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Abstract

Maternal factors, including attachment history, current attachments, level of education, religion, social support, age, marital status, and trimester were examined in relation to prenatal attachment scores. Data from 32 women at various points in their pregnancy was analyzed using three 2 x 2 ANOVAs and one 2 x 2 x 3 ANOVA. Factors that appear to individually increase prenatal attachment include low parental overprotection, high social support, being non-religious, and low anxiety and dependence in terms of current attachments. Further, interactions of maternal variables produced several significant findings. These results suggest that future research in prenatal attachment should not be limited to correlations or main effects. Rather, studying maternal variables in combinations may provide more consistency and clarity in this important area of research.

Keywords: prenatal attachment, maternal-fetal attachment, attachment to parents, pregnancy, adult attachment style
The Effect of Maternal Factors on Prenatal Attachment

In the United States, 85% of women have given birth at least once by the time they reach age 40 (Martinez, Daniels, & Chandra, 2012). The fact that such a large portion of women experience pregnancy and childbirth at some point in their lives renders the psychology of pregnancy an important area of study. Since many aspects of a woman’s lived experience during pregnancy (including physical, mental, and emotional states) can impact their babies in utero, it is important to study women’s thoughts and feelings toward their babies before birth, as they may influence future interactions between mother and child as well as the child’s development itself.

The concept of prenatal attachment was formally developed by a series of nurses and doctors within the fields of obstetrics and perinatal care during the 1960s and 70s (Brandon, Pitts, Denton, Stringer, and Evans, 2009). These professionals, including Reva Rubin, Judith Lumley, and Mecca Cranley built upon attachment theory developed by John Bowlby and Mary Ainsworth, in order to extend the origins of maternal-infant attachment to a one-way bond (an emotional connection directed from the mother toward the child) that could be developed before birth (Brandon et al., 2009). Mecca Cranley is credited with the first formal definition of the theory of prenatal attachment, as well as the development of the first self report assessment of the construct, describing it in 1981 as, “The extent to which women engage in behaviors that represent an affiliation and interaction with their unborn child” (p. 282). In the early 1990s, Mary Müller proposed a broader definition, which considered not only behaviors, but also a woman’s thoughts and feelings towards her fetus (Müller, 1990). Finally, John Condon critiqued Cranley’s definition and instrument, suggesting that both revealed a woman’s attitude to the pregnancy state (as in her beliefs about motherhood, or her feelings about the physical aspects of
pregnancy), more than her attachment to the fetus itself (Condon, 1993). Therefore, he created a new definition and corresponding self-report questionnaire based on a model of five comprehensive dispositions of attachment (disposition to know, to interact with, to avoid separation/loss, to protect, and to gratify needs) and resulting attachment behaviors such as proximity/information seeking, caretaking, safeguarding, et cetera (Condon, 1993). Condon’s model and recent exploratory scholarship applies these attachment criteria specifically to pregnant women in relation to their fetus, and also to fathers’ or marital partners’ experiences of attachment before birth.

Prenatal attachment (PA) is an important field of study because some research suggests that there is a positive correlation between levels of maternal prenatal attachment and postnatal parent-infant bonding (see Müller, 1996). One Swedish study found that women who reported higher levels of PA during the third trimester of pregnancy displayed more postnatal involvement with their infants, they responded more appropriately to infant behaviors, and they displayed more proximal stimulation (i.e. kissing or touching their baby) at 12 weeks postpartum (Siddiqui & HaggiOf, 2000). In a different study, PA was found to be a good predictor of mother infant attachment immediately after birth, and at ages 1, 2 and 3, as measured by different versions of Müller’s (1994) Maternal Attachment Inventory to be applied to relationships with babies at ages 1, 2 and 3 (Tsujino, Higa, & Inuihara, 2002).

