ATTACHMENT SECURITY: THE ROLE OF INFANT, MATERNAL, AND CONTEXTUAL FACTORS

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Abstract

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Research addressing the antecedents of attachment security has traditionally focused on maternal sensitivity, but it has become increasingly clear that attachment security is multiply determined, with infant, maternal, and contextual antecedents playing an important role in its development. This study seeks to extend previous work by examining variables within each of these categories in relation to attachment security. Specifically, it was hypothesized that the relationship between infant negative emotionality and attachment security would be mediated by both maternal parenting efficacy and maternal sensitivity. Infant negative emotionality, parenting efficacy, and maternal sensitivity were assessed when the infants were age 4 months; attachment security was assessed when the infants were age 12 months.

Significant relationships were found between attachment security and maternal parenting efficacy and maternal sensitivity, but not infant negative emotionality. Thus, the proposed mediational model was not supported. However, when entered into a regression with other predictors, infant negative emotionality emerged as a significant predictor of attachment security, suggesting parenting variables may be acting as suppressor variables. A simple mediation model, wherein the relationship between attachment security and infant difficulty was hypothesized to be mediated by maternal sensitivity was also tested but not supported. Implications of this research and future directions for research are discussed.
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CHAPTER ONE
INTRODUCTION

Since its inception, attachment has become a core concept in both research and clinical work concerning human development. Encompassing research in developmental, clinical, social, and even physiological psychology, and dealing with every period of development, from the prenatal period to adulthood, attachment theory has been called “one of the best current examples of the value of serious, coherent theorizing in psychology,” (Cassidy & Shaver, 1999).

Much of the research concerning attachment has focused on determining the antecedents of a secure attachment between parent and child. Driven by theory, the primary focus of initial work in this area was maternal sensitivity. However, as maternal sensitivity became established as an important factor in the development of attachment security, researchers also came to realize that sensitive parenting was dependent upon the mother responding to her infant’s individual needs and behaviors. Thus, parental sensitivity must be determined in part by individual differences; what constitutes sensitive parenting for one infant may be intrusive or insufficient for other infants.

It is quite clear that mothering impacts attachment security (Belsky, 1997). However, it has become increasingly clear that a variety of factors are related to the attachment relationship. Thus, taking a more ecological perspective, the current view recognizes the importance of factors internal to the child, such as temperament; factors internal to the parent, such as personality or psychopathology; as well as experiences within child-parent dyad, such as parenting sensitivity. Moreover, inclusion of contextual characteristics of the family, such as the quality of the parental relationship or social support, may be important to fully understand the antecedents of secure attachment.
It may be most accurate then, to describe the attachment relationship as multiply determined, with a wide variety of direct and indirect influences. It appears that attachment security is better predicted by examining a combination of maternal and child characteristics, than by focusing on individual characteristics in isolation. Similarly, attachment security cannot be seen as a function of the individual or of the experiential context (the parenting environment) alone (Mangelsdorf, 2000). Viewing attachment as multiply determined, however, means that the relative and cumulative impact of all these factors must be determined.

Thus, the purpose of this paper is to review and integrate the extant literature on both infant and parent characteristics, as well as some contextual characteristics of the family, in order to suggest further avenues of study. The first portion of the paper reviews attachment theory, the development of attachment, and its measurement. The second reviews those factors thought to be implicated in the development of attachment, beginning with maternal sensitivity, often regarded as the principal determinant of whether an infant develops a secure or insecure attachment. Infant, maternal, and contextual characteristics are then considered in turn. Finally, a model is proposed to integrate the findings in each of these areas and consider each factor in the larger context.

**Attachment Theory and Measurement**

Bowlby (1982) defined attachment as an affective tie or bond, as well as a behavioral system operating in the service of the goal of providing the infant a sense of security. It is mediated by feeling states and interacts with other behavioral systems, such as exploration and fear. It is not a trait or set of behaviors that are constantly operative. Attachment is not reducible to infant-caregiver interaction, but is a product of the interaction.
Attachment theory grew from Bowlby’s dissatisfaction with the explanations of the child’s tie to the mother available to him. Prior to his development of attachment theory, secondary-drive theories, deriving from both psychoanalytic and social learning orientations, were widely accepted as the explanation for the tie between child and mother. According to these perspectives, the infant-mother relationship resulted from the mother’s feeding of the infant, with the pleasure of having hunger drives satisfied becoming associated with the mother’s presence in a positive manner, as illustrated in Freud’s statement that “Love has its origin in attachment to the satisfied need for nourishment,” (1940; from Bowlby, 1969).

Bowlby noted, however, that neither research nor his observations were consistent with this theory. For example, Lorenz (1935) reported that infant geese became attached to parents who did not feed them, while Harlow (1958) demonstrated that, when distressed, infant rhesus monkeys sought out a cloth-covered “mother” rather than the wire-mesh “mother” which provided food. Further, systematic observation of human infants showed that they, too, became attached to people who did not feed them (Cassidy, 1999).

Bowlby sought a new explanation which would better fit the available evidence, drawing from such varied fields as evolutionary biology, ethology, developmental psychology, cognitive science, and control systems theory (1969). His eventual proposal, that the infant’s tie to the mother was produced by a biologically based desire for proximity, resulting from evolutionary pressures and through the process of natural selection (Bowlby, 1969), provided a new understanding of the nature of the tie between child and mother.

This proposal, with its focus on the biological basis of attachment behavior, replaced psychoanalytic and social learning drive reduction theories with a control systems analysis (Waters & Deane, 1985). Utilizing this perspective, Bowlby (1969/1982) argued that the
biological function of attachment is protection, asserting that during human evolution infants who were biologically predisposed to remain close to their mothers were less likely to be killed by predators. Thus, during the time when humans were evolving from other primates, living in what Bowlby labeled the “environment of evolutionary adaptedness”, genetic selection favored behaviors which maintained child-mother proximity (Bowlby, 1969). Indeed, Bowlby (1973) argued that even within the modern environment a child is much more vulnerable to disaster (becoming a victim of a traffic accident, for example) when alone than when in the company of an adult caregiver. Seen within this light, attachment confers evolutionary advantage and should be viewed as a normal, healthy characteristic throughout the lifespan.

Given this explanation for the origin of attachment and its biological function, attachment behaviors may be defined as behaviors which have the predictable outcome of bringing the attachment figure into closer proximity (Bowlby, 1969). Some of these behaviors, such as smiling or vocalizing, serve as positive signals of the infant’s interest, bringing the attachment figure closer for interaction. Others, such as crying, are aversive, signaling the infant’s distress, and serve to bring the attachment figure to the child in order to terminate them. As the child develops, gaining more control over locomotor activities, he or she may also approach or follow the attachment figure, allowing him or her to maintain proximity to the attachment figure of their own volition.

These attachment behaviors are thought to be organized into the attachment behavioral system, a specific control system. Borrowing the concept of the control system from ethology, Bowlby (1969) offered the functioning of a thermostat as an example. The thermostat has a particular temperature setting which it tries to maintain within a room, its set-goal. When the temperature of the room falls, deviating from the set-goal, the thermostat activates the heater.
Once the desired temperature is again achieved, the thermostat turns the heater off. Similarly, within the attachment behavioral system, a child has a particular set-goal in terms of maintaining proximity to the attachment figure. When separation from the attachment figure deviates from this set-goal, in terms of either distance or time, the attachment system becomes activated. Once acceptable proximity has been achieved, activation of the attachment system is terminated.

Bowlby (1982) later revised his original theory, stating that, unlike a thermostat, the attachment behavioral system is continually activated, but varies in terms of more or less activation, rather than being completely turned off at times.

The predictable outcome of the activation of the attachment behavioral system, and attachment as a bond, is the maintenance of the child’s set-goal (Ainsworth et al., 1978). This set-goal, or the child’s desired degree of proximity, is thought to vary according to context, however. Bowlby (1969) posited that both conditions of the child, such as illness, hunger, fatigue, or pain, and conditions of the environment, such as the presence or absence of threatening stimuli, could contribute to activation of the attachment system. He noted that the location and behavior of the attachment figure were particularly important in determining this activation. Further, he stated that the interaction between activating conditions could be quite complex. Thus, at times only one condition would be needed to activate attachment behavior, while at others, several may be necessary.

The degree of activation of the attachment behavioral system may also vary and, depending on the degree of activation, the set-goal may be changed. For instance, with a high degree of activation the set-goal may be reset from being able to see the attachment figure to close bodily contact with the attachment figure; attachment behaviors will not terminate until this new set-goal is achieved (Ainsworth et al., 1978). Thus, within Bowlby’s control systems view,
attachment behaviors begin in order to achieve a set-goal and stop in the presence of a
terminating stimulus which indicates that the set goal has been accomplished. The necessary
intensity of the terminating stimulus varies with the activation of the attachment behavioral
system. If highly activated, contact with the attachment figure may be necessary for termination;
if moderately activated, the presence or voice of the parent may be sufficient for termination.

Bowlby (1969/1982) states that there is a great deal of flexibility in the attachment
behaviors which may be utilized to achieve the set goal. Noting the “functional equivalence” of
attachment behaviors, in that they all serve the goal of proximity to the attachment figure, he
asserted that the particular behavior utilized, whether running or crying, is of relatively little
consequence. Thus, a nonmobile infant may cry and reach out to the attachment figure for
contact, while a mobile child may establish contact by crawling. The infant utilizes the behavior
thought to be most useful within their specific context, gaining access to a greater variety of
methods to achieve proximity as they mature and develop greater locomotor abilities. The
functional equivalence of attachment behaviors helps explain the possibility of stability of
attachment within the context of the natural developmental and contextual change experienced
by every infant (Sroufe & Waters, 1977).

Bowlby (1969) describes the attachment behavioral system as operating in a goal-
corrected manner. Thus, unlike reflexes, which maintain a fixed course once activated, the
attachment system is flexible and purposeful, although it also has a basis in biological
programming. The infant continually monitors the attachment figure’s location and behavior, as
well as the environment, while attempting to maintain proximity. When changes occur in the
attachment figure or environment, the infant considers the changes and is able to respond
flexibly to achieve and maintain his or her set-goal. Thus, the infant is acting in a goal-corrected
manner, making continual on course adjustments to his or her behaviors, like a hawk adjusting its flight to the movement of its prey (Bretherton, 1992).

In summary, the attachment behavioral system activates proximity-seeking behaviors when the infant receives information, from either internal or external sources, that the set goal has been exceeded. The system remains activated until the goal is achieved and then terminates the attachment behaviors. Thus, the infant uses the attachment figure as a “safe haven” (Ainsworth, 1967), a “stronger and wiser” individual who can provide refuge and reassurance (Bretherton & Mulholland, 1999). It is important to note, however, that within Bowlby’s theory, the goal of the child is not the object of the attachment figure, as proposed by psychoanalytic theories, but the preservation of a state, maintaining the set-goal regarding proximity to the attachment figure (Cassidy, 1999).

Attachment & Secure Base Behaviors

As long as the child feels at ease, the attachment figure serves as a secure base of operations whose presence fosters exploration, play, and social behavior. When the child feels threatened, however, exploratory goals are overridden, the set-goal narrows, and the child seeks closer proximity to the attachment figure. Thus, in familiar contexts, the attachment behavioral system favors exploration with intermittent checks on the attachment figure’s location, while in risky contexts, the system favors physical contact over exploration (Waters & Deane, 1985). The operation of the system results in the secure base phenomenon; how well the system fulfills its function of physical and psychological protection depends on the quality of the interactions between the child and attachment figure over time, however (Bretherton & Mulholland, 1999). When operating as intended, the control system allows the infant to play an active role in its
behavior and development, facilitating social and cognitive development (Waters & Deane, 1985).

As evident in the above description, the infant’s use of an attachment figure as a “secure base from which to explore” is a central concept in attachment theory (Ainsworth, 1963). For both Bowlby and Ainsworth, *to be attached* is to use an attachment figure preferentially as a secure base from which to explore, while the term *secure attachment* refers to skillful use of a secure base over time and in a variety of contexts, as well as having confidence in the attachment figure’s availability, responsiveness, and competence to serve as a secure base (Waters & Cummings, 2000). Infants showing an insecure attachment are anxious about their attachment figure’s availability, responsiveness, and competence to serve in this capacity. Thus, secure base behaviors may serve as an indicator of the quality of the attachment relationship. An infant able to successfully use an attachment figure as a secure base will exhibit an “attachment-exploration balance,” responding flexibly to a particular situation after assessing the environment’s characteristics and the attachment figure’s availability and likely behavior (Ainsworth, Bell, and Stayton, 1971).

*Attachment & Internal Working Models*

Drawing inspiration from cognitive science, Bowlby (1969/1982) proposed that the attachment behavioral system is organized through the use of cognitive components – mental representations of the attachment figure, the self, and the environment – which he called internal working models. The internal working model concept offered Bowlby an insight into the mental representation of appraisal and set-goal components of the secure base control system (Waters & Cummings, 2000).
Given Bowlby’s training as a psychoanalyst and his familiarity with object relations theory, it is not surprising that he emphasized the importance of mental representation in attachment relationships (Bretherton, 2005). However, Bowlby held that internal representations were based on actual experience, diverging from traditional psychoanalytic theory which had focused on the role of internal fantasy (Cassidy, 1999). Additionally, he adopted the concept of representation as mental models prior to empirical support for the notion was available. Understanding that his idea may appear unlikely to researchers “steeped in extreme behaviorism,” Bowlby (1969) held that humans’ capacity for “foresightful and insightful behavior” was difficult to understand in the absence of the assumption that the brain builds mental models of the environment and the self (Bretherton, 2005).

Bowlby (1973) held that internal working models are built from experiences the child has with his or her caregivers. These experiences lead to expectations and beliefs about the self, the attachment figure, and the world, which, in turn, allow the child to anticipate the future and make plans. If the child’s experience of the attachment figure is that he or she is generally accessible and responsive, the child will likely develop an internal working model which enables a wider range of proximity; if, however, the attachment figure has shown inconsistent or ineffective accessibility and responsiveness, it is likely the child’s set goal will reflect a desire for a narrower range of proximity (Ainsworth et al., 1978). A child who is able to count on his or her attachment figure’s responsiveness, support, and protection is also able to devote their full attention to other concerns, such as exploration or companionable interaction (Bretherton & Mulholland, 1999), while a child who cannot count on their attachment figure must devote more of their resources to monitoring and maintaining proximity or providing for protection in some other manner.
Thus, the child uses his or her mental models to organize attachment behaviors, such as when deciding the specific behavior to use in a specific situation with a specific person (Cassidy, 1999). This process works best when internal working models are relatively accurate reflections of reality; to this end, Bowlby (1973) held that internal working models are both persistent and open to revision in light of experience. The persistence of internal working models allows children to utilize their previous positive secure base experiences to organize their behavior when an attachment figure is not present (Waters, 2000). It also serves to buffer the child against future unsupportive or disappointing relationship experiences (Waters, Hamilton, & Weinfield, 2000). Conversely, in the presence of unsupportive care, the child may utilize previous negative experiences to organize their behavior even when the attachment figure is not present, leading to less effective social interactions.

Bowlby saw the internal working model as the transformation of actual relationship patterns into interdependent representations of the self and attachment figure (e.g., parent as loving-protecting, self as loved-secure) (Bretherton, 2005). In this sense, internal working models are relationship specific. However, Bowlby (1988) also believed that these early relationship patterns impact the way a child may interact in relationships with other caregivers and peers, and, later during adulthood, with future mates and children, through the influence of internal working models. Children who had experienced sensitive and responsive care, he believed, would come to approach the world with confidence or seek help if they were unable to manage independently. They would thus develop internal working models of a secure self, loving parents, and a reasonably benign world (Bretherton, 2005). Children who were unable to rely on their attachment figures providing sensitive and responsive care, however, would learn to view the world as unpredictable and unreliable, leading them to either retreat from it or fight it
(Bretherton, 2005). Thus, for Bowlby, every situation an individual faces is interpreted through the lens of their internal working model of the world and themselves. Information regarding the environment reaches the individual through the sensory organs and is then selected and interpreted in terms of the internal working model, leading to our emotional reaction to the situation. The information’s significance is evaluated in terms of the model, and plans of action are developed and executed with the model in mind (Bowlby, 1980).

**Development of Attachment**

The development of the attachment relationship is one of the primary developmental achievements of the infant, emerging during the first year of life. As described above, Bowlby considered the quality of the child’s attachment to his or her caregiver to be based on their interaction history, a function of both the initial behaviors they brought to the relationship and the effect of those behaviors on one another, making it clear that the attachment relationship develops over time.

In keeping with his belief that the relationship was influenced both by the individual’s abilities and the effect of each individual on the other over time, Bowlby proposed four phases of development for the attachment relationship (1969). The first he referred to as Orientation and Signals without Discrimination of Figure, during which the infant shows undiscriminating social responsiveness, generally lasting from birth to about 3 months. The next phase he called Orientation and Signal Directed towards One or More Discriminated Figures, in which the infant displays preferential social responsiveness, and generally lasts from about 3 to 6 months. The third phase, Maintenance of Proximity to a Discriminated Figure by Locomotion and Signals, in which the emergence of secure base behavior occurs, typically emerges at about 6 months and lasts through approximately 24 months. The final stage of development, Formation of a Goal
Corrected Partnership, emerges following this time, at which point the infant is considered able to have some insight into the caregiver’s feelings and motives (Bowlby 1969). As Ainsworth (1969) notes, while other theoretical orientations (e.g., psychoanalytic, object relations, etc.) had focused primarily on the first two phases and the transition from undiscriminating to preferential social responsiveness, the third and fourth phases represented theoretical contributions unique to Bowlby’s work.

Phase I: Orientation and Signals without Discrimination of Figure

At birth, the infant is far from the *tabula rasa* proposed by Locke. Rather, the infant’s motor and signal systems are already particularly adept at eliciting interest and caregiving from other humans, ensuring that a number of needs, including proximity, physical contact, nutrition, and warmth are predictable outcomes (Marvin & Britner, 1999). Additionally, infants respond to stimuli in ways which increase their likelihood of continued contact with other people. At this stage, however, the infant shows undiscriminating social responsiveness, as the infant lacks the ability to discriminate between individuals, responding to anyone in his or her vicinity with a number of characteristic behaviors. These behaviors may include orienting, tracking with his/her eyes, grasping, smiling, reaching, or ceasing to cry.

