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Health and Attachment Processes

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People with supportive social relationships, more social connections, and greater social integration typically evidence better emotional and physical health than those with unsupportive relationships, fewer social connections, and less social integration (Holt-Lunstad, Smith, & Layton, 2010; Uchino, 2009). Marital relationships, in particular, appear to confer health benefits (Kiecolt-Glaser & Newton, 2001), especially when those relationships are high in quality. Researchers have repeatedly found links between close relationships and health, but much remains to be learned about the processes through which relationships affect health.

Research following from attachment theory can offer insights into how relationships contribute to health, because many aspects of attachment processes (e.g., affect regulation, self-regulation, perceptions of support and support seeking, caregiving) are implicated in health. Accordingly, a growing literature has begun to examine the extent to which individual differences in attachment style are associated with health-related biological indicators, health behaviors, and health and disease outcomes from childhood through adulthood (Maunder & Hunter, 2008; Pietromonaco, DeBuse, & Powers, 2013; Pietromonaco, Uchino, & Dunkel Schetter, 2013). In this chapter, we first discuss the relevance of attachment processes for understanding health-related behaviors and outcomes, and present a theoretical framework for understanding potential connections between attachment and health. We then review research examining linkages between and among attachment

and health-related biological responses, health behavior, and health and disease outcomes. Throughout our review, we evaluate how attachment processes across the lifespan—from childhood through adulthood—contribute to health-related outcomes. Finally, we discuss several emerging themes, as well as directions for future research that will enhance our understanding of the mechanisms linking attachment processes and health.

Relevance of Attachment Processes for Health

Research and theory point to several ways in which attachment processes contribute to health-related physiological responses and downstream health and disease outcomes. Attachment processes are inextricably tied to how people regulate distress in the face of threat (Mikulincer & Shaver, 2007; Pietromonaco & Beck, 2015), and these regulatory strategies are likely to have long-term consequences for both emotional and physical health. In normative cases, individuals (infants, children, or adults) who face a threatening event seek out their attachment figures, who then provide comfort and reassurance, thereby allowing distressed individuals to regain a sense of calm. People vary, however, in the kinds of regulatory strategies they apply, depending on what they have come to expect about the responsiveness and reliability of attachment figures (i.e., depending on the content of their working models of attachment; Mikulincer & Shaver, 2007). Individuals with an insecure *anxious* attachment style expect that close others will not be readily available; as a result, they respond to threat by using hyperactivating strategies, including persisting in signaling their emotional distress to their partners and in trying to maintain proximity to partners, and excessively seeking reassurance and support from partners. Individuals with an insecure *avoidant* attachment style typically expect that their attachment figures will be unavailable and unresponsive to their needs. As a result, avoidantly attached individuals often respond to threat by suppressing or minimizing their distress and by not turning to close others for support. In contrast, individuals with a *secure* attachment style expect that their attachment figures will be available and responsive, and they are comfortable turning to their attachment figures when they are in need of support or reassurance. These chronic strategies for regulating negative affect are associated with different emotional health outcomes and may raise or lower risks for physical illness as well. For example, both anxious and avoidant individuals are more likely to show symptoms of depression (Carnelley, Pietromonaco, & Jaffe, 1994; Simpson, Rholes, Campbell, Tran, & Wilson, 2003; Wei, Mallinckrodt, Larson, & Zakalik, 2005), which in turn predict impaired immune functioning and the development of infectious diseases and chronic illnesses such as cancer (Antoni et al., 2006; Miller, 2010).

Another way in which attachment may influence health is via perceptions and provision of support; that is, individual differences in attachment-based affect regulation strategies predict the extent to which individuals rely on and benefit from their partners' efforts to provide support and reassurance, how they perceive their partners' supportive attempts, and how they provide support to partners (Beck, Pietromonaco, DeBuse, Powers, & Sayer, 2013; Carnelley, Pietromonaco, & Jaffe, 1996; Collins & Feeney, 2004; Simpson, Winterheld, Rholes, & Oriña, 2007). Given the importance of social support throughout life for later health outcomes (Robles, Slatcher, Trombello, & McGinn, 2014; Uchino, 2009) and the potential benefits of caregiving (Brown et al., 2009), attachment-related expectations and beliefs constitute an important antecedent condition that is likely to predict the extent to which individuals reap the health benefits of receiving and giving social support.

A final pathway linking attachment and health is that individual differences in attachment style and associated affect regulation strategies are connected to the ability to self-regulate and organize behavior in an effort to achieve goals (for a review, see Mikulincer & Shaver, 2007). For example, in young children, attachment security predicts the ability to regulate behavior on tasks that require them to suppress a dominant response (Kochanska, Philibert, & Barry, 2009) or that require social control (Drake, Belsky, & Fearon, 2014). Similarly, in adults, attachment security has been associated with greater self-control (Tangney, Baumeister, & Boone, 2004), as well as more effective behavioral regulation in a variety of domains (e.g., analyzing a problem, concentrating on a task, task persistence; reported in Mikulincer & Shaver, 2007, pp. 229–230). These findings suggest that insecurely attached individuals will have greater difficulty regulating behaviors related to health—including taking preventive measures such as obtaining regular physical exams and immunizations, eating a healthy diet, and avoiding risky behaviors.

Given the hypothesized ways that attachment-related differences in affect regulation, care seeking and support, and self-regulation influence individuals' later health outcomes, we have developed a model (Figure 11.1) that illustrates how these processes, along with physiological and affective responses and health behaviors, may account for the link between attachment and health. The conceptual framework illustrates that in a relationship between two partners (Partner A and Partner B), each partner's own attachment style shapes his or her affect and self-regulation strategies and relationship behavior, which in turn trigger patterns of health-related physiological responses (e.g., cortisol reactivity to stress, cardiovascular reactivity, immune functioning), affect, and health behavior (e.g., diet, exercise). The framework further suggests that these physiological and affective responses and health behaviors then contribute to the development of health conditions and disease. In addition, the theoretical framework emphasizes