Correlational studies designed to identify demographic, psychological, socio-environmental, and pregnancy-related links to differences in prenatal attachment have yielded varying and often inconsistent results (Cannella, 2005). In a literature review covering research published between 1980-2000, main effects of variables such as maternal social support, self-esteem, education, income, marital status, and race did not consistently predict PA (Canella,
2005). However, positive parental relationships, secure mate relationships, decreased number of children, first pregnancies, having experienced quickening, and advanced week of gestation generally predicted high levels of prenatal attachment (Canella, 2005). In a follow up literature review of studies published between 2000-2007, additional evidence suggests that PA increases throughout the course of the pregnancy, high prenatal attachment predicts improved pregnancy-related health practices (such as obtaining prenatal medical care, eating a nutritious diet, and exercising regularly), and women who reflect positively on their own upbringing report increased attachment to their fetus (Alhusen, 2008). In a recent study, Geneviève Bouchard (2011) proposed that inconsistent findings in regards to main effects are a result of demographic variables being studied too often in isolation, and that increasingly significant findings would be reached by studying various factors in conjunction. Indeed, Bouchard found that PA was effectively predicted by women’s assessment of the quality of their mate relationship, but only for women who also scored low on neuroticism and attachment to their own parents (Bouchard, 2011). In contrast, fathers’ PA was predicted by the interaction of high quality partner relationships and strong attachment to parents (Bouchard, 2011). Overall, Bouchard’s suggestion that predictor variables should not be studied in isolation was supported.

Factors related to expectant parents’ attachment styles and memories of their own upbringing seem to relate to variation in PA (Alhusen, 2008). A study conducted in Israel by Mikulincer and Florian (1999) found that differences in women’s self-reported overall attachment styles (secure, avoidant, or ambivalent, in terms of comfort and willingness to develop relationships with others) correlated with differences in the timing and intensity of fetal bonding, as well as mental health states and coping strategies. Specifically, securely attached mothers tended to have higher PA starting at an earlier point in their pregnancy, they more
frequently requested support from others, and maintained positive mental health throughout their pregnancy (Mikulincer & Florian, 1999). Insecurely attached women (avoidant and anxious) experienced greater instability in PA scores at different points of the pregnancy, reported more mental health difficulties, and tended to use less effective coping strategies (Mikulincer & Florian, 1999). Relatedly, one study found that pregnant women who recalled increased emotional warmth from their own mothers during childhood yielded higher PA scores, but no significant link between parental overprotection or rejection was found (Siddiqui, Hägglöf, & Eisemann, 2000).

The purpose of this study was to contribute clarity to several quasi-independent maternal variables that have shown inconsistent relationships with the dependent variable of prenatal attachment, by studying groupings of factors and their interactions. In particular, I hypothesized that older, highly educated women, who felt very supported throughout their pregnancy, and who were farther along in their pregnancy would exhibit increased prenatal attachment. In addition, women who felt cared for and were not overprotected by their own parents in childhood, and had secure adult attachment styles during adulthood were expected to reveal high prenatal attachment scores. Based on previous research, I expected to find small main effects and more robust interactions between the quasi-independent variables, revealing differences in levels of prenatal attachment. Since previous research has not focused on the interactions of maternal variables on PA, the groupings of factors used in this study were exploratory. The groups were created by combining variables that were expected to load onto the same underlying psychological construct. Parental care, parental overprotection, and education were grouped because they shed light on the woman’s family of origin; elements of childhood parenting styles are explicitly relevant to this category, and education was included because it
may be a life experience transmitted in part through family of origin values or economic status. Perceived support, religion, and willingness to get close to others in adult attachments were grouped because they all reflect elements of a woman's social support network. Attachment anxiety, attachment dependence, and education were grouped because they shed light on aspects of adult attachment; while level of education does not individually convey attachment patterns, education level may impact a woman's willingness to depend on others, or it might mediate her feelings of anxiety in regards to interpersonal relationships. Finally, marital status, trimester, and maternal age were grouped because they reveal objective aspects of timing and circumstances surrounding the woman's pregnancy.

Method

Participants

This study was comprised of 32 pregnant women. One participant did not complete the obstetric history questions, so her data was not used in the ANOVA analyses. Another individual did not provide her education information, so her data is not included in the ANOVAs that consider education. Requirements for inclusion were that the woman had to be currently pregnant, age 18 or older, and able to read and write in English. Participants received a copy of the book Bonding With Your Baby Before Birth by Maria Carella (2011), as compensation for their time. Pregnant women were recruited for the study through healthcare providers at the Redlands Birth Center and at a table outside two Babies R Us stores in Folsom, CA and Redlands, CA. Participants ranged from age 19 to 37 ($M=28.81$, $SD=5.03$). Seventy-two percent of the sample described themselves as Caucasian ($n=23$), 16% as Hispanic ($n=5$), 6% as Asian ($n=2$), 3% as Native American ($n=1$), and 3% as Pacific Islander ($n=1$). Sixty-three percent of the women were married, 31% were partnered but unmarried, and the remaining 6% were either
single (never married) or divorced. Years of education ranged from 10 to 20 years (\(M=15.16, \ SD=2.34\)).

