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The Development of Anxiety: The Role of Control in the Early Environment

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Current developments in cognitive and emotion theory suggest that anxiety plays a rather central role in negative emotions. This article reviews findings in the area of anxiety and depression, helplessness, locus of control, explanatory style, animal learning, biology, parenting, attachment theory, and childhood stress and resilience to articulate a model of the environmental influences on the development of anxiety. Evidence from a variety of sources suggests that early experience with diminished control may foster a cognitive style characterized by an increased probability of interpreting or processing subsequent events as out of one's control, which may represent a psychological vulnerability for anxiety. Implications for research are discussed.

Historically, studies of childhood and adult anxiety and depression have been characterized by a discontinuity between major theoretical frameworks, methodologies, and research paradigms particular to each area. Recently, however, theoretical advances in the understanding of both childhood and adult anxiety and depression are beginning to highlight consistencies and to allow the emergence of a more unified model. For example, in recent adult theories, the dimensional nature of pathological syndromes, the relation of normal to abnormal processes, the multiplicity and interaction of psychosocial and biological influences, and the continuity of anxious and depressive features have received increased emphasis (Alloy, Kelly, Mineka, & Clements, 1990; Barlow, 1991). Findings from outside the clinical literature have also contributed to the integration and extension of childhood and adult models of anxiety. For example, conditioning models (Mineka, 1985; Mineka & Zinbarg, 1996) and biopsychological models (Gray, 1982, 1987; Gray & McNaughton, 1996) have become increasingly relevant to traditional developmental notions of attachment (e.g., Bowlby, 1969), inhibition (e.g., Kagan, 1989), and coping and resilience (Garmezy, 1986; Hetherington, 1989; Masten, Best, & Garmezy, 1991). What is beginning to emerge is a model of negative emotions that highlights the role of uncontrollability and unpredictability and, while acknowledging the contribution of innate vulnerabilities in the experience of anxiety, also emphasizes the importance of early experience in the development and progression of these vulnerabilities. By reviewing selected findings in these diverse areas, this article is intended to explicate the notion that early experience with reduced control can foster a psychological diathesis that may eventually give rise to increased anxiety (and perhaps depression) in children and adults. We begin with some definitions.

A Model of Negative Emotions

Contemporary understanding of the relation between anxious and depressed emotion has become increasingly complex. Several lines of evidence now suggest that anxiety may play a rather central role in negative emotions (Barlow, Chorpita, & Turovsky, 1996; Brown, Chorpita, & Barlow, 1998; Chorpita, Albano, & Barlow, 1998; Gray & McNaughton, 1996). Gray (1982; Gray & McNaughton, 1996) defined *anxiety* as a state of the conceptual or central nervous system characterized by activity of the behavioral inhibition system (BIS). The *BIS* is, in turn, defined as a functional brain system involving the septal area, the hippocampus, and the Papez circuit (including also the neocortical inputs to the septo-hippocampal system, dopaminergic ascending input to the prefrontal cortex, cholinergic ascending input to the septo-hippocampal system, noradrenergic input to the hypothalamus, and the descending noradrenergic fibers of the locus coeruleus [Gray, 1982]). The outputs of this system, then, can be taken as evidence of anxious emotion. Gray defines the primary, short-term outputs as involving narrowing of attention, inhibition of gross motor behavior, increased stimulus analysis, increased exploration of environment (e.g., scanning), and priming of hypothalamic motor systems for possible rapid action that may be required (i.e., possible activation of the fight or flight system [FFS]). Here, anxiety is considered distinct from the emotion of fear and panic, which is functionally related to actual confrontation with danger, not simply the detection of and preparation for danger. In contrast to anxiety, *fear* is conceptualized as activity of the FFS and is characterized by surges of autonomic arousal and the associated action tendencies of escape, active avoidance, or defensive aggression.

Anxiety and Depression

Evidence from a number of sources suggests that, when defined in such a manner, anxiety may actually be a common component of both anxiety disorders and depressive disorders (Barlow et al., 1996; Brown et al., 1998; Chorpita et al., 1998;

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Clark & Watson, 1991; Gray & McNaughton, 1996). For example, Clark and Watson (1991; Watson & Clark, 1984) articulated a general factor, Negative Affect, common to the self-reported signs and symptoms of both anxious and depressed emotion. In Clark and Watson's model, this construct of negative affect bears a striking similarity to Gray's definition of anxiety (i.e., BIS activity). (A complex issue of semantics arises here in that Clark and Watson consider anxiety to involve both negative affect and physiological hyperarousal, whereas Gray's [1982] and Barlow's [1988] models view anxiety as distinct from autonomic arousal, and thus more synonymous with Clark and Watson's [1991] "negative affect").

Although a thorough explication of the taxonomy and structure of negative emotions is beyond the scope of this article, it is an important premise that a general emotional factor, consistent with Gray's definition of anxiety, functions as a common component of anxiety disorders and depressive disorders. This has been supported by a number of recent findings concerning the structure of negative emotions (e.g., Brown, Chorpita, Korotitsch, & Barlow, 1997; Chorpita et al., 1998; Joiner, Catanzaro, & Laurent, 1996; Lovibond & Lovibond, 1995). Very recent evidence strongly supports the notion that this general factor does indeed influence anxiety disorders and depressive disorders, and that this factor is characterized by anxious apprehension, narrowed attention, and reduced autonomic reactivity (see Borkovec, 1994). Specifically, Brown et al. (1998) found in a sample of 350 adult outpatients that covariance among dimensions of selected *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV;* American Psychiatric Association, 1994) anxiety and mood disorders was structurally related to three higher order factors (e.g., Clark & Watson, 1991). One higher order factor demonstrated a uniformly important influence on all of the *DSM-IV* syndromes, and it was highly consistent with Watson and Clark's (1984) negative affect as well as Gray's (1982) and Barlow's (1988) definitions of anxiety. The syndrome of generalized anxiety disorder was observed to load most highly on this particular factor, suggesting that anxiety (i.e., Gray's behavioral inhibition) may be a core factor among the disorders of emotion.

Related Theoretical Models

Theoretical developments in other areas are consistent with this model. For example, Alloy et al. (1990), approaching some of the same theoretical issues from the perspective of depression, have articulated a comparable point of view (see also Abramson, Metalsky, & Alloy, 1989). Alloy et al. asserted a cognitive model of depression and anxiety that posited a continuum of proximal causality for these syndromes. As such, one dimension on which these disorders or syndromes are said to vary involves the individual's degree of a sense of control. Specifically, when an individual experiences uncertainty about the ability to control outcomes (i.e., "uncertain helplessness"), the resulting affective state is one of "aroused anxiety." If this ostensible lack of control increases (i.e., "certain helplessness"), one experiences a state of "mixed anxiety–depression." Finally, when an individual's sense of control is entirely diminished (i.e., "hopelessness") and there is certainty of a negative outcome, one experiences a depressive state (Alloy et al., 1990, pp. 525–526). This cognitive model of helplessness–hopelessness serves to explain many of the observed similarities of anxious and depressive syndromes, and it is consistent with the idea of a shared vulnerability for anxiety disorders and depressive disorders.

Alloy et al. (1990) reviewed a number of important findings that further support the notion of anxiety as a core component of the emotional disorders. For example, the sequential relation between anxiety and depressive disorders is characterized by a temporal asymmetry, such that anxiety disorders are more likely to precede depressive disorders than to follow (e.g., Angst, Vollrath, Merikangas, & Ernst, 1990). Similar findings have emerged in cross-sectional comorbidity research. That is, cases of anxiety disorders without depression are commonly observed, but cases of depression without anxiety are relatively rare (e.g., Di Nardo & Barlow, 1990; Dobson, 1985). Collectively, these patterns highlight the primacy of anxiety among the disorders of emotion and implicate anxiety as a general risk factor (Barlow et al., 1996).