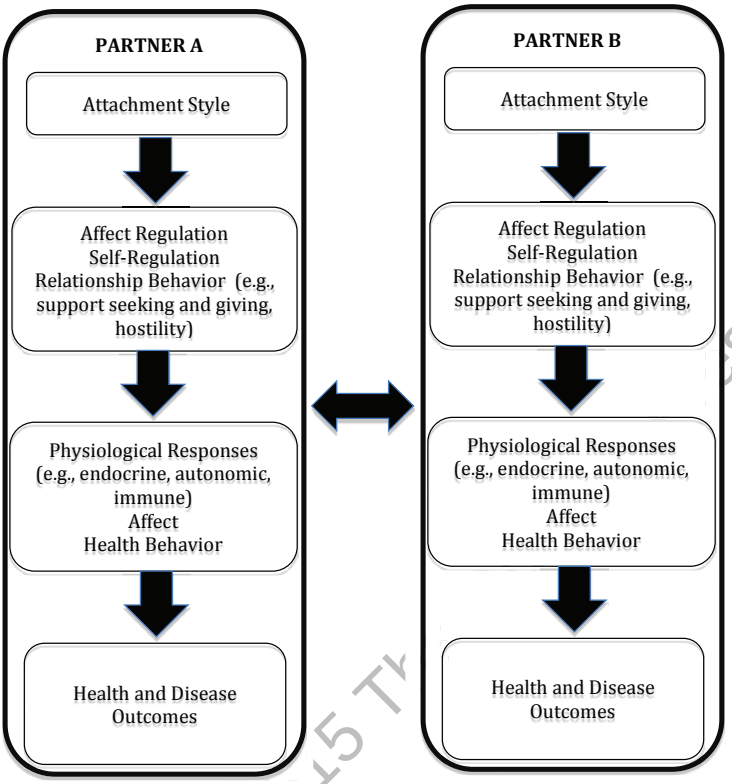

FIGURE 11.1. A theoretical framework for guiding research on attachment and health-related processes and outcomes.

that attachment relationships are dyadic, suggesting that each partner's characteristics, responses, and outcomes can influence the other partner at various points (Pietromonaco, Uchino, et al., 2013). To simplify the model, we have illustrated effects in only one direction (e.g., from attachment to health and disease outcomes), but some effects are likely to be bidirectional (e.g., having a disease may influence attachment security). Although a fair amount of research has examined the connection between attachment and health-related processes and outcomes, few studies have tested the hypothesized mediating links in the model. As an example, little is known about whether the link between attachment insecurity and health conditions such as cardiovascular disease (McWilliams & Bailey, 2010) can be accounted for by the cumulative effects of cortisol reactivity to stress, or health behaviors such as food and exercise patterns, or a combination of these factors. In the following sections, we review evidence indicating that individual

differences in attachment style—in both childhood and adulthood—are associated with health-related biological responses, health behavior, and health and disease outcomes. When possible, we discuss evidence relevant to the mediating mechanisms (see Figure 11.1); we return to this issue in the final section, in which we make recommendations for the next generation of studies.

Physiological Mechanisms Linking Attachment and Health

Early adverse attachment experiences can alter the development and functioning of biological regulatory systems, including the hypothalamic–pituitary–adrenal (HPA) axis, the sympathetic–adrenal medullary (SAM) axis, and the immune system, leaving individuals vulnerable to the effects of stress on the body (Felitti et al., 1998; Gunnar & Donzella, 2002; Repetti, Taylor, & Seeman, 2002; Schore, 2001; Shonkoff, Boyce, & McEwen, 2009; Taylor, Way, & Seeman, 2011). Specifically, children who experience harsh circumstances—including neglectful or abusive parents, or environments with high levels of conflict or disorganization—not only evidence difficulty in regulating distress, but also show dysregulation in their physiological stress responses (Repetti et al., 2002; Taylor et al., 2011). Indeed, early childhood adversity and low socioeconomic status (SES) have been linked to higher risk for a variety of chronic health conditions, such as cardiovascular disease, obesity, metabolic syndrome, and cancer (Kelly-Irving et al., 2013; Lehman, Taylor, Kiefe, & Seeman, 2005; Miller & Cole, 2012; Steptoe & Kivimäki, 2013; Tamayo, Christian, & Rathmann, 2010). Thus, as illustrated in Figure 11.1, dysregulation in endocrine, autonomic, and immune responses may provide a pathway through which attachment-related beliefs and expectations developed early in life (e.g., as a result of early adverse experiences) contribute to downstream health and disease outcomes. Similarly, attachment in adulthood also may shape health and disease outcomes through biological response systems, either because of continuity between earlier and later attachment patterns (Fraley & Brumbaugh, 2004), or because attachment in adult relationships also can shape biological stress responses (Pietromonaco, DeBuse, et al., 2013; Pietromonaco, Uchino, et al., 2013). The primary biological indicators that have been examined reflect activity in the HPA axis, SAM axis, and immune system. We selectively review key studies for each of these biological responses.

HPA Responses

A key physiological system subject to the influence of attachment is the HPA axis. Upon activation by a stressor, the HPA axis governs the release of cortisol into the bloodstream. Although this response prepares the body

to deal with acute stressors, continued release of cortisol disrupts numerous body processes, including metabolism, immune responses, and autonomic nervous system activity (Pietromonaco, DeBuse, et al., 2013). Indeed, the effect of cortisol on health may be attributed to its inhibitory effect on the immune system, which predisposes individuals to negative health outcomes such as increased susceptibility to infectious disease, flareups of existing allergies or other conditions, and accelerated progression of chronic disease (Miller, Chen, & Zhou, 2007).

Childhood Attachment and HPA Responses

The link between attachment style and health-related biological outcomes emerges very early in life. Support from a large body of research suggests that infants and children raised in a harsh family environment experience mental and physical health problems well into adulthood, and that HPA axis dysregulation is implicated in the link between risky family background and health risks (Taylor, Lerner, Sage, Lehman, & Seeman, 2004). In particular, parental caregiving may influence children's biologically based stress response systems; for example, poorer caregiving by parents (which is associated with children's attachment insecurity) can increase children's baseline cortisol levels, and this dysregulation potentiates lower executive functioning and higher reactivity to stimuli (Blair & Raver, 2012). These outcomes are correlates of poor self-regulation, which places infants and children at risk for serious health problems including heart disease and depression, as well as increases in the prevalence of health-threatening behaviors such as substance abuse and sexual promiscuity (Repetti et al., 2002). In this way, an adverse environment in childhood may have lasting effects on HPA axis functioning, increasing one's propensity for health risks and disease.