**Design**

This study utilized a quasi-experimental research design to examine differences in mean prenatal attachment scores as a function of various maternal factors. Specifically, three 2 x 2 x 2 between-subjects ANOVAs, and one 2 x 2 x 3 between-subjects ANOVA were used to evaluate the relationships between combinations of maternal quasi-independent variables with the dependent variable of prenatal attachment, as operationalized by the score on the Maternal Antenatal Attachment Scale (Condon, 1993). Obstetric history including number of pregnancies, deliveries, abortions, and miscarriages were entered as covariates, in order to control for these differences in women's individual experiences with pregnancy and childbearing. Maternal age was divided into two levels (younger, between ages 19-29; and older, between ages 30-37). Due to limitations of sample variability, religion was coded as either religious or non-religious, ethnicity was either Caucasian or Other, and marital status was grouped as married or unmarried. Education was split by the meaningful marker of 14 years (since this usually indicates completing an associate degree or attending community college), so groups consisted of 10-14 and 15-20 years of school. Week of gestation was grouped by the three trimesters (first trimester consists of weeks 1-12, second trimester consists of weeks 13-28, and third trimester consists of weeks 29-40). Having an ultrasound and experiencing quickening (feeling first fetal movement) were yes or no questions, and therefore both two level variables. Maternal support was assessed on a 5-point Likert scale. In order to create equal groups, the two levels were assigned as 'fully supported' (a score of 5 on the scale) and 'not fully supported' (scores from 1-4 on the scale). Wantedness was assessed by asking women how actively they were trying to get pregnant on a
5-point Likert scale. Wantedness was converted into a two-level categorical variable by grouping women who “tried not to get pregnant” or “neither tried nor didn’t try to get pregnant” as opposed to those who “actively tried to get pregnant”. Scores on the subscales of the Revised Adult Attachment Scale and the Parental Bonding Instrument were dichotomized (low vs. high) based on a median split.

Measures

The demographic survey asked about age, marital status, education, ethnicity, religious preference, obstetric history (e.g., frequencies of previous pregnancies, deliveries, abortions, and miscarriages), and current pregnancy (e.g., week of gestation, experiencing quickening, having first ultrasound). The demographic questionnaire also asked the women how happy they were to be pregnant, how actively they tried to become pregnant, and how supported they felt with their pregnancy.

Prenatal attachment was measured with Condon’s Maternal Antenatal Attachment Scale (Condon, 1993). The questionnaire consists of 19 statements, which the participant ranks on a 5-point Likert scale. The content of the statements is intended to measure the quality of mother/fetus experiences as well as the intensity of feelings of attachment. Sample statements include “Over the past two weeks I have found myself talking to my baby when I am alone: Not at all, Occasionally, Frequently, Very Frequently, Almost all the time” and “When I first see my baby after the birth I expect I will feel: Intense affection, Mostly affection, Dislike about one or two aspects of the baby, Dislike about quite a few aspects of the baby, Mostly dislike”. Overall scores on the MAAS range from 19-95, with higher scores indicating greater prenatal attachment.
The overall attachment scores of the participants were measured using the Adult Attachment Scale, Close Relationships Version (Collins, 1996). The scale consists of 18 statements such as “I often wonder whether other people really care about me,” “I am comfortable depending on others,” and “I often worry that other people don’t really love me,” which are rated on a 1 to 5 scale (1 being “Not at all characteristic of me,” 5 being “Very characteristic of me”). The scale measures three attachment subscales (each with a range from 6-30); a high score on the ‘close’ dimension indicates being comfortable with intimacy, a high score on the ‘depend’ dimension signifies a belief that others can be counted on in times of need, and a high score on the ‘anxiety’ dimension reveals fear of being rejected or unloved.