Influences on Anxiety

Let us then consider the events that activate this emotion of anxiety. Gray (1982) states that the BIS responds to signals for punishment, signals for frustrative nonreward, and novel stimuli. These inputs are mediated by what Brooks (1986) and Gray and McNaughton (1996) call the "comparator," a subsystem involving the Papez loop (subicular area, mammilary bodies, anteroventral hypothalamus, and cingulate cortex). The comparator analyzes information from a number of sources and, based on these analyses, regulates BIS activity. Principally, the sources of compared information are (a) the current observed state of the world, (b) the next planned step in the motor program, (c) stored regularities about the world (stimulus–stimulus associations as determined by Pavlovian conditioning), and (d) stored regularities about the behavior-outcome relations (stimulus–behavior–stimulus associations as determined by instrumental conditioning; see Figure 1). According to Gray and McNaughton (1996), the comparator "has the task of predicting the next sensory event to which the animal will be exposed and checking whether it actually does occur; of operating the outputs of the BIS either if there is a mismatch between the actual and predicted events or if the predicted event is aversive; and of testing out alternative strategies (including alternative multi-dimensional descriptions of stimuli and/or responses) which may overcome the difficulty with which the animal is faced" (p. 75). What is important with respect to this article is that BIS activity (i.e., anxiety) is very much a function of the stored regularities associated with both Pavlovian and instrumental conditioning history, as established during early development. Let us now examine how these may be related to a history of low control.

Control and Anxiety

Definitions of control, its putative influence on anxiety, and its relation to similar constructs such as predictability and self-efficacy have been argued extensively elsewhere (e.g., Biglan, 1987; Minor, Dess, & Overmier, 1991). For example, Minor et al., reviewing animal research, have argued that lack of control (i.e., the inability to influence events) is one of a number of

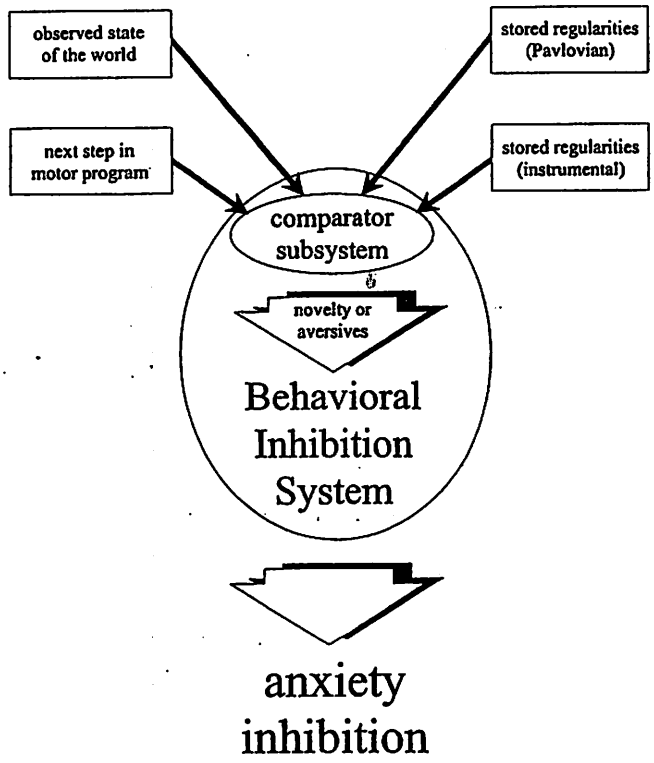

Figure 1. Schematic of Gray and McNaughton's (1996) model of the behavioral inhibition system, detailing the function and operation of the comparator subsystem.

pathways to fear and anxiety. For the purposes of this article, *control* is broadly defined as the ability to personally influence events and outcomes in one's environment, principally those related to positive or negative reinforcement. This definition overlaps with "prediction" in that control, as such, can implicitly allow prediction of when something will happen, such as the termination of an aversive event. This definition is also consistent with the theorizing of Weisz (1986), who has emphasized that it is not only important that one perceives outcomes as contingent on the behavior of others in general but also whether one perceives outcomes as contingent on one's own behavior.

Given such a definition of control, there exists a diversity of literature supporting the notion that an immediate sense of diminished control is commonly associated with the immediate expression of anxiety (Barlow, 1988, 1991; Beck & Emery, 1985; Lazarus, 1966, 1968; Lazarus, Averill, & Opton, 1970; Mandler, 1972; Sanderson, Rapee, & Barlow, 1989). In terms of Gray's BIS, lower control over a threatening stimulus would increase the expected probability of danger, given that fewer alternative strategies for avoidance would be accessed by the comparator. Hence, evidence of low control would likely increase anxiety (i.e., BIS activity) in the immediate sense.

What is more compelling, however, is the idea that a history of lack of control may put individuals at eventual risk to experience chronic anxiety or related negative emotional states through the development of a psychological vulnerability. Specifically, converging evidence suggests that sufficient early experience with uncontrollable events may eventually lead to an increased generalized tendency to perceive or process events as not within one's control (see Schneewind, 1995). In terms of the effects on anxiety, it seems possible that the conditioning history involving control over (positive and negative) reinforcement would determine the nature of the stored regularities involved in the comparator subsystem. That is, an individual reared with control over these events will have relatively greater access to stored information that predicts the possibility of avoiding punishment or nonreward (mainly through the so-called instrumental regularities; see Figure 1). Conversely, experiencing diminished control over events during development may establish stored regularities that more commonly result in the comparator predicting an aversive outcome. Thus, in the face of identical inputs related to signals for punishment or nonreward, stored information related to a history of low control should result in heightened activity of the BIS, hence greater anxiety.

In this manner, early experience with uncontrollable events may be thought of as a primary pathway to the development of anxiety in that such experience may foster an increased likelihood to process events as not within one's control (i.e., a psychological vulnerability). In this way, it appears that early experience can be disproportionately important in that it weights or colors subsequent experience. Of course, this is not to say that experience in adulthood cannot instill or remove a sense of diminished control, only that early experiences contribute most heavily to the formation of this psychological vulnerability (see Rotter, 1966).

Control in Animal Models

Although one might expect much of the empirical support for these concepts to emanate from research on anxiety in humans, more frequently it is the animal literature that implicates experience with uncontrollable events in subsequently fostering stable anxious responding (Mowrer & Viek, 1948; Weiss, 1971a, 1971b). Much of the original anxiety work has been overshadowed by the study of learned helplessness (e.g., Overmier & Seligman, 1967, Seligman & Maier, 1967). Ironically, although this study of helplessness was originally conceptualized as an analogue for human depression, it has been subsequently described as perhaps the most useful psychological animal model of anxiety in humans (Barlow, 1988; Mineka, 1985; Mineka & Zinbarg, 1996). What has emerged from the collective lines of research is the understanding that the tendency of events to subsequently trigger some analogue of anxiety or negative affect is dependent to some degree on the amount of control the organism experiences over those events.

In a review of this literature, Maier and Seligman (1976) outlined the idea that events uncontrollable to an organism produce subsequent motivational, cognitive, and emotional disturbance. The best known of these experiments involved the classic learned helplessness manipulation used by Overmier and Seligman (1967), during which a dog is repeatedly exposed to inescapable shock and then fails to escape when escape is made possible. It has further been shown that these performance deficits are not related to shock or aversive stimulation, but rather they are a result of the uncontrollability of the shock (e.g., Maier, 1970; Seligman & Maier, 1967). That is, in classic evaluations of the effects of uncontrollable aversive stimulation (in addition to a standard control group), a group with control over aversive

stimulation is added, to which the experimental group is yoked, thus equating the total amount of aversive stimulation.

Experiments with rats have shown similar evidence of induced helplessness, albeit using more challenging tasks than simply escape (e.g., Maier & Testa, 1975; Seligman, Rosellini, & Kozak, 1975). Subsequent alternatives to learned helplessness theory have emerged (e.g., Minor, Dess, & Overmier, 1991; Overmier, 1988), and although these models emphasize parameters and mechanisms other than response-shock noncontingency (as in learned helplessness), they acknowledge the importance of experience with lack of mastery, predictability, or control as contributory to anxious responding.