Several studies have focused specifically on the link between parent–child attachment and physiological responses. This work has indicated that infants with different attachment classifications exhibit distinctive physiological patterns to stressful stimuli. Infants with a Type D (disorganized/disoriented) attachment classification consistently show significantly higher elevations in cortisol levels and heart rates than infants with other attachment classifications (Hertsgaard, Gunnar, Erickson, & Nachmias, 1995; Spangler & Grossmann, 1993). Similarly, toddlers of mothers who reported more frequently using emotional withdrawal in response to their children (which presumably would increase the likelihood that the children were insecurely attached) were more likely to show higher levels of baseline cortisol (Bugental, Martorell, & Barraza, 2003). Other work has found that attachment moderated the association between behavior inhibition and HPA activity, such that HPA activation was most prominent in fearful or behaviorally inhibited infants who were also insecurely attached (Gunnar, Brodersen, Nachmias, Buss, & Rigatuso, 1996; Nachmias, Gunnar,

Mangelsdorf, Parritz, & Buss, 1996; Spangler & Schieche, 1998). Still other work has examined attachment in early childhood and later patterns of stress reactivity in adolescence among individuals at risk for asthma; in this sample, insecure attachment in early childhood predicted flatter patterns of cortisol reactivity over the course of a standard laboratory stressor, suggesting dysregulated HPA responses (Kelsay, Leung, Mrazek, & Klinnert, 2013). Conversely, attachment security may have a health-protective effect. One study found that attachment security buffered infants from elevations in cortisol when the infants were facing threatening stimuli, such as receiving an immunization (Gunnar et al., 1996). Taken together, the research indicates that childhood attachment insecurity is linked to greater dysregulation in physiological responses to stress. It is possible that these dysregulated physiological patterns, such as the frequency and magnitude of HPA activation, may serve as precursors to childhood health and disease problems.

Adult Attachment and HPA Responses

HPA activation has been shown to affect mental and physical wellness in numerous ways (Jaremka et al., 2013; Miller et al., 2007), but research has only recently addressed whether attachment in adult relationships is connected to physiological stress responses that may predispose individuals to later deleterious health outcomes. One study (Powers, Pietromonaco, Gunlicks, & Sayer, 2006) examined how attachment style in dating couples modulates patterns of cortisol release and recovery in response to an interpersonal stressor: discussing a heated and unresolved area of disagreement with one's partner. Salivary cortisol was assessed at multiple time points before, during, and after each couple's conflict discussion. The findings indicated that patterns of cortisol release and recovery varied as a function of attachment style and gender. For women, higher attachment *avoidance* predicted heightened cortisol responses before and during the discussion, but a rapid recovery after the discussion when they were able to disengage from the stressor. For men, higher attachment *anxiety* predicted a peak in cortisol in anticipation of the stressful discussion and resulted in slower recovery afterward. These findings suggest that different types of attachment insecurity are associated with distinct patterns of HPA axis responses to attachment-related threats such as relationship conflict.

While both attachment avoidance and anxiety appear to support atypical HPA axis activity, anxiously attached individuals are especially vulnerable to exaggerated physiological and affective reactivity to stress, particularly when the stressor is relationship-threatening (Pietromonaco, DeBuse, et al., 2013). For instance, heightened HPA axis activity was observed in anxiously attached individuals during travel separations, reinforcing the notion that an anxious attachment style may enhance sensitivity to threats of decreased partner closeness and availability (Diamond, Hicks, & Otter-Henderson, 2008).

Collectively, these findings suggest that an individual's attachment style is associated with his or her stress responses, especially reactions to attachment-relevant threats. In addition, research suggests that one's *partner's* attachment style may modulate, for better or for worse, one's *own* stress response. For example, when husbands withdrew in response to wives' negativity during a conflict interaction, wives showed increased cortisol reactivity (Kiecolt-Glaser et al., 1996). Additional support for the effect of partners' behaviors on individuals' own physiological stress responses comes from research finding that men with securely attached female partners showed lower cortisol reactivity and faster recovery to relationship conflict than did men with insecure partners (Powers et al., 2006). This finding is thought to be a function of secure individuals' tendency to be more responsive, which may have reduced the physiological stress of men in this study (Powers et al., 2006).

Little research has examined how the interplay between *both* partners' attachment orientations is associated with physiological responses, although developmental models have long recognized the significance of this interplay. Specifically, transactional or goodness-of-fit models (Thomas & Chess, 1977) suggest that the attachment orientations, behavior, and temperament of both infants and their mothers need to be considered in predicting how each dyad member responds (Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990). Recent work in our lab examined how both partners' attachment styles might jointly contribute to their physiological and behavioral responses to a conflict discussion (Beck et al., 2013). In this study of 218 newlywed couples, we found that pairs including a more anxiously attached wife and a more avoidantly attached husband showed a distinctive pattern of cortisol responses in anticipation of and before a discussion of a major area of unresolved conflict in their relationship. Both spouses showed rapid increases in cortisol in anticipation of a conflict discussion, followed by rapid declines. These cortisol patterns were paralleled by less constructive interaction behaviors: More anxiously attached wives had difficulty recognizing their husbands' distress when the husbands were high in avoidance, and more avoidantly attached husbands were less able to express their needs for support and responsiveness when their wives were high in anxiety (Beck et al., 2013). These partner effects suggest that relationship partners dynamically influence each other's physiological activity over time, with potential downstream consequences for psychological well-being and physical health.

SAM Responses

Attachment also may influence health outcomes through the SAM system, which includes the autonomic nervous system (Diamond & Fagundes, 2010). As with HPA axis responses, dysregulated reactivity in the SAM

axis is likely to accompany insecure attachment in children and adults, and to affect biological markers with implications for health.

Childhood Attachment and SAM Responses

Researchers have become increasingly interested in the complex interactions among genetic predispositions, childhood experiences, attachment style, and physiological outcomes. For instance, attachment behavior has been hypothesized to modulate infants' genetically based physiological sensitivities to distress, such that secure attachment may protect against SAM hyperactivation in individuals with genetic polymorphisms that put them at risk for dysregulated stress responses (Frigerio et al., 2009).

Along with constitutional factors, experiences early in life (e.g., quality of parental caregiving) shape a child's developing attachment style, and a substantial body of research suggests that adverse experiences may disrupt various physiological systems with the potential for long-term adverse health effects. Research on individuals from risky family backgrounds suggests that continued social challenges in early life—such as parental unavailability or insensitivity—can disrupt a child's SAM system, which over time taxes cardiovascular functioning (Repetti et al., 2002). Another pathway by which attachment style in childhood may predict health risks is via attachment-associated social interaction patterns (attachment → relationship behavior in Figure 11.1) with known health correlates. For example, insecure attachment with caregivers may predispose the development of loneliness, fewer reciprocated friendships, and less social competence in children (Kerns, Klepac, & Cole, 1996), which would appear to increase SAM activation and the risk for coronary heart disease. Taken together, these findings support a model whereby attachment-based influences early in development shape lifelong physical health outcomes via multiple avenues.