While the infant shows undifferentiated social responsiveness during the first phase of development, the caregiver is of great importance in the development of attachment, as it is primarily the caregiver who maintains proximity to the infant and protects it at this time (Marvin & Britner 1999). Further, just as infants are biased to act in ways that evoke caregiving, mothers are biased to behave in particular ways toward their infants, such as by holding the infant in a face-to-face position likely to orient him or her to her, as well as allowing the infant to more easily explore her (Bowlby, 1969). Thus, the infant and caregiver experience a great deal of
interaction during these early months. Through these interactions, the responses of the infant and caregiver to one another gradually become stronger and it is from these early reciprocal interactions that attachment begins.

By reviewing and integrating information about the infant’s early abilities and behavioral systems, Bowlby outlined a specific process by which this may occur (1969). He concluded that the infant has an inbuilt bias toward preferential looking at certain patterns and at things that move; that this bias predisposes the infant to pay special attention to the human face and track it when it moves; that the familiar becomes distinguished from the strange through perceptual learning; that there is an in-built bias to approach the familiar and, later, withdraw from the strange; and that the feedback of consequences may augment or diminish sequences of orientation behavior (Ainsworth, 1969). Thus, Bowlby argues, the necessity of invoking the mothers’ provision of food to the infant in order to explain the infant’s orientation to her is negated; rather, he states that it is more likely that the more the infant watches his/her mother, the more likely she is to “approach him and to gesture, talk, pat, and hug him”, thus maintaining proximity, and that these behaviors reinforce the infant’s tendency to watch her (Ainsworth, 1969)

During the first months of life, these patterns of infant-caregiver interaction are frequently repeated. If the caregiver’s initiation and responses are well attuned to the infant’s behavior (i.e., if the infant’s attachment behaviors are predictably terminated by the caregiver’s behaviors), then stable patterns of interaction may be established. These patterns of reciprocal caregiver-behavior interaction gradually minimize the frequency and intensity of attachment behaviors such as crying and more easily elicit other behaviors like smiling or visual orientation. Given this context, the infant may be seen as establishing its own behavior and autoregulation so
that stable internal and dyadic rhythms are becoming established concurrently (Marvin & Britner, 1999).

During the first phase, the infant’s internal working models are thought to be quite primitive. Research in early cognitive development indicates that the infant is unable to distinguish self from others, to realize that the different stimuli that originate from the caregiver are organized together in a single individual, or realize that the other person exists even when they are not perceived by the infant at this stage. Given this limited understanding, the infant’s internal working models are likely limited to “internal on-again, off-again experiences associated with the activation and termination of individual behaviors,” (Marvin & Britner, 1999). It appears that the infant, unable to yet distinguish between the people who interact with him or her, is not yet able to form set-goals but may come to recognize predictable outcomes of his or her behaviors (Marvin & Britner, 1999).

Bowlby (1969/1982) proposed that in an environment of evolutionary adaptedness, an environment in which the conditions are well-suited to those abilities chosen by the process of natural selection, Phase I lasts from birth to sometime between 8 and 12 weeks of age. He suggested, however, that under unfavorable conditions, including neglect or maltreatment, this phase can last much longer.

*Phase II: Orientation and Signals Directed toward One or More Discriminated Figures*

During Phase II, the infant begins to show differential responsiveness and the phase may be operationally defined in terms of the infant’s differentiating between his most familiar caregivers and others in directing his or her attachment behaviors (Marvin & Britner, 1999). The infant generally continues to behave in a friendly and sociable manner toward others, as he or she did during Phase I, but does so in a more marked fashion toward attachment figures, such as
the mother, than toward others (Bowlby, 1969/1982). Thus, the infant responds differently to his or her mother’s voice, maintains a different visual-postural orientation toward the mother, cries differently when his or her mother departs, ceases crying differentially according to who holds him, smiles and vocalizes differentially, and shows differential greetings (Ainsworth, 1969).

The shift between undifferentiated responding, characteristic of Phase I, and differentiated responding, characteristic of Phase II, takes place gradually, with some attachment behaviors showing evidence of differential response before others. Further, Bowlby states that the infant may behave differentially toward familiar figures other than the mother soon after he or she develops differential responsiveness to his mother; these figures may include individuals who have had no responsibility for fulfilling the infant’s basic needs or responsibility for reducing his basic drives (1969/1982).

During Phase II the simple behavior systems characteristic of a Phase I infant become integrated into more complex, chain-linked behavior systems (Marvin & Britner, 1999). While the caregiver in Phase I provides the conditions for terminating one behavioral link in a chain and activating the next, during Phase II the infant assumes much of this control (Marvin & Britner, 1999). For instance, at three months, the infant’s perception of a bottle or breast may serve as an activating stimulus for opening the mouth, and often, bringing the hand toward the mouth (Hetzer & Ripin, 1930 from Bowlby, 1969). By 4 months, the infant’s visual system begins to activate the motor behavior of reaching for an object and through a reciprocal feedback process, wherein the infant alternates his or her gaze between the hand and the object, eventually grasps the object. By 5 months the infant is so skilled at this activity that he or she is able to reach toward and grasp parts of the mother’s body and clothing while being held by her (Marvin & Britner, 1999). Thus, the infant’s behaviors become increasingly complex and self-directed.
Given this greater control, during Phase II the infant shows an increasing tendency to actively initiate attachment-caregiving and sociable interactions with the principal caregiver(s) (Marvin & Britner, 1999). Ainsworth (1967) noted that as early as 2 months, the infant is active in seeking interaction rather than passively responding to it and that the infant is increasingly active in seeking interaction as he or she ages. Thus, infants are able to both initiate more interaction and exert more control over the interaction through the use of increasingly complex, chain-linked behaviors during Phase II (Marvin & Britner, 1999).

The elaboration of chain-linked behavior systems, as well as the infant’s increasingly differential attachment and sociable behavior, which are characteristic of Phase II may have important repercussions for the development of the individual differences in patterns of attachment described by Ainsworth (1978) (Marvin & Britner, 1999). For instance, parents of infants later classified as avoidant tend to terminate their infants’ cries less often and hold them less during the first months of life. These behaviors leave the infant in a “painful” state for significant periods of time, creating an environment in which it is likely that the infant will eventually develop alternate links in its behavioral chain in which some behavior of their own will terminate its distress. These patterns of infant-caregiver interaction may stabilize in the same manner as attachment behavior patterns stabilize in the normative, eventually secure infant, leading to an avoidant strategy and the tendency of the infant to contribute to the perpetuation of the behavioral pattern (Marvin & Britner, 1999).

In terms of the infant’s internal working models during Phase II, the infant’s increasing ability to differentiate his or her primary caregiver from others, indicates that the infant in some sense “knows” who his or her caregivers are. However, it seems that the infant remains unable
to conceive of an attachment figure as someone with an existence separate from his or her own
existence (Marvin & Britner, 1999).

Phase III: Maintenance of Proximity to Discriminated Figure by Locomotion and Signals

During Phase III, the infant is thought to consolidate attachment to its caregiver and it is
during this phase that most experts consider the infant to be “really” attached (Marvin & Britner,
1999). Phase III generally begins around the sixth month of life, although its emergence may be
delayed until after the first birthday in infants who have had little contact with a primary
caregiver (Bowlby, 1969/1982). Phase III usually lasts until approximately 24 months (Bowlby,
1969/1982).

During phase three, the infant’s increasing locomotor abilities enable him or her to show
further differential behaviors, including approaching, following, climbing on, exploring, and
clinging to the mother preferentially (Ainsworth, 1969), as well as allowing the infant some
degree of control over proximity to his or her attachment figure. Additionally, the infant begins
using the mother as a secure base from which to explore the surrounding environment and a
haven of safety to return to (Bowlby, 1969/1982). Thus, a delicate balance between exploration
and proximity seeking behaviors remains characteristic of the infant throughout the third stage.

At the same time, the infant’s behavior becomes more clearly organized on a goal
corrected basis, adjusting his or her behaviors in light of feedback from the environment to more
effectively maintain the desired proximity to the attachment figure (Bowlby, 1969/1982). This
change can in part be attributed to the infant’s increasing cognitive skills. With this
development, some of the infant’s earlier chain-linked behaviors now become organized under
his or her intentional control. Bowlby (1969/1982) suggests that during this phase, the infant is
able to hold in mind an internal image of an end state, or set goal, that he or she would like to
achieve. With this ability, the infant can operate internally on available behaviors, select behaviors that are likely to achieve his or her desired set goal, act on this plan, alter the plan according to feedback from the environment, and terminate the plan when the discrepancy between the set goal and the infant’s perception of his or her position is reduced to zero (Marvin & Britner, 1999).

Thus, the infant begins to maintain proximity to the attachment figure by utilizing a primitive cognitive map. The infant also comes to conceive of the attachment figure as an object which is independent, persistent in time and space, and “moving more or less predictably in a time-space continuum (cf. Piaget 1954)” (Ainsworth, 1969). Thus, the infant now has separate working models of the caregiver and of him- or herself, consisting of organized cognitive images and plans of the self and other, based in his or her new ability to operate internally on the images and likely behaviors that became chain-linked during Phase II (Marvin & Britner, 1999). Despite these advances, the internal working models of the infant in Phase III remain primitive in that the infant is limited, at least during the early part of the phase, to thinking about the caregiver and self only in terms of behaviors; the infant does not yet comprehend that the attachment figure has unique cognitions, perceptions, and goals (Marvin & Britner, 1999). Additionally, early in the phase, the infant is unable to think about behaviors in terms of long sequences (Marvin & Britner, 1999).

However, with the development of the ability to think about the caregiver’s likely behavior, the infant’s set-goals become partially regulated by his or her expectations of the mother’s behavior and location. The infant’s set-goals may be influenced by many factors, including his or her physiological state; the presence or absence of a disturbing event in the environment; assessment of the caregiver’s attention to the infant; and whether the caregiver is
present, departing, absent, or returning from an absence (Bowlby, 1969/1982). The infant’s set-goal may also depend on the dyad’s history of the relatively stable patterns of attachment-caregiving interactions established throughout this and earlier phases (Marvin & Britner, 1999).

While increasing signs of attachment to the caregiver are hallmarks of Phase III, infants during this stage are particularly likely to show wariness when faced with an unfamiliar situation or person. Phase III infants are likely to stop exploration when confronted by a strange person, to remain wary or fearful for several moments, and either remain stationary or move away from the stranger and toward the attachment figure, although they may later approach the stranger and interact sociably if he or she does not seem threatening (Marvin & Britner, 1999).

**Phase IV: Formation of a Goal Corrected Partnership**

Phase IV is thought to begin around 24 months of life at earliest, although it may emerge closer to 30 months for many children (Bowlby, 1969/1982). The infant begins to be able to predict his/her mother’s movements and adjust behaviors to them accordingly during the third phase of attachment development, and the fourth phase of attachment development, the goal corrected partnership, is marked by a gradual development of the infant’s ability to infer something about his or her caregiver’s set-goals and the plans s/he is forming to achieve these (Bowlby, 1969). The infant is then able to attempt to change the caregiver’s set-goal to something more closely related to his or her own goals by utilizing techniques of request or persuasion, rather than merely adjusting his set-goal to suit hers (Ainsworth, 1969). The ability to form a plan for changing the set-goal of another’s behavior requires a considerable degree of cognitive competence, including the ability to see things from another’s point of view. Thus, the child’s earliest attempts at such plans are often hampered by egocentrism and may appear primitive or incompetent (Ainsworth, 1969). Over time, the child’s attempts may be either
facilitated or hampered by his or her caregivers’ behaviors, depending on the extent to which they clarify or dissemble their own set goals, or encourage or discourage the child’s awareness of them (Ainsworth, 1969). With the child’s improving judgment, proximity is maintained by as much by the child as by the mother (Ainsworth, 1969).

Thus, the infant shows increasing control over their own behavior and understanding of the caregiver’s behavior as they progress through the four phases of attachment development, eventually developing the ability to independently maintain proximity to the caregiver and act to influence the caregiver’s set-goals. While Bowlby’s four phases of development have provided researchers a useful model, providing a great deal of detail about the origins and onset of attachment behaviors, he did not intend for this theory to be the final word (Waters & Cummings, 2000). Indeed, Bowlby’s theory does little to address further development in attachment following the first few years of life. While secure base behaviors and internal working models emerge early in development, they continue to develop throughout childhood and adolescence according to their attachment related experiences (Bowlby, 1973; Bretherton, 1990). However, relatively little is understood about how this development occurs and the specific processes implicated in further development. Thus, much is left to learn and researchers should remain open to revisions and additions to the theory.

**Stability of attachment**

Bowlby’s theory (1973) proposed that internal working models, once established, would be persistent, but open to revision in light of experience. However, his theory also envisioned working models evolving and responding to experience through adolescence (Waters & Cummings, 2000). Thus, theory would predict stability in attachment, provided a stable environment, and the possibility of change in attachment with changing environment. However,
other theorists, taking a situationist perspective, argued that individual differences in attachment were not stable, coherent, or of practical importance (Masters & Wellman, 1974; Mischel, 1968).

An early study of attachment stability supported stable individual differences in the quality of the mother-infant attachment relationship, as measured by the Strange Situation, over a six month period (Waters, 1978). Within this study, only 4% of the infants showed changes in attachment classification. However, the sample was comprised of middle-class families, consisting of two parents with stable paternal employment and residential stability. These characteristics were sought consciously, as Waters expected that stability of attachment was most likely when environmental supports for interaction were stable and unanticipated changes in stress were minimized. Thus, the sample was thought to be useful in providing initial evidence on attachment stability and established that attachment security would show stability under some circumstances.

Waters’ (1978) study was shortly followed by another study employing the Strange Situation to assess attachment at 12 and 18 months in order to examine attachment stability, this time with an economically disadvantaged sample (Vaughn et al., 1979). With the results of the earlier study, establishing the possibility of stable attachment, as well as other studies establishing the Strange Situation as a valid measure (see below), the researchers felt confident that if they were to find evidence of change in attachment in families under stress, it would reflect actual changes in the infant-mother relationship. Their sample was comprised of younger mothers, many single, with little education (40% had not earned a high school diploma), and low incomes (over half received public assistance). The study found significant evidence for stability of attachment, with 62% of the infants receiving the same classification at 12 and 18 months;
however, the percentage of infants whose classifications changed (38%) was much higher than that found within Waters’ stable middle-class sample (4%).

Mothers also provided reports on stressful events taking place during the six month study. Vaughn et al. found that changes from secure to anxious attachment during the study were associated with higher frequencies of stressful events in the maternal report, providing evidence that stress and change within the environment could be related in a meaningful way to instability in the attachment relationship, possibly by impacting maternal behavior.

The initial findings provided by these studies have been largely supported in later studies examining attachment stability. In a set of three studies designed to investigate whether attachment security remains stable over a longer period, from infancy to early adulthood, researchers also found support for attachment stability and evidence that change in attachment security is related to meaningful changes in the family environment (Waters, Hamilton, & Weinfield, 2000). In each of these studies, attachment during infancy was measured with the Strange Situation, while later attachment was measured with the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985).

The first of these studies (Waters et al., 2000) followed up 50 of the 60 participants in Waters’ (1978) original study of stability 20 years later. Thus, the study addressed attachment stability from infancy to early adulthood in a middle-class sample. Utilizing three classification categories at each age (Secure, Avoidant, and Resistant in infancy and Secure, Dismissing, Preoccupied during adulthood), 32 of the 50 participants (64%) were assigned to corresponding classifications in infancy and early adulthood. Utilizing a secure-insecure dichotomy, 36 of the 50 (72%) received the same classification. Within this study, negative life events (defined as loss of a parent, parental divorce, life-threatening illness of parent or child, parental psychiatric
disorder, and physical or sexual abuse by a family member) were also measured, utilizing transcripts from the AAI. Analyses including these events indicated that participants who reported one or more stressful life events were more likely to change attachment classification than those who reported none. Further, stressful life events were significantly related to the likelihood of a securely attached infant becoming insecure in early adulthood.

Hamilton (2000) addressed the same questions utilizing an alternative lifestyle sample. Participants within this study were a subset of children drawn from the Family Lifestyle Project, a longitudinal study composed of children raised by single mothers, domestic living groups (loosely affiliated groups of nonrelated adults and children), creedal communal groups, unmarried cohabitating couples, and a comparison group of conventional two parent families. Within this group, 63% of the participants retained the same classification utilizing a three-way classification and 77% retained the same classification utilizing a secure-insecure dichotomy. Hamilton also examined the negative life events measured in Waters et al. (2000) study, adding two events, physical separation of mother and child in early childhood and parental drug use, which were thought to be of particular relevance within this sample. Results indicated that negative life events appeared to operate in maintaining insecure attachment status within this sample.

In contrast, Weinfield et al. (2000) utilized a high-risk sample to examine stability of attachment. The participants within this sample were originally chosen for poverty and high risk of poor developmental outcomes; the lives of the sample members were described as being characterized by “high levels of stress and instability and low levels of social support.” Indeed, in measuring negative life events similar to the previous two studies, Weinfield and colleagues reported that 91.2% of the sample had experienced at least one negative life event. Within this
high-risk sample, a significant degree of stability between attachment during infancy and early adulthood was not found utilizing either the three classification categories (38.6% showed stability) or the secure-insecure dichotomy (50.9% showed stability). Given the high level of negative life events within the sample, it was impossible to compare participants who had experienced negative life events with those who had not. Instead, the researchers investigated correlates of stability and instability, finding support for the contention that changes in attachment were not random. For instance, participants who moved from secure to insecure attachment had mothers who were significantly more often depressed than mothers of participants in the group who remained securely attached. Additionally, better family functioning during adolescence was found in participants who moved from insecure to secure attachment.