With respect to learned helplessness, Maier and Seligman (1976) argued that there are profound emotional consequences of lack of control in animals. Some authors have suggested that these effects bear a striking similarity to what is known about chronic anxiety (e.g., Barlow, 1988; Mineka, 1985). In fact, Drugan, Ryan, Minor, and Maier (1984) found that antianxiety drugs administered prior to exposure to uncontrollable stress can prevent subsequent learned helplessness effects in rats. Examining the relation of uncontrollable threat to physiology, Weiss (1971a, 1971b, 1971c) demonstrated the ability of uncontrollable shock (relative to controllable shock) to produce increased cortisol secretion and gastric ulceration in rats. In one rather revealing study, Stroebel (1969) trained a group of rhesus monkeys to control various aversive stimuli in their chamber by means of a lever and, on removing that lever, witnessed dramatic changes in the monkeys' behavior, including increased weakness, poor grooming, compulsive hand waving, and hair pulling. These behaviors may be an analogue for what humans experience as anxiety. Most recently, Peterson, Maier, and Seligman (1993) reviewed work showing that animals demonstrate heightened anxiety in novel situations following helplessness induction.

Mineka, Gunnar, and Champoux (1986) substantially contributed to the understanding of anxiety in humans in their work with primates. Interestingly, their study investigated the effects of control over appetitive, not aversive, events during rearing. Eight of 20 infant rhesus monkeys were raised in conditions allowing their control over delivery of food, water, and treats. Another 8 monkeys received these stimuli noncontingently (yoked control). The remaining 4 monkeys were raised in a "standard rearing" control condition. The monkeys were raised in these environments for up to 12 months, and the testing phase began at about the 8th month. During testing, monkeys reared with control were noted to habituate more quickly than the yoked and standard rearing groups when confronted with a mechanical toy robot and also to demonstrate more exploratory behavior in a novel playroom situation. In addition, the master group showed enhanced active coping responses during selected trials of separation from peers.

These results seem particularly noteworthy as an analogue for human anxiety. Indeed, the notion that control over *appetitive* events mitigates a vulnerability for anxiety and expression of fear extends the framework beyond that of stressors causing anxiety to suggest that nearly all aspects of rearing may have an impact on the development of a psychological vulnerability, which can ultimately contribute to the expression of anxiety.

Studies from a variety of other sources have suggested the tendency for uncontrollable stimuli to result in submissive or inhibited behavior related to anxiety (e.g., Sapolsky, 1989; Williams & Lierle, 1986; Williams & Scott, 1989). For example, in a series of studies of wild olive baboons, Sapolsky (1989; Sapolsky & Ray, 1989; Ray & Sapolsky, 1992) outlined a possible relation between control and the development of personality characteristics as well as biological functioning. Using male baboons from two troops in the wild, Sapolsky (1989) attempted to ascertain the physiological source of excessive cortisol secretion commonly associated with chronic stress. *Glucocorticoids,* hormones that are secreted during challenging situations, are found to be at higher basal levels in chronically stressed organisms (i.e., hypercortisolism). Sapolsky hypothesized that the physiological origin of hypercortisolism might involve impaired feedback sensitivity of the pituitary gland or central nervous system (not hypersensitivity of the adrenal glands). This hypothesis was influenced by previous findings concerning dexamethasone nonsuppression[1] in anxious or depressed humans (e.g., Carroll, 1985), another indicator of glucocorticoid feedback insensitivity.

In the course of identifying a possible central nervous system dysregulation associated with hypercortisolism, Sapolsky (1989) made some important interpretations involving the observed behavioral data from the troops. Specifically, hypercortisolism was found disproportionately among those baboons who were lower in the social rank. These baboons were frequent targets of displaced and unpredictable aggression and more disruption in attempted consortships with females. One might assume that glucocorticoid dysregulation might be the cause of impaired social functioning; however, other data do not support this contention. For example, social ranks commonly change over time in primate groups. It has been found that as animals' social ranks change over time, changes in psychophysiological profiles of these animals will follow (Rose, Bernstein, Gordon, & Catlin, 1974). Although control over social rank was not directly manipulated, Sapolsky inferred that it was not subordinance per se, but the experience of low control or instability that was responsible for hypercortisolism (Sapolsky & Ray, 1989). Sapolsky (1989) stated:

> It is not merely the rank, but the context in which the rank occurs. For example, the physiological correlates of dominance tend to be diametrically opposed depending on whether the hierarchy is stable or unstable. In general, in a stable hierarchy in which dominant males are securely entrenched, the physiological profile of dominance is an adaptive one. . . . Amid an unstable hierarchy, all of those associations with dominance are lost. (p. 1050)

In light of these data, Supolsky (1989, p. 1049) inferred, "for the olive baboon, stressfulness [i.e., the tendency of stimuli to elicit anxious behavior] might best be considered to reflect low

[1] The dexamethasone suppression test involves the indirect assessment of pituitary feedback sensitivity to cortisol. Under normal circumstances, the pituitary gland should respond to the presence of dexamethasone (an agent indistinguishable from cortisol by the pituitary gland) by decreasing (i.e., suppressing) the release of adrenocorticotropic releasing hormone. It has been shown, however, that some adults with anxiety or depression do not show these normal rates of suppression and, consequently, dexamethasone suppression has been posited as a biological marker (albeit not necessarily causal) for these syndromes (e.g., Carroll, 1985; Schweizer, Swenson, Winokur, Rickels, & Maislin, 1986).

degrees of control or predictability about social circumstances." The implication that experience with control can affect physiological profiles associated with "biological markers" (e.g., hypercortisolism) for human anxiety and related emotions (Fowles, 1995; Schweizer, Swenson, Winokur, Rickels, & Maislin, 1986) highlights the complex interplay of psychological and biological variables. Experience with lack of control may actually engender or exacerbate selected biopsychological risk factors that contribute to stable patterns in behavior.

Continuing in this line of research, Ray and Sapolsky (1992) found that control over aversive social threats was not the only factor associated with disrupted glucocorticoid secretion profiles. Data from 41 male baboons suggested that control over appetitive social experience was also related significantly to normal cortisol functioning. Positive social affiliation and degree of sexual contact were associated with lower basal cortisol levels in the male baboons. Ray and Sapolsky inferred that this relation was not so much a function of dominance but rather a function of the degree to which the animal could successfully control access to these events (although, here again, control was never directly manipulated). Similar to the manner in which Mineka et al. (1986) documented the importance of control over appetitive events for influencing habituation to a frightening stimulus, so Ray and Sapolsky have suggested the applicability of control over appetitives to neurophysiological functioning associated with anxiety.

The above findings appear to support the relation of uncontrollable events and the expression of anxiety, but the more interesting proposition involves identifying the role of a psychological vulnerability, characterized by chronic perception of events as not in the organism's control. To that end, other findings by Sapolsky and colleagues do implicate the role of psychological variables as a possible moderator for the effects of stressful stimuli on the organism's response. For example, male baboons who were better able to distinguish actual rival threats from neutral or mild threat cues also showed normal basal cortisol levels.[2] Baboons who could not make the distinction and, therefore, perceived potential threat more commonly, evidenced high basal cortisol levels. This observation suggests that the (accurate or inaccurate) perception of uncontrollability (or unpredictability) may be more important than the degree of actual threat itself (e.g., Raab & Oswald, 1980; Sanderson, Rapee, & Barlow, 1989), emphasizing the importance of psychological factors in modifying the physiological dysregulation associated with stress. It seems that the ubiquitous and equivocal term *stress* might best be defined in terms of a "top–down" phenomenon, in that its consequences appear to be closely related to its mental construction or interpretation, in lower animals as well as humans.

Control in Children

Locus of Control

Attempts to define or measure a sense of control in humans have a long history (e.g., Rotter, 1954). Rotter (1966) articulated a dimension of control as existing along a continuum from internal to external causality, that is, "locus of control." According to theory, the degree to which one is reinforced by a stimulus is mediated by the direction of one's attribution about the response–stimulus relation. Thus, locus of control is generally felt to represent the extent to which an individual perceives personal control over events in one's environment.

