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DEVELOPMENTAL PERSPECTIVES ON LINKS BETWEEN ATTACHMENT AND AFFECT REGULATION OVER THE LIFESPAN

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In the late 1950's since John Bowlby's initial reflections on infant–caregiver attachment first appeared in print, attachment theory has arguably revolutionized research on affectional bonding and its role in psychological health and development. One of the most compelling aspects of attachment theory is its lifespan perspective. Although Bowlby focused primarily on infant–caregiver attachment, he argued that attachment

processes remain central to mental and physical well-being "from the cradle to the grave" (Bowlby, 1988, p. 62). Accordingly, the extension of attachment theory to adult love relationships (Hazan & Shaver, 1987; Shaver, Hazan, & Bradshaw, 1988) has created opportunities for building comprehensive developmental models that use the same core principles to explain the nature, dynamics, and effects of intimate human relationships at *all* stages of life.

Yet the promise of such sweeping lifespan models has largely gone unfulfilled. Rather, contemporary attachment research remains bifurcated between developmental investigations of infant–caregiver bonds and social-psychological investigations of adult romantic bonds. Researchers from each "camp" emphasize different aspects of attachment and use different methods to capture and evaluate attachment phenomena. With some exceptions (for example Grossmann, Grossmann, & Waters, 2005), few researchers have attempted to integrate findings—and empirical investigations—across these domains into a broader analysis of the attachment system and its implications for social, psychological, and physical well-being over the entire life course.

We think that a greater emphasis on the *affect- and emotion-regulation* functions of attachment can ameliorate this problem and provide a powerful unifying framework for integrative, biobehavioral, process-oriented models of the attachment system from birth through adulthood. In this chapter, we make this case by reviewing prior theory and research linking attachment to affect-regulation processes, and also reviewing some of our own empirical data on linkages between these domains during the adolescent years. As a bridge between childhood and adulthood, adolescence presents special challenges and opportunities for investigating the functioning of the attachment system and its implications for mental and physical well-being. We hope to demonstrate how investigations of multiple processes of affect regulation, and the multiple origins of individual differences in these processes, can contribute to research on attachment not only during the adolescent years, but across the life course.

We begin with a brief review of attachment theory and some of the current challenges facing attachment research, specifically with regard to integrating the child and adult literatures, and integrating research on normative processes vs individual differences. We then review research linking affect and emotion regulation to attachment processes, highlighting both psychological and physiological aspects of affect regulation, and showing how these processes potentially explain the mental and physical health implications of attachment relationships. We then spend the remainder of the chapter reviewing some of our own research on these topics, and highlighting promising directions for future study.

I. Review of Attachment Theory

Bowlby (1958, 1982) conceptualized attachment as an evolved behavioral system designed to regulate infants' proximity to caregivers and thereby maximize chances for survival. When an infant experiences distress, he or she immediately attempts to seek contact with the attachment figure. In normative cases, this proximity reassures and soothes the infant, who subsequently comes to associate the presence of the attachment figure with emotional security and distress-alleviation. Even when the attachment figure is not consistently successful at alleviating distress, infants typically develop a unique, exclusive, emotionally primary relationship with the attachment figure, such that this person becomes the preferred target for security-seeking. Normative attachments are characterized by the presence of four distinct forms of behavior: seeking and maintaining physical closeness to the attachment figure ("proximity seeking"), turning to the attachment figure for comfort and reassurance ("safe haven behavior"), experiencing distress as a result of separations from the attachment figure ("separation distress"), and using the attachment figure as a reliable, dependable base of support from which to explore the world ("secure base behavior") (Ainsworth *et al.*, 1978; Bowlby, 1982).

According to attachment theory, infants develop nonconscious mental representations of their bond with the caregiver—termed *internal working models*—which encode expectations of caregiver behavior (Sensitive? Trustworthy? Dependable? Consistent?) and corresponding views of one's self as worthy or unworthy of love and attention (Bowlby, 1973, 1980, 1982; Kobak & Sceery, 1988; Main, Kaplan, & Cassidy, 1985). As the child matures, these working models provide organizing frameworks for relationship skills and expectations (Bartholomew & Horowitz, 1991; Cassidy *et al.*, 1996; Sroufe, 2005; Sroufe & Fleeson, 1986; Sroufe *et al.*, 2005) and provide the child with an "inner resource" of security that allows him or her to seek increasing independence from the caregiver and to explore his/her environment (Ainsworth *et al.*, 1978).

A. DEVELOPMENTAL TRANSITIONS

The attachment system remains active over the life course, but undergoes important developmental changes. As argued by Hazan and Shaver (1987), adults do not typically continue to utilize parents as primary bases of emotional security, but instead turn to romantic partners for that function. Hence, adult romantic relationships are thought to be *functionally analogous* to infant–caregiver attachments, and based in the same

neurobiologically mediated social-behavioral system. The fundamental correspondence between infant–caregiver attachment and adult romantic ties is supported by extensive research documenting that these phenomena share the same core emotional and behavioral dynamics: heightened proximity maintenance, resistance to separation, and utilization of the partner as a preferred target for comfort- and security-seeking (reviewed in Hazan & Zeifman, 1999). Even more powerful evidence is provided by the voluminous animal research documenting that two types of affectional bonding are mediated by the same opioid- and oxytocin-based neural circuitry (Carter, 1998).

This view suggests that the basic purpose and processes of the attachment system remain largely continuous over the lifespan, although the "target" of the system changes quite dramatically, from parents to romantic partners. The foundation for this transition is laid during adolescence, as part of the normative, well-documented developmental process through which youths seek progressively more independence and differentiation from parents, and correspondingly seek more intimacy, support, and companionship from friends and dating partners (Laursen, 1996; Savin-Williams & Berndt, 1990). In the general adolescent developmental literature, these processes are described in terms of autonomy and differentiation (Allen & Hauser, 1996; Steinberg & Silverberg, 1986); in the attachment literature, they are discussed in terms of "transfer" of attachment from parents to peers, and the "reshuffling" of the attachment hierarchy such that parents no longer occupy the preeminent positions they once did (Cooper *et al.*, 2004; Hazan & Zeifman, 1994; Markiewicz *et al.*, 2006; Trinke & Bartholomew, 1997). Specifically, by the time youths are 17–20, they are no longer expected to maintain a primary sense of security through proximity and contact with parents, but instead through contact with a romantic partner. Parents remain important, but function more in the background, as "attachment figures in reserve" (Weiss, 1982).

The first systematic study of this process was conducted by Hazan and Zeifman (1994), who sought to document age-related changes in attachment behavior from late childhood to young adulthood. They asked children and adolescents, ranging in age from 6 to 17, to fill out a self-report questionnaire that assessed who they primarily utilized for the attachment functions of proximity maintenance (sample item: "who do you most enjoy hanging out with?"), safe haven ("who provides you with support when you're under stress?"), and secure base ("who do you know will always be there for you, no matter what?"). Consistent with attachment theory, younger children typically listed their mother or father as the primary target for each of these components. Yet with advancing age, youths increasingly listed peers rather than parents as primary targets. Importantly, Hazan and Zeifman (1994) described a specific developmental sequence to this process of "transferring" attachment functions to peers: proximity seeking, followed by safe haven, and finally secure base (which was often not completely transferred to peers until the adolescent had developed a serious romantic relationship).

Analogous findings using similar methods were reported by Fraley and Davis (1997) and Trinke and Bartholomew (1997). Yet Markiewicz and colleagues (2006) found a somewhat different pattern. They compared youths between 12 and 15, between 16 and 19, and between 20 and 28. Similar to the aforementioned studies, proximity seeking and safe haven behaviors were directed to mothers less often with age. Yet contrary to the notion that peers also supplanted parents as primary sources of *security* by young adulthood, mothers continued to serve as targets for the secure-base component of attachment youths across the entire age range, even among those with serious romantic partners. Also, their findings regarding safe haven behavior were not entirely consistent with the classic "transfer" perspective: *Younger* rather than older adolescents preferentially directed safe haven behaviors to best friends, suggesting that youths might vacillate back and forth over time in the targeting of their attachment behavior, perhaps redirecting comfort- and security-seeking back to parents as they confront the progressively more challenging and complex developmental transitions of later adolescence.

Hence, the notion of progressively "transferring" attachment from parents to peers over the course of adolescence might be oversimplified, and might fail to capture the ways in which adolescents become increasingly peer-directed in their attachment behavior *without* necessarily relinquishing the primary role of parents. Because previous studies of attachment transfer have used a forced-choice method, in which only one person could be nominated as the primary target for each attachment behavior, they do not reflect the extent to which youths may utilize parents and peers *simultaneously and equally* for attachment-related functions during certain stages of development. Such simultaneity would be more consistent with the published research on adolescent autonomy, in which the healthiest development trajectories *combine* increasing behavioral and psychological independence with continued warmth, emotional connectedness, and emotional security (reviewed by Allen *et al.*, 1994; Allen & Land, 1999).

Many unanswered questions remain regarding the normative development of attachment in adolescence, which is perhaps not surprising in light of the overall underinvestigation of normative features of the attachment system (Berlin & Cassidy, 1999; Hazan, Gur-Yaish, & Campa, 2004; Marvin & Britner, 1999; Simpson & Rholes, 1998), in contrast to the extensive body of research on individual differences in attachment style

(reviewed subsequently). Future research would particularly profit from greater attention to questions about the specific interpersonal and intrapsychic processes through which youths begin to perceive peers as attachment figures, parents' perceptions of—and behavioral reactions to—this shift, and the multiple situational, temperamental, and relational factors which moderate this overall process.