Adult Attachment and SAM Responses

The relationship between adult attachment and SAM reactivity may vary as a function of deficient, defensive, or dissociative emotion regulation strategies that have been linked to insecure attachment (Pietromonaco & Beck, 2015). For example, individuals high in attachment avoidance tend to minimize emotional distress and rely on repressive coping in response to emotional and attachment-related tasks, and this strategy has been found to produce heightened and escalating sympathetic nervous system reactivity (Diamond et al., 2008). Indeed, several studies have found that attachment avoidance in adults potentiates hyperactivation in the SAM axis, and that in contrast to the pattern for anxiously attached individuals, this avoidance-related hyperactivation fails to correspond with heightened subjective distress (Diamond & Fagundes, 2010; Diamond et al., 2008). The

incongruence between avoidant individuals' physiological activity and their reported distress and negative affect underscores the value of physiological measurements for providing a window into a less conscious aspect of emotional reactions.

Immune Responses

Immune system functioning is another biomarker of health outcomes that can fluctuate depending on the quality of relationship experiences, which are closely associated with attachment style. The literature examining attachment and immune responses is in its infancy, with only a few studies examining these processes in early childhood or adulthood.

Childhood Attachment and Immune Responses

Few studies have directly examined childhood attachment and immune responses, but related research indicates that experiencing adversity in early childhood is associated with immune dysregulation (Fagundes, Glaser, & Kiecolt-Glaser, 2013). One study of a nationally representative sample of U.S. children has shown that children from lower-income families evidenced higher levels of C-reactive protein, an indicator of inflammation (Dowd, Zajacova, & Aiello, 2010), as well as elevated antibody levels of a herpes virus, cytomegalovirus (Dowd, Palermo, & Aiello, 2012).

Adversity early in life appears to shape immune functioning later in life (Miller & Chen, 2010; Slopen, Koenen, & Kubzansky, 2012). In one longitudinal study, individuals who as children had experienced some form of socioeconomic disadvantage or high levels of sexual abuse or physical abuse at a young age were more likely to have higher Epstein–Barr virus antibody titers, which reflect cell-mediated immune functioning (Slopen et al., 2012). The potential role of attachment is suggested by recent work showing that adults from a low-SES background who reported (retrospectively) that their mothers displayed high warmth during childhood evidenced diminished pro-inflammatory responses across several indicators of immune functioning and inflammation, compared to those who reported that their mothers displayed low warmth (Chen, Miller, Kobor, & Cole, 2011). These findings suggest that individuals who were more likely to be securely attached (i.e., those who had mothers higher in warmth) were protected from the adverse effects of low SES. However, the interpretation of these findings is limited because the quality of the mother–child relationships was assessed via participants' self-reports about their mothers' earlier behavior, rather than through direct observation of interactions in the mother–child relationships during childhood. As a result, the findings may reflect that participants who recalled their mothers as low in warmth during childhood differed from those who recalled their mothers as high in

warmth in important ways (e.g., depressed mood, quality of current relationship) that may lead to poorer immune functioning.

Adult Attachment and Immune Functioning

The few studies examining attachment in adulthood and immune functioning point to attachment avoidance, anxiety, or both as risk factors for immune system dysregulation, but the findings are not always consistent for men and women. One study found that both husbands' and wives' attachment avoidance predicted a greater inflammatory response to a marital conflict discussion, in addition to more negative and fewer positive behaviors, both of which signal cardiovascular risks (Gouin et al., 2009). Similarly, other work with a small sample of dating couples (N = 34 couples) found that women's attachment avoidance predicted slower recovery from a skin barrier wound (which reflects immune functioning) over the course of two potentially stressful discussions on two separate days (a discussion of a personal concern and another about a relationship problem); however, avoidance was unrelated to skin barrier recovery among men (Robles, Brooks, Kane, & Schetter, 2013). Instead, men high in attachment anxiety showed slower skin barrier recovery when the discussion focused on a personal concern. Furthermore, one finding for women ran counter to theoretical predictions: Women high in attachment anxiety showed more rapid skin barrier recovery at both visits. This finding is difficult to explain, given the current scarcity of research in this area (Robles et al., 2013) and in light of other recent work showing that attachment anxiety is linked to poorer immune functioning in both husbands and wives: Husbands and wives who scored higher on a measure of adult attachment anxiety showed lower levels of several types of T-cells (CD3+ T-cells, CD45+ T-cells, CD3+CD4+ helper T-cells, and CD3+CD8+ cytotoxic T-cells), suggesting impaired immune functioning (Jaremka et al., 2013).

Too few studies have been conducted to determine whether attachment avoidance, attachment anxiety, or both are more likely to be connected to immune functioning, and when these effects are likely to vary by gender. The answer may be complex: Attachment anxiety may be associated with some immune markers, whereas avoidance may be associated with others, or the links may vary across different situational contexts (e.g., across quality and type of relationship or type and degree of stress) as well as in relation to the meaning of each context for women versus men. Nevertheless, initial evidence suggests that attachment insecurity in adults is associated with disruptions in immune functioning, and that these disruptions may forecast future health problems. Additional investigations are needed to determine the conditions under which attachment anxiety, avoidance, or both are tied to immune responses, and to provide a clearer picture of the mechanisms underlying such effects.

Health Behavior

Attachment orientations are strongly tied to the strategies people use to regulate their thoughts, feelings, and behavior (see Mikulincer & Shaver, 2007, and Pietromonaco & Beck, 2015); as a result, attachment security or insecurity should predict the extent to which individuals engage in preventive health behaviors or behaviors that increase health risks. Despite the importance of this issue, relatively few studies have examined the extent to which attachment in either childhood or adulthood predicts specific health behaviors. Figure 11.1 illustrates that self-regulation, affect regulation, and relationship processes may be implicated in the link between attachment and health behavior, but this idea has yet to be directly tested.

Childhood Attachment and Health Behavior

Children and adolescents who are insecurely attached to parents show riskier health behavior. For example, insecurely attached children (ages 8–11 years) and adolescents are more likely to evidence eating disorders (Goossens, Braet, Bosmans, & Decaluwé, 2011; O'Shaughnessy & Dallos, 2009). Similarly, children who were insecurely attached at 24 months of age, compared with their securely attached peers, were more likely to be diagnosed with obesity at 4.5 years of age (Anderson & Whitaker, 2011), which also may reflect problematic eating patterns and is a risk factor for various diseases later in life (including heart disease, stroke, and diabetes). Similarly, low maternal sensitivity and children's attachment insecurity (assessed from mother–child interactions at ages 1–3) predicted obesity during early adolescence (12–16 years) (Anderson, Gooze, Lemeshow, & Whitaker, 2012). In addition, insecure attachment has been associated with poorer glycemic control among adolescents with diabetes (Rosenberg & Shields, 2009), suggesting that these adolescents had difficulty adhering to their medical regimen.