The first reliable and valid childhood measure of locus of control was developed by Nowicki and Strickland (Nowicki–Strickland Locus of Control Scale [NSLOC]; 1973). As a model of anxiety that highlights control might predict, external control scores on the NSLOC have been found to correlate with manifest anxiety scores within a clinical sample ($r = .31$; Finch & Nelson, 1974). More recently, Nunn (1988) observed the same relation in a sample of 267 students in Grades 5–8 ($r = .31$). Such findings have extended to childhood depression as well. For example, McCauley, Mitchell, Burke, and Moss (1988) noted significant differences between 47 children diagnosed with depression using a structured interview (KSADS; Puig-Antich & Chambers, 1978), 30 children whose depression had remitted within the past year, and 31 nondepressed psychiatric controls, with the current depression group showing the highest and the control group showing the lowest NSLOC scores. In addition, McCauley et al. (1988) found a correlation of .33 between the NSLOC and the Childhood Depression Inventory (CDI; Kovacs, 1981) across the three groups. It is notable that similar findings have emerged from clinically anxious, clinically depressed, and nonclinical children, and that these findings also parallel those in adult populations (e.g., Hoehn-Saric & McLeod, 1985).[3]

Although these correlations with anxiety may appear to be somewhat modest, recent arguments have emerged that locus of control may be somewhat different from the perceptions of control related to anxiety, in that locus of control is rather general and therefore less representative of the aspects of control that may be directly relevant to negative emotions (e.g., Rapee, Craske, Brown, & Barlow, 1996). For example, some investigations have suggested that Rotter's construct is multidimensional (e.g., Klockars & Varnum, 1975), and Rapee et al. (1996) demonstrated in an adult sample that a more specific measure of control over threat and one's reactions to threat (Anxiety Control Questionnaire; ACQ) was more highly correlated with measures of anxiety than was Rotter's more general measure. This finding, however, is complicated by the fact that items on the ACQ are confounded with degree of exposure to threat; that is, an increase in the overall amount of threat should inflate scores on the ACQ (regardless of control), but a similar increase should have no immediate implications for Rotter's construct. In that sense, the higher correlations of the ACQ with anxiety measures may partly be a problem with discriminant validity

[2] Ray and Sapolsky (1992) defined the tendency to differentiate between threatening and nonthreatening interactions as the absolute value of the difference between the probabilities of resumption of prior behavior following threat (as coded by investigators) and following nonthreat. Thus, for example, a baboon who did not return to prior behavior following a nonthreat (as coded by investigators) was considered to have misinterpreted nonthreat; whereas a baboon who resumed prior behavior in those same circumstances correctly interpreted nonthreat. This index was intended to measure accurate perceptions of threat.

[3] Although the reviewed studies presented no findings related to the discriminant validity of the NSLOC, Nowicki and Strickland (1973) reported that NSLOC scores were not correlated with a measure of social desirability.

of the ACQ. In general, it appears that the measurement of perceived control as a vulnerability remains a target for empirical investigation, both in adults and in children (e.g., Skinner, Chapman, & Baltes, 1988; Weisz & Stipek, 1982).

Developmental Considerations

One important consideration concerning this idea of helplessness or uncontrollability in children is the timing and manner in which it might develop. Dweck and Leggett (1988) proposed a model of the development of helplessness in children that identified critical antecedents, involving the two dimensions of ability theory and goal orientation. Dweck and Leggett (1988; Burhans & Dweck, 1995) argued that children who perceive their abilities as flexible or variant are likely to be resistant to helplessness, owing to their implicit belief that improvement on a task may eventually be possible. Further, children who approach a goal as an opportunity for learning as opposed to evaluation were also more likely to show more of a mastery orientation. An important aspect of their model is that the more complex function of forming an "ability theory" may not be applicable to younger children, who may not have the capacity to form trait conceptions of their own or others' abilities. This would suggest that the emergence of a sense of helplessness of control might not substantively emerge until middle childhood, a notion that runs somewhat counter to some of the animal findings that implicate very early development (e.g., Mineka et al., 1986).

More recently, however, Burhans and Dweck (1995) have updated this model in the wake of accumulating evidence for helplessness patterns found in children as young as preschoolers (see Dweck, 1991). This expanded model now suggests that an individual need only possess a generalized sense of conditional self-worth. That is, to the extent that a child feels that outcomes reflect on whether she is "good" or "bad," the capacity exists for helplessness to occur. When viewed together with Dweck and Leggett's (1988) existing formulation, the expanded model predicts that the greatest likelihood for helplessness should arise when the child views an outcome as an indication of an invariant attribute of global self-worth. This suggests that although important conditions for helplessness may arise early in development (i.e., a sense of contingent self-worth), additional cognitive factors that arise later in development (e.g., conceptions of attribute or trait invariance) may intensify potential for helplessness. In general, research continues to evaluate and refine these conceptions of the transformation of control-related cognitions over development. In terms of our present model, continued investigation will likely inform many of the yet-unanswered questions about the developmental prerequisites that allow uncontrollable events to establish an enduring sense of diminished control.

Attributional Style

If the goal is to outline this relation of events, cognitive style, and ultimately psychopathology over the course of development, it may be useful to look at a more well-developed literature in this regard, involving attributional style and depression. Recent work in this area has begun to illuminate the manner in which experience, cognition, and depression interact, and an examination of these findings raises some interesting hypotheses when reconsidered in the context of anxiety.

Abramson, Seligman, and Teasdale (1978) introduced the construct of attributional style, arguing that one's attributions about the causes of positive and negative events played a critical role in the development of helplessness and depression. Unlike locus of control, attributional style was advanced at the outset as a multidimensional construct, with the first of those dimensions being internal versus external, the second being global versus specific, and the third being stable versus unstable. The first dimension of attributional style (internal–external) has actually occasioned some interesting points regarding locus of control. For example, Abramson and Sackeim (1977) pointed out that depressives are typically external in locus of control and yet are also characterized by self-blame. This has been described as a theoretical paradox, in that depressives see negative events as both out of their control and a result of their own actions, ideas that may be logically incompatible (see Abramson & Sackeim, 1977, for a review of this issue). One possibility is that depressives may perceive themselves as unable to control a personal tendency to bring about negative outcomes (e.g., an individual feels that by being unattractive or socially unskilled, he or she prevents relationships from arising; here responsibility is implied as well as lack of control).

In their theoretical formulation, Abramson et al. (1978) asserted that negative events are not necessarily a risk factor for pervasive learned helplessness deficits unless individuals make global, stable, and internal attributions for these events. Alloy et al. (1990) have since extended this model to include the notion of helplessness and hopelessness as respective risk factors for anxiety and depression.

The assessment of attributional style in children was fostered by the development of the Children's Attributional Style Questionnaire (CASQ; Kaslow, Tanenbaum, & Seligman, 1978; Seligman et al., 1984). The scale assesses explanatory style for these events and is scored on six dimensions: internality, globality, and stability, for both positive and negative events. Some of the controversy involving the correlational study of attributional style concerns the causal direction of attributions and depression. For example, it may be that the depressive attributions are merely consequential to depression itself and may not represent a vulnerability or causal risk factor.

Accordingly, the most informative examinations of the cognitive vulnerability model of depression have necessarily been prospective in their design. For example, Nolen-Hoeksema, Girgus, and Seligman (1986) examined attributional style and self-reported depression in a sample of one hundred sixty-eight 8- to 11-year-old school children in a 1-year longitudinal investigation. Composite scores from the CASQ were found to be correlated not only with concurrent depression as measured by the CDI, but also with increases in CDI scores over time. This relation was found to be bidirectional, that is, increases in depression were also predictive of change in attributional style. Thus, the interpretability with respect to cognition as a risk factor is somewhat difficult. Nevertheless, the study represented sound support for a longitudinal relation between childhood attributional style and depression.

In a 5-year prospective investigation of five hundred and eight 3rd-grade school children, Nolen-Hoeksema, Girgus, and Seligman (1992) extended their previous work to include influences

of negative life events in their model. It was hypothesized that depression would be predicted not only by previous levels of negative attributional style, but also by an interaction of attributional style and negative life events (Abramson et al., 1978). Moreover, the investigators asserted that the relation of attributional style and depression might become more stable as children became older.