B. INDIVIDUAL DIFFERENCES

The aforementioned discussion concerns the *normative* component of attachment theory, which focuses on species-typical processes of affectional bonding, and their normative development. Yet attachment theory also concerns individual differences in experiences and expectations of attachment relationships, which influence psychological and interpersonal functioning over the life course. These individual differences are called *attachment styles*, and are conceived as trait-like expectations concerning the responsiveness of attachment figures, established through early infant–caregiver interactions (Ainsworth *et al.*, 1978). These expectations not only influence relationship experiences, but also come to organize the encoding, storage, retrieval, and manipulation of information related to affective states and—in particular—experiences of stress vs security (see reviews in Bartholomew & Horowitz, 1991; Mikulincer, 1998a; Mikulincer, Shaver, & Pereg, 2003). Specifically, "secure" infants are those with sensitive and responsive caregivers, who consistently experienced proximity to these caregivers as distress-alleviating. As a result, they come to view themselves as competent and worthy of love and to view others as willing and able to provide comfort and support. Individuals with an *anxious* attachment style experienced inconsistent caregiving and consequently seek repeated reassurance of the availability of their attachment figures. Individuals with an *avoidant* attachment style did not receive adequate, sensitive care from their attachment figures and therefore learned not to seek contact with them when distressed.

Although these styles were originally hypothesized to describe children's orientations toward their attachment figures, researchers have found that they also describe adults' orientations toward romantic partners, consistent with the notion that romantic partners function as adult attachment figures (Hazan & Shaver, 1987; Shaver *et al.*, 1988). Hundreds of studies have detected associations between adult attachment style and individuals' feelings and behaviors toward romantic attachment figures, including disclosure and communication (Feeney, Noller, & Callan, 1994), support-seeking and support-provision (Collins & Feeney, 2000; Simpson, Rholes, & Nelligan, 1992), conflict (Feeney *et al.*, 1994; Senchak & Leonard, 1992), and overall relationship satisfaction and stability (Kirkpatrick & Davis, 1994; Senchak & Leonard, 1992; Simpson, 1990).

Yet there continues to be extensive debate about whether adolescent and adult attachment styles are really infant-child styles "grown up," or whether attachment anxiety and avoidance represent different phenomena—with different antecedents—in infancy, childhood, adolescence, and adulthood. Longitudinal research has detected significant evidence for continuity *and* discontinuity in attachment security from infancy and childhood to adolescence and adulthood (Allen & Land, 1999; Hamilton, 2000; Roisman *et al.*, 2005; Waters *et al.*, 2000; Weinfield, Sroufe, & Egeland, 2000), and there is also evidence suggesting the continued capacity for change in adulthood as a function of participation in different types of romantic relationships (Davila, Karney, & Bradbury, 1999; Kirkpatrick & Hazan, 1994). Importantly, interpretation of these research findings is complicated by the fact that attachment security at different stages of life is typically assessed with different methods (reviewed by Allen & Land, 1999; Crowell, Fraley, & Shaver, 1999; Jacobvitz, Curran, & Moller, 2002; Solomon & George, 1999).

Yet the overall picture suggests that although early individual differences in attachment security have lasting effects on psychological and interpersonal functioning, individuals' cumulative experiences in attachment relationships over time can enhance or disrupt stability in anxiety and avoidance. For example, Allen and colleagues (2003) found that as much as 40% of variation in adolescents' attachment security was reflected in the *current* quality of youths' interpersonal interactions with parents. Weinfield, Sroufe, and Egeland (2000) found that stressful life events could significantly disrupt family functioning and precipitate longitudinal transitions from security to insecurity. Accordingly, researchers have increasingly emphasized the importance of assessing *both* generalized attachment styles *and* specific experiences of need-fulfillment within current attachment relationships in order to accurately model individual differences in attachment style at different stages of life (Cook, 2000; La Guardia *et al.*, 2000).

C. BRIDGING THE INFANT-CHILD AND ADULT TRADITIONS

Attachment theory has provided a powerful and comprehensive model of the influence of intimate relationships on social and psychological functioning over the life course, and it is currently the preeminent theory underlying research on child–caregiver relationships *and* adult romantic

relationships. Yet research on *adult* attachment has developed and evolved quite separately from research on *infant–child* attachment, despite their common heritage in Bowlby's seminal work. To some extent, this can be attributed to straightforward disciplinary boundaries: Research on infant–child attachment is typically conducted by developmental psychologists, for whom the identification of adult manifestations of the parent–child processes they study may not be a primary topic of interest. Research on adult attachment is typically conducted by social and personality psychologists, who may possess a basic familiarity with the purported developmental origins of attachment styles, but who are typically far more interested in probing their implications for adult functioning.

Each of these "camps" has produced tremendously valuable investigations into the functioning of the attachment system in infancy-childhood and adulthood, but the developmental bifurcation of attachment research has hampered our understanding of *how the system itself develops and changes over time.* Even the aforementioned longitudinal studies, which have followed individuals from infancy to adulthood, have focused on basic questions of continuity in attachment security from childhood to adulthood, and do not permit close investigation of developmental changes in attachment-related processes.

Perhaps the most vivid manifestation of this blind spot in attachment research is the continued underinvestigation of attachment processes during *adolescence* rather than infancy, childhood, and adulthood. As reviewed by Allen and Land (1999), adolescence is a critically important period of life from the lens of attachment theory. Adolescents' increasing capacities for complex reasoning, abstraction, and executive functioning (Blakemore & Choudhury, 2006; Keating, 1990) promote the progressive consolidation of internal working models of attachment, and their integration with concrete, current interpersonal experiences. Adolescents must also balance the normative developmental press for differentiation from parents with continued needs for parental support and assistance, especially in light of the increasingly complex social, emotional, and psychological challenges that accompany this stage of life. Finally, adolescents' increasing interest and participation in romantic and sexual relationships lays the groundwork for the signature developmental transformation in the attachment system: the shift from unilaterally *seeking* security from parents to reciprocally seeking *and providing* security to romantic partners.

We propose that the best way to integrate the growing body of research on adolescent attachment processes with the existing infant-child and adult traditions is to focus more systematically on the *affect- and emotion-regulation* functions of attachment. Affect and emotion regulation are critically implicated in both the normative and individual difference components of attachment theory, and have been found to mediate *and* moderate attachment processes in both adulthood and infancy-childhood. Furthermore, the growing body of research on the multiple physiological mechanisms underlying affect and emotion regulation helps to elucidate the basic psychobiology of the attachment system, and the specific physiological processes through which attachment experiences and relationships shape both mental *and* physical health over the life course (Diamond, 2001; Diamond & Hicks, 2004).

In the next section, we provide an overview of affect and emotion regulation and their associations with attachment processes. We show that at all stages of life, affect and emotion regulation remain primary functions of the attachment system, although the specific processes through which they are effected change over time. We then turn to our own research on linkages among attachment, affect regulation, and well-being during early adolescence.

II. Affect Regulation

The terms "emotion regulation" and "affect regulation" are often used interchangeably, but there are slight differences between them that bear attention: "Emotion regulation" is usually used to refer to internal and transactional processes through which individuals consciously or unconsciously modulate the experience or expression of emotions *elicited by environmental events* (Eisenberg *et al.*, 2000; Gross, 1999; Thompson, 1994). Affect regulation refers to similar processes of modulation, but the regulated "output" includes broader, ongoing affective states and moods, and not just discrete, situationally triggered emotions (Larsen, 2000). Because both affect and emotion regulation are thought to be shaped by the attachment system, for the purposes of this chapter we use the term "affect regulation" in a broad sense to refer to both.

The progressive mastery of a diverse range of strategies for affect regulation is considered a core developmental task for both children and adolescents (Cooper, Shaver, & Collins, 1998; Denham, 2006; Eisenberg & Fabes, 1992; Eisenberg, Spinrad, & Morris, 2002; Fox, 1994a; Halberstadt, Denham, & Dunsmore, 2001; Masten, 2001; Repetti, Taylor, & Seeman, 2002; Saarni, 1992). Because powerful emotions have the potential to disorganize and/or disrupt multiple psychological processes, modulation of their experience and expression (through both intrapsychic and interpersonal processes) has been considered essential for basic state regulation, behavioral exploration, cognitive processing, and social competence (reviewed in Fox, 1994b). Accordingly, inability to effectively regulate

one's own emotions, as well as one's cognitions and behaviors in emotionally arousing situations, has been linked to a range of psychological and behavioral problems in both childhood and adolescence (Cicchetti, Ackerman, & Izard, 1995; Cooper *et al.*, 1995; Cooper *et al.*, 1998; Eisenberg *et al.*, 2001; Frick & Morris, 2004; Kobak & Ferenz Gillies, 1995; Silk, Steinberg, & Morris, 2003).

Furthermore, studies of adolescents and adults have found that high and unregulated levels of negative affect are associated with general maladjustment (Gross & Munoz, 1995), anxiety and depressive disorders (Fabes & Eisenberg, 1997; Nolen-Hoeksema, Parker, & Larson, 1994), substance use (Colder & Chassin, 1997; Cooper *et al.*, 1995; Pandina, Johnson, & Labouvie, 1992; Wills, Windle, & Cleary, 1998), and even impaired neuroendocrine, autonomic, and immune functioning (Repetti *et al.*, 2002; Ryff & Singer, 2001; Taylor, Dickerson, & Klein, 2002; Taylor, Repetti, & Seeman, 1997). Hence, investigating both the normative development of affect regulation and also individual differences in affect-regulation capacities and strategies is important for understanding how healthy trajectories of socioemotional development can be established and maintained through childhood, adolescence, and adulthood.

A. CAREGIVERS AND THE DEVELOPMENT OF AFFECT REGULATION

Attachment figures have been theorized to play a fundamental role in the initial development and ongoing maintenance of infant and children's affect regulation because of the centrality of distress-alleviation and security-provision in the attachment system (see Berlin & Cassidy, 1999; Simpson & Rholes, 1994). During emotionally laden interactions, the caregiver continuously modulates the infant's affective and attentional state and aligns it with his/her own through changes in facial expression, behavioral activation, and direct engagement with different features of the immediate environment (Kopp, 1989). This process of caregiver-managed engagement and disengagement of attentional and stress-regulatory systems in the orbitofrontal cortex is thought to provide the foundation for effective self-regulation more generally, and affect regulation in particular (Schore, 1996a; Siegel, 2001). This view is supported by a growing body of biologically oriented research showing that in humans and other mammals, early experiences with nurturant vs neglectful caregiving "tune" stress-regulatory processes in the autonomic and neuroendocrine systems (Glaser, 2000; Gunnar & Donzella, 2002; Repetti *et al.*, 2002; Schore, 1996a; 2000).