Thus, attachment, although often conceptualized strictly in terms of static structures (i.e., categories), can be viewed as a dynamic process unfolding over the course of development. As predicted by attachment theory, significant stability is present, but not when existing working models are “under assault”, such as when confronted with stress or trauma. Additionally, change in attachment security is possible, but occurs primarily when adverse experiences challenge existing working models. Waters et al. (2000) note that none of the above studies implicate particular pathways to stability or change in attachment, but hypothesize that negative life events may lead to change in attachment security by impacting changes in caregiver availability and responsiveness, leading to changes in the participants’ internal working models.

The Importance of Infant Attachment

Infant attachment is considered important due to its outcomes; these outcomes, however, depend on the quality of the attachment shown. Bowlby considered two types of variation in
attachment, the presence or absence of an attachment relationship, and the individual differences in organization of secure-base behavior in an infant-caregiver dyad (Weinfield et al., 1999). While the absence of an attachment relationship was considered likely to affect the infant’s chances of survival, Bowlby did not predict that individual differences in attachment security would impact the likelihood of survival or reproductive success; he did argue, however, that these individual differences in early attachment have important implications for mastery, emotional regulation, and interpersonal relations (Weinfield et al., 1999).

Differences between infants classified as securely and insecurely attached have been explored through a great deal of empirical research, primarily focused on outcomes during the toddler and early childhood years, and Bowlby’s original conjectures have largely been supported. Goldsmith and Harman (1994) provide a summary of some of these findings. For example, securely attached children show greater persistence and positive affect when engaged in problem-solving tasks than do insecurely attached children. They generally show greater social competence, with higher levels of empathy and compliance and lower levels of conflict, in relationships with peers and adults. In comparison, insecure-resistant children are likely to show greater levels of dependency and anger in relationships with their parents and teachers, while insecure-avoidant children are likely to be hostile and distant in their relationships. Additionally, infants who are securely attached tend to grow into toddlers and children who exhibit ego-resilience, higher levels of self-esteem and positive affect, and lower levels of negative affect.

Given this research base, we can be confident that secure attachment tends to be related to more positive developmental outcomes, while insecure attachment is likely to be related to more negative developmental outcomes. Indeed, the empirical evidence appears to support Bowlby’s statement that “human beings of all ages are found to be at their happiest and to be
able to deploy their talents to best advantage when they are confident that, standing behind them, there are one or more trusted persons who will come to their aid should difficulties arise,” (Bowlby, 1973, p. 359).

**Measurement of attachment**

For approximately the first decade of the field, dating from Bowlby’s formal introduction of attachment theory in 1958 until the introduction of Ainsworth’s Strange Situation in 1969, attachment research depended primarily on the naturalistic observation and/or frequency counts of behaviors thought to denote attachment security or insecurity. As attachment security was defined as the state of being secure or untroubled about the availability of the attachment figure (Ainsworth et al., 1978), an internal state, it was, and remains, impossible to directly observe the construct. Rather, attachment security must be inferred from observable behaviors thought to be reflective of such a state (Solomon & George, 1999). Researchers, however, developed more formalized methods of assessing attachment; amongst these, perhaps the most widely used are the Strange Situation (Ainsworth & Wittig, 1969), a categorical measure, and the Attachment Q-sort (Waters & Deane, 1985), a continuous measure, to be discussed in greater detail below.

*The Strange Situation*

The Strange Situation (Ainsworth & Wittig, 1969) was devised as part of Ainsworth’s Baltimore project, an intensive longitudinal study of the development of infant-mother attachment throughout the first year of life. The Baltimore study utilized a naturalistic design, in which infants were observed in their familiar home environments. Ainsworth noted that, given this design, several behavioral patterns important in attachment that had been present in her earlier study of Ganda infants emerged less strikingly. Notably, these included the use of the mother as a secure base from which to explore; distress in brief, everyday separation from the
mother; and fear when encountering a stranger. It was thought that the Baltimore infants might be induced to act in a manner similar to the Ganda infants if stronger instigation were provided. Therefore, the Strange Situation was originally devised in the belief that an unfamiliar environment might evoke these behaviors more effectively than the familiar home environment (Ainsworth et al., 1978).

The Strange Situation (Ainsworth & Wittig, 1969) ultimately provided a categorical measure of attachment. Utilizing a standardized procedure consisting of seven increasingly stressful three minute separation and reunion episodes in an unfamiliar laboratory environment, the Strange Situation was designed to elicit the degree to which the child uses the mother as a secure base for exploration and as a source of comfort when distressed (Calkins & Fox, 1992). It should be noted that the episodes chosen were intended to activate and/or intensify the infants’ attachment behavior, but were designed to approximate situations that most infants commonly encounter in real life. Thus, “strange” denotes “unfamiliar”, as the situations took place in an unfamiliar laboratory with a previously unknown adult, rather than “odd” or “peculiar” (Ainsworth et al., 1978).

The Strange Situation procedure provides opportunity for observation of the infant’s behaviors in a variety of contexts including: exploration of a novel environment in the presence of the mother, reaction to stranger in the presence of the mother, reaction to separation from the mother, reaction to stranger without the mother, and reaction to reunion with the mother. A number of observatory measures based on this sequence of interactions were initially developed (Ainsworth, 1978). Initially Ainsworth and Wittig (1969) utilized the presence or absence of separation distress in order to classify their infants into three loose groups, A, B, and C. Group A infants showed minimal disturbance in separation episodes, while B infants were distressed.
Group C infants were also distressed at separation; however they showed “maladaptive” behaviors which made them distinguishable from Group B infants. The presence of a third Group C indicated that dimensions other than crying during separation would be needed in order to satisfactorily classify infants based on individual differences in attachment behavior (Ainsworth et al., 1978). Further study indicated that the behaviors of the infants during reunion with their mothers (i.e., whether or not the infant initiates contact and/or interaction, avoids contact, or resists contact) were particularly reflective of individual differences in the quality of infant-mother attachment (Ainsworth, 1978). Thus, in the classification system eventually developed for the Strange Situation, reunion behaviors are amongst the most important determinants of attachment status.

Based primarily on these reunion behaviors, the infant is assigned to a group reflecting the quality and patterning of its observed attachment behaviors (Ainsworth et al., 1978). Four dimensions of behavior were thought to be crucial to determining the appropriate group and subgroup classification of an infant: proximity- and contact-seeking behavior, contact-maintaining behavior, avoidance, and resistance (Ainsworth et al., 1978). Indeed, the presence or absence and quality of such behaviors largely define the categories.

Following observation, infants may be classified as securely attached (B), anxious/avoidant (A), or anxious/resistant (C) (Ainsworth et al., 1978). Securely attached infants (B) tend to seek proximity and contact with their mothers. For these infants, the presence of the mother supports exploration of the room prior to separation and the mother’s presence reduces distress and facilitates return to exploration following separation. They may or may not become upset when the mother leaves, but actively greet or seek interaction with the mother upon reunion. In comparison, anxious/avoidant infants (A) tend to explore their environment without
affective exchange in preseparation episodes, tend not to show distress upon separation, and, upon reunion, actively avoid proximity and contact with their mother. Anxious/resistant infants (C) show little exploration during preseparation episodes and are very distressed by separation from their mother. Upon reunion, the infants show mixed proximity-seeking behaviors with resistant behaviors, often showing anger and demanding but then resisting physical contact or interaction. Each of these broad classifications may be further broken into subgroups (A1, A2, B1, B2, B3, B4, C1, C2) which reflect different behavior patterns within the attachment classification in order to provide a more fine-grained description of the infant’s attachment behaviors (Ainsworth et al., 1978). For instance, within secure infants (B), those in group B1 use more distal modes of maintaining proximity, those in group B2 tend to use more proximal modes than those in B1, and those in B3 and B4 utilize increasingly proximal methods of maintaining proximity to the attachment figure.

Using Ainsworth’s traditional classification system however, approximately 15% of infants in normative samples and a higher percentage of infants in at-risk samples are difficult to classify (Main & Solomon, 1986, 1990). In an effort to better understand the behaviors of these infants, Main and Solomon proposed a fourth classification group, disorganized/disoriented (D) and developed guidelines for their classification. Infants within this group show diverse behaviors which may include contradictory behavior patterns (e.g., strong attachment behaviors followed or accompanied by avoidance); direct indices of apprehension toward the parent (e.g., fearful facial expressions); direct indices of disorganization and disorientation (e.g., disoriented wandering); or undirected, misdirected, incomplete, or interrupted movements and expressions (e.g., expressions of distress accompanied by movement away from the mother).
The reliability and validity of the Strange Situation have been carefully established through numerous studies; it is considered by researchers to be one of the gold standard measures of attachment (van IJzendoorn et al., 2004). In terms of reliability of the classification system, within-laboratory agreement for trained coders is generally reported to be quite high, with up to 100% agreement in the original Ainsworth study (Ainsworth et al., 1978) and 85-95% for researchers trained by Ainsworth and her students (e.g., Main & Weston, 1981; Waters, 1979; Solomon & George, 1999). Interlaboratory agreement ranged between 50 to 100% in a study in which Ainsworth and five expert coders coded all or a subset of 37 cases chosen for their difficulty (Carlson & Sroufe, 1993). Given the level of difficulty of the cases, the overall level of agreement was judged to be adequate and was found to be reassuring; however, the wide range of agreement amongst the experts does suggest questions about the level of agreement that may have been achieved with less experienced coders.

Classification stability also tends to be high when laboratory assessments are spaced 2 to 6 months apart or more, ranging from 50 to 96%, with higher stability levels found in middle-class samples (Solomon & George, 1999). Repeated assessments performed over shorter periods (i.e., two to four weeks) typically show lower stability; this is thought to reflect sensitization of the infants to the procedure (Ainsworth et al., 1978).

Validation of the Strange Situation was part of Ainsworth’s original work. The validity of the procedure depends on its ability to substitute for extensive assessment of secure base behaviors in naturalistic settings. In order to establish this, Ainsworth and her colleagues drew on home observation data for the original sample of 23 infants from the detailed narrative record of monthly visits during the first year of life, linking classification in the Strange Situation to variables reflecting the frequency and quality of infant attachment behavior in the home.
Additionally, secure versus insecure laboratory attachment classifications were related to different patterns of infant behavior in the home in theoretically meaningful ways (Ainsworth et al., 1978).

Thus, the Strange Situation provided researchers with a standardized measure of attachment which was judged to have acceptable evidence of reliability and validity. It also held the advantages of providing a measure of attachment within a relatively short period of time within the laboratory, as compared to the longer home observations utilized by many researchers prior to the introduction of the Strange Situation, as well as providing an interesting new classification system which suggested new avenues for research.

There has, however, been criticism of the Strange Situation as well as praise. For instance, ethical concerns have been raised relating to placing the infant in a situation likely to cause distress (e.g., Thompson, 1990). Additionally, Bronfenbrenner questioned the ecological validity of the assessment (1979). Others (Gewirtz & Palaez-Nogueras, 1999, 1991) have questioned the validity of the measurement, as well as the validity of the attachment construct, by noting that separation protests in the Strange Situation and in everyday life may be conditioned. They argue that an explanation based on the functional analysis of the environmental antecedents, particularly the reinforcement of infant protests, would be a more parsimonious and valid approach to explaining infant behavior in response to infant protests to separation from attachment figures.

The primary concerns about the Strange Situation, however, have related to its limitations as a measurement tool. For instance, it is applicable only within a narrow age range, possibly lasting only from 12 to 18 months of age, indicating the need for another method of measuring attachment in toddlers and preschoolers (Waters & Deane, 1985). Further, due to sensitization to
the procedure, repeated assessments must be spaced far apart. These limitations reduce the Strange Situation’s utility for use in research which addresses developmental change. Additionally, the procedure is expensive to administer and score, and scoring is difficult to learn without direct instruction (Waters & Deane, 1985). Finally, the distribution of infants across categories is markedly unbalanced, limiting data analysis options (Waters & Deane, 1985); researchers must often collapse Group A and Group C infants into one insecure group in order to obtain sufficient power for analyses, but sacrificing the meaningful differences between anxious-insecure and anxious-resistant infants.

The Attachment Q-sort

Recognizing these criticisms of the Strange Situation, and in an effort to provide a practical alternative to Ainsworth’s home observation narratives, Waters and Deane (1985) developed the Attachment Q-sort. They felt that the advantages of the q-sort method – that observers could be blind to constructs scored, that observers need not possess detailed knowledge of norms for each item, that a fixed distribution is utilized, and the possibility of a wide range of analytic possibilities – would address a number of the noted concerns. Thus, while the Strange Situation ultimately yielded a categorical approach to attachment measurement, the Attachment Q-sort (AQS; Waters & Deane, 1985) is able to provide a continuous measure of attachment security for children aged 12 to 48 months, focusing on secure base behavior.

Items in the Attachment Q-set were developed and defined following a literature review and observational home visits with infants and toddlers (Waters & Deane, 1985). The original items were piloted and then revised in order to minimize social desirability, and clarify item content. At this point, the item set consisted of 100 items with content clusters representing attachment/exploration balance, differential responsiveness to parents, affectivity, social
interaction, object manipulation, independence/dependency, social perceptiveness, endurance/resiliency. Finally, parents were asked to familiarize themselves with the items and to use them to describe their own infant’s or toddler’s behavior. Additionally, two observers visited the homes for three to four hours at each of two visits and used these observations to describe the subjects’ behavior. Items for which it was difficult to obtain agreement between observers were clarified and a number of items were identified and revised, in some cases to eliminate technical terminology mothers had asked to have defined, and in other cases to better clarify the relevant behavior. Following revision, the 100-item pool of the AQS was completed.

A later revision (Waters, 1995), however, was undertaken and the AQS in its current form consists of 90 items, representing a subset and extension of the original 100 items. The general content of the items was retained while further simplifying the language to eliminate technical jargon and double negatives, as well as make items more accessible to less well-trained observers, such as parents. Additionally, a number of items, including those rarely observed in the home and those which yielded very limited variability, were removed.

Thus, the AQS in its current version is made up of 90 statements designed to reflect either the secure base phenomenon itself or behaviors associated with it, with secure base behavior defined as the smooth organization of and appropriate balance between seeking proximity to the attachment figure and exploring the environment (Solomon & George, 1999). Each statement is sorted into one of nine equal piles reflecting the degree to which the item is typical of the child’s behavior. Sorts may be completed by either trained observers or parents. When completed by observers, Waters (1995) recommends that the sorts be based on several observations totaling two to six hours, and states that under ideal circumstances, multiple
observers would describe the behavior of the child over multiple settings and occasions, arguing that such a procedure would be likely to yield the most reliable and valid assessments.

While AQS data may be analyzed in a variety of forms, including single items or summary scales, perhaps the most common method of scoring is comparing each child’s sort to a criterion sort. Criterion sorts have been developed for attachment security, as well as several other constructs (e.g. social desirability, dependence, sociability), by averaging the sorts of experts in the field who were asked to imagine a prototypically securely attached child and sort the items accordingly for that child (Waters, 1995). Thus, the child’s criterion score is calculated by performing a correlation between the child’s sort and the experts’ criterion sort. However, single or average AQS scores hold no specific meaning beyond their similarity to the security criterion sort; there is no natural cutoff point for dividing secure children from insecure children (van IJzendoorn et al., 2004).

While in existence for a shorter period than the Strange Situation, the reliability and validity of the AQS have already been widely established. In terms of reliability, in contrast to categorical measures of attachment, achieving interobserver reliability on the AQS does not require extensive training and studies report interobserver reliabilities ranging from .72 to .95 when utilizing trained observers (Solomon & George, 1999).

Evidence for the AQS’s validity has also accumulated. Meta-analysis showed that observer AQS security scores were related to attachment security measured by the Strange situation (r=.32), showing “substantial but modest” convergent validity (van IJzendoorn et al., 2004). Further, with more than three hours of observation prior to completing the sort, the relation between AQS security and Strange Situation security rose (r=.42) (van IJzendoorn et al., 2004). With this evidence for reliability and validity, van IJzendoorn and colleagues (2004)
concluded that it was reasonable to include the observer-rated AQS in “a small number of gold standard measures in attachment including the Strange Situation and Adult Attachment Interview.”

Utilization of the parent-rated AQS, however, continues to be debated, based on data about parent vs. observer sorts. Agreement between the sorts of mothers and trained observers is typically moderate when sample sizes are small (below 60 subjects), but tends to improve as a function of training and supervision of mothers, observer training, and the opportunity to see a range of the child’s behavior (Teti & McGourty, 1996).

Studies looking at short-term stability of parent AQS ratings show a wide range, from .04 to .75 (Bretherton et al., 1990; Teti, Sakin, Kucera, Corns, & Das Eiden, 1996; van Dam & van IJzendoorn, 1988). Belsky and Rovine (1990) found low to moderate long-term stability from age 1 to 3 (mothers: r = .23; fathers = .53; social desirability partialed out).

In terms of validity, meta-analysis showed that parent-report AQS security scores showed a disappointingly weak relationship to Strange Situation security (r=.14), providing unconvincing evidence of convergent validity (van IJzendoorn et al., 2004). Additionally, the parent-report AQS showed a considerable relationship to temperamental reactivity (r=.35), providing evidence of poor divergent validity (van IJzendoorn et al., 2004).

Thus, although Waters and Deane attempted to make the AQS accessible to parents, van IJzendoorn and colleagues (2004) conclude that the available evidence does not yet warrant the use of parents as valid and reliable raters of attachment security when utilizing the AQS. They note that it remains unclear what is actually measured when mothers complete the AQS, theorizing that mother of insecure children may lack the observational skills necessary to correctly describe the secure-base behaviors of their children. In support of this contention,
Vereijken and Kondo-Ikemura (2004) presented evidence that more sensitive mothers provided Q-sort description that were more similar to observer descriptions. However, Stevenson-Hinde and Shouldice (1990) found that mothers of secure children consistently rated their children’s attachment security lower than did observers, while mothers of insecurely attached children assessed their children’s attachment security higher than did observers. Even the meaning of these differences is not entirely clear, however, as Waters and Deane (1985) examined the differences between mothers’ and observers’ sorts, in their initial development of the AQS, stating that, in many instances the differences resulted from mothers having better access to their child’s behavior than the observers did. They concluded that their results provided clear evidence that mothers could provide “exceptional” data on their children’s attachment behavior when informed in advance of what they should observe and how it was to be reported. Collectively, the available data provide some preliminary evidence of the parent-report AQS reliability/validity. At the same time, however, additional research is required in order to establish this approach as a gold standard measure, on par with the Strange Situation and observer-rated AQS.