Data collected at nine separate epochs over the 5-year period supported these hypotheses. That is, attributional style as well as its interaction with negative life events predicted change in depression scores at the subsequent epoch. In addition, these effects were only observed at Epochs 5, 6, 8, and 9, supporting the adjunct hypothesis that this putative cognitive risk factor may not be fully developed or operative in younger children. Once again, a bidirectional relation was noted between attributional style and depression.

Taken together, these results represent support for the relation of attributional style and self-reported depression in a number of ways. They not only represent support for longitudinal relations, but also involve multiple replication of the cross-sectional correlational findings. Although the results are not highly conclusive about the directions of causality, they suggest the compelling idea that early experiences with depression or negative events may contribute to the development of a cognitive style that only appears to demonstrate relatively stable effects on emotion after middle childhood.

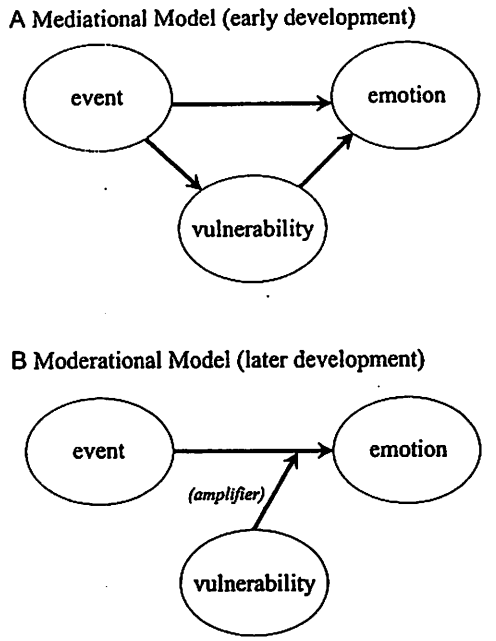

Figure 2. Mediational and moderational models of the influence of psychological factors on the expression of emotion.

Structural Relations

Although the work of Nolen-Hoeksema et al. (1992) represents an important contribution to a cognitive-developmental theory for depression, it has been suggested that additional investigation may be required to outline explicitly the structural relations among environmental, cognitive, and clinical variables. For example, Cole and Turner (1993) described a lack of specific attention in the literature to the statistical differentiation of moderational and mediational processes that are an implicit part of a cognitive-developmental theory. For example, a mediational relation would suggest that the effects of negative experience increase negative cognitions, which in turn contribute to increased negative affect (i.e., anxiety or depression). On the other hand, a moderational model would describe the interaction of negative experiences with cognition to effect subsequent negative emotion (see Figure 2). The diathesis-stress conceptualizations implicit in most cognitive and cognitive-affective theories of depression and anxiety (e.g., Alloy et al., 1990; Barlow et al., 1996; Beck & Emery, 1985) are best conceptualized as moderational, in that the effects of environmental events are moderated, or amplified, through their interpretation (i.e., cognition).

To address this issue, Cole and Turner (1993) comparatively evaluated moderational and mediational attributional models of depression in a nonclinical sample of three hundred fifty-six 4th-, 6th-, and 8th-grade students. Interestingly, the results suggested a mediational cognitive model for children in this age range, despite consistent theoretical support for a moderational cognitive model in adults (e.g., Abramson et al., 1989). Specifically, positive and negative activities (i.e., the frequency of self-reported pleasant and unpleasant events), as assessed by the Children's Activity Inventory (CAI; Shelton & Garber, 1987), as well as peer ratings of competence, were observed to directly influence attributional style, not simply to interact with it (see mediational model, Figure 2). Attributional style, in turn, was found to influence scores on the CDI.

In a second examination, Turner and Cole (1994) hypothesized that a moderational model would begin to emerge in children only at later developmental levels. The CAI, the CDI, and a measure of cognitive errors were administered to four hundred nine 4th-, 6th-, and 8th-grade students. The investigators found evidence for Age × Event × Cognition interactions for all events except those related to sports performance. That is, for the oldest children in the sample, the moderational effects of cognition began to have an observable effect, but this effect was not present in the younger children in this sample. The results supported other work that suggested moderational effects of cognition with life events appear only at later developmental levels (e.g., Fincham & Cain, 1986; Rholes, Blackwell, Jordan, & Walters, 1980). It will be useful to extend this line of work with samples spanning a greater developmental period (e.g., into adolescence) to identify more accurately the trend of these moderational effects across development (i.e., the slope of the Event × Cognition term across age levels).

In summary, the child attributional style literature has begun to outline a cognitive model of the development of depression characterized by attributional style as a cognitive mediator between events and depression early in development. In light of the present model relating control and anxiety, the general contrast between evidence for a mediational model in early childhood and a moderational model for late childhood and adulthood (Cole & Turner, 1993; Hammen, Adrian, & Hiroto, 1988; Nolen-Hoeksema et al., 1992) offers a useful conceptual framework. That is, the environment may help to foster a cognitive template, with early uncontrollable experience contributing to the formation of a cognitive vulnerability (i.e., mediational model). Later

in development, this vulnerability may then begin to operate as an amplifier for environmental events (i.e., moderational model). Although this developmental structure may be consistent across models of anxiety and depression, it is interesting to note the discrepancy between the emergence of control-related cognitions in young children (Burhans & Dweck, 1995) and the emergence of attributional style middle childhood implied by the cognitive developmental findings (e.g., Nolen-Hoeksema et al., 1992). One possible explanation may be that examinations of attributional style in children have almost exclusively involved the CASQ, and although attributional style could possibly emerge during early development, its reliable self-report might not arise until much later (e.g., Robins & Hinkley, 1989).

Familial Influences

Before speculating further about mediational structures in the present model of control cognitions and anxiety, it is necessary to review more fundamental relations regarding anxiety, control, and the environment. At present, there is a reasonable body of evidence supporting the notions that (a) a particular set of family characteristics is associated with the development of control-related cognitions in children (e.g., Schneewind, 1995) and (b) a particular set of family characteristics is associated with the development of anxiety and its disorders (e.g., Turner, Beidel, & Costello, 1987). We first review selected evidence for each of these two propositions, before advancing to discussions of whether the respective family characteristics are the same for both processes and ultimately whether family, control cognitions, and anxiety may be linked in a mediational structure in early development (see Figure 2).

Development of Control-Related Cognitions

The theoretical importance of establishing links between early environment and control-related beliefs has inspired a growing amount of literature examining familial antecedents for uncontrollability in children. The summary of findings describes family characteristics that would provide the child with opportunities for experiencing control over reinforcing events, as the present model would suggest.

Family structure. With regard to family structure, one would predict that children who have the opportunity for undivided attention from parents and who need not compete with siblings for the available reinforcers should be more likely to develop a sense of control over events. A number of studies have documented this pattern, demonstrating that first-born children display more internal locus of control than later-born children (Crandall, Katkovsky, & Crandall, 1965; Hoffman & Teyber, 1979; Krampen, 1982). In addition, family size has also been shown to be related to control cognitions, such that external locus of control beliefs increase in later-born children as family size increases (Walter & Ziegler, 1980).

Parenting. One would also predict that particular dimensions of parenting style might help foster an increased or diminished sense of control in a child. Specifically, the present model would suggest that two dimensions should be most important. First, parents who are more contingently responsive would provide the child with more occasions to experience the ability to solicit reinforcement, presumably one of the earliest opportunities to experience control. Second, parents who are less intrusive and protective and who provide the child with occasions to develop new skills and to explore and manipulate the environment would help cultivate an enhanced sense of control over events.

Such ideas have been supported in a number of studies. Regarding the first dimension noted above, parents who are consistently and contingently responsive to their children have been shown to have children with a more internalized locus of control (Diethelm, 1991; Schneewind & Pfeiffer, 1978). For example, Davis (1969) documented an association between inconsistent parental behavior during a family decision-making task and children's external locus of control. Similarly, Skinner (1986) used observational methodology to assess parental contingency and found a tendency for high parental contingency to be associated with the child's internal locus of control.