Caregiver-managed affect regulation continues to play an important role in early childhood. Both observational and experimental studies of children have found that caregiver sensitivity/responsiveness is associated with less expression of negative affect (Eisenberg *et al.*, 1991; Fabes *et al.*, 1994; Morris *et al.*, 2007) and, at later ages, greater ability to employ a range of different self-regulatory strategies across different situations (Cohn & Tronick, 1983; Gable & Isabella, 1992; Hardy, Power, & Jaedicke, 1993; Kliewer, Fearnow, & Miller, 1996). In direct contrast, maternal behavior that is neglectful or hostile has been associated with a range of deficits in both affect and behavioral regulation, which are thought to be a primary mechanism through which troubled (or "risky") family environments impair children's long-term social and emotional functioning (comprehensively reviewed in Repetti *et al.*, 2002).

The primary developmental transition from infancy to adolescence involves *internalization* of affect regulation. Whereas infants and children must rely on direct contact with the attachment figure to regulate distress, older children gradually learn to modify their own affective states independently of such contact (Calkins *et al.*, 1998; Thompson, 1994) through strategies such as self-soothing, attention shifting, reappraisal, active coping, or simply avoiding certain stimuli (Kobak *et al.*, 1993; Rothbart, 1991). Despite this progressive internalization, children and adolescents continue to seek assistance with managing affective states from a variety of different social partners (Gross & Munoz, 1995; Thompson, 1994). Attachment theory predicts that attachment figures remain the most preferred and most effective providers of this function at all stages of life, particularly when regulatory demands are high. This is supported by research demonstrating that both infants and adults prefer to seek contact with attachment figures over other social partners in times of extreme distress (Cassidy, 1994; Hazan & Zeifman, 1994; Thompson, 1994; Trinke & Bartholomew, 1997).

This renders adolescence a particularly notable period of life for investigating the interpersonal context of affect regulation: Although parents might remain the most *effective* providers of distress-alleviation, youths seek progressively more companionship, support, and comfort from peers rather than parents during this period as part of their normative developmental transition to greater autonomy and differentiation (Laursen, 1996; Savin-Williams & Berndt, 1990; Silk *et al.*, 2003; Steinberg & Morris, 2001). Hence, although adolescents' needs for assistance with affect regulation remain high, they may often be seeking such assistance from less effective providers.

At the same time, their own friends (and eventually romantic partners) increasingly call upon *them* to provide empathy, comfort, and

distress-alleviation, putting them in new caregiving roles that require effective management of their own emotions (Bandura *et al.*, 2003). Adolescents' increasingly complex and intimate relationships with friends and—eventually—romantic partners may expose them to newly intense emotions (Larson, Clore, & Wood, 1999): Even a routine romantic breakup may prove to be an adolescent's first substantive exposure to the helplessness and depression associated with interpersonal loss and loneliness (Steinberg & Silk, 2002). Combined with the heightened tension and negativity that often accompanies conflicts with parents over issues of independence and autonomy, adolescents often experience heightened and more variable positive and negative emotions, thereby increasing their day-to-day self-regulatory demands (Allen & Land, 1999; Conger & Ge, 1999; Cooper *et al.*, 1998; Larson *et al.*, 1999; Steinberg & Morris, 2001). Finally, contrary to the notion that youths' basic physiological capacities for affect regulation are "finished" developing, maturation of neural regions in the prefrontal cortex involved in affect regulation continues to undergo development and maturation well into late adolescence (Spear, 2000).

Given these normative developmental challenges, it is not surprising that youths with deficiencies in affect regulation show a range of psychological and social problems, many of which persist into young adulthood. Here, we review the extensive evidence that a primary basis for such deficiencies is attachment insecurity.

B. ATTACHMENT ANXIETY AND AVOIDANCE

Much initial research on individual differences in attachment security focused on the cognitive-representational aspects of infants' internal working models: As noted earlier, anxious and avoidant working models encapsulate specific mental expectations of caregiver behavior and corresponding views of one's self as worthy or unworthy of care. These representations function as mental prototypes for future relationship experiences. Yet consistent with Bowlby's (1973) original writings, researchers studying attachment (in both children and adults) increasingly view internal working models as also providing an organizing framework for affective experience, expression, and regulation (Brennan & Shaver, 1995; Kobak & Sceery, 1988; Mikulincer & Sheffi, 2000; Simpson *et al.*, 1992). Hence, both infant and adult attachment styles are thought to encode not only expectations of caregiver behavior, but consistent capacities and strategies for affect regulation derived from early stress-regulating

interactions with caregivers (Cooper *et al.*, 1998; Rholes *et al.*, 1999; Simpson *et al.*, 1992).

Specifically, children who did not receive adequate "external" affect regulation from their caregivers are thought to sustain developmental deficits in their own self-regulatory capacities (see Glaser, 2000), and consequently come to rely on anxiety and avoidance as secondary—and suboptimal—affect-regulation strategies. Individuals with high attachment anxiety have been found to maximize the experience and expression of negative affect, to be hypervigilant to threat cues, and to show patterns of spreading emotional reactivity such that one negative thought or memory triggers many others (Shaver & Mikulincer, 2002). Furthermore, anxious adults have been found to respond cognitively to *positive* affect inductions with the same reduced cognitive flexibility and creativity traditionally associated with *negative* affect (Mikulincer & Sheffi, 2000), suggesting that their regulatory deficits extend beyond experiences of distress. Individuals with high attachment avoidance, to the contrary, tend to minimize experiences of negative affect and to direct attention away from threat cues (Mikulincer *et al.*, 2003). These "deactivating" strategies involve the denial or suppression of affective experience, the inhibition of affective expression, and distortion of encoding of affective experiences (Becker-Stoll, Delius, & Scheitenberger, 2001; Kobak *et al.*, 1993; Mikulincer *et al.*, 2003). Importantly, both types of attachment insecurity are associated with the inability to derive affect-regulating benefits from contact with attachment figures (Feeney, 1999).

The affect-regulation conceptualization of attachment style is consistent with research on adults demonstrating that attachment anxiety and avoidance are associated with distinct patterns of affect-related appraisals and experiences over the life course (reviewed in Mikulincer *et al.*, 2003). For example, securely attached adults report more positive and benign interpretations of others' facial expressions (Magai *et al.*, 2000), endorse more positive and less negative interpretations of both hypothetical and actual relationship events (Collins, 1996; Simpson, Ickes, & Grich, 1999; Simpson, Rholes, & Phillips, 1996), and make less hostile attributions of others' motives (Mikulincer, 1998b) and more positive interpretations of others' supportive behavior (Lakey *et al.*, 1996). Correspondingly, securely attached individuals tend to report more frequent and more intense positive affect, whereas insecurely attached individuals report more negative affect (Feeney, 1999; Feeney & Ryan, 1994; Mikulincer & Orbach, 1995).

These patterns have long-term implications for mental health. Numerous studies have detected strong associations between attachment anxiety and avoidance and numerous affective disorders, including depression, mania, dysthymia, panic disorder, agoraphobia, social phobia, generalized anxiety,

and substance use (Mickelson, Kessler, & Shaver, 1997). Similar associations between attachment style and emotional adjustment and functioning have been found among adolescents (Cooper *et al.*, 1998, 2004; Doyle & Markiewicz, 2005; Moris, Meesters, & van den Berg, 2003; Torquati & Vazsonyi, 1999). Specifically, negative affective predispositions and affect-regulation problems in childhood and adolescence have been associated with maladaptive peer behavior, low social functioning, and conduct problems (Allen *et al.*, 1998; Cassidy *et al.*, 1996; Cooper *et al.*, 1998; Repetti *et al.*, 2002). Interestingly, attachment anxiety has been found to be reliably associated with *internalizing* problems such as anxiety and depression (Allen *et al.*, 1998; Cooper *et al.*, 1998; Kobak & Sceery, 1988; Kobak, Sudler, & Gamble, 1991; Rosenstein & Horowitz, 1996), whereas avoidance is consistently associated with *externalizing* behaviors such as aggression, rule-breaking, and peer hostility (Fagot & Kavanagh, 1990; Goldberg, 1997; Renken *et al.*, 1989).

Attachment insecurity also has important implications for the development of adolescent autonomy. As noted previously, a critical normative developmental transition during the adolescent years involves increased autonomy, independence, and differentiation from parents. However, the achievement of adolescent independency and autonomy does not preclude continued emotional support and connection, but in fact requires it (reviewed in Allen & Land, 1999), consistent with the notion that the provision of a secure base by parents facilitates normative processes of exploration (Feeney, 2007).

Relatedly, one developing strain of research on adolescent autonomy suggests the particular importance of emotion- and self-regulatory processes. Specifically, Deci and Ryan's (2000) self-determination theory postulates that autonomy is the degree to which behaviors are enacted with a sense of *volition* and *choicefulness*. Accordingly, adolescent autonomy is not achieved simply by separating and individuating from parents, but requires that youths develop the capacity to competently and knowledgeably select and endorse their actions, based on self-awareness of their motives, goals, and abilities. According to this perspective, the opposite of autonomy is not dependence but rather *heteronomy* (i.e., the feeling of being controlled in one's actions by external forces or by internal compulsions). Clearly, youths' abilities to reflect on, understand, and regulate *affective* experience should contribute directly to the sense of autonomous volition described by Deci and Ryan (2000). Hence, by providing the foundation for successful affect regulation, attachment security directly promotes healthy, age-appropriate trajectories of autonomy and self-determination.