The AQS holds several advantages as a method of measuring attachment. It may be used with a larger age range (12 to 48 months) than the Strange Situation and may be used in repeated measures designs (Waters and Deane 1985), making it well-suited for use in projects seeking to answer question regarding development of attachment security. Additionally, it may be conducted in the home, allaying concerns about ecological validity which have been raised in relation to the Strange Situation. Finally, it does not require stressful separations needed in the Strange Situation and may therefore be more useful in cultures in which parent-infant separations are uncommon, and additionally eliminating ethical concerns regarding those separations.
The AQS, however, also has disadvantages. It is a time consuming measure, requiring at least several hours of observation, as well as the time to complete the q-sort description. Additionally, the AQS does not provide the means of differentiating between previously identified subtypes of insecurity.

**Antecedents of Attachment Security**

**Maternal Sensitivity**

Attachment theory holds, as one of its primary conjectures, that individual differences in the security of attachment relationships result from the differing histories of interaction in mother-infant dyads. Bowlby (1969) first suggested that the attachment figure’s sensitivity in responding to the infant’s signals may be a factor in the development of a secure attachment relationship, while Ainsworth and her colleagues were the first to empirically study the assertion that maternal behavior, and specifically maternal sensitivity, at home impacted the security of attachment (Ainsworth et al., 1978). As part of the Baltimore project, 26 middle-class mother-infant dyads were observed during the first year of life, resulting in more than 70 hours of in-home observation for each pair. Within the study, the mothers’ behaviors were rated on sensitivity, acceptance, cooperation, and accessibility. At the end of the year, the mother and infant then completed the Strange Situation within the laboratory. Each of the four areas of maternal behavior studied were found to be related to attachment security, with mothers of securely attached infants showing appreciably more sensitivity, acceptance, cooperation, and accessibility than mothers of anxious-avoidant or anxious-resistant infants. Based on these results, Ainsworth and her colleagues (1978) concluded that sensitive responding to infant signals and communications, which may be “manifested in different specific ways in different
situations,” is the most important aspect of maternal behavior associated with the security-insecurity dimension of infant attachment.

Ainsworth et al. (1978) describe the “optimally sensitive mother” as one who is alert to her infant’s signals, interprets them correctly, and provides a prompt and appropriate response to them, unless no response is appropriate for the given situation. She is empathetic, tends to provide her infant what he or she seems to want, or is tactful in acknowledging the infant’s communication when she does not. Her responses are temporally contingent upon the infant’s signals. Thus, a mother’s consistent perceptions and accurate interpretations of her infant’s signals, and her appropriate and contingent responses to these signals, appear to promote the development of security. In contrast, interventions provided by mothers low in sensitivity are typically geared toward the mother’s own states wishes, and activities. These mothers tend to distort the message the baby is sending, often interpreting it in light of their own needs or defenses, or do not respond to the infant’s signals at all. Hence, insecure attachments appear to result from a mother’s inconsistent or negligent perception, interpretation, and response to her infant’s signals.

Following Ainsworth’s initial work in the area of sensitivity, researchers sought to delineate specific maternal behaviors responsible for individual differences in attachment quality (Isabella, 1993). This body of work provides evidence that mothers of securely attached 1-year-olds are significantly more responsive to their infants’ vocalizations and distress signals and more likely to involve their infants in moderate levels of interaction resulting in neither over- or understimulation (Belsky, Rovine, & Taylor, 1984), hold their infants significantly more often and interrupt infants’ ongoing behaviors less often (Miyake et al., 1985), and interact with their infants in a synchronous manner more frequently (Isabella, Belsky, & von Eye, 1989; Isabella &
Belsky, 1991). Mothers of secure infants have also been shown to be more involved with their infants (Lyons-Ruth, Gonnell, Zoll, & Stahl, 1987), more positive (Ainsworth et al., 1978; Maslin & Bates, 1983; Tracy & Ainsworth, 1981), less negative (Lyons-Ruth et al., 1987), more responsive to infant signals (Ainsworth et al., 1978; Belsky, Rovine, & Taylor, 1984; Crockenberg, 1981; Isabella & Belsky, 1991; Isabella, Belsky, & von Eye, 1989; Pederson et al., 1990; Smith & Pederson, 1988), more appropriate in their responsiveness (Smith & Pederson, 1988), and more appropriate in pacing of interactions (Blehar, Leiberman, & Ainsworth, 1977; Egeland & Farber, 1984; Miyake, Chen, & Campos, 1985).

In moving away from global levels of measurement toward more specific behaviors, researchers have been able to document distinctions between the interactional histories of secure and insecure dyads, as noted above, and have also been able to identify differences in the interactional histories of anxious-avoidant and anxious-resistant dyads. Mothers of avoidant infants generally appear to be overstimulating and intrusive (Belsky & Isabella, 1989). They showed the highest levels of reciprocal interaction and involvement (Belsky, Rovine, & Taylor, 1984), were more responsive to general infant behavior (Lewis & Feiring, 1989) and infant facial emotional expression (Malatesta et al., 1989), and responded more intensely than other mothers (Smith & Pederson, 1988). They have also been shown to vocalize in a continuous, noncontingent manner while also failing to respond verbally to their infant’s vocalizations (Belsky & Isabella, 1991). Conversely, mothers of resistant infants generally appear to be underinvolved and unavailable (Belsky & Isabella, 1989). They showed the lowest levels of reciprocal interaction and involvement (Belsky, Rovine, & Taylor, 1984) and were under-responsive and underinvolved in a semistructured interaction episode (Smith & Pederson, 1988). Additionally, they showed minimal maternal involvement when infants vocalized and/or looked
at them, characterized only by visual attention and poorly coordinated interactions (Belsky & Isabella, 1991). As a whole, these findings suggest that anxious-avoidant attachments are the result of intrusive and hyper-responsive caregiving, while anxious-resistant attachments are the result of low levels of maternal involvement and responsiveness and poorly timed interactive bids (Belsky & Isabella, 1991). By identifying specific behavioral antecedents related to each attachment pattern, some researchers argue, this body of research has made a significant contribution by strengthening the validity of the sensitivity construct (Isabella, 1993). Other researchers, however, argue that the findings of this research have been inconsistent (e.g., Goldsmith & Alansky, 1987); it is possible that this research may serve to distract from the larger picture of whether sensitive responding based on infant signals and communications is a necessary antecedent of attachment security.

In a different vein of research, other studies have set out to replicate the link between maternal sensitivity and attachment security found in Ainsworth’s Baltimore project. Results of these studies have often provided support for the role of maternal sensitivity in attachment security (e.g., Belsky, Rovine, & Taylor, 1984; Grossman, Grossman, Spangler, Suess & Unzner, 1985; Isabella, 1993). However, other research has failed to find the expected relationship (e.g., Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990; Rosen & Rothbaum, 1993; Seifer, Schiller, Sameroff, Resnick, & Riordan, 1996; Ward & Carlson, 1995). Given these conflicting results, and the number of available studies, meta-analyses have proven useful in elucidating the sensitivity-attachment relationship. In the first, Goldsmith and Alansky (1987) found that, when evaluated in terms of statistical significance, the studies included in their meta-analysis generally supported Ainsworth et al.’s (1978) findings regarding the relation between maternal sensitivity and secure attachment. However, they noted that the actual size of the predictive effect of
maternal sensitivity was substantially smaller than that suggested in the original study. They concluded that, omitting the results Ainsworth et al. (1978) a mean effect size of $d = .36$ was the most appropriate estimate of the magnitude of the sensitivity-security relation, standing in marked contrast to the effect size of $d = 2.48$ computed from Ainsworth et al. (1978). These findings suggested that an effect which researchers largely had great confidence in, the impact of maternal sensitivity on attachment security, was not as strong as had been believed.

De Wolff and van IJzendoorn (1997), however, observed that despite these results, many theorists continued to hold that maternal sensitivity is a crucial antecedent of attachment security. They noted that the weaker associations between sensitivity and attachment security found in the studies following Ainsworth et al.’s original study had been attributed to methodological weaknesses by some researchers. They summarized the “orthodox” attachment theorists’ position as follows: The mother’s interactive behavior, especially her sensitivity, is considered the primary determinant of attachment quality; in order to detect the relationship, however, observations of maternal behavior must be sufficiently intensive and reliable, and the dimensions of maternal behavior observed and measured must be conceptually close to sensitivity. Hence, studies in which sensitivity was measured in a single home visit or brief laboratory assessment, or studies in which related concepts, but not sensitivity as originally conceptualized, were measured would yield weaker findings, whereas studies designed in accordance with the original features and conceptualizations of Ainsworth’s Baltimore study would result in findings more similar to the original findings (Pederson et al., 1990; Pederson, 1998). The meta-analysis conducted by de Wolff and van IJzendoorn (1997) was designed in part to address this conjecture.
Excluding the Ainsworth et al. (1978) Baltimore study (due to its status as the original study and its somewhat outlying status), the combined effect size for the association between attachment and maternal sensitivity was $r(1,644) = .22$ within the de Wolff & van IJzendoorn (1997) meta-analysis. Using a strict definition of maternal sensitivity, including only studies that measured sensitivity with Ainsworth’s original sensitivity rating scale, the effect size increased, but only to $r(835) = .24$ (de Wolff & van IJzendoorn, 1997). These effect sizes show a medium degree of association, utilizing Cohen’s (1988) criteria, and are notable in that they reveal a smaller magnitude of relation between maternal sensitivity and attachment security than the Baltimore study, $r(21) = .78$. Additionally, they show that even replication studies utilizing similar intensive, longitudinal designs and measurements have not revealed results as strong as those found in the Baltimore study, providing evidence against the “orthodox” position that studies designed in a manner similar to the Ainsworth et al. (1978) study would yield similar results. More specifically, de Wolff & van Ijzendoorn’s (1997) analyses revealed that neither the setting of the study (lab or home), nor the duration of observations, nor the type of assessment (Strange Situation or alternate measure of security) had an impact on the magnitude of relation between maternal sensitivity and attachment security.

Socioeconomic status and age of the infants at the time of assessment were, however, significant moderators of the sensitivity-security relationship. In middle-class samples, the effect size was $r(886) = .27$, while in lower-class samples the effect size was $r(650) = .15$. Samples with infants older than 1 year at the time of sensitivity assessment showed stronger effect sizes, $r(1,062) = .24$, than samples with younger infants, $r(602) = .20$. Samples with infants older than one year at the time of attachment assessment also showed stronger effect sizes, $r(847) = .25$, than samples with younger infants, $r(817) = .19$. 

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Further, de Wolff and van IJzendoorn investigated several domains of maternal interactive behavior in addition to sensitivity, including mutuality, synchrony, emotional support, attitude, and stimulation. Mutuality, which includes the amount of positive exchanges in which the mother and infant show joint attention and the mother’s skill in modulating the infant’s arousal, was associated with attachment security, \( r(166) = .32 \). Synchrony, the extent to which interaction between mother and infant is reciprocal and mutually rewarding, was also related to attachment security, \( r(256) = .26 \). Effect sizes for the other domains of interactive behavior ranged from .16 to .19. These findings, coupled with the more modest correlations between sensitivity and attachment security, suggest that features of parenting not directly related to the sensitivity construct may play an important role in the development of attachment.

Taken as a whole, the results of the Goldsmith and Alansky (1987) and de Wolff and van IJzendoorn (1997) meta-analyses provide strong support for a relationship between maternal sensitivity and attachment security. The magnitude of this relationship, however, appears smaller than that suggested by Ainsworth et al.’s (1978) original study; indeed the findings from this study were considered an outlier in both meta-analyses. Additionally, the relationship between sensitivity and security was moderated by both socioeconomic status and infant age at assessment, suggesting that sensitivity may be linked to security only when it remains stable across time, which may occur only in a stable social context (de Wolff & van IJzendoorn, 1997). Further, other dimensions of parenting were found to be significantly related to attachment security with comparable effect sizes.

These findings do not necessarily negate the importance of maternal sensitivity in the establishment of a secure attachment relationship; moderately strong – and even weak – correlations may signify powerful causal relationships (de Wolff & van IJzendoorn, 1997). They
do, however, suggest that maternal sensitivity should not be considered as the sole factor in the development of attachment security, and perhaps not even the most important. As this view has become clearer in the literature, more and more researchers have begun to call for studies considering other factors in concert with maternal sensitivity in order to achieve a better understanding of the antecedents of attachment security (e.g., de Wolff & van Ijzendoorn, 1997; Diener, 2003; Schnier, 2000; Seifer & Schiller, 1996). Specifically, researchers have suggested a focus on more distal or contextual factors which may impact parenting (e.g., Schnier, 2000), infant characteristics (e.g., Belsky, 1997), and parent characteristics (e.g., Clark, 2000).

**Infant Temperament and Attachment**

Bowlby (1982) stated “It is evident that the particular pattern taken by any one child’s attachment behavior turns partly on the initial biases that infant and mother each bring to their partnership and the way that each affects the other during the course of it,” thus accepting a variety of individual influences on the quality of attachment between child and caregiver. Of these, child temperament is perhaps one of the most studied. However, despite the great deal of research into the possible relationship between temperament and attachment, researchers have yet to reach a consensus on how the two constructs are related, although a great variety of relationships have been proposed.

At the extremes, some attachment theorists have discounted the impact of temperament, asserting that it is not a major determinant of attachment security (Sroufe, 1985), while some temperament theorists have argued that security of attachment is a result of temperamental variation amongst infants (Chess & Thomas, 1982; Kagan, 1982, 1984). Between these extremes, three proposed positions have received a great deal of attention (Sroufe, 1985). First, temperament may directly impact the infant’s behaviors in the Strange Situation and the child’s
attachment classification. In other words, temperamental variation may determine what type of insecurity (avoidance or resistance) the child manifests. Second, temperament may impact the infant’s behaviors in the Strange Situation, but not directly impact the child’s attachment classification. Finally, maternal behaviors which influence attachment security may also affect the development of temperament, such that it makes little contribution to the quality of attachment. Although not receiving as much theoretical or empirical attention, other perspectives have also been put forward. Temperament may have an indirect effect on the quality of the attachment relationship by impacting child-caregiver interactions, and thus, the overall child-caregiver attachment (Goldsmith et al., 1986). Alternately, temperament characteristics may also moderate the child’s responsiveness to the mothering they receive (Waters, 2000). Finally, attachment and temperament may exert reciprocal influences on each other (Goldsmith & Harman, 1994).

The empirical evidence for any of the proposed relations may be characterized as sparse and contradictory (Seifer and Schiller, 1996). Some studies have found support for direct relation between temperament and attachment (e.g., Calkins and Fox, 1992; Frodi, Bridges, & Shonk, 1989; Goldsmith & Alansky, 1987; Miyake, Chen, & Campos, 1985), while others have not (e.g., Bates, Maslin, & Frankel, 1985; Bohlin, Hagekull, Gerner, Andersson, & Lindberg, 1989; Gunnar, Mangelsdorf, Larson, & Hertsgaard, 1989).

In an attempt to provide some clarity to the field, Goldsmith and Alansky (1987) completed a meta-analysis which addressed the question of whether temperament might explain observed variation in attachment security. Specifically, they hypothesized that temperamental proneness to distress would predict resistant behaviors within the Strange Situation. They found that this was the case, but with low strength (r = .16). Both questionnaire and observational
measures of temperament yielded similar effect sizes (r = .14 and .15, respectively). The interval between the measurement of temperament and attachment did not influence the strength of the effect. While this study is often cited as a seminal investigation in temperament/attachment literature, it should be noted that it addresses only one aspect of temperament, proneness-to-distress, in one context, the Strange Situation. Moreover, researchers are divided in their interpretations of this effect. Some report that the meta-analysis found little evidence for an association between temperament and attachment (Goldsmith & Harman, 1994), while others cite the study as strong support, describing the effect as similar in size to that of parenting effects (Seifer & Schiller, 1996).

It has been proposed that some of the confusion within the literature may result from the degree of heterogeneity within temperament theory and literature (Vaughn & Bost, 1999). Most temperament theories have several features in common: the constructs included are largely, though not exclusively, emotional in nature; they appear during infancy; they are relatively stable for significant periods of development; and they are thought to have biological substrates (Goldsmith & Harman, 1994). Temperament theorists also largely agree that individual differences in temperament dimensions have implications for frequencies and qualities of exchanges between a child and his or her caregivers, and that these exchanges may modify the child’s characteristic expression of temperament (Vaughn & Bost, 1999). These areas of agreement, however, also leave large areas for difference. A variety of theories of temperament exist, each with its own definition of temperament, list of constructs falling within the domain of temperament, and, in many cases, methods for measuring and assessing temperament. Given the diversity present in the temperament field, Vaughn and Bost (1999) proposed reviewing the
temperament/attachment literature by temperament theory in hopes that this approach would provide further clarity.

Within their review, Vaughn and Bost (1999) identified four broad categories of temperament theory: temperament as behavioral-style, as in the theory of temperament presented by Thomas and Chess; temperament as emergent personality, as in the theory presented by Buss and Plomin; temperament as emotion and emotion regulation, as in the theories of Goldsmith and Campos and Rothbart and Derryberry, as well as the more specific positions of Gunnar et al. (temperamental “proneness to distress”) and Kagan et al. (temperamental “behavioral inhibition”); and temperament as social construction, as in the theory presented by Bates. They then organized the literature according to these categories, looking for a pattern in the results according to temperament theory.