Maternal attachment history was measured using the Parental Bonding Instrument (Parker, Tupling, & Brown, 1979). This questionnaire measures an individual’s perception of their relationship with their parents during the first 16 years of life. The instrument consists of 25 brief statements like “Seemed emotionally cold to me,” “Appeared to understand my problems and worries,” and “Did not want me to grow up” which the participant responds to using a 4-point scale from “Very like” to “Very unlike”. The PBI measures two bonding dimensions: care (scores range from 0-36) and overprotection (scores range from 0-39). The measure identifies “optimal parenting” as scores high in care and low in overprotection. In most cases the participant responds to the same set of questions twice, one for perception of the mother, and another for perception of the father. For this study, the participants were directed to respond in reference to one individual who they deemed to have been their primary caregiver during infancy and childhood.

Procedure
Volunteers who approached the study were told briefly that the research project was about women’s psychological experiences of pregnancy. Women from the Redlands Birth Center contacted the researcher through telephone or email. Women who participated near the Babies R Us stores were not approached for participation. Instead, a sign briefly explained the study, and eligible women approached the researcher if they were interested in participating. They were informed that they would be compensated with a small book if they decided to participate, and were told that their participation would involve approximately 15 minutes to complete a questionnaire. Women who decided to participate were given the informed consent document, and asked to read it attentively. The researcher then described the main points of the informed consent form, including that the participant could drop out of the study at any time, that they would not be videotaped or audiotaped, and that no identifying information would be linked to their responses on the questionnaire. The participant was then given the opportunity to ask questions or voice concerns before signing the informed consent document. After signing the informed consent, the participant received the packet of questionnaires. Participants completed a demographic survey, Condon’s (1993) Maternal Antenatal Attachment Scale (MAAS), Collins’ (1996) Revised Adult Attachment Scale (RAAS), and Parker, Tupling, and Brown’s (1979) Parental Bonding Instrument (PBI) in that order. When the participant had finished the surveys, she was thanked for her time, and given a copy of Bonding With Your Baby Before Birth by Maria Carella (2011).

Results

Women who were older, more educated, highly supported, and at a later point in their pregnancy were expected to report higher levels of prenatal attachment. In addition, women who felt cared for by their own parents during childhood were expected to exhibit high prenatal
attachment. In contrast, women who felt highly overprotected by their parents during childhood were expected to reveal lower levels of prenatal attachment. Finally, willingness to get close to and depend on meaningful others should increase as a function of high prenatal attachment, while high anxiety about closeness with others should reduce prenatal attachment. Quasi-independent variables were grouped into groups of three in order to examine both main effects and interactions on prenatal attachment scores.

**Parental Care, Parental Overprotection, and Education**

The scores on the care dimension of the Parental Bonding Instrument ranged from 7 to 36 ($M = 27.81$, $SD = 6.88$), while scores on the overprotection dimension ranged from 2 to 29 ($M = 15.22$, $SD = 6.97$). The mean level of education was 15.16 years ($SD = 2.34$). Overall scores on the Maternal Antenatal Attachment Scale ranged from 61 to 93 ($M = 81.38$, $SD = 7.21$). The 2 x 2 x 2 ANOVA yielded a significant main effect of parental overprotection on PA scores, $F(1,19) = 8.04$, $p = .011$, $\eta^2 = .297$. Individuals who reported lower overprotection had significantly higher PA ($M = 86.04$, SE = 1.97) than individuals who reported higher overprotection ($M = 74.60$, SE = 2.78). There was no significant main effect of education, $F(1,19) = 2.77$, $p = .113$, $\eta^2 = .127$ or parental care, $F(1,19) = 1.28$, $p = .272$, $\eta^2 = .063$ on PA. There was a significant interaction between parental care and overprotection, $F(1,19) = 4.61$, $p = .045$, $\eta^2 = .195$, which indicated that women who reported low care had the lowest PA when they reported high overprotection ($M = 68.40$, SE = 5.68) and highest PA when they reported low overprotection ($M = 88.15$, SE = 2.97) (see Figure 1). There was not as much difference in levels of PA for those who reported high care as a function of high overprotection ($M = 80.79$, SE = 2.34) as opposed to low overprotection ($M = 83.93$, SE = 2.17). There was also a significant interaction between parental care and education, $F(1,19) = 7.02$, $p = .016$, $\eta^2 = .270$, which indicated that women who
reported low care had significantly lower PA when they also reported low education \( (M = 70.53, SE = 5.58) \) and highest PA when they reported high education \( (M = 86.02, SE = 2.20) \) (see Figure 2). There was not as much difference in levels of PA for those who reported high care as a function of low education \( (M = 83.17, SE = 2.03) \) as opposed to high education \( (M = 81.56, SE = 2.77) \). The interaction between parental overprotection and education was not significant, \( F(1,19) = 1.52, p = .233, \eta^2 = .074 \). Finally, there was a significant three-way interaction between parental care, parental overprotection, and education, \( F(1,19) = 7.89, p = .011, \eta^2 = .293 \). Figure 3 shows the graphs of the three-way interaction, split as a function of high versus low level of education. As can be seen in the graphs, the combination of low parental care and high parental overprotection revealed the lowest PA scores in less educated women.