Finally, as noted subsequently, individual differences in attachment anxiety and avoidance also have long-term implications for adolescent and

adult *physical* health, via patterns of maladaptive physiological functioning associated with affect- and stress-regulation deficits (Diamond & Hicks, 2004; Diamond, Hicks, & Otter-Henderson, 2006; Feeney, 2000; Powers *et al.*, 2006; Repetti *et al.*, 2002). We review such pathways in the next section.

C. PHYSIOLOGICAL PROCESSES LINKING ATTACHMENT AND AFFECT REGULATION

Despite the decidedly non-biological slant of most research on infant and adult attachment (reviewed in Diamond, 2001; Spangler & Zimmermann, 1999), Bowlby conceptualized the attachment system as a fundamentally psychobiological system, especially with regard to its affect-regulating functions. Specifically, he posited two different "rings" of homeostasis that assist the individual in responding to major and minor stressors so that emotional security could be maintained and environmental exploration resumed (Bowlby, 1973). The inner ring comprises life-maintaining biological systems that govern ongoing physiological adaptation to external demands. The outer ring comprises behavioral (and particularly, interpersonal) strategies for coping and adaptation. From Bowlby's perspective, the integrated functioning of these two levels is critical for optimal self-regulation.

Numerous studies of both animals and humans have confirmed Bowlby's view. As noted earlier, early experiences of nurturant care appear to play a critical role in "tuning" multiple stress-regulatory systems in the orbitofrontal cortex that provide a foundation for adaptive affect regulation (see Glaser, 2000; Repetti *et al.*, 2002; Schore, 1996a, 2000; Taylor *et al.*, 2002). Hence, deficits in infant–caregiver attachment not only disrupt children's social and behavioral development, but also their biological capacities for maintaining homeostasis in the face of threat. These early regulatory problems create potential cascades of related dysregulation in immunological, endocrinological, and autonomic functioning (Cacioppo & Berntson, 2007; Gunnar, 2003; Kiecolt-Glaser *et al.*, 2002b; Repetti *et al.*, 2002; Ryff *et al.*, 2001) with direct implications for long-term risks for a variety of pathophysiological processes and outcomes, including cardiovascular disease, diabetes, hypertension, and cancer (Croiset *et al.*, 1990; Grossman, Brinkman, & de Vries, 1992; Hessler & Fainsilber Katz, 2007; Irwin, Hauger, & Brown, 1992; McEwen & Stellar, 1993; Munck & Guyre, 1991).

To identify the developmental, intra-familial origins of such risk trajectories, researchers are increasingly adopting "biosocial" approaches

to family life and child development (Booth, Carver, & Granger, 2000; Repetti *et al.*, 2002) in which individuals and families are understood as the product of reciprocal influences among environmental, interpersonal, behavioral, psychological, and biological processes, unfolding over time (Cairns, Gariepy, & Hood, 1990; Gottlieb, 1991). In this view, biological predispositions set the stage for certain types of behavioral and psychological adaptation to environmental challenge. These adaptational patterns, which become increasingly regularized over time, have both immediate and long-term effects on physiological functioning. Although such dynamics involve numerous biological processes, we focus here on two systems that have particular relevance for affect regulation: the parasympathetic branch of the autonomic system and the hypothalamic-pituitary-adrenocortical (HPA) axis of the endocrine system.

1. Parasympathetic Regulation of Heart Rate

The functioning of the parasympathetic nervous system (PNS) in maintaining chronotropic control of the heart (sometimes called vagal regulation) has become one of the most widely researched physiological indices of affect regulation. The specific relevance of this physiological system for attachment-related phenomena is discussed at length elsewhere (Diamond, 2001), but key elements are reviewed here.

Briefly, both the PNS and the sympathetic nervous system (SNS) are involved in the moment-by-moment physiological changes triggered by environmental demands—changes in heart rate, blood pressure, sweating, and the like. Yet the SNS and the PNS have antagonistic effects on autonomic functioning, and thus stress responses such as heart rate acceleration can be brought about by activation of the SNS, withdrawal of the PNS, or some combination of the two. This has important implications for affect regulation because autonomic changes that are driven by adjustments in the PNS appear to be more rapid, more flexible, and easier to disengage than SNS-dominated changes (Berger, Saul, & Cohen, 1989; Saul, 1990; Spear *et al.*, 1979). Hence, individuals with greater PNS regulation of heart rate are conceptualized as having nervous systems that flexibly react to and recover from environmental stressors, facilitating more effective affect regulation (Calkins, 1997; DeGangi *et al.*, 1991; Porges, 1992; Porges, Doussard-Roosevelt, & Maiti, 1994).

This is borne out by studies relating tonic levels of PNS chronotropic control (indexed by resting levels of respiration-related variability in heart rate, also known as *respiratory sinus arrhythmia* or RSA) to regulatory outcomes. For example, infants with greater PNS regulation of heart rate (i.e., greater RSA) are more facially expressive, more reactive to novel events, and better able to sustain attention and avoid distraction (Porges, 1992; Stifter & Fox, 1990). In contrast, infants and children with lower RSA show a compromised capacity for self-soothing after psychological stress and are less easily and effectively soothed by others (reviewed in Porges, 1991). They also show poorer emotional control and higher behavioral inhibition (Fox, 1989; Snidman, 1989). In adults, higher RSA is associated with more effective emotional and behavioral responses to stress (Fabes & Eisenberg, 1997), whereas lower levels are associated with depression, anger, mental stress, generalized anxiety, and panic anxiety (reviewed in Brosschot & Thayer, 1998; Friedman & Thayer, 1998; Horsten *et al.*, 1999).

Historically, far fewer studies of PNS functioning and affect regulation have been conducted among adolescents than among adults, infants, or children, but several studies of adolescents have confirmed associations between problems with affective, attentional, and behavioral regulation and low PNS regulation of heart rate (Beauchaine, Kopp, & Mead, 2007; Kibler, Prosser, & Ma, 2004; Tobin & Graziano, 2006), and individual differences in PNS regulation in childhood appeared to be preserved into adolescence (El-Sheikh, 2005). Future coordinated assessment of PNS regulation, affect regulation, and attachment dimensions can make important contributions to research on the biopsychological context of adolescent psychosocial development.

2. HPA Axis Activity

As reviewed by Seeman (2001), interpretations of environmental demands *and* one's resources (both social and nonsocial) for meeting these demands are processed first by the neocortex and then fed to the amygdala and hippocampus, leading to systemwide neuroendocrine activation (Bovard, 1985; Gray, 1995; LeDoux, 1995; McEwen, 1995; Schneiderman, 1983; Williams Jr., 1985). Specifically, the hypothalamus signals the anterior pituitary to release a cascade of neurochemicals that operate in concert to increase blood glucose levels and modulate immune activity in response to the perceived demand. Thus, information-processing biases that consistently favor negative and threat-related interpretations of environmental events and stimuli can produce patterns of "warped emotion processing" (Repetti *et al.*, 2002, p. 351) that trigger maladaptive profiles of physiological activation. Accordingly, multiple studies of animals and humans have documented associations between HPA hyperreactivity in response to stress and patterns of cognitive and behavioral affect regulation. For example, individuals with exaggerated HPA reactivity show deficient coping strategies and exaggerated experiences of negative affect (reviewed in Scarpa & Raine, 1997; Stansbury & Gunnar, 1994).

There are also individual differences in *tonic* levels of HPA activity, which have been linked to chronic stress. Yet importantly, these studies have found that chronic stress can result in *either* disproportionately high or low cortisol levels (Miller, Chen, & Zhou, 2007), depending on a variety of factors. Consistently high levels of tonic HPA activity among individuals exposed to chronic stress and strain suggest that failures to down-regulate stress and negative affect are associated with dysregulation of the normal feedback processes through which HPA activation is typically "shut down" once sufficient levels of cortisol are present in the bloodstream to meet environmental demands. Yet studies have also found associations with stress and chronically low or "blunted" HPA activity, which have been interpreted as a potentially adaptive mechanism for protecting the brain from the detrimental effects of sustained exposure to cortisol, which include deficits in immune functioning (Coe *et al.*, 1988) as well as memory and attentional process (Kirschbaum *et al.*, 1996; Lupien *et al.*, 1994; McEwen *et al.*, 1992). Yet this "blunting" response may entail long-term regulatory "costs" in the forms of psychobiological dysfunctions in stress-regulation and immune function (Buske-Kirschbaum *et al.*, 1997; Hart, Gunnar, & Cicchetti, 1995).

If secure attachment fosters effective affect regulation, this may be reflected in adaptive patterns of HPA axis functioning. Sure enough, high levels of physical affection and warmth between caregivers and their infants during stressful circumstances have been tied to normal HPA activation profiles in response to environmental demands (Chorpita & Barlow, 1998; Hertsgaard *et al.*, 1995). Additionally, Flinn and England (1995) found that HPA activation in response to such normal demands varied as a function of family environment—but most notably, high vs low levels of maternal care—in children aged 2–18. Hence, both tonic- and stress-related patterns of HPA activity provides a potential window into attachment-related disruptions in affect regulation.

D. TOWARD A PROCESS-ORIENTED, BIOBEHAVIORAL APPROACH

To summarize, a growing body of research suggests that the well-documented associations between adolescent attachment insecurity and deficits in psychosocial and psychological functioning (Allen *et al.*, 1998; Cooper *et al.*, 1998, 2004; Hauser, Gerber, & Allen, 1998; Kobak *et al.*, 1991; Rosenstein & Horowitz, 1996; Sroufe, 2005; van Ijzendoorn, Schuengel, & Bakermans-Kranenburg, 1999) may be mediated by attachment-related deficits in affect regulation. Given the abrupt status transitions and the

increased emotional challenges of the adolescent years (Buchanan, Eccles, & Becker, 1992; Larson & Richards, 1994; Spear, 2000), biobehavioral investigations of attachment and affect regulation during this period would seem to provide powerful new insights into pathways of physical and psychological risk vs resilience from childhood to adulthood.