Furthermore, adolescents with insecure attachments to their parents are more likely to use alcohol and drugs (Branstetter, Furman, & Cottrell, 2009), smoke cigarettes (Foshee & Bauman, 1994), and engage in risky sexual behavior (Luster & Small, 1994). Research examining African American girls (a group at higher risk for sexually transmitted diseases) has shown that girls who had higher-quality relationships with their mothers (a proxy for secure attachment) were less likely to engage in risky sexual behaviors (e.g., unprotected sex, multiple sexual partners, earlier sexual intercourse) (Crosby et al., 2001; Emerson, Donenberg, & Wilson, 2012; Moore & Chase-Lansdale, 2001), suggesting a protective effect of attachment security.

The mechanisms underlying the link between children's attachment and health behavior have yet to be tested. Children who have poorer-quality

relationships with parents also have greater difficulty regulating emotions (Contreras, Kerns, Weimer, Gentzler, & Tomich, 2000), which is likely to interfere with their ability to engage in and persist at behaviors such as resisting attractive but potentially health-damaging foods or following a regular exercise routine. Children who are insecurely attached (especially avoidantly attached) may be reluctant to seek assistance from parents or other adults, and discussions with parents about health-protective behaviors may be difficult (Brody et al., 2006). Alternatively, parents who provide less sensitive and responsive caregiving themselves may be more likely to engage in riskier behaviors and less likely to engage in health-protective behaviors, and therefore transmit similar attitudes and behaviors to their children through modeling.

Adult Attachment and Health Behavior

Limited research indicates that attachment insecurity (anxiety, avoidance, or both) in young adults is associated with using drugs, having a poorer body image, engaging in risky sexual behavior, reporting greater alcohol use, having a poorer diet, and exercising less (Feeney, Peterson, Gallois, & Terry, 2000; Huntsinger & Luecken, 2004). In a similar vein, a recent study of 701 adult women found that attachment anxiety predicted riskier sexual behavior, and that avoidance predicted being more likely to smoke (Ahrens, Ciechanowski, & Katon, 2012).

Other work has demonstrated that individuals with insecure attachment styles are less likely to take preventive health measures. For example, women who are higher in avoidance or anxiety are less likely to report receiving cervical cancer screening and perceive more barriers to screening, even after their sexual experience and levels of neuroticism are taken into account (Hill & Gick, 2013). Avoidantly attached women also are less likely to use seat belts routinely (Ahrens et al., 2012). In addition, evidence from a sample of over 4,000 primary care patients with diabetes indicated that those with dismissing/avoidant attachments (i.e., high in avoidance and low in anxiety) showed less adherence to their treatment plans; they were less likely to follow diet, foot care, medication, exercise, and smoking recommendations (Ciechanowski et al., 2004).

Research in this area would be enhanced by examining attachment and health behavior at a dyadic level, taking into account how relationship partners' attachment orientations and associated relational behavior might shape each partner's health behaviors. Research on relationships and health behavior has increasingly shown that dyadic processes contribute to health behaviors, including weight loss attempts (Novak & Webster, 2011), smoking (Lewis & Butterfield, 2007), and management of one partner's diabetes (August, Rook, Franks, & Stephens, 2013; Stephens et al., 2013). For example, one recent diary study found that on days when spouses provided

support and encouragement about following the recommended diet, their partners with Type 2 diabetes were more likely to adhere to their dietary regimen on the following day; however, on days when spouses exerted pressure or coercion, their partners were less likely to adhere to their diet on the following day (Stephens et al., 2013). Incorporating an attachment perspective into dyadic studies of health behavior will be useful for identifying whether individuals with particular attachment styles (e.g., avoidant) or couples with particular attachment pairings (e.g., a more anxious caregiving partner with a more avoidant patient partner) may be especially prone to veer from their diet when partners exert pressure, or whether support is effective for some patients (e.g., securely attached) but less so for others (e.g., avoidantly attached). Future work investigating how individuals' own attachment styles together with their partners' attachment styles shape dyadic efforts to manage and change health behaviors will be important for developing interventions that take into account individual differences, and that can be tailored for different individuals and types of couples.

Physical Health

All of the factors discussed so far may ultimately contribute to physical health and disease risks and outcomes, as illustrated in Figure 11.1. We now discuss the research linking attachment in childhood and adulthood to known health risks and health conditions.

Childhood Attachment and Health Conditions

A number of studies have examined whether health conditions *during childhood* vary as a function of early childhood attachment insecurity (Maunder & Hunter, 2001). One general finding is that insecure attachment to parents is more prevalent among children diagnosed with a clinical condition, compared with healthy controls; for instance, this pattern has been found for premature infants or infants affected by atopic dermatitis (Cassibba, van IJzendoorn, & Coppola, 2012), infants with congenital heart disease (Goldberg, Simmons, Newman, Campbell, & Fowler, 1991), and asthmatic preschool children (Mrazek, Casey, & Anderson, 1987).

Although studies have demonstrated an association between childhood attachment and children's health conditions and outcomes, the direction of this association remains elusive. It is possible that early attachment contributes to childhood health conditions through physiological pathways, such as the HPA axis; an additional possibility is that disease conditions alter parent–child interactions in ways that increase the likelihood that children will become insecurely attached. Few studies have addressed this question; however, one study has shown that children born with congenital heart disease

were more likely to be classified as avoidantly attached at 12–18 months of age (based on behavior in the Strange Situation) than healthy controls were (Goldberg et al., 1991). Furthermore, of the children with congenital heart disease, 70% of those classified as securely attached showed improvement in cardiac function from an earlier initial intake interview to the laboratory session in which attachment behavior was observed, whereas only 30% of children classified as insecurely attached showed improvement, even though the two groups did not differ in the initial severity of their illness. This finding suggests that improvement in a child's health condition may alter parent–child interactions in ways increasing the likelihood that the child will show secure attachment behavior; however, prospective data are needed to evaluate the direction of these effects more precisely.