**Perceived Support, Religion, and Closeness in Adult Attachments**

Seventy-seven percent of the women felt fully supported during their pregnancy, while 23% felt less than fully supported. Forty-two percent of the participants reported no religious affiliation, while 58% did consider themselves to be religious (39% Christian, 16% Catholic, 3% Sikh). The mean score on the close dimension of the Adult Attachment Scale was 22.84 \( (SD = 4.77) \). The \( 2 \times 2 \times 2 \) ANOVA yielded a significant main effect of support, \( F(1,20) = 8.39, p = .009, \eta^2 = .296 \), on PA scores. Women who reported lower support had significantly lower PA \( (M = 73.35, SE = 3.24) \) than individuals who reported higher support \( (M = 84.77, SE = 1.52) \). There was also a significant main effect of religiosity, \( F(1,20) = 7.78, p = .011, \eta^2 = .280 \), on PA scores, such that women who reported no religious affiliation had significantly higher PA \( (M = 85.17, SE = 2.40) \) than individuals who reported having a religious affiliation \( (M = 72.95, SE = 2.97) \). There was not a significant main effect of attachment closeness on PA, \( F(1,20) = 4.21, p = .053, \eta^2 = .174 \). There was a significant interaction between support and religion, \( F(1,20) = 6.28, \)
\( p = .021, \eta^2 = .239 \), which indicated that women who reported low support had significantly lower PA when they also reported being religious \((M = 61.41, SE = 6.41)\) and highest PA when they reported being non-religious \((M = 85.29, SE = 4.08)\) (see Figure 4). There was not as much difference in levels of PA for those who reported high support as a function of religiosity \((M = 84.50, SE = 1.91)\) as opposed to non-religiosity \((M = 85.05, SE = 2.26)\). The two-way interaction between support and attachment closeness was insignificant, \(F(1,20) = 3.47, p = .077, \eta^2 = .148\), as was the interaction between religion and attachment closeness, \(F(1,20) = 2.83, p = .108, \eta^2 = .124\). Finally, the three-way interaction between support, religion, and attachment closeness was not significant, \(F(1,20) = 1.72, p = .205, \eta^2 = .079\).

