with the strongest predictor being infant attachment status ($\beta = .202, p < .01$). Although maternal sensitivity was not a significant predictor of either adult friendship satisfaction at age 32 or 16-year friendship security, it did predict peer competence at sixth grade ($\beta = .203, p < .01$). As expected, infant attachment and maternal sensitivity were positively correlated ($r = .284; \beta = .286, p < .001$). Infant attachment also significantly predicted 16-year best friendship security ($\beta = .221, p < .01$) but was not a significant predictor of peer competence at age 12. All indirect pathways were not significant and are included within the online supplemental materials (online Supplemental Table S1).

When controlling for participants' gender, no significant differences emerged for any of the path coefficients. Further analyses were conducted to determine whether gender moderated any of the pathways in the best-fitting model (Model 4). Post hoc analyses revealed no gender moderation involving any of the pathways. Gender, however, was a significant predictor of peer competence at sixth grade, with girls rated

Figure 2
Results for Each of the Four Models



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Table 2
Model Comparisons

Model	<i>df</i>	χ^2	χ^2 / df	$\Delta\chi^2 (\Delta df)$	RMSEA	CFI	R^2
1	7	21.002	3	—	0.11	0.578	2.20%
2	5	12.166	2.433	8.836 (2)	0.093	0.784	2.60%
3	4	8.139	2.035	4.027 (1)*	0.079	0.875	5.50%
4	2	0.971	0.486	7.168 (2)*	0	1	9.40%

Note. Model comparisons for all four models. RMSEA = root mean square error of approximation; CFI = comparative fit index.
* $p < .05$.

higher in competence than boys ($\beta = .168, p < .05$). These findings replicate prior studies that have revealed mean-level gender differences in peer competence (e.g., LaFreniere & Sroufe, 1985).

Discussion

To our knowledge, this is the first prospective study to test the link between early attachment security (assessed in the Strange Situation Procedure) and satisfaction with close friends in adulthood. Our primary aim was to examine the role of two theoretically relevant early life developmental antecedents of adult friendship satisfaction—infant attachment and maternal sensitivity. Our secondary aim was to explore whether logically plausible mediators might further explain the connection between these early life developmental antecedents and friendship satisfaction in adulthood.

Examining four nested models, we found that the early predictors provided the best fit to the data. Most notably, infant attachment status directly predicted satisfaction with best friends at age 32, with individuals who were securely attached as infants having more satisfying relationships with their best friends in adulthood. This finding suggests that early working models of attachment may partially set the stage for experiencing greater satisfaction with close friendships later in life. Attachment patterns (security vs. insecurity) differ from the quality of care received (indexed by early maternal sensitivity in this study) in that attachment status represents the “absorption” of early life caregiving along with other experiences with other significant people that shape working models, which are then carried forward and shape other close relationships later in life, including close friendships.

Despite good model fit, several of the pathways we examined were not significant. For example, the two mediators we explored—

peer competence at age 12 and security with best friends at age 16—did not significantly predict satisfaction with best friends in adulthood. Moreover, attachment security with best friends at age 16 did not mediate the association between infant attachment status and friendship satisfaction at age 32. What might explain this unexpected finding? Friendships at ages 16 and 32 are likely to differ in their nature and functions given the different life circumstances and events between these two ages. Unlike in adolescence, individuals who are entering middle adulthood tend to be involved in more stable, long-term romantic relationships, have full-time jobs along with bills to pay, are more likely to have children, and often have other responsibilities that should influence what they need, want, and look for in close friendships. Consequently, the security that a person experiences with a specific best friend at age 16 may have little bearing on their satisfaction with (most likely) a different best friend during a different phase of life 16 years later.

Future research should examine other plausible mediators of the link between early attachment security and satisfaction with best friends in adulthood, including other facets of friendship quality in adolescence and young adulthood and direct measures of the support that individuals need, seek, and receive from close friends. Furthermore, current life circumstances such as parental status or employment may impact friendship satisfaction. It remains possible, however, that satisfaction with best friends in adulthood may still be at least partially explained by the working models that underlie early infant attachment security versus insecurity.

Lack of Gender Moderation

None of the paths in any of our models were moderated by gender, indicating that our results were similar for women and men, at least across this part of the life span. Past studies, primarily cross-

Table 3
Unstandardized and Standardized Parameter Estimates

Parameter estimates	Unstandardized	Standardized	Est/SE
Infant attachment → 12-year peer competence	9.076	0.128	1.623
Infant attachment → 16-year friend security	0.787	0.221	2.68
Infant attachment → 32-year friendship satisfaction	0.554	0.202	2.454
Infant attachment → Maternal sensitivity	0.095	0.286	3.935
Maternal sensitivity → 12-year peer competence	9.362	0.203	2.651
Maternal sensitivity → 16-year friend security	0.11	0.048	0.578
Maternal sensitivity → 32-year friendship satisfaction	0.095	0.053	0.65
12-year peer competence → 16-year friend security	0.005	0.107	1.264
12-year peer competence → 32-year friendship satisfaction	0.005	0.136	1.523
16-year friend security → 32-year friendship satisfaction	0.029	0.038	0.423

Note. Parameter estimates for each variable contained in Model 4. Est = estimate.

sectional ones, have reported mean-level gender differences for certain friendship outcomes at different stages of life (e.g., Hall, 2011). For example, mean-level gender differences have been documented in both close and casual friendships, starting in early childhood (e.g., Felmlee et al., 2012; Gillespie, Lever, et al., 2015). They also have been observed in adolescent friendships, with girls and boys behaving differently and valuing different features of friendships. Adolescent girls, for instance, tend to share more intimate details about their lives with their close friends, whereas the close friendships of adolescent boys tend to focus more on shared but parallel activities (Rose & Rudolph, 2006). In addition, whereas adolescent boys typically display more competitiveness with their friends, adolescent girls tend to perspective-take and listen to their friends (Furman & Rose, 2015). Most of these differences carry forward to shape the development and norms surrounding friendships later in adulthood. Young adult women and men, for example, also differ on average in similar ways, with most adult women preferring loyalty, self-disclosure, and companionship in their close friends and with most adult men preferring companionate friends who have higher status and/or more resources that can be shared with them (Hall, 2011).