Few studies have examined whether childhood attachment to parents predicts health conditions *in adulthood*. Evidence from studies in which individuals retrospectively reported on their childhood relationships suggests that individuals with poorer-quality family relationships are more likely to have health problems in adulthood (Stewart-Brown, Fletcher, & Wadsworth, 2005). Interpreting findings from studies relying on retrospective reports of childhood attachment is difficult, however, because participants' current states (e.g., current attachment, mood, physical health conditions) could bias their memory for earlier childhood experiences. Other work has used self-report indicators of early attachment disruption that are less likely to be biased by participants' current states. For example, one study examined whether the self-reported death of a biological parent before age 16 predicted adults' health-related physiological responses to stress (Luecken, 1998). This research found that young adults who had lost a parent before age 16 showed higher blood pressure and cortisol levels in response to novel stressful stimuli (watching a video clip depicting loss of a parent or giving an impromptu speech) in comparison to young adults who had not experienced the loss of a parent. If physiological responses such as those observed in this study accumulate over time, they may contribute to the development of adverse health conditions. Similarly, research using childhood SES as an indicator of early childhood environment has found that individuals from lower-SES backgrounds are more likely to develop adult metabolic syndrome; however, this association appears to be stronger among participants who report poorer maternal nurturance (possibly reflecting insecure attachment) and weaker among individuals who report better maternal nurturance (possibly reflecting secure attachment) (Miller, Lachman, et al., 2011).

The best way to examine the role of childhood attachment and future health and disease outcomes in adulthood is to assess attachment in childhood and then follow these individuals into adulthood (Maunder & Hunter, 2001). Although nearly 30 years ago researchers pointed to the importance of taking a developmental perspective to understand how early childhood

experiences shape health in later life (e.g., Boyce, 1985), few studies have examined this question by using prospective, longitudinal designs. A recent landmark study, however, used a prospective design to follow individuals from infancy to age 32, providing the most compelling evidence yet for a connection between attachment in childhood and health outcomes in adulthood (Puig, Englund, Simpson, & Collins, 2013). In this study, childhood attachment was assessed when participants were 12 and 18 months of age with an objective measure: the infants' behavior (coded by trained observers) in response to separation and reunion with their mothers in the Strange Situation. Physical health was assessed many years later, when participants were 32 years old. Remarkably, individuals' infant attachment classifications predicted their physical health outcomes in middle adulthood, even after potentially related variables (e.g., life stress, negative emotion, body mass index) were taken into account. Specifically, individuals whose attachments had been classified as anxious-resistant in infancy were more likely to report physical illness as adults 32 years later than were individuals who had been classified as securely attached in infancy. Adults whose attachments had previously been classified as anxious-avoidant or anxious-resistant were more likely to report having an inflammation-related illness at age 32 than their secure peers. In addition, participants classified as insecurely attached at both times (12 months and 18 months) during infancy were more likely to report having a physical illness, inflammation-related illness, and nonspecific symptoms at age 32 than participants classified as insecurely attached at one time or as securely attached at both times during infancy.

The Puig et al. (2013) study also examined whether several factors mediated the link between early attachment and later health outcomes—including variables that our model (Figure 11.1) suggests may be important mechanisms, such as the role of childhood emotion regulation ability, interpersonal competence with peers, and emotional health. None of the variables tested significantly mediated the attachment–health link. As Puig et al. note, however, the small percentage of participants with a physical illness may have made it difficult to detect mediation.

This prospective research suggests that the quality of early parent–child relationships is an important antecedent of later physical health. Additional prospective longitudinal studies are needed for replicating this effect and assessing its generality across samples. The infants in the Puig et al. (2013) study were originally from low-SES backgrounds; such individuals carry a greater risk for adverse health outcomes in adulthood, a process that may occur in part through alterations beginning in childhood in the body's physiological stress response systems (Miller, Lachman, et al., 2011). Thus it will be important for additional prospective studies to determine whether the link between childhood attachment and later health outcomes is intensified by early adverse circumstances (e.g., low SES), or whether a similar

link emerges among individuals who have not experienced early childhood adversity. Furthermore, research in this area will be advanced by assessing potential physiological pathways (Miller, Chen, & Parker, 2011), as well as further examining possible behavioral and emotional mechanisms (e.g., learned strategies for regulating emotion) through which early experiences shape downstream health outcomes. This knowledge will be vital for developing early intervention programs to target processes that are implicated in the link between early experience and later health and disease outcomes.

Adult Attachment and Health/Disease Outcomes in Adulthood

A growing literature suggests that adult attachment is associated with physical symptoms (e.g., sleep problems, perceptions of pain) and health and disease risks and conditions (e.g., cardiovascular reactivity, high blood pressure, stroke, heart attack).

Physical Symptoms

Anxiously attached individuals, who show greater affective reactivity (Pietromonaco, Barrett, & Powers, 2006; Pietromonaco & Barrett, 1997), also may be more sensitive to physical distress and pain. Consistent with this idea, individuals characterized by anxious attachment report more physical and somatic symptoms than individuals with other forms of attachment do (Feeney & Ryan, 1994; Kidd & Sheffield, 2005; Ciechanowski, Walker, Katon, & Russo, 2002).

Most of the studies have examined adult attachment and reported physical symptoms at the same point in time, making it difficult to know whether attachment style influences symptom reporting, or whether experiencing unpleasant physical symptoms creates conditions that lead to attachment insecurity. For example, people who are in pain may find it difficult to engage in positive interactions with others, which over time may increase their attachment insecurity.

Studies of experimentally induced pain suggest that attachment anxiety is associated not only with anxiously attached individuals' reports of pain experienced in their daily lives, but also with their reactions to induced pain. Individuals higher in attachment anxiety show more intense reactions to experimentally induced pain, including a lower pain threshold, greater catastrophizing about the pain (e.g., ruminating about it, feeling overwhelmed by it), and greater perceptions of pain (Meredith, Strong, & Feeney, 2006; Wilson & Ruben, 2011), although some work has not found this association (Andrews, Meredith, & Strong, 2011).

The link between attachment avoidance and experimentally induced pain is less clear. Some work has found greater pain tolerance among avoidantly attached individuals exposed to an acute laboratory pain induction

(Andrews et al., 2011; Wilson & Ruben, 2011). Other work, however, has found that both attachment anxiety and avoidance predict pain intensity. In a diary study of women with chronic pain, those high in attachment anxiety reported greater pain intensity and showed more pain catastrophizing on days when they reported more intense pain; more avoidant women also reported greater pain intensity and catastrophizing, but they were less likely to cope by relying on others on days when they showed higher catastrophizing (Kratz, Davis, & Zautra, 2012).