Yet this requires that we identify the *specific* cognitive, physiological, and behavioral mechanisms through which affect regulation and attachment shape adolescent adjustment. This is no easy feat: As many researchers have noted, the concept of affect and emotion regulation has been defined and operationalized in many different ways by theorists and researchers focusing on different stages of life (Bridges, Denham, & Ganiban, 2004; Campos, Frankel, & Camras, 2004; Cole, Martin, & Dennis, 2004; Gross, 1999). Even differentiating between regulated and unregulated affect is problematic. As Gross (1999) noted, the distinction between these concepts implies that an emotional experience or expression "after" regulation is fundamentally different from its "unregulated" state, yet some have argued that affect and emotion are *always* regulated to some degree (Fridja, 1986; Tomkins, 1984). Gross (1999) adopts a middle ground between these two extremes and argues for an emphasis on relative regulation of different aspects of emotional phenomena under different circumstances. However, he cautions that an ongoing and critical challenge for research on such processes involves specifying whether affect regulation has even occurred, what components of emotion have been regulated, and how regulation has altered such components.

Then there is the question of *which* regulatory processes: Different researchers have emphasized a range of different conscious and unconscious regulatory capacities and strategies, both adaptive and maladaptive: for example reactivity, recovery, suppression, disengagement, rumination, reappraisal, attention shifting, distraction, problem-focused coping, self-soothing, support-seeking, and the like (Belsky, Friedman, & Hsieh, 2001; Broderick, 1998; Glynn, Christenfeld, & Gerin, 2002; Gross, 1998). Furthermore, different combinations of these processes, in concert with other individual differences in affective experience, appear to produce a range of different affective phenomena. For example, Gohm (2003) demonstrated important differences between the regulatory strategies of emotionally reactive individuals as a function of whether such individuals also had high emotional clarity, representing their capacity to understand and interpret the basis for their emotional responses. Specifically, reactive individuals with low emotional clarity were more easily "overwhelmed" by their emotions and hence made greater efforts to avoid and attenuate strong emotional experiences, whereas those with high emotional clarity appeared better able to tolerate these experiences and their immediate effects. These

findings support emerging views of "emotional intelligence" (Salovey & Mayer, 1990) that emphasize how psychological well-being and interpersonal functioning are facilitated by the accurate perception, appraisal, and expression of emotion, effective utilization of emotion in the service of cognitive processing, effective comprehension and communication of emotion-relevant concepts, and the capacity to regulate one's own emotions and those of others.

Clearly, if greater emphasis on the affect-regulation functions of attachment, particularly during the adolescent years, holds promise for bridging the infant-child and adult attachment literatures, this emphasis must include more systematic delineation of specific affect-regulation processes, including motivated processes such as suppression and reappraisal, basic capacities such as emotional clarity and efficient recovery, and physiological indices of regulatory capacities, such as parasympathetic functioning and HPA activity. Up until now, studies adopting such an integrative, differentiated approach have tended to focus on either adults or infants (with notable exceptions, such as Granger, Weisz, & Kauneckis, 1994; Moss *et al.*, 1999; Walker, Walder, & Reynolds, 2001), and little of this research has specifically investigated links to attachment-related processes and their normative changes over the adolescent years. Thus, comprehensive biobehavioral models of normative affect-regulation processes across the adolescent years, individual differences in these processes, and their links to attachment phenomena remain to be developed.

We have sought to contribute to this long-term goal in our own longitudinal, biobehavioral research on adolescent attachment to parents and peers, affect regulation, and physical and mental health. In the next section, we review findings from this ongoing program of research suggesting that normative developmental processes *and* individual differences in attachment-related patterns of affect regulation help to elucidate adolescent trajectories of well-being. We hope that this type of biosocial research can provide a model of how a greater emphasis on affect-regulation processes can contribute to lifespan models of attachment and affect regulation that integrate research findings from both the infant-child and adult literatures.

III. Attachment and Affect Regulation During Adolescence

A. BACKGROUND AND METHODS

The findings presented here come from an ongoing longitudinal investigation of 103 14-year-old youths (51 boys and 52 girls) that examines

linkages among the quality of youths' relationships with their parents and peers, normative developmental transitions in attachment hierarchies, individual differences in attachment style and affect regulation, and individual differences in physiological indices of affect regulation. Participants were recruited from public and private high schools around Salt Lake City, Utah. Each youth visited our laboratory with both parents (37 youths were not currently living with their father, and completed the laboratory visit with their mother only), where they completed questionnaires assessing the following constructs:

1. *Attachment anxiety and avoidance*: To measure adolescents' attachment anxiety and avoidance with respect to their parents, we administered a revised version of Miller and Hoicowitz's (2004) *Adolescent Attachment Scale*, which is based on the widely used *Experiences in Close Relationships Inventory*, designed to assess romantic attachment anxiety and avoidance (Fraley, Waller, & Brennan, 2000). Sample items assessing attachment anxiety include "I sometimes wonder of my mother really loves me" and "I worry that my mother doesn't care about me as much as I care about her." Sample items assessing avoidance include "it's hard for me to let myself count on my mother," and "I don't feel comfortable opening up to my mother." Youths completed the measure separately in relation to their mother and father: For the analyses reported here, responses were averaged across parents (ancillary analyses found that this did not change the major findings).
2. *Parenting characteristics*: We administered Uchino and colleagues' *Social Relations Index* (Uchino *et al.*, 2001) to assess the degree of unpredictability and helpfulness-enthusiasm that youths perceived in their parents. This measure asks individuals to rate social partners' unpredictability and helpfulness-enthusiasm specifically in response to times when (1) you achieve something good and (2) you need help or assistance. This item was administered separately for mothers and fathers, and the responses were averaged. To assess parenting style, we administered Schaefer's (1965) widely used assessment of parental warmth, discipline, and psychological control (the latter indexing the degree to which parents use strategies like love-withdrawal, expression of their own negative affect, and manipulation in order to control their child's behavior). To measure emotional climate in the family, we administered Halberstadt's *Self-Expressiveness in the Family Scale* (Halberstadt *et al.*, 1995), which measures the degree of positive and negative emotional expressiveness in youths' families.

3. *Adjustment*: We used the following subscales from the *Youth Self Report* (Achenbach, 2001), a widely used measure of adolescent adjustment: attentional problems, internalizing problems, and externalizing problems. We also administered the "self" subscale of Patrick, Edwards, and Topolski's (2002) *Adolescent quality of life scale* to measure youths' overall satisfaction with their sense of self. To measure feelings of loneliness in the family context, we administered the family subscale of the *Measure of Social and Emotional Loneliness* (DiTommaso & Spinner, 1993). To measure depression, we used the CESD-R (Radloff, 1977).
4. *Affect regulation*: Our measures of affect regulation included measures of *recovery* (Rothbart & Derryberry, 1981), indexing how quickly individuals' calm down and recovery after intense emotional activation, *suppression* (Gross, 1998) indexing the strategy of dealing with negative emotions intentionally trying to dampen them, *repair*, a composite measure indexing the use of positive reframing and reappraisal to moderate one's emotions, comprised of items from the "repair" subscale of the trait meta-mood scale (Salovey *et al.*, 1995), Gross' (1998) measure of reappraisal, and Moos' (1988) measure of positive reframing. To assess individuals' ability to detect and identify their emotions, we administered Salovey *et al.*'s (1995) measures of emotional *clarity*, assessing the perceived clarity with which respondents experience their emotions, and emotional *attention*, measuring the extent to which respondents attend to and value their emotional experiences.
5. *Exploration and dependency*: To measure exploration, we used selected items from Block and Kremen's (1996) *Ego-Resiliency* scale. Sample items included "I like to do new and different things," and "I enjoy dealing with new and unusual situations." To measure dependency, we included selected items from the aforementioned *Youth Self-Report*, including "I depend too much on adults" and "I act young for my age."
6. *Physical affection with parents*: We measured the degree to which adolescents hugged their parents, cuddled with them, and engaged in routine forms of physical contact such as adjusting hair or behavior and patting arms and legs (Diamond, 2000). This scale was based on previous reviews of the forms of physical contact considered most specific to attachment relationships (Hazan & Zeifman, 1994).
7. *Attachment components*: To measure the dimensions of proximity seeking, safe haven, and secure base, we used items from the *companionship*, *intimacy*, and *reliable alliance* subscales of the *Network of Relationships Inventory* (Furman & Buhrmester, 1992). These NRI subscales are highly similar to the aforementioned WHOTO (Hazan & Zeifman, 1994), but the NRI has been well-validated and is more widely used than the WHOTO, permitting more direct comparisons with previous research. Also, the NRI permits ratings of the *specific degree* to which certain social partners are utilized for specific attachment-related functions, and hence allows two different individuals to have the same rating, whereas the WHOTO uses a forced-choice format. A sample companionship (i.e., proximity seeking) item is "how much do you play around with and have fun with this person?" A sample intimacy (i.e., safe haven) item is "how much do you share your secrets and private feelings with this person?" A sample reliable alliance (i.e., secure base) item is "how sure are you that this relationship will last no matter what?" Participants completed this measure with regard to both parents, their best friend, their romantic partner (if applicable), a close relative, a close but unrelated adult, and a sibling.
8. *Physiological stress regulation*: Two indices of physiological stress regulation were measured: RSA, a measure of parasympathetic control over heart rate, and HPA axis activity, measured via salivary cortisol. RSA was measured during a quiet baseline assessment during which youths' breathed in time with a recorded tape (following recommendations of Grossman, Stemmler, & Meinhardt, 1990), because variations in respiratory rate can interfere with measurement of individual differences in RSA (Berntson *et al.*, 1997; Grossman, Karemaker, & Wieling, 1991). Details of the physiological recording equipment can be found in previous published reports (Diamond & Hicks, 2005; Diamond *et al.*, 2006). RSA was assessed on the basis of ECG and respiration data. Interbeat intervals (IBIs) were calculated as the time in milliseconds between successive R waves in the electrocardiogram, and the "peak-to-valley" method (Grossman & Svebak, 1987) was used to derive RSA on the basis of these IBIs. This method computes the difference between the heart period between inspiration onset and expiration onset. Following standard practice, RSA values were logged before analysis in order to normalize their distribution. Additionally, several days after the laboratory visit, participants provided a saliva sample at home, taken at the same time as their laboratory session had begun. Because of diurnal variation in cortisol, all laboratory sessions were scheduled to begin between 4 and 6 pm.