The mean-level gender differences observed in the current study are generally consistent with gender differences documented in prior research. Girls in our study, for example, were rated higher in competence with their peers at sixth grade than boys were. Nevertheless, none of the path coefficients or correlations in our models revealed any evidence of gender moderation, indicating that our primary findings are similar for women and men. In sum, despite the existence of mean-level differences in the friendships of women and men in our study, the psychological processes that link early life interpersonal experiences and satisfaction with close friends in adulthood appear to be similar for both genders.

Contributions, Limitations, and Conclusion

The current study makes some noteworthy contributions to both the attachment literature and research on adult friendships by examining a key theoretical assumption that has never been addressed until now. According to attachment theory, infant attachment security versus insecurity should have ramifications for the quality of other close relationships later in development, beyond just romantic relationships. Our novel prospective study and its results confirm the importance of infant attachment on the quality of close friendship satisfaction in adulthood. Although friends have been viewed as “mediating relationships” between infant attachment and the functioning of later adult romantic relationships (e.g., Simpson et al., 2007), the current study documents a direct connection between infant attachment and close friendship satisfaction in adulthood. Furthermore, most prior research examining adult friendships and attachment has relied on self-report measures of both constructs (e.g., Furman, 2001; Grabill & Kerns, 2000). Using a well-validated measure of early life attachment (the Strange Situation Procedure), the current study reveals theoretically meaningful ties between a behavioral measure of attachment patterns (assessed at 12 and 18 months) and a coder-rated interview of satisfaction with close friends at age 32.

Identifying the developmental antecedents of friendship satisfaction can inform future research addressing both how and why friendships form and the underlying psychological processes that

generate satisfying friendships, not only across the life span but perhaps also during daily interactions with friends as well. Working models of attachment formed early in life may implicitly (nonconsciously) guide interactions with adult friends at a proximal level, which could reveal how day-to-day interactions with friends impact an individual’s perceptions of and behaviors with them. Implicit working models developed in infancy may evoke different emotions in people who have secure versus insecure attachment histories, especially when risky interpersonal situations arise with close friends. Conversations that make one feel vulnerable or intimate disclosures from close friends may, for example, induce strong emotional connection among those with a secure attachment history or feelings of discomfort in those with an insecure history. These processes, if repeated over time, may in turn generate greater friendship satisfaction or, conversely, might gradually erode close friendships. Additionally, there is a need to clarify whether and how the same (or different) developmental processes shape friendship satisfaction versus romantic relationship satisfaction over the life span. Gaining a clearer understanding of the joint and unique developmental origins of satisfaction in different types of close relationships may be necessary to fully capture how people create and maintain fulfilling social connections across their lives.

These contributions notwithstanding, the current study has some limitations. First, our data are correlational, so causal conclusions cannot be made. Second, we assessed friendship satisfaction with a friendship interview that focused primarily on individuals’ best friends. Satisfaction with best friends, of course, may be distinct from satisfaction with one’s broader friendship network or with casual friends. Although low-quality best friend relationships are likely to be indicative of having a lower-quality friendship network, such inferences must be documented. Some people, for instance, might be highly satisfied with their best friend but believe that their network of friends is too small or unsatisfactory. Third, even though we explored two plausible mediators that could have explained the link between infant attachment and adult friendship satisfaction (rather than leaving the developmental periods in between unexamined), our mediators were limited by what was available in the MLSRA data set. Future work should explore other plausible, theoretically relevant mediators, which could include other features of friendship quality in adolescence and young adulthood as well as measures of the support that individuals actually need, seek, and receive from their close friends. Fourth, although the current study prospectively links infant attachment to adult friendship satisfaction across 30 years, this time span reflects only part of the entire life span. We still do not know whether or how friendship satisfaction changes later in adulthood or which subsequent experiences forecast friendship development and satisfaction leading into old age (Ajrouch et al., 2001; Jones & Vaughan, 1990). Fifth, the models that we examined and found the best support for are not the only ones that might explain satisfaction with close friends in adulthood. Longitudinal studies containing other measures of potential antecedents of adult friendship assessed early in life and/or later in life should be tested. Finally, future research needs to sample a wider range of SES to determine whether our results are specific to people who began life as members of lower-SES families.

In conclusion, the current prospective study advances our knowledge of developmental variables and processes that have been presumed to contribute, at least in part, to close friendship satisfaction in adulthood. This age is a unique time for friendships

because many people are having children, advancing (or changing) their careers, and settling into more normal, routine daily patterns. As societal-level factors such as decreasing rates of marriage and children continue to decrease, the relative importance of friends—especially throughout adulthood—may increase. Early and middle adulthood may therefore be of particular importance for the development of later friendships as people age.

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