**Attachment Anxiety, Attachment Dependence, and Education**

Scores on the anxiety subscale of the Adult Attachment Scale ranged from 6 to 26 \((M = 12.31, SD = 5.57)\), while scores on the depend dimension ranged from 6 to 27 \((M = 19.69, SD = 4.80)\). The 2 x 2 x 2 ANOVA yielded a significant main effect of attachment anxiety on PA, \(F(1,19) = 15.49, p = .001, \eta^2 = .449\). Women who reported lower anxiety surrounding their relationships had significantly higher PA \((M = 85.47, SE = 1.32)\) than individuals who reported higher anxiety in terms of their relationships \((M = 78.40, SE = 1.20)\). There was also a significant main effect of attachment dependence on PA, \(F(1,19) = 6.13, p = .023, \eta^2 = .244\). Women who reported lower willingness to depend on others had significantly higher PA \((M = 84.16, SE = 1.24)\) than individuals who reported higher comfort depending on others \((M = 79.71, SE = 1.28)\). There was not a significant main effect of education on PA, \(F(1,19) = 1.71, p = .207, \eta^2 = .082\). There was a significant two-way interaction between attachment dependence and education, \(F(1,19) = 4.56, p = .046, \eta^2 = .194\), which indicated that women who reported high education had significantly lower PA when they also reported high willingness to depend on others \((M = \)
78.99, $SE = 1.25$) and highest PA when they reported low willingness to depend on others ($M = 87.28, SE = 2.11$) (see Figure 5). There was not as much difference in levels of PA for those who reported low education as a function of low willingness to depend on others ($M = 81.04, SE = 1.38$) as opposed to high willingness to depend on others ($M = 80.43, SE = 2.24$). There was also a significant two-way interaction between attachment anxiety and education, $F(1,19) = 20.85, p < .001, \eta^2 = .523$, on PA scores (see Figure 6). Women who reported low education had significantly higher PA when they also reported low attachment anxiety ($M = 88.42, SE = 1.52$) and lowest PA scores when they reported high attachment anxiety ($M = 73.05, SE = 2.15$). There was not as much difference in levels of PA for those who reported high education as a function of low attachment anxiety ($M = 82.52, SE = 2.18$) as opposed to high attachment anxiety ($M = 83.74, SE = 1.16$). There was not a significant two-way interaction between attachment anxiety and dependence on PA scores, $F(1,19) = 1.59, p = .223, \eta^2 = .077$. There was a significant three-way interaction between attachment anxiety, attachment dependence, and education, $F(1,19) = 11.37, p = .003, \eta^2 = .374$. Figure 7 shows the graphs of the three-way interaction, split as a function of high versus low education.

**Marital Status, Trimester, and Maternal Age**

Sixty-three percent of the women were married, while 37% were unmarried. The mean week of gestation in the sample was 25.25 ($SD = 10.91$). Week of gestation was coded into the trimester system; 48% of the women were in their third trimester, 36% in their second trimester, and the remaining 16% in their first trimester. Fifty-eight percent of the participants were aged 29 or less (the minimum age in the sample was 19), while 42% were aged 30 or above (the maximum age was 37). There were no significant findings from this $2 \times 2 \times 3$ ANOVA. The main effect of marital status on PA scores was insignificant, $F(1,19) = .00, p = .995, \eta^2 = .000$, as
was the main effect of trimester, $F(1, 19) = .68, p = .517$, and maternal age, $F(1, 19) = .23, p = .639$, $\eta^2 = .012$. There was no significant two-way interaction between marital status and trimester, $F(1, 19) = .91, p = .352$, $\eta^2 = .046$. The two-way interaction between marital status and maternal age was also insignificant, $F(1, 19) = .02, p = .899$, $\eta^2 = .001$. Finally, the two-way interaction between trimester and age was not significant, $F(1, 19) = .76, p = .395$, $\eta^2 = .038$.

Discussion

The purpose of this study was to examine the interactive effects of maternal variables upon levels of prenatal attachment. Results suggest that certain maternal characteristics do interact to influence PA scores. For example, women who felt uncared for and stifled or exceedingly overprotected by their caregiver during childhood were more likely to report low PA scores. This suggests that the combination of high parental overprotection and low care during a woman’s childhood presents a risk factor for weakened prenatal attachment levels, and potentially low levels of attachment after birth. In addition, it appears that low parental care is especially damaging for women with low levels of education. Low levels of education also interact with high attachment anxiety, putting women at risk for low PA.

Certain maternal characteristics (such as marital status, trimester, and maternal age) appeared not to predict PA as a main effect or as an interaction. In this study, there was not a significant effect of trimester upon levels of PA, although Cannella’s (2005) literature review found that the concept of PA increasing as the pregnancy progresses was one of the most robust findings in this area of research. This discrepancy may be a result of the fact that the current study had unequal groups of participants in the three trimesters, or it could be due to different systems for measuring or operationalizing the trimester variable. While former research has been mixed on the effect of marital status on PA, this study was inconsistent with Lindgren’s (2001)
finding that married women scored higher on PA than unmarried women. In the present study, marital status did not influence levels of PA. The current study replicated Cannella's (2005) finding that the majority of the literature suggests that education does not have a main effect on PA. However, in this study, level of education appeared to be an important moderating factor, when combined with other variables, in influencing PA. It is possible that demographic factors such as marital status, trimester, and maternal age could have shown significant differences in relation to PA, if grouped with attachment history, education, or support variables.