B. PATTERNS OF ATTACHMENT TRANSFER

Previous research on the process of transferring attachment from parents to peers suggests that in early to mid-adolescence, most youths will continue

to utilize parents as a primary base of security, but will preferentially seek companionship and safe haven from peers. Yet as critiqued previously, the reliance of previous studies on forced-choice methodologies has not allowed for investigation of mixed patterns of parent- and peer-directedness in attachment functions. Accordingly, we were interested in revisiting the question of attachment transfer and specifically investigating such mixed patterns. In short, does transfer appear to occur "in order," as suggested by Hazan and Zeifman (1994), beginning with proximity seeking, followed by safe haven and then secure base?

Overall, 53% of youths rated one of their parents higher on the reliable alliance subscale of the NRI (which, for the sake of efficiency, we will call "security") than they rated a peer (either their best friend or their romantic partner); 39% gave equal ratings to both, and 8% rated a peer higher. As for the intimacy subscale, 65% of youths rated one of their parents higher than they rated a peer, 13% gave equal ratings to both, and 22% rated a peer higher. For companionship, 45% rated a parent higher than a peer, 17% gave equal ratings, and 37% gave peers higher ratings. This pattern of results supports some aspects of the classic picture of attachment transfer, but clearly demonstrates the importance of investigating patterns of *mixed* peer–parent orientation.

Specifically, consistent with previous conceptualizations of normative attachment, very few 14-year-olds sought security from peers. Yet they were actually *more* parent-oriented for intimacy than for security. This may reflect subtle differences between interpersonal intimacy and "safe haven," strictly defined. Youths might preferentially nominate peers for disclosure of secrets, and yet still consider parents better sources of emotional support in times of stress. Notably, research by Reis and Franks (1994) has shown that interpersonal intimacy and support are distinct relationship dimensions, and that the mental and physical health benefits of interpersonal intimacy are actually mediated by support-provision. Hence, peer-directedness in interpersonal intimacy does not fully capture transfer of the safe haven component of attachment.

As for companionship, although the classic portrait of attachment transfer suggests that youths should be most peer-oriented in proximity seeking, only about a third of youths reported more companionship with peers than with parents. This suggests that even in mid-adolescence, parents remain important targets for even the most elemental attachment functions.

Also, contrary to the notion that romantic involvement is the impetus for youths to transfer security-seeking from parents to peers (Hazan & Zeifman, 1994), youths with current romantic partners (25% of the sample) were more likely—rather than less likely—to rate parents higher than peers as sources of security (62% vs 50%). Youths without romantic partners were more likely to give peers and parents equal ratings (45% vs 20%). As for companionship and intimacy, there were no significant differences between youths with and without romantic partners. Of course, given the age of our participants, their romantic relationships simply may lack the depth and intimacy that characterizes the more "attachment-like" romantic involvements of late adolescence and early adulthood; hence, in later years, romantic involvement will probably be more directly associated with peer-directedness in attachment functions.

Clearly, there is substantial variation in the normative pattern of "attachment transfer": What are the implications of these variations? To answer this question, we compared the three security groups—parent-oriented, parent-and-peer-oriented, and peer-oriented—on internalizing and externalizing problems, attention problems, depression, and quality of life, and found a significant effect of group membership, controlling for gender. Inspection of the univariate tests revealed that for each outcome except for quality of life, youths who were peer-oriented reported the poorest adjustment, whereas the other two groups did not differ from one another. Hence, seeking security from peers *while continuing to seek security from parents* does not appear to be detrimental. The ideal pattern, then, may not be to transfer attachment, but to *broaden* it, beginning to explore new attachments to peers while still actively maintaining functional relationships to parents. Even Weiss' (1982) notion of "attachment figures in reserve" might underestimate the importance of parental ties for youths in this age range, given that they continued to view parents as primary targets for companionship as well as security.

The group "to watch," then, is the group that proved to be disproportionately peer-oriented with respect to security. What specific processes and mechanisms explain their maladjustment? One possibility is that the link between peer-orientation and maladjustment is simply a function of the fact that peer-oriented youths *start out* with unusually low perceptions of security in their parental relationships, so that as they increasingly—and normatively—seek security from peers over the course of adolescence, peers inevitably end up "ranking higher" than parents. If this is the case, then the association between peer-orientation and maladjustment should no longer be significant after controlling for overall levels of parental security. Sure enough, this was the case. When we entered youths' ratings of parental security into the aforementioned model predicting maladjustment from peer-vs-parent-orientation, the effect of peer-vs-parent-orientation was no longer significant.

Inspection of the univariate tests revealed that after controlling for overall security levels, peer-vs-parent-orientation remained significantly

associated with externalizing problems, and marginally so with attention problems, but not with internalizing problems or depression. In contrast, overall parental security was significantly associated with internalizing problems, depression, and quality of life and not with externalizing or attention problems. These results suggest that one potential reason that "premature" transfer of security-seeking to peers from parents is potentially maladaptive is that youths who take this developmental route have disproportionately low levels of parental security to begin with, which appears to have detrimental associations with adolescent psychosocial functioning regardless of whether youths attempt to "compensate" by seeking greater security from peers. Consistent with the findings of other research (reviewed in Repetti *et al.*, 2002), these results clearly indicate that security from peers cannot, in fact, compensate for low parental security.

C. BRIDGES TO AUTONOMY: EXPLORATION AND DEPENDENCY

As noted earlier, historical perspectives on adolescent autonomy suggest that individuation from parents is a precursor for age-appropriate exploration; if so, then one would expect that youths who are peer-orientated in security-seeking, companionship, and intimacy should report greater tendencies toward exploration and also less dependency on parents. We tested this hypothesis, and found that although peer-vs-parent orientation in security was associated with both exploration and dependency, peer-vs-parent orientation in intimacy and companionship were not. Specifically, youths who were parent-oriented in security had the lowest levels of exploration, whereas those who were peer-oriented or *equally* parent- and peer-oriented reported comparable—and higher—levels of exploration. For dependency, there was an interaction between peer-vs-parent orientation in security and gender: Among boys, peer-orientation was actually associated with higher levels of dependency, whereas the lowest levels of dependency were observed among youths who were equally oriented to parents and peers. In girls, groups did not differ. These findings provide further support for the notion that adolescent adaptation is best facilitated by a pattern of security-seeking from *both* parents and peers, rather than an exclusive focus on either parents *or* peers.

In concert with the findings on overall adjustment, we think that this pattern of results harkens back to Deci and Ryan's (2000) self-determination theory. As reviewed earlier, this theory suggests that autonomous adolescents are not merely those who successfully separate and individuate from their parents, but those whose confidence in their own judgment, and

awareness of their own values and motives, leads them to confidently endorse and defend their actions. According to this theory, the optimal exercise of adolescent volition, judgment, and self-reliance is fully compatible with—and potentially enhanced by—the continued use of parents as bases for emotional security (Soenens *et al.*, 2007). Adolescents who are disproportionately peer-oriented regarding security may begin to assert independence *without* developing volition and choicefulness, which may hamper both exploration and overall adjustment, and facilitate continued dependency.

D. ATTACHMENT STYLE AND AFFECT REGULATION

We were also interested in whether attachment style moderated these patterns, and so we added attachment anxiety and avoidance (measured separately for each parent and averaged, unless noted otherwise) to the models described previously. The results were striking: Contrary to previous research suggesting that attachment anxiety has stronger associations than avoidance with psychological adjustment in both adolescence and adulthood (Cooper *et al.*, 1998, 2004; Mickelson *et al.*, 1997), we found that attachment avoidance was the *only* significant overall predictor of youths' psychological adjustment and was strongly related to each of the adjustment outcomes. Perhaps most notably, parental security and parent-vs-peer orientation were no longer significantly associated with any of the adjustment outcomes after controlling for attachment avoidance, indicating that both of these effects were mediated by avoidance. Why—and through what psychological mechanisms—does avoidance have such detrimental implications for adjustment? Attachment theory suggests two possibilities: First, avoidant adolescents may have affect-regulation deficiencies that predispose them to poor adjustment; second, avoidant adolescents have such poor quality family relationships that their resulting feelings of loneliness and isolation predispose them to poor adjustment. To examine each of these possibilities, we added the set of affect-regulation measures (repair, clarity, suppression, recovery, and attention) to the model, and found that they were strongly related to adjustment, whereas the effect of avoidance was no longer significant. In contrast, when loneliness within the family was added to the model, it did not make a unique contribution.

The preeminence of affect regulation in this model prompted us to return to our initial peer-orientation groupings, and examine whether youths who (1) were disproportionately peer-oriented regarding security, or (2) had low overall ratings of security to their parents, were characterized by affect-regulation deficits. In this model, we began by predicting repair, clarity,

attention, recovery, suppression from parent-vs-peer orientation. There was a strong omnibus effect, and inspection of the univariate tests showed that peer-oriented youths had poorer affect regulation on all of the dimensions except for suppression. After adding parental security to the model, parent-vs-peer orientation remained strongly associated with affect regulation, whereas parental security was not. Hence, unlike the adjustment outcomes, youths' specific capacities and strategies for affect regulation are uniquely associated with peer-orientation in security, regardless of youths' overall levels of parental security.