These findings suggest that for women with chronic pain, both attachment anxiety and avoidance are associated with perceptions of pain and coping strategies, especially on days that are more difficult (the pain is more intense, or worries about the pain are high). Findings vary somewhat across studies, possibly because the extent to which either attachment anxiety, avoidance, or both are associated with pain responses may depend on the context (e.g., an acute laboratory stressor or chronic pain), the nature of the sample (e.g., individuals with or without chronic pain, age of sample), and other contextual variables (e.g., the extent to which the pain sufferers feel supported or rejected) (Andrews et al., 2011; MacDonald, 2008). For example, anxiously attached individuals who were reminded of rejection evidenced a lower pain threshold than anxiously attached individuals in a control condition did (MacDonald, 2008), suggesting that social pain may trigger greater sensitivity to physical pain among those with anxious attachments.

Another symptom associated with attachment is difficulty sleeping, which is linked to greater health risks such as contracting the common cold (Cohen, Doyle, Alper, Janicki-Deverts, & Turner, 2009), poorer immune function (Prather et al., 2012), and metabolic and cardiovascular diseases (Grandner, Jackson, Pak, & Gehrman, 2012). Attachment anxiety in adults may be relevant for sleep quality, because an individual's worries about the relationship and partner (e.g., concerns about closeness, rejection) may become salient when the individual attempts to fall asleep (Carmichael & Reis, 2005). In line with this reasoning, one study of married couples found that attachment anxiety predicted difficulties with sleeping for husbands and wives, even after the researchers controlled for individuals' symptoms of depression, which also are linked to sleep problems (Carmichael & Reis, 2005). Similarly, research using a diverse sample of older adults (ages 60–85 years) found that individuals who were preoccupied with attachment (high in anxiety and low in avoidance) were more likely to use medication to help them sleep and more likely to take naps during the daytime, possibly as a side effect of the medications or because they had trouble sleeping at night (Verdecias, Jean-Louis, Zizi, Casimir, & Browne, 2009).

Other work has found a link between anxious attachment and objective sleep quality, but, surprisingly, not subjective sleep quality (Troxel, Cyranowski, Hall, Frank, & Buysse, 2007; Troxel & Germain, 2011). In

this work, anxiously attached women with major depression showed poorer sleep quality on objective measures: They showed the lowest percentage of sleep during stages 3 and 4 (deep sleep), especially if they had lost a spouse through divorce, separation, or death (Troxel et al., 2007). Similarly, military veterans with posttraumatic stress disorder who were more anxiously attached showed less sleep in stages 3 and 4 (Troxel & Germain, 2011).

Overall, the findings consistently show that attachment anxiety is associated with sleep disturbances, whereas few studies have shown a similar link between avoidance and sleep disturbances (Maunder, Hunter, & Lancee, 2011). Importantly, the link between relationship functioning and sleep disruptions appears to be bidirectional (Hasler & Troxel, 2010). As a result, individuals who are anxiously attached may experience a vicious cycle in which attachment-related worries lead to poorer sleep quality, and being fatigued may increase the likelihood of problematic interactions with their partners, which can then interfere with subsequent sleep. This idea fits with findings from a diary study showing that more anxiously attached couple members reported greater sleep problems on mornings following days of greater conflict with their partners, and fewer sleep problems on mornings following days of lower conflict (Hicks & Diamond, 2011). In contrast, individuals higher in avoidance showed a weaker association between experiencing conflict on the previous day and sleep problems the next morning than did those low in avoidance, perhaps because highly avoidant individuals are better able to suppress potentially disturbing thoughts about conflict.

Health Risks and Conditions

Cardiovascular reactivity to stress, particularly if cumulative, is a risk factor for later cardiovascular disease (Uchino, Cacioppo, & Kiecolt-Glaser, 1996). Several studies suggest that attachment insecurity is associated with cardiovascular reactivity. For example, individuals who were anxiously or avoidantly attached responded with increased heart rate and blood pressure after separation from their romantic partners during a stress task (Feeney & Kirkpatrick, 1996) or when they imagined themselves in hypothetical scenarios about their romantic partners that evoked anger (Mikulincer, 1998). In addition, adolescents who were more anxiously attached in their relationships with close others showed higher ambulatory diastolic and systolic blood pressure in response to interactions with friends, and those who were more avoidantly attached showed higher diastolic blood pressure in response to interpersonal conflict (Gallo & Matthews, 2006). (Although this study examined adolescents, it is included in this section because the attachment measure did not specifically assess parent–child attachment.) Although these studies point to attachment insecurity as a risk factor for downstream health problems, no studies have yet demonstrated that

attachment-related fluctuations in blood pressure predict health and disease outcomes later in life.

Some work has examined whether adult attachment predicts the likelihood of having a health condition. The best evidence comes from cross-sectional data from the National Comorbidity Survey Replication, in which researchers examined the links between adult attachment and a range of health conditions in a large (N = 5,692) national probability sample from the United States (McWilliams & Bailey, 2010). In analyses that simultaneously included attachment ratings for security, anxiety, and avoidance and controlled for demographic variables (gender, marital status, race, age, education), attachment avoidance was associated with greater odds of having conditions defined primarily by pain (headaches, arthritis, back and neck problems, other chronic pain). Attachment anxiety was associated with greater odds of having headaches and some forms of chronic pain, as well as more serious conditions such as ulcers, high blood pressure, heart attack, and stroke.

Attachment insecurity also has been associated with risks for depression, anxiety symptoms and disorders, and substance abuse (Carnelley et al., 1994; Mickelson, Kessler, & Shaver, 1997; Simpson et al., 2003). For this reason, it is important that researchers take into account psychological disorders when examining the connection between attachment and physical health conditions. Following this reasoning, in additional analyses of the data from the National Comorbidity Survey Replication, McWilliams and Bailey (2010) controlled for psychiatric disorders (e.g., depression, anxiety) associated with attachment insecurity. These analyses indicated that attachment anxiety remained significantly associated with some forms of chronic pain and with stroke, heart attack, and high blood pressure, over and above any associations with psychiatric conditions. Attachment avoidance, however, was no longer significantly associated with chronic pain conditions after the investigators took into account psychological health, suggesting that some forms of psychopathology (especially depression and anxiety disorders) may account for the link between attachment avoidance and pain-related conditions. These findings are intriguing and invite further research in this understudied area. In particular, prospective longitudinal studies are essential for clarifying the nature of the attachment–health link, as well as for investigating the possible mediating roles of negative affect such as depression and anxiety.