Vaughn and Bost (1999) reported that behavioral-style temperament studies generally showed inconsistent results in relation to Strange Situation classifications of attachment and significant correlations to AQS attachment security. These correlations varied widely ($r$’s from -.04 to -.54), but suggested that cases rated as more temperamentally “difficult” had lower attachment security scores. Further, values appeared more likely to achieve significance when mothers completed both the temperament ratings and the AQS. Studies that addressed temperament as emergent personality also yielded inconsistent findings. For example, some studies suggested that irritable infants were more likely to be classified as resistant in the Strange Situation (Waters et al., 1980; Sussman-Stillman et al., 1996), while others suggested that irritable infants are more likely to classified as avoidant (van den Boom, 1989, 1994). For those studies addressing temperament as emotionality and emotional regulation, Vaughn and Bost reported three studies which found significant relations between temperament and AQS security,
specifically between a composite score for negative reactivity (Kochanska, 1995; Kotsaftis, 1989, in Vaughn, 1992) and Distress to Limitations (Seifer et al., 1996). Studies utilizing the Strange Situation were somewhat inconsistent, with one finding no significant relations between temperament and Strange Situation classifications (Seifer et al., 1996) and one finding a composite of positive versus negative affect was positively and significantly correlated with avoidance in the Strange Situation (Bradshaw, Goldsmith, and Campos, 1987). Further, findings of the majority of the studies addressing temperamental proneness to distress have failed to find a significant association between this construct and attachment classification in the Strange Situation. Studies which addressed temperament as social construction largely found no significant correlation between Strange Situation attachment classifications, but one study did find an association between a summary score for infant difficultness and the AQS security score (Vaughn, 1992).

Within this approach to temperament, a group of studies deserve further consideration because they address the proposition that temperament may impact behavior within the Strange Situation, rather than Strange Situation classification. Belsky and Rovine (1987) regrouped the infants within their study into two categories, a group composed of avoidant infants and infants classified as either B1 or B2, and a group composed of resistant infants and infants classified as B3 or B4. They then compared the two groups and found that the first group, composed of the A through B2, was less difficult than the second, composed of infants classified as B3 through C. These findings have proven difficult to replicate, however, and a number of studies utilizing the same and different assessment protocols have found no relations between these Strange Situation groups and temperament (e.g., Gunnar et al., 1989; Mangelsdorf et al., 1990, Seifer et al., 1996; Vaughn et al., 1989). Further, within the Seifer et al. (1996) study a significant effect was found
in the opposite direction. The A through B2 cases were found to be significantly more difficult than the B3 through C cases.

Taken as a whole, the evidence for direct effects of temperament reviewed above is inconsistent. When differences between secure and insecure infants as measured in the Strange Situation are examined, temperament dimensions such as negative emotionality generally do not distinguish securely attached infant from insecurely attached infants. In terms of potential associations between temperament dimensions such as difficulty, emotionality, and negative reactivity and irritability/distress as seen in the Strange Situation, results have been contradictory. Temperament has been more frequently linked with attachment security as assessed by the AQS. Infants who are rated as being more difficult, prone to distress, reactive, and so on are rated as less secure than children showing lower levels of these characteristics.

With the inconsistency illustrated in the literature, it is difficult to make a case for the stance that attachment security is determined by temperamental variation. Some evidence supports the view that temperament may impact behavior in the Strange Situation, however, it is impossible to categorically state what impact this may be. With the lack of support for direct effects of temperament, several researchers have suggested that difficult infant temperament may affect attachment security in combination with other risk factors, such as maternal low sensitivity (e.g. Mangelsdorf, Gunnar, Kestenbaum, & Lang, 1991; van den Boom, 1994). While most research continues to address direct relationships, some evidence for indirect relationships exists. For example, the interaction of maternal sensitivity and infant irritability, both assessed at three months, was found to be a significant predictor of attachment security at three months, providing support for a moderator model (Susman-Stillman, Kalkoske, Egeland, and Waldman, 1996). Within the same study, support was found for maternal sensitivity mediating the effect of
irritability on attachment security when all were assessed at six months. Similarly, Crockenberg (1981) reported that high infant irritability was associated with anxious attachment only in the presence of low maternal social support. These and other studies indicate that the relation between temperament and attachment may be more complex than that initially studied by the majority of temperament/attachment researchers.

**Parental Personality/Temperament**

Given the large amount of research focusing on possible links between infant temperament and attachment, the relative dearth of research on links between parent personality or temperament and attachment is surprising. Few researchers have specifically addressed whether such links may exist. Moreover, within the extant work, few aspects of parental personality have received more than a cursory examination. Rather more research examining relationships between parental personality and parenting exists, although, again, researchers have noted a surprising lack of study in this area (Clark, Kochanska, & Ready, 2000).

**Negative Affectivity**

Negative affectivity or negative emotionality is one aspect of parental personality which has been examined by a number of researchers. It may be defined as including both proneness to negative emotions and reactivity to stress (Watson et al., 1994; in Kochanska, Clark, & Goldman, 1997). Drawing inferences from findings of research on parental depression, researchers have generally expected high levels of negative emotionality to be associated with a lower quality of parenting and poorer child outcomes. In terms of parenting, mothers high on negative emotionality, in comparison to those who rated themselves low on this attribute, had more negative expectations and perceptions of their infants, were less positively involved with their infants in observed interactions, and were less sensitive to their infants (Belsky, Crnic, &
Mothers’ negative emotionality and disagreeableness have been found to predict less responsive and more power-assertive parenting when measured with self-report (Kochanska, Clark, & Goldman, 1997). Similarly, negative affectivity and disagreeableness have been shown to be related to less adaptive parenting in the context of observations (Clark, Kochanska, & Ready, 2000).

Although this existing research on negative emotionality and parenting is provocative, it cannot answer the question of whether parental personality is related to eventual child attachment security. A study by Kochanska, Clark, and Goldman (1997) examined child attachment security, measured by the AQS, as part of their global measure of “mother-reported adaptive developmental outcome,” along with information on behavior problems and internalization of maternal rules. They reported that negative emotionality was negatively related to this outcome, such that higher levels of maternal negative emotionality predicted poorer child outcomes, including lower levels of attachment security. Due to the aggregate nature of this outcome measure, it is important not to overstate the significance of this finding in relation to attachment. However, it is worth noting that the consequences of negative emotionality were present even after controlling for parenting variables, such as responsiveness/warmth. This suggests the possibility of a direct, as well as indirect, relationship between parental personality and child outcomes, including attachment security.

In a study more exclusively focused on attachment, Stevenson-Hinde (1995) reported that mothers of securely attached children rated themselves significantly lower on “negative mood” than mothers of children with insecure attachment. Similarly, Izard, Haynes, Chisolm, and Baak (1991) found that mothers of children with higher insecurity scores (i.e., more likely to be
classified as insecurely attached) reported experiencing more negative emotion, while mothers of children with lower insecurity scores (i.e., children more likely to be classified as securely attached) reported experiencing less negative emotion. However, in looking at expression of negative emotion, they found that mothers whose infants were more likely to be classified as insecurely attached reported being less open in the expression of their negative emotions around their children; mothers whose children were more likely to be classified as securely attached reported being more open in expressing their negative emotions around their children. Thus, mothers of more insecure children reported experiencing more negative emotion but expressing it less openly around their children. Izard et al. (1991) suggest that this inconsistency may result in the mothers sometimes sending mixed or uninterpretable messages to their children which could, over time, impact their attachment status.

In another study, Ispa, Fine, and Thornburg (2003) found that maternal stress reaction, a construct reflective of mother’s propensity to experience negative emotions such as worry or anger over everyday occurrences, predicted infant attachment security, even after controlling for infant fearfulness. They further reported that the interaction between maternal stress reaction and infant fearfulness was a significant predictor of attachment security, such that infant temperament was not significantly related to insecure attachment for infants whose mothers were in the medium or high stress reactivity. This finding was interpreted as evidence of the importance of maternal personality, with the researchers noting that maternal negativity may overpower the effect of infant temperament on attachment security in some cases.

Interestingly, the findings on maternal negative emotionality are not entirely consistent. Mangelsdorf, McHale, Diener, and Lehn (2000) reported that maternal negative affectivity was
not significantly related to infant behavior during the Strange Situation, nor did mothers of secure and insecure infants report significantly different levels of negative affectivity.

*Positive Affectivity/Extraversion & Agreeableness*

Positive affectivity, positive emotionality, or extraversion, has also received a fair amount of attention in research on relations between parental personality and infant attachment. Positive affectivity includes experience of positive affect, confidence, energy level, and enjoyment of social interactions and exciting/intense experiences (Watson et al., 1994; in Kochanska, Clark, & Goldberg, 1997). A positive relationship between positive affectivity and parenting has generally been reported. For example, Mangelsdorf et al., (1990) found that mothers who reported higher levels of positive affectivity were rated by observers as warmer and more supportive in interaction with their 9-month-old infants. Similarly, Kendler et al (1997) reported a positive association between positive affectivity and maternal warmth. Clark, Kochanska, and Ready (2000), also reported that mothers high in extraversion tended to be more responsive to their children. Interestingly, they found mother’s levels of extraversion to be related to the level of power assertion utilized in parenting as well. Mothers high in extraversion used power assertion differentially, responding to children high in negative emotionality with high power assertion and those low in negative emotionality with low power. Mothers low in extraversion used little power assertion regardless of their child’s level of negative emotionality. The latter finding was not anticipated, and the researchers speculated that the high degree of engagement typical of individuals high in extraversion may contribute to higher levels of dominant and assertive behavior. They note that extraversion, as measured by the NEO-FFI which was utilized in the study, includes features of warmth and assertiveness (Costa & McCrae, 1992; in Clark, Kochanska, & Ready, 2000), and the multi-factorial nature of the trait may explain the
differential association between extraversion and parenting behaviors. Again, however, not all results link positive emotionality to parenting; in an earlier study, Kochanska, Clark, and Goldman (1997) reported that sociability/affiliation was not found to be significantly related to any observed parenting behaviors.

Mothers’ level of positive emotionality appears to be linked to attachment security. Izard, Haynes, Chisolm, and Baak (1991) found that mothers of children with lower insecurity scores (those more likely to be classified as securely attached) reported higher positive emotionality and sociability. Surprisingly, however, mothers of children with higher insecurity scores (those more likely to be classified as insecurely attached) reported expressing more positive emotions around their children in daily life. Again, it was suggested that these somewhat mixed results could result in mothers of insecure children sometimes sending mixed or uninterpretable messages to their children, which could, over time, impact attachment status.

Mangelsdorf, McHale, Diener, and Lehn (2000) found a significant difference between the level of positive affectivity reported by mothers of avoidant infants and mothers of resistant infants, with mothers of avoidant infants reporting lower levels of positive affectivity. Mothers of secure infants scored more similarly to mothers of resistant infants (reporting higher levels of positive affectivity) but did not differ significantly from either insecure group. Positive affectivity within this study was measured with the Multidimensional Personality Questionnaire (Tellegen, 1982), which provides subscales for the positive affectivity factor. Planned contrasts between positive affectivity subscales showed that mothers of secure infants scored higher on Well-being than insecure infants, indicating that these mothers are likely to report happy, cheerful dispositions, and positive feelings about themselves, compared to mothers of insecure infants. Additionally, mothers of resistant children scored higher on Achievement than mothers
of avoidant infants, indicating that they were more likely to place emphasis on work and accomplishments and be perfectionistic. While it remains unclear how this dimension of positive affectivity may be related to a resistant, rather than avoidant, attachment style, the researchers note that it is possible such an orientation may result in an inconsistently sensitive and available mother.

Agreeableness, which includes aspects of empathy, altruism, kindness, trust, courtesy, and harmony in social interactions (Watson et al., 1984; in Kochanska, Clark, & Goldman, 1997), has also been shown to relate to parenting in a positive manner. Mothers higher in agreeableness have been shown to engage in more positive and less negative parenting (Belsky et al., 1995). Specifically, agreeableness was found to predict high positive and low negative affect in mothers’ interactions with their toddlers, greater sensitivity, and lower levels of detachment (Belsky et al., 1995). Further, low agreeableness was found to be related to lower levels of adaptive parenting and less positive child development outcomes (Kochanska, Clark, & Goldman, 1997). In this case, however, the associations were present only when parenting was not statistically controlled for, providing some evidence that the relation between low agreeableness and child outcome may be mediated by parenting practices. No study has yet specifically and directly addressed the relation between maternal agreeableness and infant attachment.

*Constraint & Conscientiousness*

Research on constraint, defined as the acceptance of the norms of one’s culture, control of impulses for the sake of distant goals, planfulness, risk avoidance, and responsibility (Watson et al., 1994; in Kochanska, Clark, & Goldman, 1997), and conscientiousness, a similar construct, though scant, indicates interesting relations to parenting and attachment. On the whole,
researchers have typically hypothesized that mothers high on constraint are likely to be sensitive to their children’s needs and establish predictable routines, which should, in turn, be related to positive child outcomes. This view has largely been supported in the available research.

Kochanska, Clark, and Goldman (1997) reported that maternal constraint was positively related with adaptive mother-reported child outcomes. In terms of parenting, Clark, Kochanska, and Ready (2000) report that conscientiousness was positively correlated with responsiveness and was a stronger predictor of this outcome than other parent personality traits.

Mangelsdorf et al. (2000) reported on associations between maternal constraint and infant attachment. Higher levels of constraint were correlated with lower levels of resistance during reunion episodes in the strange situation. Additionally, securely attached infants were found to have mothers who were higher on constraint than insecurely attached infants. In an earlier study, however, Mangelsdorf et al. (1990) did not report significant relations between maternal constraint and attachment status, although infant proneness-to-distress and attachment security were found to interact with constraint. Thus, maternal constraint was not related to attachment security for infants low on proneness-to-distress, but for infants high on proneness-to-distress, low maternal constraint was associated with secure attachment. It may be that mothers high in constraint have more difficulty suddenly changing their plans in response to their infant’s needs when the infant is consistently expressing a higher level of distress, while mothers similarly high in constraint may be able to adequately provide support to an infant who is less prone to distress.

**Personality traits in combination**

While most of the existing research has focused on specific aspects of maternal personality (e.g., negative emotionality, positive emotionality, etc.), composite measures of personality traits may also prove to be of use in predicting infant attachment. In a large sample
involving over 1,100 infants, mothers of infants classified as secure at 15 months of age scored higher on a composite index of maternal personality (agreeableness + extraversion – neuroticism – depression) assessed at 1 month of age (NICHD Early Child Care Network, 1997). This finding was interpreted as indicating that greater maternal psychological well-being is associated with attachment security. While other studies have occasionally examined interactions between maternal personality factors, further research focused on how personality factors may act in concert with one another to impact attachment may be fruitful.

Similarly, the interactions between maternal personality and infant characteristics noted above suggest that further research may point to the limitations inherent in presupposing that the development of attachment security depends primarily on the characteristics of only one member of the attachment relationship. Rather, attachment security likely emerges from the interplay between the characteristics of both the mother and infant, as described by goodness-of-fit models (Mangelsdorf, 1990).

**Maternal Psychopathology**

Depression is prevalent among women of childbearing age, impacting 8 to 10 percent of women between 25 and 44 years of age (Kessler et al., 1996, in Carter et al., 2003). Estimates of rates of women suffering from postnatal depression range from 3 to 27 percent; of these, 20 to 30 percent will have previously experienced a mood disorder and 30 to 50 percent will suffer postnatal depression following the birth of a subsequent child (O’Hara et al, 1983; Searle, 1987; in Milgrom, 1996).

A large body of research suggests that children of depressed mothers experience more negative outcomes. Overall, the parenting of depressed mothers has been variously characterized as insensitive, incompetent, apathetic, uninvolved, ineffective, emotionally flat, disengaged,
intrusive, and angry (Cummings and Davies, 1994; Gelfand and Teti, 1990). Of particular interest are findings suggesting that depressed mothers show less positive and more negative affect (e.g., Cohn & Campbell, 1992; Cohn et al., 1986, 1990; Field et al., 1985) and decreased gaze at their infants’ faces (e.g., Fleming et al., 1988). Additionally, their responses to their infants tend to be delayed, less contingent, and less consistent (e.g., Cohn et al., 1986; Field et al., 1985; Fleming et al., 1988). With these findings, researchers have become interested in the impact of depression and other disorders on attachment security, as attachment theory has traditionally suggested that consistent, responsive, and sensitive interactions with the mother are crucial to the development of a secure attachment relationship with her.

**Bipolar Disorder**

Perhaps the most consistent finding reported in the literature attachment and maternal psychopathology has been that of high rates of insecurity in children of mothers with bipolar disorder. In an early study, Gaensbauer et al. (1981) reported observing a trend toward development of avoidant attachment in these infants, with four of seven infants observed showing this attachment pattern at 12 months and six of the seven showing it at 18 months. A later study by Radke-Yarrow and colleagues (1985) showed that 79% of the infants within their sample whose mothers had bipolar disorder exhibited insecure attachment. This finding was replicated in a later study (DeMulder & Radke-Yarrow, 1991), with 79% of the infants of mothers with bipolar disorder showing insecure attachment and the majority of these infants being classified as disorganized.

**Major Depression**

A number of studies report an association between unipolar depression and insecure attachment as well (D’Angelo, 1986; Das Eiden & Leonard, 1996; Diener, 2003; Donovan &
Leavitt, 1989; Lyons-Ruth, et al., 1990; Murray, Fiori-Cowley, Hooper, & Cooper, 1996; Radke-Yarrow, Cummings, Kuczynski, and Chapman, 1985; Teti, Gelfand, Messinger, & Isabella, 1995). For example, Radke-Yarrow and colleagues (1985), found that rates of insecure attachment amongst the mother-infant dyads with no history of mood disorder and those with minor depression were comparable to rates reported in other studies of normal populations (approximately 25 to 30% of cases) while mother-infant dyads with a greater degree of mood disturbance showed higher rates of insecurity, with 46% of infants in the major unipolar depression group showing insecure attachment patterns. Similarly, Campell et al. (1993) found insecure attachment patterns in infants to be related to maternal postpartum depression that lasted beyond the child’s first 6 months of life. These findings are not always replicated however; for instance, DeMulder and Radke-Yarrow (1991) found no significant difference in rates of insecurity between children of mothers with major depression and those whose mothers’ had no history of affective illness. Similarly, other research has failed to show the expected relation between depression and elevated rates of insecure attachment (Lyons-Ruth, Zoll, Connell, & Grunebaum, 1986 [12 month data]; Sameroff, Seifer, & Zax, 1982).