Given our previous findings regarding the significance of attachment avoidance for youths' adjustment, we then added attachment avoidance to the affect-regulation model to see whether it was mediating the effect of parent-vs-peer orientation. This proved to be the case: Avoidance had significant unique associations with *each* of the affect-regulation measures, and neither parent-vs-peer orientation nor parental security was now associated with these outcomes. Although our data do not permit causal inferences, our findings are consistent with a potential developmental pathway in which avoidantly attached youths' poor affect-regulation predisposes them to low parental security, high levels of peer-orientation, *and* maladjustment. Although these youths' relative security with parents and peers also contribute to their levels of maladjustment, affect-regulation deficits appear to play the most preeminent role. This provides strong evidence for the importance of affect regulation in understanding normative and non-normative trajectories of attachment during the transition from childhood to adulthood, and their implications for youths' well-being.

E. PHYSIOLOGICAL CORRELATES OF AFFECT REGULATION

Our findings of consistent associations among attachment domains, affect regulation, and overall adjustment find further support in our analyses of physiological correlates of affect regulation. Specifically, boys' afternoon levels of cortisol, measured at home, were associated with their degree of attachment anxiety to mothers and their perceptions of maternal support-enthusiasm. That is, higher levels of attachment anxiety were associated with *lower* cortisol levels, whereas perceptions of support-enthusiasm were associated with *higher* levels. These findings are consistent with previous research documenting that adolescent boys with affect regulation and conduct problems tend to show dampened cortisol levels (Loney *et al.*, 2006; Ramirez, 2003; Shoal, Giancola, & Kirillova, 2003). Also, another study found that boys whose parents had divorced before the age of 10 showed dampened cortisol responses in young adulthood after stimulation with corticotropin releasing hormone, in comparison to controls, suggesting the specific importance of attachment-related stressors for HPA dysregulation (Bloch *et al.*, 2007).

Contrary to the findings with boys, we found that girls who described their parents as unpredictable had *higher* evening levels of cortisol, at the trend level; yet notably, this effect was mediated by girls' capacities for emotional clarity (which was significantly associated with both parental unpredictability, and girls' home cortisol levels). When added to the model predicting home cortisol levels, emotional clarity was marginally associated with lower cortisol but the effect of parental unpredictability was no longer significant.

These findings suggest intriguing possibilities regarding the familial origins of affect regulation and their associations with HPA functioning. One possibility is that girls whose parents display unpredictable reactions to their own positive and negative emotions develop difficulties with affective awareness and understanding that are manifested in heightened HPA activation at home. This is consistent with prior research showing that unpredictability and negativity in the home places children at risk for heightened emotional reactivity and, eventually, chronic emotional insecurity (Cummings & Davies, 1996). Girls' heightened HPA levels might stem from these chronic appraisals of uncontrollability and insecurity in the family's emotional dynamic, consistent with prior research on links among interpersonal experiences, emotional appraisals, and HPA activity (Seeman, 2001). Our finding of such linkages among girls, but not boys, is consistent with previous studies documenting similar gender differences (McCormick & Mathews, 2007; Schiefelbein & Susman, 2006).

Alternatively, patterns of heightened HPA activity may "drive" interpersonal problems, predisposing girls to difficulties with affective self-awareness which eventually lead them to perceive their parents as unpredictable. If the latter were so, one would expect that when predicting girls' emotional clarity from their cortisol levels and their perceptions of parental unpredictability, heightened cortisol levels should mediate the association between emotional clarity and perceptions of parental unpredictability. Yet when we tested this possibility, we found that it was not the case. Rather, both parental unpredictability and home cortisol levels made unique contributions to emotional clarity.

As for PNS functioning, it also showed gender-specific patterns. In both girls and boys, higher baseline RSA was associated with greater externalizing problems, less physical affection from parents, less positive emotional expression in the family, and less emotional repair, clarity, and attention. The strong association with emotional clarity is particularly

notable, given the aforementioned association between girls' emotional clarity and their HPA activation. Given that emotional clarity was associated with each of the other variables (with the exception of physical affection), we ran a series of analyses to determine whether the link between RSA and affect regulation mediated these associations, and found this to be the case.

These findings pose a contrast to our earlier work with adults, in which we found lower resting RSA among adult men who reported high attachment anxiety and low perceptions of security in their current romantic relationships (Diamond & Hicks, 2005). Notably, these studies did not include the detailed assessments of adjustment and of individual differences in affect regulation that we included in the present study (although we did find that high-anxious men's low RSA mediated their tendencies to show poor self-reported emotional recovery from laboratory-administered stress). One possible explanation for the different pattern of results for adults vs youths is that as these youths develop and as their individual differences in affect regulation and adjustment canalize them into specific types of intimate relationships, their differential capacities for PNS regulation will eventually be made manifest in poorer quality romantic relationships and—accordingly—both heightened attachment anxiety and lower perceptions of relationship-specific security. The youths in our present sample may simply not have had enough romantic experience for such effects to emerge. Yet the pattern of findings reviewed previously suggests the possibility that we are detecting, at an early developmental stage, precursors to the patterns of association between attachment anxiety and PNS functioning that we detected in our previous studies of adult men.

The notion of a developmental component to associations between affect regulation and attachment style is also consistent with the fact that although most studies of adults find robust associations between romantic attachment anxiety and maladjustment, we did not find this pattern among our adolescent participants. Instead, we found *avoidance* to be more robustly associated with negative psychological outcomes. Of course, this may be attributable to differences between the mental health implications of *maternal* vs *romantic* attachment anxiety. Perhaps these youths' current affect regulation and adjustment problems will eventually propel them into the types of romantic attachments which serve to reinforce their anxieties and emotional difficulties, regardless of whether they are also carrying over residual attachment-related anxieties from their parental attachments. Hence, by the time they are adults, romantic anxiety may be "codetermined" by both affect regulation problems *and* concrete romantic experiences.

IV. Implications and Future Directions

The results reviewed here suggest the promise of integrative, biosocial research on adolescent attachment, affect regulation, and well-being. In particular, developmental research focusing on the affect-regulation functions of attachment provides a fruitful way to build theoretical and empirical bridges between the infant-child and adult literatures, toward the eventual goal of developing integrative *lifespan* models of the attachment system and its impact on physical and mental functioning from the cradle to the grave. Of course, the data we have presented focus on one wave of assessment, and are therefore unable to answer fundamental questions of causation and to examine patterns of reciprocal linkage over time: For example, to what extent do early-appearing, temperamental deficiencies in affect regulation "drive" the development of attachment insecurity (instead of vice versa) via strained, asynchronous parent–child interactions? Are there specific developmental moments during which problematic trajectories of attachment insecurity, affect regulation, and adolescent internalizing and externalizing problems can be fruitfully redirected? Answers to these questions will come with continued longitudinal investigation. For now, we want to conclude by highlighting several additional avenues for future research which can make significant contributions toward the development of generative lifespan models of attachment and affect regulation.

A. INTEGRATION OF ATTACHMENT AND AFFECT REGULATION WITH OTHER REGULATORY PROCESSES

Historically, links between affect regulation and broader processes of *self*-regulation have been more explicitly discussed by researchers focusing on infant-child development than those focusing on regulatory processes in adolescents and adults. For example, Siegel (1999) noted that because affect and emotion reflect the mind's assignment of value to internal and external events, and because they consequently direct the distribution of attentional resources to engage these events, affect regulation in infancy "can be seen at the center of the self-organization of the mind" (p. 245). Dodge (1991) placed specific emphasis on cognitive processes, contending that "... all information processing is emotional, in that emotion is the energy that drives, organizes, amplifies, and attenuates cognitive activity and in turn is the experience and expression of this activity" (p. 159). In their research on infants and children, Fox and Calkins (2003) have highlighted links between affect regulation and *behavioral* self-regulation, noting that effective management of affective reactivity is critical for motivating approach

behaviors and inhibiting withdrawal behaviors that might otherwise interfere with children's goal pursuit or their compliance with rules and/or expectations.

Investigating such interconnections among the organizing and valuing functions of affect and emotion, information processing, social behavior, and goal pursuit *at all stages of life* holds great promise for elucidating the multiple interconnecting mechanisms through which attachment security promotes adjustment and well-being across the life course. Another advantage of such an approach is that it would provide a valuable corrective to views of attachment and affect regulation which implicitly presume that the role of attachment figures is to unilaterally down-regulate intense (and presumably disruptive) experiences of affect *so that* goal pursuit can proceed or resume. This view reflects outmoded conceptualizations of emotion and cognition as separate and often opposing processes (i.e. hot vs cold processing, thinking vs feeling, emotion-focused vs problem-focused coping—for reviews and critiques see Isen, 2003; Isen & Hastorf, 1982; Stanton *et al.*, 1994, 2000). We would advocate, instead, investigation of how attachment figures assist with more subtle and nuanced forms of affective regulation toward the goal of optimizing affective "input" into a range of situation-specific cognitive and behavioral processes.

As we noted earlier, we find self-determination theory (Deci & Ryan, 2000) to be a useful framework for developing integrative conceptualizations of the reciprocal linkages among affect regulation, self-regulation, attachment, and autonomy during adolescence. Specifically, we expect that the backdrop of attachment security will promote the ability of adolescents to develop a sense of volition and choicefulness regarding a *range* of goals, requiring a range of regulatory skills, and to take the necessary exploratory risks to achieve their goals. Feeney (2007) has most explicitly articulated the argument that in the realm of attachment, "dependence" in the form of emotional security *promotes* rather than hinders eventual independence and autonomy. Future investigation of adolescents' development of self-regulation across a broader variety of domains, and how each developmental trajectory is facilitated (perhaps at different maturational stages) by attachment security, can contribute to a comprehensive, process-oriented understanding of the web of interconnections among attachment and multiple regulatory processes from infancy to adulthood.