With respect to the second parenting dimension, it has been demonstrated that parents who provide more opportunity for autonomy and independence and who encourage the development of new skills are more likely to foster internal locus of control beliefs in their children (Chandler, Wolf, Cook, & Dugovics, 1980; Gordon, Nowicki, & Wichern, 1981). Carton and Nowicki (1994) reviewed a variety of studies documenting the association between high external locus of control in children and parental dimensions of protectiveness (e.g., Biocca, 1985) and intrusive governing (e.g., Washington, 1974). Parents of children showing internal control expectancies were more likely to reward, value, or encourage independence (e.g., Gordon et al., 1981). With respect to the present model, it appears that both parental dimensions have a common provision of opportunities for the child to experience control over reinforcing events in early development, through social contingency and mastery of the environment. Over time, such experiences can become part of the child's stored (learned) information and contribute to a generalized sense of control (e.g., Bryant & Trockel, 1976; Carton & Nowicki, 1994).

Nolen-Hoeksema, Wolfson, Mumme, and Guskin (1995) recently examined the issue in familial influences on control-related cognition from the perspective of helplessness and depression. Two groups of 5- to 7-year-old children were compared with respect to their ability to demonstrate mastery versus helplessness in a puzzle task, completed jointly with their mothers. Groups differed on the presence or absence of major depression in the mother. Interestingly, maternal diagnosis did not account for differences in children's display of helplessness, but rather the degree to which mothers were less responsive and able to encourage active problem solving best accounted for the display of helplessness in the children during the task. This highlights the importance of a specific psychosocial link between helplessness in parents and their children, suggesting that it is not maternal depressed affect per se that influences cognitive development of a sense of diminished control in the child, but rather the specific dimensions that provide and encourage opportunities for control over events.

Attachment Theory: A Bridge Between Control and Anxiety?

Given the appearance that particular family characteristics are related to the development of a sense of control in children,

the next consideration becomes the relevance of these parenting dimensions to the development of anxiety. However, before proceeding directly to a review of familial antecedents to childhood anxiety, an examination of attachment theory may serve as a useful bridge, in that attachment theory implicitly involves the development of a cognitive style characterized by security (cf. prediction and control; Thompson, 1998) and has been implicated in the development of anxiety and psychopathology more generally (Campbell, 1989).

According to classic attachment theory (Bowlby, 1969, 1973, 1980), the parent serves an evolutionary and biological function of a protective and secure base (i.e., attachment object) from which the child operates. Critical to the child's healthy functioning is a secure and predictable relationship with the caregiver. During a period of threat or surprise, the child can retreat to the parent safely. A child separated from the attachment object may therefore become anxious and protest in a programmed attempt to elicit reunion. If this relationship is disrupted, however, (e.g., through repeated, unexpected separation) one possible outcome may involve the child's exhibiting "anxious attachment," becoming more chronically dependent and apprehensive. Further disruption in the relationship will be followed by the gradual dissolution of the anxious response pattern and will predispose a more withdrawn and depressive nature over time (e.g., Rutter, 1980).

Empirical investigation of attachment quality has been a challenging task (Sroufe, 1979). This stems in part from the fact that attachment behavior is influenced by numerous transient variables that make reliable assessment difficult. Rutter (1980), for example, has suggested that hunger, pain, tiredness, sickness, fear, rejection, maternal sensitivity, and other state variables may influence attachment behaviors. Attempting to control the effects of transient variables, Ainsworth, Blehar, Waters, and Wall (1978) developed a standardized situational task for assessment of attachment quality. The task, termed the *Strange Situation* procedure, involved the separation and reunion of the 1-year-old infant and its mother. Ainsworth's coding system allowed for the classification of infant behavior into three basic categories (A) avoidant, in which the infant shows little preference for the attachment figure over others, and when separated from the attachment figure avoids the caregiver upon reunion; (B) secure, in which the infant can comfortably explore in the presence of the attachment figure and seeks proximity following reunion; and (C) resistant–ambivalent, in which the infant is withdrawn, shows minimal exploratory behaviors in the presence of the attachment figure, and demonstrates distress or agitation upon reunion. A fourth category, (D) disorganized–disoriented, was later added to this system to characterize children who do not fall into the first three classes, are highly atypical, and are thought to be at greatest developmental risk (Main, 1996; Main & Solomon, 1990). This assessment procedure has subsequently fostered a substantial body of research on attachment (e.g., Radke-Yarrow, Cummings, & Kuczynski, 1985; Urban, Carlson, Egeland, & Sroufe, 1992; Waters, Vaughn, Posada, & Kondo-Ikemura, 1995; Waters, Wippman, & Sroufe, 1979).

Recent advances in attachment theory emphasize the quality of the infant–child relationship as an antecedent of general sociopersonality development (see Thompson, 1998, for a review). Indeed, some of the proximal sequelae of attachment security appear to be closely related to control cognitions as articulated in our present model. For example, Thompson stated, "Another kind of expectation emerging from . . . .early interactive experiences concerns the infant's emerging sense of agency or effectance," and further, "An awareness that [infants'] signals and actions can have predictable effects on others is fostered by the contingency inherent in the adult's responsiveness" (p. 29). Thus, an important connection can be drawn between the reciprocal social influences inherent in secure attachment and the notions of consistency and autonomy valued in the literature on the development of control cognitions (e.g., Carton & Nowicki, 1994).

Rutter (1980) has elaborated on this reciprocal communicative nature of the attachment relationship. He suggested that to the extent that the infant and mother have a well-established repertoire of ways in which to interact, communicate, and influence each other (e.g., smiling, cooing, grabbing), the greater the potential for secure exploratory behavior by the infant. According to Rutter, attachment has specific effects on the infant that are not characteristic of other social interactions. In particular, (a) anxiety will increase attachment or proximity seeking, (b) separation from the attachment figure will increase anxiety and withdrawal, and (c) presence of the attachment figure promotes exploration and lowers inhibition and anxiety.

Sroufe (1990) described one example of this process in detail. Specifically, healthy infants who become overstimulated during interaction with the mother can signal the mother to de-escalate the interaction using subtle cues (e.g., head turning). Mothers who respond to these cues appropriately allow the child to return to a state of less arousal, and hence prevent crying or other disorganized affect in the infant. At some point, this ability to negotiate the intensity of interaction is thought to become internalized in the infant. Children who are unable to develop this particular skill are believed to be at risk for subsequent anxiety or depression (Sroufe, 1990). These ideas are consistent with the model presented so far that early experience and skill with response-contingent reinforcing outcomes (i.e., control) is one pathway to positive long-term functioning.

Outcomes of attachment. Again, the question remains how and whether these early socialization processes may be related to anxiety and disorders of emotion more generally. Campbell (1989) reviewed a number of empirical investigations on the long-term outcome of attachment patterns. In a high-risk sample of children from impoverished and stressful environments, for example, Sroufe (1983) found anxious attachment (avoidant and resistant) at 1 year of age to be related to behavioral, school-related, and interpersonal problems in preschool. Similarly, in a sample of middle-class children, Lewis, Feirig, McGuffog, and Jaskir (1984) detected an association between anxious attachment at 1 year and level of psychopathology at age 6 but only for boys. Unfortunately, because of the lack of clinical measures, it is unclear the degree to which these behaviors were related to anxiety. Other findings are less consistent. For example, Bates and Bayles (1988) followed a similar sample over 5 years and found no relation between security of attachment at infancy and subsequent behavior problems as reported by the mother. In general, the evidence is difficult to interpret clearly. As stated earlier, it is frequently difficult to rule out the confounding effects of extensive biological and environmental factors that can act as common influences for attachment and

outcome measures (e.g., Lewis, 1990), and Lewis et al. (1984) strongly emphasized the interplay of attachment with other variables (i.e., stressors, demographics) in predicting later child functioning. Continued efforts to evaluate the long-term outcome of attachment in terms of psychopathology and specific syndromes are greatly needed (Thompson, 1998).