Additionally, the severity and duration of depression may be important factors in determining the impact of depression on attachment security, as a number of studies call attention to these issues (e.g., Campbell et al., 1993; Lyons-Ruth et al., 1986; Radke-Yarrow et al., 1985; Teti et al., 1995). Greater chronicity of depression appears to increase risk of insecure attachment (Radke-Yarrow et al., 1985; Teti et al., 1995). Further, severity of depression and the amount of exposure to disturbed affect were both associated with an increased probability of insecure attachment (Radke-Yarrow et al., 1985).
It is possible that the impact of maternal depression on attachment is best understood as one of a variety of risk factors. When maternal depression is the sole risk factor, the mother-infant dyad may be able to buffer against the impact of the disorder. However, when combined with other risk factors (e.g., other comorbid disorders, family/marital distress, poverty, etc.), depression may result in amplified risk and adaptive developmental progress may be interrupted (Carter et al., 2001). In support of this assertion, Carter et al. (2001) compared the attachment patterns of children of mothers with no psychopathology, mothers with major depression, and mothers with major depression and a comorbid diagnosis. Of the infants in the no psychopathology group, 77% were classified as secure. In the depression only group, 69% were classified as secure. However, only 20% of the infants in the comorbid group were classified as secure. Similarly, Murray et al. (1996) reported that mothers who experienced depression and stress simultaneously were more likely to have insecurely attached children than those who experienced depression or stress alone. Thus, the relation between maternal depression and insecurity is likely moderated by amount of exposure to the depressed mother, the duration and severity of mood disturbance, the mother’s ability to cope or function well despite her illness, and whether day-to-day care is adversely impacted by her depression (Belsky, 1999).

**Anxiety Disorders**

Manassis et al. (1994) reported the first study of attachment in children of mothers diagnosed with anxiety disorders. Eighty percent of the children within the study were classified as insecure, with 81% of these children showing a disorganized pattern of attachment. The children within the study who did show secure attachment had mothers who reported fewer depressive symptoms, fewer stressful life events, and a greater sense of parenting competence.

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These intriguing results indicate that further study of the impact of maternal anxiety disorders on attachment would be worthwhile.

**Contextual Sources of Stress or Support**

Belsky (1984) proposed that contextual sources of stress or support may be major determinants of parenting, influencing the child’s development both directly and indirectly. Greater stress has consistently been shown to be related to less optimal parent and family functioning, less optimal parent-child interactions, and lower child developmental competence (Crnic & Greenberg, 1990). While major life stressors have been shown to be meaningfully related to changes in children’s attachment status (Vaughn et al., 1979; Waters et al., 2000; Hamilton, 2000; Weinfield et al., 2000), minor, daily hassles may also have an impact on the parent-child relationship (Crnic & Greenberg, 1990). For example, minor, daily hassles experienced by mothers predicted irritable responding to children (Patterson, 1983) and mothers were found to interact with their children in a more aversive manner on days when they had experienced aversive interactions with other adults, relative to days when they had not (Dumas, 1986). The importance of these types of stresses should not be underestimated, as Crnic and Greenberg (1990) showed that daily hassles may have an even greater impact on the child-parent relationship than major life events. Moreover, as these hassles build, one upon another, their cumulative impact may grow to represent a far more serious stressor for the mother. Social support, the quality or satisfaction associated with the marital or interparental relationship, and parenting self-efficacy, are all more specific parenting related constructs which may function to lead to additional daily stress or buffer against the impact of other difficulties.

*Social Support*
Researchers investigating the impact of social support on maternal behavior have made a strong case for the positive impact of social support across a variety of settings. For instance, middle-class Caucasian mothers with more prenatal social support were more sensitive when interacting with their 3-month-old infants (Goldstein, Diener, & Mangelsdorf, 1996). Low income African American mothers who had larger social networks were more responsive in interaction with their infants (Burchinal, Follmer, & Bryand, 1996). Similarly, poor Hispanic mothers who received more material resources from friends and relatives engaged in more proximal (touching, kissing, holding) and distal (vocalizing, looking) interactions with their 3-month-old infants (Feiring et al., 1987). Given the demonstrated impact that social support has on maternal behaviors, it is sensible to investigate the impact of maternal social support on attachment.

In one of the first studies to specifically address this question, Crockenberg (1981) found that infants of mothers with higher levels of social support showed significantly fewer anxious behaviors in the Strange Situation. Low maternal social support was associated with high resistance and high avoidance, only for infants high in irritability. Thus, mothers of irritable infants with high levels of social support were able to establish more secure relationships with their children than mothers experiencing low levels of social support. These results established that social support could impact attachment security and suggested that social support may have a differential impact on attachment based on infant individual differences (high vs. low irritability).

Other studies also provided evidence of an association between social support and mother-infant attachment. Crnic et al. (1986) reported that an index of total community support was positively correlated with attachment security in a sample of premature infants. Another
study showed that friendships and community supports consistently moderated the impact of mothers’ experiences of daily hassles on maternal behaviors (Crnic & Greenberg, 1990). Further, the number of people included in the parental social network, as well as the number of supportive people in the overall social network, predicted attachment security in a study of an at-risk population (Frodi et al., 1984). Weaker support comes from a study of infants with abusive or neglectful mothers, in which low social support was shown to predict insecurity; the effect of social support disappeared, however, when the quality of maternal care was controlled for (Crittenden, 1985). In a recent study, the relationship between social support and parenting was further elucidated, showing that the more negative attachment experiences mothers recalled from their own past, the less satisfied they were with their levels of prenatal social support. Moreover, mothers reporting higher levels of prenatal social support also reported higher levels of postnatal social support, which, in turn, were related to greater attachment security (Huth-Bocks, Levendosky, Bogat, & von Eye, 2004).

The results of these studies also suggest that all forms of social support are not functionally equivalent when it comes to parenting and child outcomes. Crnic and Greenberg’s (1990) study showed that friendship and community supports consistently moderated the experience of daily hassles on indices of maternal interactive behavior, while intimate support showed only one significant moderator effect. These findings were taken to suggest that maternal support from friends, perhaps more than husbands or partners, could buffer mothers from the negative effects of daily stress. A later study directly addressed the importance of social support from other females (Huth-Bocks, Levendosky, Bogat, & von Eye, 2004). The results of this study suggested that social support from other women was directly related to greater attachment security. This direct association may be due to a number of factors,
including: (a) exposure to positive models of caregiving, which women are then able to repeat with their own children; (b) corrective attachment experiences that alter working models or improve mothers’ abilities to be sensitively attuned to their infants; or (c) mothers’ generalized working models of relationships, which influence their choice of female supporters and relationships with their infants. Alternately, support from other women, many of whom are mothers, may be particularly important because of the increased credibility granted to them as a result of the mothers’ own experiences with caregiving. Therefore, support from other women may be given more weight than support from males in the context of parenthood (Huth-Bocks, Levendosky, Bogat, & Von Eye, 2004).

Despite the evidence for relations between social support and attachment, a number of studies have failed to show the expected association (Belsky et al., 1995; Belsky & Isabella, 1988; Crnic et al., 1986, Levitt et al., 1986; Spieker, 1988; Spieker & Booth, 1988; Zeanah et al., 1993). A number of reasons for these inconsistent results have been proposed. It has been noted that the samples of studies which failed to find a relationship between social support and attachment were drawn from low-risk populations only (Huth-Bocks, et al., 2004). Thus, it may be that social support is more critical for high-risk families than for mothers and infants who have lower levels of life stress overall or more resources to draw from. Additionally, social support may generally have an indirect, rather than direct, effect on infant-mother attachment. Isabella (1994) found that high social support played a meditational role, in that it significantly predicted high maternal role satisfaction, and thereby the quality of maternal care and attachment security. It may be that social support mediates other factors not typically examined, which in turn impact attachment security (Belsky, 1999).

*Marital/Interparental Conflict*
Raising children can cause significant stress within the parental relationship, particularly during infancy and early childhood (Belsky & Rovine, 1990). Marital or interparental conflict can lead to an emotionally distressing family life for all family members, even infants. From at least six months of age children respond to unresolved anger between adults with visible upset (Shred, McDonnel, Church, & Rowan, 1991, in Davies & Cummings, 1994). While infants and toddlers rarely mediate disputes between their parents, they may attempt to comfort or distract them (Cummings et al., 1981, 1984).

While some researchers initially reasoned that children exposed to large amounts of marital conflict would “get used to it” or habituate (Jeffrey & Cohen, 1971), research has clearly shown that this is not the case. Rather, experiential history of interparental conflict, like parental psychopathology or low levels of social support, has consistently been shown to have a significant relationship with negative child outcomes (Crnic & Greenberg, 1990; Emery, 1988) and with disturbances in the emotional relationship between parents and children (Davies & Cummings, 1994). Conversely, supportive spousal relationships during infancy and toddlerhood have consistently been correlated with the kinds of sensitive parenting thought to lead to secure attachments (for reviews, see Belsky, 1984, 1990; for a meta-analysis, see Erel & Burman, 1995).

Research directly addressing the relation between marital conflict and attachment security is also largely consistent, generally supporting the belief that children who grow up in families with better functioning marriages are more likely to develop secure attachments than those who grow up in homes with higher levels of conflict. Results supporting this contention are found in a variety of cross-sectional studies (Bretherton et al., 1990; Crnic, Greenberg, & Slough, 1986; Eiden, Teti, & Cons, 1995; Goldberg & Easterbrooks, 1984; Howes & Markman, 1989; Jacobson
& Frye, 1991; Durrett, Otaki, & Richards, 1984), with findings applying to both emotional and physical conflict. For instance, Sims and colleagues (1996, in Belsky, 1999) found that when fathers were physically violent toward mothers, insecure attachments between the mother and the child were more likely.

Longitudinal research also principally supports a correlation between interparental conflict and attachment. In a study by Howes and Markman (1989) parents completed pre- and post-birth ratings of marital satisfaction, communication, and conflict and described their children using the Attachment Behavior Q-set. For mothers, greater satisfaction, greater quality communication, and less conflict were related to attachment security, although the same was not true of fathers. Similarly, Lewis, Owen, and Cox (1988) reported that 1-year-old daughters were more likely to be securely attached to their mothers when the mothers reported more harmonious marital relationships during pregnancy. Marital harmony before the birth of a second child was also shown to predict greater security between the firstborn child and the mother, as measured by the Attachment Behavior Q-set, during the mother’s last trimester of pregnancy and two months following birth (Teti et al., 1996).

Conversely, Belsky and Isabella (1988) reported that the quality of marital relationships most appreciably worsened during the transition to parenthood in families in which the infant was eventually classified as insecurely attached. Correspondingly, in high-risk mother-infant dyads, low ratings of spousal support, measured prenatally and at three months postpartum, were characteristic of families in which the infant was later classified as having a disorganized attachment to the mother (Spieker & Booth, 1988). Further, greater marital conflict, measured prenatally and 3 months postpartum, predicted greater disorganization in infant-mother
relationships and greater insecurity in infant-father relationships at 12 months (Owen & Cox, 1997).

Despite the consistent results reported above, several studies have failed to find a significant association between measures of marital quality and infant-parent attachment (Belsky, 1996; Belsky et al., 1995; Das Eiden & Leonard, 1996; levitt et al., 1986; Teti, Nakagawa, Das, & Wirth, 1991; Zeanah et al., 1993). These results may be better understood by examining the mechanisms proposed by researchers to explain the relationship between marital conflict and attachment security, as many of these rely on indirect, rather than direct, relationships. For instance, marital conflict may negatively impact attachment security by increasing negativity in parent-child interactions or by decreasing parental involvement and/or emotional availability (Davies & Cummings, 1994). Alternately, marital conflict may cause parents to rely on their children for emotional support and nurturance not present in the marital relationship; in turn, children may be pressured to ally themselves with one parent against the other, leading to insecurity in the parental relationship (Davies & Cummings, 1994). Thus, the apparent lack of evidence for a direct relationship in the studies cited above may be the result of the inherent limitations of examining only direct effects, rather than representing the absence of a relationship between marital conflict and attachment security (Belsky, 1999).

Some evidence of indirect effects of the quality of the marital relationship on attachment security exists. One study found that no direct relationship between prenatal marital quality and attachment security measured at one year; however, higher levels of marital quality predicted greater maternal role satisfaction at four months postpartum, which predicted greater maternal sensitivity five months later, and, in turn, attachment security (Isabella, 1994). In the same vein, maternal parenting was found to mediate the effect of interparental hostility, measured at six
months, on later child-mother security (Frosch & Mangelsdorf, 2000). Taken as a whole, the existing evidence for indirect effects of marital conflict on attachment suggests that marital discord is linked with impaired parenting, which is linked with attachment security.

This is not to say that a direct link between marital quality and attachment security does not exist. Davies & Cummings (1994) hypothesize that children’s experience of marital conflict or discord may impact their internal working models of both interparental relationships and parent-child relationships. Rather, both direct and mediational links between marital conflict and attachment security are likely to exist. Frosch and Mangelsdorf (2000) provide some evidence of this possibility, noting that in some analyses, maternal parenting behavior acted as a partial mediator of the effects of marital conflict on attachment security, leaving the possibility of direct effects as well.

Maternal Self-Efficacy

Parenting self-efficacy has been explored as a distal factor which may impact attachment security. Perceptions of efficacy are an important factor in the initiation and regulation of behavior (Rotter, Chance, & Phares, 1972; Seligman, 1975) and in judgments of how well one expects to do in a particular situation (Bandura, 1982). More specifically, perceptions of self-efficacy influence how much effort people will expend and how long they will persist in the face of an obstacle or aversive experience (Bandura, 1977, 1982). Judgments about one’s own self-efficacy also impact cognitive and affective reactions to stress. Thus, individuals with high self-efficacy beliefs are persistent, avoid self-denigrating attributions, and experience less anxiety and depression when faced with stress, while those with less positive self-efficacy beliefs tend to give up easily, make internal attributions for failure, and experience high levels of anxiety and/or depression (Bandura, 1982).
Beliefs about self-efficacy as a parent can impact mothers’ response to their infants, influencing how much and what she attends to, the effort she expends in raising her child and her emotional responses to the child’s behavior (Mash & Johnston, 1990). Parents who believe that their children will be responsive to their efforts to parent may be more likely to invest time in effective parenting practices. For instance mothers with higher self-efficacy may be more engaged with their children and show more responsiveness; if this is the case, beliefs about parenting efficacy may mediate the relationship between maternal depression and maternal sensitivity (Teti & Gelfand, 1991). Similarly, a number of researchers take the view that the mother’s perceived self-efficacy is an important determinant of whether or not she responds sensitively to her child (Donovan, 1981; Donovan & Leavitt, 1985, 1989).

Research also demonstrates some provocative links between maternal self-efficacy and attachment. Several studies have found that mothers of secure infants report greater confidence in handling caregiving tasks shortly after birth than mothers of insecure infants (Donovan & Leavitt, 1989; Donovan, Leavitt, & Walsh, 1990; Spieker & Booth, 1988). It should be noted, however, that researchers concluded some mothers within these studies displayed a defensive strategy (e.g., high illusions of control in mothers of avoidant children) in order to mask feelings of inefficacy. Thus, the data suggest that it is important to distinguish between those mothers who are realistically self-efficacious and those who are unrealistically self-efficacious, as well as showing the impact that perceived maternal self-efficacy may have on the infant.

Maternal self-efficacy is an attribute that may interact in interesting ways with several other factors discussed previously. For instance, Teti and Gelfand (1991) suggest that infant temperament may moderate the relationship between parental depression and self-efficacy. They note that depressed mothers report lower levels of self-efficacy than do non-depressed mothers.
(Fox & Gelfand, 1994; Gross & Rocissano, 1988; Teti & Gelfand, 1991), and therefore are more vulnerable to perceiving a temperamentally difficult baby negatively and to developing performance deficits in mothering. Their analyses revealed that severity of maternal depressive symptoms and perceptions of infant difficulty interacted to predict the mothers’ feelings of efficacy. Thus, the combination of moderate to severe maternal depression and perceptions of infant difficulty may interact to produce substantially higher risk of parenting disturbances than either factor alone. Additionally, studies have revealed a significant relationship between maternal social support and maternal self-efficacy in both low- and high-risk samples of women (Cutrona & Troutman, 1986; Shea & Tronick, 1988).

Conclusion

The purpose of this review has been to examine the relative and cumulative impact of a variety of individual and contextual characteristics on attachment security. While the nature of the relationships between some of these characteristics and attachment security remains unclear, in other cases, it seems fair to conclude, as Belsky (1997) did, that “the first wave of research on the effects of mothering on attachment security is now complete.” Results from a variety of studies, including several meta-analyses, firmly establish maternal sensitivity as being linked to attachment security. However, they also indicate that the size of the effect may be smaller than initially believed, that other parenting constructs may be equally related to attachment security, and that parenting sensitivity may be mediated by a variety of factors. Thus, there is room for other individual, dyadic, or contextual factors to influence attachment security through a series of direct and/or indirect relationships, whereby maternal sensitivity is mediated by another individual, dyadic, or contextual factor.
From an ecological perspective, it is clear that this statement indicates the need to understand how each of these characteristics may be related to attachment security and each other, in order to best understand the antecedents of a secure attachment. The psychological characteristics of the child and the mother, as well as the mother’s social relationships with her partner and others providing support, are all likely to impact the infant-mother attachment relationship. These effects likely occur through direct, as well as indirect processes, and possibly through the impact of these effects or processes on the quality of care the mother provides to the infant. In this way, the ecological perspective draws attention to contextual factors likely to influence the microdevelopmental processes – the daily, interactional exchanges between the parent and child and the emerging internal working models of the child – emphasized within attachment theory (Belsky, 1996). Thus, the ecological perspective suggests that maternal sensitivity, the primary independent variable in attachment theory, may also be understood as a dependent variable, something to be explained in its own right (Belsky, 1996). Few researchers have implemented a truly ecological perspective in their research on attachment, however. Studies have primarily focused on maternal and infant contributions to the dyadic relationship, largely ignoring the possible influence of contextual or family characteristics. Additionally, studies have focused on individual characteristics of the mother, infant, or context in isolation, or in concert with only one or two other features. Few studies have simultaneously investigated multiple factors from the domains of maternal, child, and contextual characteristics as determinants of attachment security (see Belsky, 1996; Belsky & Isabella, 1988, and Diener, Nievar, & Wright, 2003 for notable exceptions). Viewing the attachment relationship ecologically, and as one that is multiply determined, requires that the proximal characteristics of the child and mother, as well as the more distal characteristics of the context, be examined
(Diener, 2003). However, much of the research relevant to attachment remains disconnected, with findings in disparate areas existing in isolation, without notable attempts at integration. This may, in part, be due to the absence of a conceptual model enabling a synthesis of these findings into a logical and coherent network.