This study was generally congruent with previous research on prenatal attachment. Factors related to the mother's specific attachment patterns have been found to predict PA (see, for example, Mikulincer & Florian, 1999), and this study furthers our knowledge of the relationship between adult attachment and PA by finding significant links using an alternative attachment inventory and a different PA scale. As predicted, high anxiety surrounding current attachments was linked to lower PA scores. Contrary to expectation, women who scored low on willingness to depend on others exhibited higher PA scores. This may be due to a disconnect between the concept of 'dependence,' because dependence on the scale is meant to measure one's trust in others to be available in times of need, while women may have interpreted the questions more along the lines of self-reliance or self-efficacy.

While past research has found positive correlations between adult closeness/security and high PA, the current study did not replicate that main effect (Mikulincer & Florian, 1999). However, the finding that high attachment anxiety predicts low levels of PA was replicated (Mikulincer & Florian, 1999). Attachment history with one's own parents has also been found to predict PA (Siddiqui, Hägglöf, & Eisemann, 2000). However, my research found that in isolation, parental overprotection was a significant risk factor for low PA, while parental care did
not create significant differences in PA scores. Overall, the findings support the notion that attachment history and current attachment style do influence prenatal attachment scores, although the links between specific subscales of those measures remains unclear.

To my knowledge, the factor of maternal religiosity has not been considered in any previous research, and my finding that for religious women in particular, low social support surrounding their pregnancy predicts low PA, suggests that more research is needed in this area. It may be that for religious women, the acceptance of their pregnancy by their religious community has an important effect on the formation of their bond with the baby. If so, low encouragement and support within a spiritual group could potentially be a risk factor for low PA. However, the present sample contained insufficient religious diversity to be studied separately, so the findings only distinguish between religious and non-religious women. Future research could identify the differences between religious backgrounds to better understand the relevance of this interaction.

The results of this study support Bouchard’s (2011) proposal that maternal factors should be studied in groupings rather than isolation in order to most effectively understand risk factors and predictors of prenatal attachment. Awareness of these combined effects will allow for increasingly relevant and successful intervention programs designed to promote maternal-fetal attachment. According to these findings, ideal programs might promote maternal support systems by providing community parent-infant resources, and training women to reach out for help in productive ways. In addition, programs might provide individual or group counseling to reduce attachment anxiety using simple cognitive/behavioral interventions, while simultaneously providing a supportive environment.
The main limitation of this research study was the small, geographically limited sample. A larger, more diverse sample might provide useful contrasts in trimester, maternal age, marital status, and closeness in adult attachments, revealing statistically significant differences that were not reached in this study. Further, a more diverse sample may yield interesting differences between religious and non-religious mothers, as well as differences between religious traditions. Future research should also examine the noteworthy effect of education, which was found to boost PA scores in this study. It would be interesting to more closely examine whether the sheer number of years a woman has been educated is the primary predictor of PA, or if certain degrees or fields of study more accurately relate to PA. Finally, many of these combinations of factors could usefully be studied in terms of their application to fathers, partners, or family members associated with the upcoming birth of a child. Further research is necessary in order to clarify the nature of prenatal attachment, and investment in this field is essential for psychologists, medical personnel, educators, and future parents to better understand the earliest foundations of parent-infant attachment. Overall, it is important to continue pursuing clear, replicable research in the field of prenatal attachment and birth psychology, in order to promote optimal relationship outcomes for women, infants, and families.
References


Figure 1. Differences in prenatal attachment means, based on the significant two-way interaction between parental overprotection and parental care.

Figure 2. Differences in prenatal attachment means, based on the significant two-way interaction between level of education and parental care.
Figure 3. Differences in prenatal attachment means, based on the significant three-way interaction between parental care, parental overprotection, and education.
Figure 4. Differences in prenatal attachment means, based on the significant two-way interaction between perceived social support and religiosity.

Figure 5. Differences in prenatal attachment means, based on the significant two-way interaction between level of education and willingness to depend on others in relationships.
Figure 6. Differences in prenatal attachment means, based on the significant two-way interaction between level of education and anxiety surrounding relationships.
Figure 7. Differences in prenatal attachment means, based on the significant three-way interaction between attachment anxiety, attachment dependence, and level of education.