Attachment representations. More recent research in the area of attachment has focused on "attachment representations," (i.e., internal working models of the early attachment relationship carried forward into adulthood). The quality of adult attachment has been classified as autonomous–secure, preoccupied, and dismissing (a fourth category of unresolved–disorganized attachment is assigned to individuals not able to be classified into the first three). These groups have been found conceptually to correspond respectively with Ainsworth et al.'s (1978) secure, ambivalent–resistant, avoidant (and disorganized) infant patterns (e.g., Bretherton, 1992; van IJzendoorn & Bakermans-Kranenburg, 1996) and have been shown to be related to pathological functioning (e.g., Fonagy et al., 1996). In this regard, the study of attachment representations in adulthood has in many ways begun to fill some of the conceptual gaps between developmental and cognitive models.

In general, this idea that early experiences with attachment figures might not only influence immediate functioning but also contribute to longer standing attachment representations is highly concordant with the recent findings in the literatures on child depression and the socialization of control-related beliefs reviewed above, particularly with respect to the formation of an enduring cognitive risk factor. The links are weakest, particularly in the extant control and attachment models, between these sociocognitive styles (internal control, attachment security) and later psychopathology.

Development of Anxiety

Because of this lack of direct support for the link between a sense of diminished control and anxiety, it becomes necessary (at least initially) to look elsewhere to draw such connections. Both the control and the attachment literatures summarized so far appear to implicate the importance of two basic parenting dimensions, which can be abbreviated as follows: (a) sensitivity–consistency–contingency and (b) encouragement of autonomy–lack of intrusion and excessive control. More interesting, the literature relating parenting style and later anxiety implicates two dimensions of parenting demonstrating remarkable overlap with those reviewed above. These dimensions are often labeled *warmth* or *sensitivity* and *overprotection* or *control.* (Here, control as a parenting dimension is the actual intrusive governance and associated constraint imposed on the child's actions and should not be confused with the cognitive factor of control as discussed above.)

In several studies using a retrospective self-report measure designed to assess parenting style from one's childhood (*Egna Minnen Beträffende Uppfostran* [EMBU]; "my memories of upbringing"), Perris, Jacobsson, Lindstrom, von Knorring, and Perris (1980) outlined four basic factors of parenting style: Rejection, Emotional Warmth, Overprotection, and Favoring Subject. The Overprotection scale assesses the degree to which parents constrain and intrude on the child's environment (Gerlsma, Emmelkamp, & Arrindell, 1990). Across a number of studies, the scores on the Overprotection scale have been found to discriminate between clinically anxious samples and controls (e.g., Ehiobuche, 1988) and remitted depressives and controls (e.g., Gotlib, Mount, Cordie, & Whiffen, 1988). (The use of populations in remission is particularly noteworthy, given the state dependent memory bias one might expect for depressed individuals.) These findings complement Rotter's (1966) assertion that powerful parents can foster the development of external control orientations.

The work of Parker (1983; Silove et al., 1991) remains perhaps the most thorough explication of the relation between parental behavior and the development of anxiety. Parker, Tupling, and Brown (1979) developed the Parental Bonding Instrument (PBI) to assess perceived dimensions of warmth and control in parents, which Parker terms *care* and *protection,* respectively. Like the EMBU, the PBI is a self-report measure filled out retrospectively by adults to describe the parenting they received as children. The questionnaire is filled out once to rate each parent, yielding four scales total: Maternal Care, Maternal Protection, Paternal Care, and Paternal Protection. The test–retest reliabilities for these four scales range from .87 to .92 in a sample of depressed patients (Parker, 1981) and from .63 to .76 in a nonclinical sample (Parker et al., 1979). Validity for the scales has also been shown to be satisfactory. Perhaps most importantly, the dimensions identified (i.e., care, protection) seem fairly robust in that they are consistent with a diversity of related measures that have yielded theoretically similar two-factor models (Gerlsma et al., 1990), not to mention their correspondence with the control and attachment literatures reviewed above.

The dimension of protection (maternal or paternal) is intended to assess what Parker (1983) terms *overprotection.* He describes this construct as involving excessive parental involvement in controlling the child's environment to minimize aversive experiences for the child (Parker, 1983). As the term *overprotection* implies, these anticipated aversive experiences may not represent actual threats to the child, and thus overprotection may not appreciably limit the exposure to aversive situations. However, overprotection is likely to narrow the range of behaviors likely to be exhibited by the child or to constrain the child's ability to manipulate and engage the environment independently (cf. "coercion"; Hayes & Maley, 1977).

The other dimension outlined by Parker (1983), care (maternal or paternal), is related to the notion of warmth or responsiveness of the parent. Again, this dimension is compatible with both the control and attachment literatures in suggesting that consistently unresponsive parenting may lead to disruption and distress over the course of the child's development. Low parental care may also serve to teach the child that his or her actions may not control or influence important stimuli in the environment (i.e., reinforcers). An example of this possibility presented by Sroufe (1990) was reviewed above.

Parker (1983) has suggested that these two dimensions alone may not be sufficient to predict anxious or depressive outcomes over the course of development but rather that the combination of high protection and low care, what he calls "affectionless control," is likely the to have the most reliable negative influence. For example, a child in a high care and high protection environment may nevertheless have an indirect avenue to control events; for example, crying could elicit a (caring) parental re-

sponse of investigation or elimination of aversives in the environment. It is when both pathways to control are limited that the child may be at increased risk. Specifically, the effect of low responsivity of parents who, in turn, constrain and narrow behavioral options for their child has visible implications for the child's development of a sense that events are not under the child's control. One notable difficulty with the study of care involves the routine association of high attention with contingent attention, creating a confound when one attempts to examine the role of contingency alone. An additional problem with this line of research is that it deals only with the main effects of each parenting dimension and unfortunately does not often examine the statistical interaction of these two types of parenting style. Nevertheless, albeit in a preliminary manner, a number of studies have summarized evidence about parenting style that are consistent with the premise that early experience with lack of control may foster increased risk for anxiety and mood disorders.

The PBI has most frequently been used to examine the relation between clinical disturbance and perceptions of parenting. In a study of 125 "neurotic depressives," 125 matched controls, and 125 "screened" controls (interviewed to ensure no history of depression), the depressive patients were found to have a significantly higher frequency of classifying their parents as low in care and high in protection (Parker, 1979a). A subsequent study (Parker, 1979b) examined the relation of PBI scores to various self-report measures in a nonclinical sample of 236 predominantly Australian participants. Rather than the traditional separation of parents into mother and father groups, parents or other caretakers were classified as to how important they were in the individual's childhood in terms of parenting. PBI scores were obtained with respect to the most and the second-most important parenting figures for these participants. The protection scores for the primary parenting figure were significantly and moderately correlated with trait depression, the number of depressive episodes in the past year, low self-esteem, trait anxiety, and neuroticism scores from the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1964). Care scores for the primary parenting figure were significantly correlated negatively with trait depression, the number of depressive episodes in the past year, low self-esteem, and alienation. Replication of the research involving depression and parenting style has demonstrated that adults with major depression score higher than nonclinical participants on the protection scales and lower on the care scales (Plantes, Prusoff, Brennan, & Parker, 1988). Investigations involving bipolar disorder have found that this relation does not generalize to the other mood disorders (Joyce, 1984).

Similar investigations have been conducted with anxious samples. Parker (1981) compared 50 outpatients having diagnoses of an anxiety disorder to a matched sample of controls selected from archival normative data (Parker et al., 1979). Anxious participants were found to have a significantly higher rate of classifying parents as high on protection and low on care. In a sample of 289 nonclinical adults, Parker (1979c) found that participants classifying their parents as higher on protection and lower on care demonstrated significantly higher trait anxiety scores than the others in the sample. These results are quite consistent with those from a previous sample and support the notion that perceived parenting style is related to trait anxiety.