A notable example of taking an ecological perspective comes from the theoretical work of Belsky (1984), who proposed a social-contextual model of parenting (Figure 1) which may serve as inspiration, and possibly a foundation, for a conceptual model of the antecedents of attachment security. Within this model, three domains of parenting determinants are identified, personal psychological characteristics of the parents, characteristics of the child, and contextual sources of stress and support. The model presumes that parental functioning is multiply determined. Specifically, it is directly influenced by forces emanating from within the individual parent and within the individual child. The model also presupposes that sources of contextual stress and support can directly affect parenting (Belsky, 1984).

Utilizing the same domains proposed in Belsky’s (1984) model, a proposed model representing the relations between parent characteristics (personality, psychopathology) and child temperament, as well as contextual sources of stress and support (social support, marital/interparental relationship, parenting self-efficacy), and attachment security is presented in Figure 2. This model retains and adapts a number of the assumptions put forth in Belsky’s parenting model. For example, child attachment security is viewed as multiply determined, and is believed to be directly influenced by individual parent and child characteristics, as well as by parenting practices. Individual parent and child characteristics may also directly affect parenting practices, which in turn affect attachment security. Contextual sources of stress and support are also conceptualized as directly affecting parenting, and thus, in turn, attachment security.
Thus far, the proposed model is largely consistent with the research reviewed above. Some evidence suggests that maternal personality and child temperament both have direct relationships with attachment security, while other evidence suggests that the relationship between both constructs and attachment security may be mediated by parenting. Several other relationships have been added to the model based on research findings. Where mediational analyses have been performed and partial mediation has been supported (e.g., in the case of marital/interparental conflict), the possibility of a direct relationship between attachment security and the variable of interest has been added to the model. Without such evidence, contextual variables are assumed to impact attachment security through their effect on parenting. This assumption is made because it is believed that while contextual variables may directly affect attachment, most of the effect of such distal factors will be accounted for by their impact on the quality of care that the mother provides (Belsky, 1999).

Within Belsky’s original parenting model (1984), it was proposed that because parenting was multiply determined, the parenting system could be buffered against threats deriving from weaknesses in any single source. Research on risk and resilience suggests that family resources (e.g., social support, high quality marital relationship) may buffer against family stressors (e.g., maternal psychopathology, child difficult temperament) (Garmezy, Masten, & Tellegen, 1984). However, when multiple risk factors are present, or resources are low, less adaptive outcomes are expected. Additionally, multiple risk factors considered simultaneously often explain greater variance in child outcomes than any individual risk factor; it is therefore important to determine whether any individual risk factor accounts for unique variance in predicting child attachment security in the context of other risk variables (Seifer, 1995). Unfortunately, research on
attachment security has generally examined one or two predictors without considering the larger context of resources/stressors or the predictor in combination with other factors (Diener, 2003).

Perhaps the best illustration of the importance of considering a variety of potential contributors concurrently in the context of risk and protective factors comes from a study by Belsky & Isabella (1988). Studying the contributions of maternal personality, marital quality, and maternal perceptions of temperament to attachment security, scores on each variable that fell below the median were considered risks factors, while those that fell above the median were considered protective factors. In families for whom all considered domains were protective, 92% of the infants were securely attached, whereas in families for whom all domains were categorized as producing risks, only 17% of the children were securely attached.

In conclusion, more research is clearly needed in order to effectively elucidate how each of the characteristics discussed above may contribute to child attachment security, and the conceptual model proposed in this paper may prove useful in organizing further research. Considering a variety of infant, maternal, and contextual characteristics simultaneously within a study presents several pragmatic challenges, however. First, examining a larger number of variables within the same study requires larger sample sizes in order to maintain adequate statistical power. Additionally, greater demand is placed on study participants, in terms of time and effort, as they are required to complete more measures. It is to be hoped, however, that researchers will confront these challenges in order to provide a comprehensive account of the antecedents of secure attachment.

**Present Study**

The present study seeks to extend previous work by examining the impact of infant, maternal, and contextual factors on attachment security. Based on evidence summarized above,
a hypothesized model (Figure 3) is proposed and will be tested. Specifically, it is hypothesized that higher levels of infant negative emotionality will be related to lower levels of maternal parenting efficacy, which will be related to lower levels of maternal sensitivity, which will in turn be related to lower attachment security. Thus, it is proposed that the relation between infant negative emotionality and attachment security is mediated by both maternal parenting efficacy and maternal sensitivity.
CHAPTER TWO

METHODS

Participants

Participants were recruited from communities in the Eastern Washington/Northern Idaho area. Parents and infants participated in laboratory assessments and parents completed questionnaires when infants were 4, 6, 8, 10, and 12 months of age. Infants were considered to fall within these age categories if they were within two weeks of each exact age. Infants were recruited to approximate a similar number of male and female participants. At 12 months of age, complete data are available for 43 mother-infant dyads (26 female infants, 17 male infants).

Measures

*Infant Behavior Questionnaire* (IBQ-R; Gartstein & Rothbart, 2003).

The IBQ-R is a rationally derived, fine-grained, psychobiologically oriented assessment designed as a parent report measure of infant temperament. Items and scales constructed for the IBQ-R were based on the definition of temperament proposed by Rothbart & Derryberry (1981), as well as work with the Child Behavior Questionnaire (Rothbart, Ahadi, & Hershey, 1994), comparative studies, and other developmental research identifying significant dimensions and associated behavioral tendencies.

The IBQ-R is comprised of three overarching factors which are in turn composed of 14 scales: (1) Positive Affectivity/Surgency - Smiling and Laughter, High Intensity Pleasure, Activity Level, Approach, Perceptual Sensitivity, and Vocal Reactivity; (2) Negative Emotionality - Fear, Distress to Limitations, Sadness, and Falling Reactivity (negatively loading); (3) Orienting/Regulatory Capacity - Duration of Orienting, Soothability, Cuddliness/Affiliation, and Low Intensity Pleasure (Gartstein & Rothbart, 2003). In terms of
psychometric properties, the reliability and validity of this questionnaire have been documented, with Cronbach’s alphas ranging from .77 to .96 (Gartstein & Rothbart, 2003; Gartstein, Slobodskaya & Kinsht, 2003). Scores from the Negative Emotionality factor will be utilized in the present study.

**Coding of Maternal Interactional Behavior**

The laboratory assessment includes a two minute parent-child interaction episode, utilized as a measure of maternal sensitivity within the present study. Mothers were given the instructions “Here is a phone that you can use to play with your baby. You can interact/play however you would like, just try not to get [baby’s name] too excited. I will be back when it’s time for the next activity.” The experimenter then left the room and the interaction was videotaped through a one-way mirror using a camera monitored by an experimenter in the adjoining room.

Global ratings of synchrony/reciprocity in parent-child interactions and maternal responsivity/sensitivity were provided using a 7-point Likert scales (1 = extremely asynchronous/non-reciprocal, insensitive/non-responsive; 4 = moderately synchronous/reciprocal, sensitive/responsive; 7 = extremely synchronous/reciprocal, sensitive/responsive). Ten variables identified as components of responsiveness were used to assess individual aspects of maternal interactional sensitivity (e.g., initiatives to motivate play, emotional attunement, enjoyment of joint activity) (Laasko et al., 1999). Considering these aspects deemed relevant to responsive parental behavior aided the raters in generating an appropriate responsivity code. Thus, based on observation of a two-minute video segment of play, the coder assigned a global rating from one to seven to the mother’s behavior based on examination of these 10 responsivity-related variables.
Coding of maternal interactional behavior was completed by two graduate students in psychology. Coders were trained in the coding system and participated in reliability checks to ensure understanding of the categories and specific criteria used in coding, as well as agreement between raters. Coders achieved satisfactory interobserver reliability ratings, with correlation coefficients ranging from .88 to .91.

*Parenting Stress Index* (PSI; Abidin, 1995).

The PSI assesses the level of stress the parent experiences in relation to his or her parenting role, resulting from child or parent characteristics, and/or situational variables (Abidin, 1995). The sense of competence scale, which assesses insecurity in the parenting role, will be utilized within this study as an indicator of parenting efficacy. Items on this scale include “Being a parent is harder than I thought it would be,” and “I enjoy being a parent,” amongst others. A higher score on this scale indicates more difficulty, and thus, lower parenting efficacy. Maternal domain subscales have been demonstrated to have a moderate to high degree of internal consistency and test-retest reliability; Chronbach’s alpha coefficients as high as .95 have been reported for PSI subscales, while test-retest reliabilities have ranged from .88 to .96 (Abidin, 1995).

*Attachment Phone Interview*

The attachment security measurement utilized within the current study is an adaptation of the Attachment Q-Sort (AQS; Waters & Deane, 1985). Mothers were initially asked to complete the AQS following their 12 month laboratory visit and then send it back to the laboratory. However, this procedure was modified after only a few uses because of the incomplete/unusable data returning from participants. Data loss was due to errors in completion of the AQS, as well
as a low number of Q-sorts being returned to the laboratory. A modified interview-based procedure was implemented after consultation.

Research suggested an abbreviated, scale scored version of the Q-set may prove to be valid and simpler for mothers to complete (Rogmann, Cook, & Akers, 2004). Based on the attachment security expert criterion sort, an abbreviated version of the AQS was developed. The abbreviated version retained the 31 items with the highest criterion scores and 30 items with the lowest criterion scores, while discarding the remaining 29 items. Mothers were then asked to rate each item on a 7-point Likert scale, similar to that utilized in the IBQ-R, ranging from very unlike their child to very similar to their child. At the 12 month lab appointment, mothers were given a copy of the items to take home, asked to read them over, and observe their child’s behavior. They were then called at home by a research assistant who asked them to provide their ratings for each of the items. The interview took approximately 20 minutes to complete. The attachment security score was then computed by summing the scores from the 21 items with the highest criterion scores and the reverse scores from the 30 items with the lowest criterion scores.

Utilizing data from a previous sample, and treating sorted piles as Likert-type ratings, analyses suggested that scale scores from the abbreviated version were comparable to the traditional criterion-scoring of the full AQS, $r=.99$, $p<.01$ (Swanson et al., 2006). While not a direct comparison, as mothers in the present study were not required to provide an equal distribution of scores as they would be in the traditional Q-sort (i.e., to provide an equal number of responses for each rating), these results suggest that the abbreviated telephone interview may provide an alternative measure of attachment security.
Procedures

Infants in were located through local birth announcements, as well as by advertisement through local community-based organizations and programs (e.g., Whitman and Latah Counties’ Ages and Stages Early Intervention Project), medical centers, and pediatricians. The First Steps prevention program operating in both local hospitals was also instrumental in recruiting participants for this research. Prospective families were contacted by telephone approximately 2 weeks before their infants were 4 months of age. At this time, parents were informed about the nature of the study and their participation, including the time demands and reimbursement schedule. Participants in this sample were assessed at 4, 6, 8, 10, and 12 months of age. Among other questionnaires that will not be utilized for the current study, mothers were asked to complete the PSI prior to the first appointment. They also completed the IBQ-R at each time point and mothers were asked to complete a laboratory assessment with their infants at each of these ages. A developmentally appropriate abbreviated form of the laboratory assessment, lasting approximately 15 minutes, was utilized when infants were 4 months of age. Each subsequent laboratory session (from ages 6 to 12 months) lasted approximately one hour. Following their last appointment, mothers were called by a research assistant to complete the attachment security assessment. Upon completion of the study, participants received a $100 reimbursement. For the purpose of the current study, the maternal questionnaire data to be used was completed prior to the 4 month appointment, while the infant questionnaire data was completed for the 4 month appointment. An assessment of infant-mother interaction from the 12 month laboratory appointment was also utilized.
Analytic Strategy

As the measurement of attachment security to be utilized in the present study has not been widely used, the first planned step in analyses was to calculate Chronbach’s alpha for the attachment phone interview in order to examine the measure’s internal consistency.

In order to assess the proposed mediational model, associations between maternal parenting efficacy, maternal sensitivity, and attachment security must first be established. Simple correlation coefficients were computed to demonstrate these relationships. It was then planned to utilize hierarchical multiple regression in order to evaluate the hypothesized paths. In order to do so, it was planned to first test whether parenting efficacy mediated the relationship between negative emotionality and sensitivity, and then test whether efficacy and sensitivity mediated the relationship between negative emotionality and attachment security.

Support for a mediated model would be established if regression analyses met the following conditions. First, negative emotionality must be shown to predict maternal sensitivity. Then, negative emotionality must be shown to predict parenting efficacy (the mediating variable). Next, parenting efficacy must be shown to predict parenting sensitivity and parenting sensitivity must be demonstrated to predict attachment security. Finally, negative emotionality, parenting efficacy, and parenting sensitivity would all be entered into a regression predicting attachment security.

In order to establish mediation, all regressions and predictors within the regression must show significance until the final step. At this point, the relation between negative emotionality and attachment security must be shown to diminish with the mediating variables (parenting efficacy and maternal sensitivity) included in the model. Thus, the association between negative emotionality and attachment security should become non-significant with the addition of the
mediating variables in the final regression equation, as indicated by the non-significance of the F test, the value of the $R^2$ change statistic, and the beta weights of the predictors.
CHAPTER THREE

RESULTS

Planned Analyses

As the measure of attachment utilized in the study has not been widely used, Cronbach’s alpha was calculated as planned, indicating an acceptable level of reliability (α = .86). Given acceptable reliability, correlations between infant temperament, parenting efficacy, parenting sensitivity, and attachment security were calculated (Table 1). A significant relationship was found between parenting efficacy and attachment security (r = -.36, p<.05), such that parents with a greater sense of competence at 4 months tended to have infants who were more securely attached at 12 months (higher scores on the PSI competence scale reflect a lower sense of competence). Maternal sensitivity and attachment security were also significantly related (r = .31, p<.05). These findings were consistent with hypotheses. Hypothesized relationships between infant negative emotionality and other variables were not supported, however; infant negative emotionality was not significantly related to any variables in the study.

A hierarchical regression predicting attachment security was performed, despite the fact that an examination of simple correlations indicated that the predicted multiple mediator model would not be supported (i.e., given the lack of significant relationships between infant negative emotionality and the other variables within the model). Initially, infant sex was controlled for, however it was eliminated from the model because of a lack of a significant contribution, in order to increase power to detect the effects associated with the other independent variables. The hierarchical regression procedure included several steps, starting with the entry of infant negative emotionality entered in Step 1, parenting efficacy entered in Step 2, and maternal sensitivity in Step 3(Table 2). Interestingly, infant negative emotionality emerged as a significant predictor in
the final model, despite its nonsignificant correlation with attachment security. Together, infant negative emotionality, parenting efficacy, and maternal sensitivity measured at 4 months accounted for 29% of the variance in attachment security at 12 months.

**Exploratory Analyses**

As the proposed multiple mediator model was not supported, due to the lack of association between infant negative emotionality and attachment security, several exploratory analyses were undertaken. While the majority of the research exploring relations between infant temperament and attachment has focused on negative emotionality, sometimes to the exclusion of other dimensions of temperament, past studies have also demonstrated relations between attachment and infant regulatory abilities and positive emotionality (e.g., Swanson et al 2006, Swanson et al 2007). Given these findings, relations between infant orienting/regulatory control and positive emotionality and parenting competence, maternal sensitivity, and attachment security were explored. The correlations between these constructs are reported in Table 1. While infant negative emotionality was not significantly related to later attachment in the planned analyses, both infant positive emotionality and infant orienting/regulatory control at four months were significantly related to attachment at 12 months. However, neither temperament construct was significantly related to parenting efficacy or maternal sensitivity.

A score representing infant difficulty was computed, as a significant portion of the literature examining the relationship between infant temperament and attachment has examined temperament relying on this conceptualization (e.g., Vaughn & Bost, 1999; Waters et al., 1980). Perhaps most importantly, utilizing a composite score, in addition to examining each temperament domain individually, allows for the possibility that a constellation of temperament traits, namely higher negative emotionality and lower positive emotionality in the presence of
poor regulatory abilities, may be more predictive of later attachment than any domain in isolation. Further, utilizing a difficulty score combining information from multiple temperament domains is consistent with past studies which have utilized composite or summary scores of temperament in studying attachment (e.g., Belsky & Rovine, 1987; Bradshaw, Goldsmith, & Campos, 1987; Clark, Kochanska, & Ready, 2000; Cutrona & Troutman, 1986; Weber & Levitt, 1986). Thus, exploratory analyses described below facilitate comparisons between this study and existing research. The difficulty score was constructed by first standardizing the scores for each temperament domain (negative emotionality, positive emotionality, and orienting/regulatory control). Each infant’s score for positive emotionality was then added to his/her score for orienting/regulatory capacity; the infant’s negative emotionality score was then subtracted from this sum (i.e., difficulty score = PE + ORC – NE). Thus, higher scores actually represent lower levels of difficulty. Correlations between infant difficulty, parenting efficacy, maternal sensitivity, and attachment security were also computed and are shown in Table 1. Like infant positive emotionality and orienting/regulatory control, the difficulty score was significantly related to later attachment security. Unlike each domain in isolation, however, the difficulty score was also significantly related to parenting efficacy, such that greater infant difficulty (represented in lower difficulty scores) was related to less parenting efficacy (represented in higher efficacy scores).