Emerging Themes and Future Directions

Much of the literature linking attachment in childhood and adulthood to health is newly developing. The work so far suggests that attachment

insecurity is a risk factor for a variety of health problems, including dysregulated stress responses, maladaptive health behaviors, physical symptoms, and serious outcomes such as heart disease and stroke. Nonetheless, the small number of studies (particularly regarding the links between attachment and immune responses or health behavior) makes it difficult to generalize about connections between specific forms of attachment insecurity (i.e., attachment anxiety, avoidance, or both) and particular response patterns. Some of the variation across studies probably results from differences in the context of the situations or stressors (e.g., relationship-related, achievement-related, relevance to the self) as well as gender-related characteristics, and we expect that further work allowing for comparisons across a broader range of contexts will clarify the nature of these links. We suggest several promising directions for advancing knowledge about the nature of the attachment–health link, and especially the processes through which attachment from infancy through adulthood shapes later health outcomes.

One important avenue for future research is to pinpoint specific mechanisms that might account for the link between attachment and health-related outcomes. As Figure 11.1 suggests, physiological responses are likely to be mediating pathways through which attachment influences subsequent health outcomes, but there is no direct evidence on this point. Specifically, further work needs to determine the conditions under which physiological responses (e.g., HPA, SAM responses) to acute stressors mediate the link between attachment and longer-term health/disease outcomes. In addition, most research examines one or two physiological markers or systems in isolation; more needs to be known about how the interplay among different physiological markers and systems contributes to the attachment–health link (Diamond & Fagundes, 2010). This work will necessarily entail the use of prospective longitudinal designs that examine the link between attachment and physiological responses at earlier time points, and then test whether physiological responses mediate the link between attachment and later physical health outcomes. Similarly, additional work will be required to determine whether other factors in the model—self-regulatory skills, affect regulation strategies, affective responses, and health behaviors—mediate the relationship between attachment and downstream health outcomes.

Attachment insecurity predicts problematic relationship behaviors, including poorer communication, hostility, and poorer care seeking and caregiving (Beck et al., 2013; Collins & Feeney, 2000; Simpson, Rholes, & Phillips, 1996; Beck, Pietromonaco, DeVito, Powers, & Boyle, 2014). And, as shown in Figure 11.1, such relationship behaviors may provide a key pathway connecting attachment style to health-related physiological responses, health behavior, and downstream health outcomes. Although a few studies have explored links between relationship behavior and

physiological responses (Gouin et al., 2009; Kiecolt-Glaser et al., 1993, 1996), no research has directly tested the extent to which relationship behaviors account for links between attachment and subsequent health-related outcomes. Identifying the mediating role of relationship behaviors in the attachment–health link will facilitate efforts to develop interventions to promote health. For example, positive interaction styles or having securely attached partners may act as a *buffer* against negative relationship outcomes for insecure individuals (Salvatore, Kuo, Steele, Simpson, & Collins, 2011). In a similar manner, positive interactions with relationship partners may help to protect insecure individuals from later adverse health consequences. For example, engaging in a positive-mindset emotion regulation intervention prior to discussing a conflict with one's partner decreased cardiovascular arousal and negative affect in both the manipulated person *and* his or her partner; interestingly, this effect was especially robust for individuals high in attachment anxiety (Ben-Naim, Hirschberger, Ein-Dor, & Mikulincer, 2013).

The dyadic context is important for understanding the link between attachment and health-related outcomes (Beck et al., 2013; Pietromonaco, Uchino, et al., 2013; Powers et al., 2006). For example, given the theorized mediating role of physiological activity in the attachment–health link, questions about how romantic partners modulate each other's physiology and downstream health demand further exploration. Emerging research on coregulation focuses on how relationship partners influence each other's psychological and physiological responses (Sbarra & Hazan, 2008). For example, wives who displayed negative behavior in a conflict interaction showed heightened cortisol responses when their husbands withdrew (Kiecolt-Glaser et al., 1996), and the interplay between husbands' avoidance and wives' anxiety has been found to predict distinctive cortisol patterns in response to a conflict discussion (Beck et al., 2013), suggesting the importance of dyadic processes in physiological response patterns. Other work indicates that spouses' cortisol levels are associated with each other (Papp, Pendry, Simon, & Adam, 2013; Saxbe & Repetti, 2010), and that spouses' cortisol levels in response to conflict show convergence over the first 3 years of marriage (Laws, Sayer, Pietromonaco, & Powers, 2014). A challenge for future work will be to determine the conditions under which coregulation processes (and other dyadic processes) contribute over time to health-related behaviors and outcomes.

Still other work underscores the value of taking a dyadic approach for understanding how attachment shapes individuals' health behaviors and illness outcomes. For example, some work has demonstrated the value of incorporating both partners into health behavior change programs (Lewis & Butterfield, 2007), and research in this area would benefit from examining how partners' attachment styles and associated relationship processes

affect health behavior change. Recent work highlights the role of dyadic processes in predicting patients' outcomes: Anxiously attached patients with Alzheimer's disease reported more physical and psychological symptoms, especially when their spouses/caregivers were also anxiously attached (Monin, Schulz, & Kershaw, 2013).

Another important set of questions concern the extent to which attachment patterns in childhood versus adulthood contribute to health outcomes via the same or different pathways. For example, little is known about the stability of health-related physiological responses from childhood to adulthood. To what extent are stability between childhood and adult attachment, and the physiological correlates of each, able to account for the links between adult attachment and health outcomes? And to what extent does attachment at different points in development uniquely predict such outcomes? In addition, experiences in early childhood may be more likely than those in adulthood to alter underlying physiological stress response systems (e.g., see Schore, 2001). If so, then early experiences may be more potent predictors of later physical health.

Finally, it will be important to place the connection between attachment and health within the larger context of other kinds of relationships, such as those with health care providers. For example, insecurely attached patients often desire close, supportive relationships with their physicians (Noyes et al., 2003) and trust their physicians less (Holwerda et al., 2013). Such perceptions may contribute to patients' disease outcomes. For instance, patients with diabetes and with dismissing/avoidant attachments who reported lower-quality communications with their provider showed poorer metabolic control (Ciechanowski, Katon, Russo, & Walker, 2001). Research incorporating the perspectives of both health care providers and patients, as well as spouses or close others who may be involved in the care process, will inform the development of tailored interventions that take into account which kinds of communication strategies promote health for which patients.

Conclusions

Attachment patterns from childhood through adulthood are associated with a range of health-related outcomes, including physiological stress responses, health behavior, and health and disease conditions. Although research in this area is growing, many questions remain about how attachment patterns translate into later health and disease outcomes. We hope that our model illustrating potential pathways underlying the attachment–health link, as well as our recommendations for future research, will serve as a roadmap to guide the next generation of studies.

Acknowledgment

Preparation of this chapter was facilitated by a grant from the National Cancer Institute of the National Institutes of Health (Grant No. R01CA133908) to Paula R. Pietromonaco.

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