B. A DYADIC APPROACH TO ADOLESCENCE

One of the major developments within relationship research since the late 1990s involves the increased emphasis on *dyadic* approaches to modeling

and measuring interpersonal phenomena (Gable & Reis, 1999; Lyons & Sayer, 2005). This approach can make important contributions to investigations of attachment and affect regulation during the adolescent years, particularly given the complex negotiation between intimacy and autonomy which characterizes this stage of life. In particular, we think that dyadic approaches pull for greater specificity in conceptualizing the relative roles of *self* and *other* in the context of affect regulation. As reviewed previously, the development of affect regulation from childhood to adolescence can be cast as a gradual transition from reliance on a sensitive, responsive "other" for regulatory assistance to reliance on one's *own* regulatory skills and capacities, such as attention shifting, active coping, or selective approach and avoidance (Calkins *et al.*, 1998; Kobak *et al.*, 1993; Rothbart, 1991; Thompson, 1994).

This conceptualization presumes meaningful boundaries between regulatory processes that reside in the "self" vs those that reside in the "other." However, research increasingly suggests that such boundaries might be relatively fluid, and that future developmental research should more closely attend to the multiple bidirectional, co-regulatory processes that unfold in different contexts, with different constraints, at different stages of life. This approach has already been adopted by researchers investigating the development of self-regulation in infancy. Beebe and Lachmann (1998), for example, have argued for greater attention to how "dyadic process may (re-)organize both inner and relational processes, and reciprocally, how changes in self-regulation in either partner may alter the interactive process" (p. 481). Fogel (1992) has similarly emphasized that social behavior, communication, and emotions do not reside "in" the infant, but are continuously constructed in the course of direct interaction with the caregiver. Interestingly, neurobiological research provides converging support for this dyadic approach. The cascade of psychobiological effects of infant–caregiver interactions — from experience-expectant and experience-dependent proliferation and pruning of neural circuits (Schore, 1996a, 1996b) to endocrinological responses to stress and soothing (Chorpita & Barlow, 1998; Gunnar & Donzella, 2002; Hertsgaard *et al.*, 1995) — suggests that especially in early stages of development, the infant – caregiver dyad can be viewed as a mutually regulating psychobiological unit (Schore, 2000).

The extent to which this model also characterizes *adolescents' and adults'* most intimate and important relationships is unknown. Pipp and Harmon (1987) speculated that "homeostatic regulation between members of a dyad is a stable aspect of all intimate relationships throughout the lifespan" (p. 651), and Hofer (1984) has similarly argued that the psychological effects of interpersonal loss and bereavement can be interpreted as concomitants of multisystem *dysregulation* stemming from the removal of

one member of the dyad. Dyadic approaches are also directly relevant to investigations of the health consequences of close relationships: Cacioppo (1994), for example, argued that an individual's overall patterns of cardiovascular and neuroendocrine activity could be conceptualized as a function of his/her most important interpersonal relationship.

Such approaches have been more consistently applied to studies of infants (in the context of infant–caregiver relationships) and adults (in the context of romantic ties) than to adolescents. Yet we expect that studies of adolescent social and psychological development, particularly regarding linkages between attachment relationships and affect-regulation processes, would benefit greatly if researchers shifted toward treating the *dyad*—rather than the isolated adolescent—as the unit of analysis. Of course, one obvious complication is that more than one type of dyad is likely to be developmentally significant: Although mother–adolescent pairs have received the most extensive attention in prior research (consistent with the fact that mothers are typically adolescents' primary attachment figures), research has devoted increasing attention to fathers' roles as attachment figures (Kerns & Barth, 1995; Youngblade, Park, & Belsky, 1993) and to the unique roles that fathers play in psychosocial development (Cabrera *et al.*, 2000; Marsiglio *et al.*, 2000; Phares & Compas, 1992). Similarly, different dynamics might characterize peer–peer dyads, depending on the nature of the relationship (best friends? romantic couple?) and the unique contributions of each peer's temperament and behavior. Finally, all of these dynamics might be developmentally specific, undergoing notable maturational changes from early adolescence to young adulthood. Clearly, a comprehensive dyadic approach to adolescent development introduces numerous logistical and methodological challenges, yet such an approach may help to elucidate relationship-specific processes through which adolescents' intimate relationships shape—and are shaped by—affect-regulation capacities and strategies over time.

C. THE SPECIFIC IMPORTANCE OF POSITIVE AFFECT

Most research on affect regulation, particularly in the context of attachment, focuses on attenuating *negative* affect, and particularly on alleviating psychological stress. This is not without cause: Both acute and chronic negative affectivity has been found to impede children's *and* adults' social functioning, empathy, exploratory behavior, cognitive processing, and the quality of their close relationships (Cooper *et al.*, 1998; Eisenberg *et al.*, 2000; Kim *et al.*, 2001; Mikulincer *et al.*, 2003). Studies of adolescence, in particular, have suggested that normative increases in the

frequency and intensity of negative emotions (Buchanan *et al.*, 1992; Larson, Csikszentmihalyi, & Graef, 1980; Larson & Richards, 1994; Richards *et al.*, 1998) often set the stage for adjustment and behavioral problems (Cooper *et al.*, 1998).

Yet, researchers have increasingly focused on the multiple psychological and physiological benefits of *positive* affective experience. Positive and negative affect operate through distinct neural pathways (Lane *et al.*, 1997) and appear to influence physical and mental functioning through different psychological mechanisms (Isen, 2002; Taylor *et al.*, 2002). In particular, positive affect is associated with approach-oriented behavior (Cacioppo, Gardner, & Berntson, 1999), active engagement with the environment (reviewed in Fredrickson, 2001), more creative and flexible decision-making (reviewed in Isen, 1993, 2000), generating multiple potential solutions to one's problems (Fredrickson & Joiner, 2002), the effective processing of negative—but useful—problem-relevant information (reviewed in Aspinwall, 1998), anticipation and management of stressors before they occur (known as "proactive coping," Aspinwall & Taylor, 1997), and positive reframing of one's problems to emphasize the meaning that can be gleaned from adversity (Affleck & Tennen, 1996; Davis, Nolen-Hoeksema, & Larson, 1998). This rich constellation of benefits not only promotes everyday cognitive and social competence, but also fosters adaptive coping to both major and minor stressors (Folkman & Moskowitz, 2000; Park, Cohen, & Murch, 1996).

On the basis of such findings, Fredrickson (2001) developed the *broaden-and-build theory* of positive emotions, which maintains that positive emotional experiences "broaden people's momentary thought-action repertoires and build their enduring personal resources, ranging from physical and intellectual resources to social and psychological resources" (p. 219). This theory is supported by empirical research demonstrating that not only can positive emotions offset or "undo" some of the immediate negative psychological and physiological effects of negative emotional arousal (Fredrickson & Levenson, 1998; Fredrickson *et al.*, 2000; Fujita, Diener, & Sandvik, 1991), but that they appear to foster future increases in coping resources and psychological resilience (Fredrickson & Joiner, 2002).

At the current time, these intriguing new conceptualizations of positive affect have not been systematically integrated into attachment–theoretical perspectives on affect regulation (with some exceptions, such as Mikulincer *et al.*, 2003). Nor have they received extensive attention in the adolescent literature. Yet they have important implications for understanding the processes through which attachment security promotes adolescent affect regulation and well-being. Notably, positive affect experienced in the context of close interpersonal relationships appears to be particularly

influential and beneficial. Reis (2001) has argued that socially derived affect plays a unique role in shaping both day-to-day and global well-being, and Ryff and Singer (2001) have shown that trajectories of interpersonal affective experience, beginning with parent–child ties and continuing through adult marital relationships, show robust associations with both physical and mental well-being over the long term.

In adolescence, positive affect experienced *during interactions* with attachment figures may prove to be particularly important for preventing escalation of the heightened negativity and conflict that often characterizes these relationships (Conger & Ge, 1999; Kim *et al.*, 2001; Laursen, Coy, & Collins, 1998). This is consistent with emerging perspectives on regulatory benefits associated with *coactivation* of negative and positive affective states (Larsen, McGraw, & Cacioppo, 2001; Larsen *et al.*, 2003). Specifically, experiencing positive affect in concert with negative affect is thought to bolster individuals' psychological and physiological resources for processing and coping with negative events, thereby preventing acute episodes of negative affect from becoming solidified into defensive and maladaptive regulatory patterns.

Hence, such coactivation in youths' attachment relationships may provide them with direct and immediate examples of how mobilization of positive affect can assist with the process of coping with both major and minor environmental demands. Clearly, greater investigation of such possibilities, and of the broader psychological concomitants of positive affect, can make important contributions to our understanding of the multiple, developmentally specific processes linking attachment to affect regulation from childhood to adulthood.

D. CONCLUSION

The importance of attachment relationships in fostering psychological and physical well-being at all stages of the life course makes it all the more important to bridge the long-standing bifurcation between infant-child and adult attachment research. The development of integrative, lifespan, biobehavioral models of the attachment system should be a priority for future research, and greater emphasis on the affect-regulation functions of attachment, particularly during the critical developmental transitions of the adolescent years, can make an important contribution to this goal. From our perspective, affect regulation is not a developmental task to be mastered at a certain age (after which attention turns to the psychological and behavioral implications of one's relative success or failure at this task), but rather a "moving target" that is continually sensitive to changing goals

and contexts. The optimal developmental outcome, therefore, is not complete regulatory independence from attachment figures and other social partners, but rather a flexible and enduring capacity to adapt one's affect-regulation strategies to the context at hand, to engage the assistance of social partners when needed, and to develop a sense of autonomy and self-determination that is *based in* the psychological resources fostered by attachment security.

Our own research on attachment and affect regulation during the adolescent years shows the importance of attending to multiple affect-regulation processes, multiple components of attachment relationships, and multiple domains of adjustment in order to capture dynamic linkages among these domains over time. The results demonstrate that the quality of youths' parental attachments has implications for both subjective and physiological aspects of affect regulation, opening up a host of fascinating questions regarding the basic biopsychology of the attachment system and its potential developmental changes over the lifespan. Addressing these questions can help to integrate the increasingly sophisticated bodies of knowledge on social relationships and mental–physical health that have developed within the social-psychological, developmental, and behavioral medicine traditions. Such an integration is critical for elucidating how and why attachment bonds play such a fundamental role in well-being over the life course.

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