Given this finding, a hierarchical regression was performed, following the model initially proposed, but replacing infant negative emotionality with infant difficulty. As before, infant sex was initially controlled for, but was eliminated from the model because of a lack of significant contribution, and to increase power to detect the effects associated with the other independent variables. The regression is presented in Table 3. While infant difficulty was a significant
predictor of attachment security, parenting efficacy and maternal sensitivity were not significant predictors. However, together, infant difficulty, parenting efficacy, and maternal sensitivity accounted for 30% of the variance in attachment security.

In examining the pattern of correlations presented in Table 1, it was noted that while the multiple mediator model initially proposed would not be supported, due to the lack of a significant relationship between infant difficulty and maternal sensitivity, a simple mediation model could be tested, wherein the relationship between infant difficulty and attachment security would be mediated by parenting efficacy (Figure 4). Regression was utilized in order to test this model. First, infant difficulty was utilized to predict attachment security, demonstrating that the initial variable in the model is correlated with the outcome variable (Table 4). Infant difficulty did significantly predict attachment security, accounting for 19% of the variance in attachment security. Next, a regression predicting parenting efficacy from infant difficulty was computed in order to show the independent variable’s relationship with the proposed mediator (Table 5). In this analysis, infant difficulty significantly predicted parenting efficacy, accounting for 10% of the variance in parenting efficacy. Infant difficulty and parenting efficacy were then entered in a regression predicting attachment security, in order to demonstrate that the proposed mediator also affects the outcome variable controlling for the initial variable (Table 6). In this case, after controlling for infant difficulty, parenting efficacy was not a significant predictor of attachment security, although it approached significance (t = -1.67, p = .10). Given lack of support at this step, no further analyses were conducted.
CHAPTER FOUR
DISCUSSION

The current study sought to extend previous research on the antecedents of attachment by examining the relations between this construct and infant temperament, parenting efficacy, and maternal sensitivity. While mediation was not supported by analyses, at the level of direct relationships a number of findings are of interest. Overall, findings suggest the importance of considering both child and maternal variables in addition to maternal sensitivity in examining the development of attachment security.

Temperament and attachment

In contrast to a number of previous studies (e.g., Goldsmith & Alansky, 1987; Kochanska, 1995; Seifer et al., 1996), a significant relationship was not found between infant negative emotionality and attachment security. When viewed through a developmental lens, this finding may be less surprising, however. During the first several months of life, negative emotionality is generally characterized by early irritable forms of distress (Rothbart & Derryberry, 2001) and later differentiating into anger, fear, and irritability, each following a different developmental trajectory. Within this study, parental report of temperament was obtained when the infant was four months of age, a period of time when anger responses are generally decreasing, likely in response to greater flexibility in attention (Johnson, Posner, & Rothbart, 1994), while fear has not yet begun to increase in response to the infant’s greater degree of interaction with the environment and as a function of maturation of the Behavioral Inhibition System (Gray 1982; Putnam & Stifter, 2002; Rothbart 1988, 1989.) Thus, it may be that infant negative emotionality during this early infancy period may be of less importance in the development of attachment security relative to distress demonstrated in the latter half of the
first year. This may be a function of the fact that aspects of negative emotionality (e.g., fear, anger) tend to increase and become more noticed by caregivers in the second part of the first year of life (e.g., Gartstein & Rothbart, 2003).

Significant associations were also found between both infant positive emotionality and orienting/regulatory control and later attachment security. These findings, in combination with the lack of association between negative emotionality and later attachment security, suggest the importance of examining all domains of temperament in trying to elucidate the relationship between temperament and attachment rather than focusing solely on negative emotion to the exclusion of other qualities. A great deal of the literature has focused exclusively, or nearly exclusively, on the role of negative emotionality (e.g., Goldsmith & Alansky, 1987; Mangelsdorf, et al 1990). It may be that during the first months of life, positive emotionality and regulatory abilities play an equally important or even more important role in the development of eventual attachment security, as suggested by this study.

It is notable, however, that although infant negative emotionality was not significantly correlated to later attachment security, it did emerge as a significant predictor of attachment security when both parenting efficacy and maternal sensitivity were entered into the regression equation. Conger (1974) defines a suppressor variable as “a variable which increases the predictive validity of another variable (or set of variables) by its inclusion in a regression equation” where predictive validity is assessed by the magnitude of the regression coefficient. In this case it appears that the parenting variables may be acting as suppressor variables, as the magnitude of the association between infant negative emotionality and attachment security increased substantially with the addition of these variables. Thus, by accounting for variance in attachment due to parenting, but irrelevant to negative emotionality, we may gain a better
understanding of the relationship between negative emotionality and attachment security, indicating that the two constructs are positively related. Thus, higher levels of infant negative emotionality at four months are related to a more securely attached infant at 12 months, a surprising finding, as a negative relationship between these variables is more often expected and reported (e.g. Kochanska, 1995; Vaughn & Bost, 1999). It may be that with the variance related to parenting/parent characteristics accounted for, the remaining portion of negative emotionality variability reflects those cues, sensitivity to which on the part of the parent actually leads to increased attachment security later. It is also interesting to note that with the inclusion of parenting variables, the magnitude of the relationship between both temperament and maternal sensitivity and later attachment security was roughly equivalent.

Additionally, these data suggest that for the development of attachment security, a constellation of temperament dimensions incorporated in the construct of infant difficulty may be more important than individual contributions of the three temperament factors. Past research has suggested that infants rated as more temperamentally difficult are likely to be less securely attached (e.g., Vaughn & Bost, 1999). This finding was replicated within the present study. Further, in contrast to the results for negative emotionality alone, when entered into a regression equation with parenting efficacy and maternal sensitivity, infant difficulty emerged as the only significant predictor of later attachment security. Thus, a more global approach to temperament, rather than the fine-grained approach, may be more useful in predicting attachment security.

Caution should be exercised in interpreting findings related to the infant difficulty index, however, due to the observed pattern of correlations between infant temperament factors. Specifically, positive emotionality, negative emotionality, and orienting/regulatory control were all positively correlated with one another. However, in order to construct a summary score
which would reflect infant difficulty (high levels of negative emotionality and low levels of positive emotionality in the presence of poor orienting/regulatory control), scores for positive emotionality and orienting/regulatory control were summed and the score for negative emotionality was then subtracted. As the observed pattern of correlations demonstrates that all temperament factors were positively related at four months, subtracting the negative emotionality score, as required to create an accurate representation of infant difficulty as conceptualized by theory, may have brought about unforeseen complications in the pattern of results related to this score. Further study of infant difficulty and the relationships between temperament factors at four months is required in order to confirm the pattern of findings reported in this study is valid.

As mediation between temperament and later attachment security was not supported, this study provides further support for the possibility of a direct relationship between infant temperament and attachment security or suggests that the relationship may be mediated by something other than parenting behaviors (i.e., maternal sensitivity) or belief/s (i.e., parenting efficacy).

**Maternal sensitivity and parenting efficacy**

Maternal sensitivity was significantly related to attachment, demonstrating a moderate positive relationship. This finding is consistent with previous research and theory; the magnitude of the relationship found is similar to that found within the meta-analyses by Goldsmith and Alansky (1987) and de Wolf and van Ijzendoorn (1997) when the outlying findings from Ainsworth et al’s (1978) original study were excluded. It is interesting to note, however, that the magnitude of the relationship between maternal sensitivity and attachment security was smaller than that between attachment security and temperament variables (infant positive emotionality, orienting/regulatory control, and difficulty) and parenting efficacy, suggesting that while
maternal sensitivity remains an important predictor of attachment security, other factors may be equally if not more important. Although, methodological differences could also explain the slight discrepancy in the magnitude of associations. That is, maternal sensitivity was measured via an observation protocol, whereas mothers provided self-report concerning parenting efficacy, and also reported regarding their infants’ temperament. Thus, the different measurement approaches could have produced the observed pattern of results.

Maternal sensitivity was not significantly related to any domain of temperament examined in the study. Similarly, maternal sensitivity was not related to parenting efficacy. While efficacy theory suggests that judgments about the likelihood that one’s actions will influence how long one will persist when faced with an aversive experience or how much effort one will expend (Bandura 1977, 1982), in the case of parenting, the study results do not suggest that a mother’s perceived self-efficacy is an important factor in whether or not she will respond sensitively to her child. This finding stands in contrast to those of Donovan (1981; Donovan & Leavitt, 1985, 1989) who argues that a mother’s sense of efficacy does play an important role in determining whether she responds sensitively. Within Donovan’s studies, self-efficacy measurement focuses on perceptions of control, while the present study’s measure of self-efficacy assesses beliefs about competence and security in the parenting role. It may be that perceptions of control over infant behavior and beliefs about competence as a parent may represent separate dimensions of parenting efficacy, each having different relationships with parenting behavior.

While parenting efficacy was not related to maternal sensitivity, it was significantly related to eventual attachment security, such that parents with a greater sense of competence at 4 months tended to have infants who were more securely attached at 12 months, consistent with
findings reported by Diener, Nievar, and Wright (2003) and demonstrating a relationship of similar magnitude to that found within their study.

**Implications**

This study has a number of implications for future research. First, the abbreviated version of the Attachment Q-set administered via telephone interview appears to hold promise as measurement of attachment security. The interview demonstrated reasonably internal consistency and attachment security was significantly related to all variables, with the exception of infant negative emotionality, in the expected direction, with these findings supporting the validity of this measurement. As noted earlier, some researchers have argued against employing mothers’ ratings when using the Attachment Q-set (e.g., Teti et al., 1991) due to the relative difficulty presented by the task of completing a valid and accurate Q-sort with equally-sized piles, as required. By negating the need for the complex sorting task, the adaptation of the Attachment Q-set utilized within this study may present a more reasonable task for mothers to complete, in terms of the information processing demands, leading to higher quality (e.g., more reliable) data. Further, as the measure was completed via a telephone interview, there is no reason to be concerned regarding mothers’ ability to read or comprehend the items within the Q-set, as the interviewer was able to provide information and answer questions as necessary during the procedure. Thus, the abbreviated attachment interview utilized in this study may be useful for a variety of investigations, providing a low cost and time-limited approach to the evaluation of attachment security.

The study also points to the importance of considering dimensions of temperament in addition to negative emotionality. When examined separately, both infant positive emotionality and orienting/regulatory control demonstrated significant relationships with attachment security,
whereas infant negative emotionality did not. When combined into a difficulty composite score, the combination of these constructs also demonstrated a significant relationship with attachment security. Overall, it appears that too narrow a focus on aspects of negative emotionality may obscure the true relationship between temperament and attachment security.

Clinically, the study has interesting implications as well. Parenting efficacy was shown to be significantly related to later attachment security, though not to maternal sensitivity, suggesting that addressing parenting efficacy may present another avenue for early intervention in addition to interventions addressing specific parenting behaviors. As a significant relationship between infant difficulty and parenting efficacy was found, demonstrating that higher levels of infant difficulty are associated with lower levels of parenting efficacy, it may be that targeting parents of difficult infants in such interventions would be of particular benefit.

Limitations and directions for further research

A marked limitation of the present study is sample size. While the sample was large enough to detect large effects within multiple regression (Cohen, 1992), some medium and most small effect sizes may have been missed.

The sample included in this research can be described as a community sample. As a result, most mothers exhibited at least moderately sensitive responding to their infants. Similarly, few infants were rated with very low attachment security scores. Within a clinical sample (e.g., mothers with depression or anxiety or mother/infant dyads diagnosed with relationship problems in the DC:0-3 system), observed patterns of relationships may vary. This work is nonetheless important in so far as research on “nonsymptomatic precursors of psychopathology” is essential for understanding etiological pathways” (Gilliom & Shaw, 2004). A follow-up study including a more “high-risk” group of parents and infants would still be of
great interest in order to determine if the same pattern of findings would result or if differences relative to the results of the present study would emerge. Similarly, it would be of interest to examine the development of attachment security between infants and their fathers, examining similarities and differences between the development of attachment with their mothers.

Measurement of attachment security may be another area of relative weakness within the study, in that the abbreviated version of the Attachment Q-set has not been widely used or validated, and questions have been raised about parents responding to these items, rather than observers (e.g., Teti et al., 1991). While arguments for the apparent validity and reliability of the instrument are presented above, it remains a relatively new measurement method and further work to validate it would be of benefit, particularly given the promising findings within this study.

All variables within the study were measured via either parent report (infant temperament and parenting efficacy) or laboratory observation (maternal sensitivity). The addition of laboratory observation of temperament could have enabled the construction of a multi-method construct which may have been a better indicator of infant temperament, as well as allowed for examination of differences between observation and parent report of temperament in predicting attachment security. Similarly, observing maternal sensitivity in a more naturalistic setting, as in Ainsworth’s original studies, or observing maternal sensitivity over a longer period of time or over multiple periods may have enabled a more nuanced measurement of sensitivity.

While mediation between infant temperament and attachment security was not supported within this study, significant relationships between both infant and maternal variables, in addition to maternal sensitivity were found. In light of these results, continued exploration of maternal, child, and contextual variables in relation to the development of attachment security
appears important. As research examining the impact of these more distal contributors to the development of attachment security can be characterized as sparse and contradictory, further work testing for indirect effects important to attachment security is needed.
References


Cicchetti, M. Greenberg, & E.M. Cummings (Eds.), *Attachment during the preschool years: Theory, research, and intervention* (pp. 272-308).


Fig. 1 – Belsky’s social-contextual model of parenting

Fig. 2 – Proposed model of attachment security
Fig. 3 – Multiple mediator model to be tested

Infant negative emotionality → Maternal parenting efficacy → Maternal sensitivity → Infant attachment security

Fig. 4 – Simple mediation model to be tested

Infant difficulty → Maternal parenting efficacy → Infant attachment security
Table 1 – Correlations

<table>
<thead>
<tr>
<th></th>
<th>Infant NE</th>
<th>Infant PE</th>
<th>Infant ORC</th>
<th>Infant Difficulty</th>
<th>Parenting Efficacy</th>
<th>Maternal Sensitivity</th>
<th>Attachment Security</th>
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<tr>
<td>Infant NE</td>
<td>.43**</td>
<td>.50**</td>
<td>.66**</td>
<td>-.05</td>
<td>.24</td>
<td>-.21</td>
<td>.16</td>
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<td>.42**</td>
<td>.70**</td>
<td>-.25</td>
<td>-.05</td>
<td>.05</td>
<td>.39**</td>
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<tr>
<td>Infant ORC</td>
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<td></td>
<td>.66**</td>
<td>.03</td>
<td>-.12</td>
<td>.38**</td>
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<tr>
<td>Infant Difficulty</td>
<td></td>
<td></td>
<td></td>
<td>-.32*</td>
<td>.10</td>
<td>-.36*</td>
<td>.45**</td>
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<tr>
<td>Parenting Efficacy</td>
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<td></td>
<td></td>
<td></td>
<td>-.17</td>
<td></td>
<td>.31</td>
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<tr>
<td>Maternal Sensitivity</td>
<td></td>
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<td>Attachment Security</td>
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</tbody>
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* p<.05    **p<.01
Table 2 – Hierarchical regression predicting attachment security from infant negative emotionality, parenting efficacy, and maternal sensitivity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th></th>
<th></th>
<th>Model 2</th>
<th></th>
<th></th>
<th>Model 3</th>
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<tr>
<td></td>
<td>$B$</td>
<td>$SE$ $B$</td>
<td>$\beta$</td>
<td>$B$</td>
<td>$SE$ $B$</td>
<td>$\beta$</td>
<td>$B$</td>
<td>$SE$ $B$</td>
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<td>Infant Negative Emotionality</td>
<td>3.96</td>
<td>3.91</td>
<td>.156</td>
<td>6.48</td>
<td>3.71</td>
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<td>7.97</td>
<td>3.59</td>
<td>.31*</td>
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<tr>
<td>Parenting Efficacy</td>
<td>-2.05</td>
<td>.72</td>
<td>-.42**</td>
<td>-1.86</td>
<td>.69</td>
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<td>Maternal Sensitivity</td>
<td>7.39</td>
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<td></td>
<td></td>
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<td></td>
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<td>$R^2$</td>
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<td>.29</td>
<td></td>
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$F(1,41)=1.02$  $F(2,40)=4.71^*$  $F(3,39)=5.20^{**}$

*p<.05  **p<.01
Table 3 – Hierarchical regression predicting attachment security from infant difficulty, parenting efficacy, and maternal sensitivity

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<th></th>
<th>Model 2</th>
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<td>Infant Difficulty</td>
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<td>.44**</td>
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<td>-1.01</td>
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<tr>
<td>Maternal Sensitivity</td>
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<td></td>
<td></td>
<td>5.70</td>
<td>3.16</td>
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<td>$R^2$</td>
<td>.19</td>
<td></td>
<td>.25</td>
<td></td>
<td>.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F (1,41) = 9.73**</td>
<td>F (2,40) = 6.49**</td>
<td>F (3,39) = 5.65**</td>
<td></td>
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*p<.05    **p<.01
Table 4 – Regression predicting infant attachment from infant difficulty

<table>
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<tr>
<td>Infant Difficulty</td>
<td>8.50</td>
<td>2.72</td>
<td>.44**</td>
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</table>

$R^2 = .19$  
$F(1,41) = 9.73**$

*p<.05  **p<.01

Table 5 – Regression predicting parenting efficacy from infant difficulty

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<td>Infant Difficulty</td>
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<td>.59</td>
<td>-.32*</td>
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</table>

$R^2 = .10$  
$F(1,41) = 4.72*$

*p<.05  **p<.01
Table 6 – Regression predicting attachment security from infant difficulty and parenting efficacy

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<td>SE B</td>
<td>β</td>
<td>B</td>
<td>SE B</td>
<td>β</td>
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<tr>
<td>Infant Difficulty</td>
<td>8.5</td>
<td>2.72</td>
<td>.44**</td>
<td>6.98</td>
<td>2.82</td>
<td>.36*</td>
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<tr>
<td>Parenting Efficacy</td>
<td></td>
<td></td>
<td>-1.19</td>
<td></td>
<td>.71</td>
<td>-.24</td>
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<td>$R^2$</td>
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<td>F (1,41) = 9.73**</td>
<td>F (2,40) = 6.49**</td>
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*p<.05    **p<.01