Attempting to identify how parenting style might discriminate among different anxiety disorders, Silove, Parker, Hadzi-Pavlovic, Manicavasagar, and Blaszczynski (1991) investigated recall of parenting style in patients with *DSM-III-R* (American Psychiatric Association, 1987) diagnoses of panic disorder (PD; $n = 42$), generalized anxiety disorder (GAD; $n = 36$), and matched controls ($n = 205$). The investigators used scores on the PBI to classify parents into four groups, corresponding to (a) high care–low overprotection, (b) high care–high overprotection, (c) low care–low overprotection, and (d) low care–high overprotection (i.e., "affectionless control"). Conditional logistic regression was used to predict the risk of being assigned to one of these groups based on the diagnostic group membership. Results suggested that insufficient care and excess protection were associated with clinical anxiety. Separate analyses demonstrated that high overprotection scores seemed to be associated with both PD and GAD, and low care scores were associated with PD only. Once again, the results are consistent with the basic notion that a relation exists between high parental control and low parental care and children's risk for anxiety and depression, although definitive conclusions await stronger empirical support, particularly in terms of the hypothesized interaction of the two parenting dimensions (i.e., care and protection).

Dumas, LaFreniere, and Serketich (1995) have identified a similar pattern of coercion and control in mother–child dyads involving anxious children. Preschool children were classified as competent ($n = 42$), aggressive ($n = 42$), and anxious ($n = 42$) using a teacher rating scale. Mother–child interactions during an elaborate, semistructured game were videotaped and coded for affect and behavior. Mothers of anxious children were found to show the highest levels of "aversive control" (i.e., attempts to elicit compliance involving criticism, punishment, intrusion, etc.) and the lowest levels of compliance and responsivity to the child. More interesting, anxious children were found to show the highest degree of noncompliance during these interactions. Dumas et al. (1995) highlighted the role of aversive control attempts in terms of their potential involvement with dysfunction in these dyads and suggested that such interactions may limit the development of prosocial behaviors and adaptive coping styles in anxious children.

Recent research by Reiss et al. (1995) represents perhaps the most rigorous cross-sectional evaluation of psychosocial familial influence for negative affect to date. In a study of 708 families, the effects of various dimensions of parenting were examined on symptoms of depression in adolescents. In a structural equations analysis, multiple indicators (i.e., adolescent and parent self-report, behavioral observation) of parenting variables were examined in terms of their relation to self- or parent-reported symptoms of depression in the adolescent. Parenting was measured through self-report as well as coded videotaped interactions of parents with their adolescents, and was classified into domains of conflict–negativity, warmth–support, and monitoring–control. It was found that paternal and maternal warmth–support (cf. care) had significant path coefficients (-0.26 and -0.37) to adolescent depressive symptoms, suggesting that low warmth was related to increased symptoms in the offspring. In a second analysis, monitoring–control was not

found to be related to depressive symptoms; however, one of this domain's lower order factors, maternal "attempts at control" over the adolescent, was found to have an observable influence on depressive symptoms in that adolescent.

Although these data are supportive, some caveats are warranted with respect to the present model. It is unclear, for example, the degree to which the construct of "attempts at control" relates to the notion of Parker's (1983) "protection" or to the putative cognitive variables associated with a sense of control. In addition, although genetic data were gathered in this study, the results presented are preliminary in that there was no correction for heritability effects in the present analyses. The fact that all of the probands were adolescents also obscures the developmental nature of parental influence, in that parental control may no longer be directly contributory to symptoms of anxiety or depression by these later years. Nevertheless, despite these limitations, Reiss et al. (1995) is clearly a major step toward a comprehensive understanding of the influence of parenting on pathological symptomatology in offspring. The analytical strategies in particular are a likely prototype for the type of work that lies ahead in this area. Of course, longitudinal studies using similar structural and multivariate methodology will likely be the definitive test of these hypotheses.

With the exception of Reiss et al. (1995), most studies of parenting style are limited by the fact that assessment has been conducted retrospectively, requiring individuals with anxiety or depression to describe their perceptions of early parenting experiences. Although some evidence exists that these retrospective accounts may not be state dependent or otherwise biased (e.g., Parker, 1979d), there is clearly a need to validate this line of work with an emphasis on cross-sectional or prospective designs (Messer & Beidel, 1994).

Most important, although studies of the relation of parenting style to anxiety or depression implicate high protection and low warmth as significant influences, few studies integrate these findings with the developments in cognitive theory. That is, almost all of the studies, including the work of Reiss et al. (1995), fail to examine the role of a cognitive link (e.g., attributional style, locus of control) between parental behavior and the development of negative affect, a relation that has received preliminary examination in the context of attribution and childhood depression. Because findings from biological, cognitive, and emotion theories support the idea that early experiences with control may play a role in the origin of cognitive vulnerability, it would seem prudent to continue to examine parenting with respect to its influence on or through cognitive phenomena (mediational model, Figure 2). Research in this area is only in its earliest stages (e.g., Chorpita, in press).

Family Influences on Neuroendocrine Responding

Another area of research attention has involved family influences on biological variables, most notably neuroendocrine responding. As mentioned above, a common neuroendocrine correlate of anxiety (and depression) is elevated basal cortisol level. These observations are consistent with Gray's model of anxiety, in that BIS activity is described as priming the hypothalamic pituitary adrenocortical (HPA) axis, which has cortisol as its end product. Not surprisingly, Kagan, Reznick, and Snidman (1987) found that children classified as behaviorally inhibited were found to have elevated levels of cortisol. Although Kagan et al.'s definition of inhibition differs somewhat from Gray's, Kagan et al.'s inhibition has been found to be associated with the increased likelihood for the development of anxiety disorders (Hirshfeld et al., 1992) and may represent a very similar underlying process.

Regarding the family, it has been demonstrated that features of the parent–child relationship can potentiate or inhibit this HPA stress response. For example, Nachmias, Gunnar, Mangelsdorf, Parritz, and Buss (1996) examined cortisol responding in 77 infants exposed to novel stimuli (e.g., clowns, puppets). Consistent with prediction, only children who had been classified as inhibited showed elevations in salivary cortisol. However, among the inhibited children, salivary cortisol change scores were noted only for those with insecure attachment (avoidant or resistant). The responding of the securely attached inhibited children looked like that of the uninhibited children. These findings suggest that inferences about the developmental elaboration of inhibited temperament may need to consider the influence of parenting. As mentioned above, the theoretical connection between attachment quality and experience with control highlights control as a potentially important pathway for these influences.

Gunnar, Larson, Hertsgaard, Harris, and Broderson (1992) looked more closely at the involvement of control by examining caretakers' ability to influence the HPA cortisol responding. In discussing this study, Gunnar (1994) described separation from parents as involving loss of control: "Not only is the child blocked from access to the mother (loss of control over proximity), but the child also loses the mother's help in controlling the internal and external environment" (p. 182). Gunnar et al. found that 9-month-old infants showed an elevated cortisol response when separated from mother, but that this effect was eliminated when the infant was accompanied by a highly responsive caretaker versus a less responsive caretaker. These results underscore the possibility that contingent access to appetitive stimulation (i.e., control) may play an important role in reducing HPA responding. Taken together with the findings of Nachmias et al. (1996), they highlight the importance of the interplay between parent–child interaction and temperamental factors related to anxiety. Questions about the degree to which experience with control accounts for the observed effects of responsive parenting clearly suggests an area for continued study.

Stressors and Resilience

An Overview

Although parenting plays a major role in shaping the environment of the child, a host of other factors are also important and may also influence the development of a sense of control. For example, the relation between stressors and subsequent maladjustment in children is supported by considerable research (Garmezy, 1986; Garmezy & Rutter, 1983; note also that this relation may be moderated by parenting behavior). However, the effects of stressors are not straightforward, in that their long-term effects on development are not necessarily harmful. In fact, the negative impact of stressors appears to be closely tied to their interpretation (as suggested earlier) and to one's ability to control these stressors. When control is possible, environmental

challenges and the associated distress may potentially facilitate adaptive functioning over time.

For example, Izard (e.g., Izard & Beuchler, 1979) described the states of arousal normally associated with stressful childhood experience as the emergence of basic human emotions. Thus, crying, yelling, or other apparently disorganized expressions of emotion in children may not necessarily represent compromised performance, as some models have suggested (see Garmezy, 1986), but rather an integral part of a negotiation or coping process in which an infant or young child must sometimes engage (cf. attachment; Sroufe, 1990). Hence, the degree to which reinforcing events in the environment are contingent on these emotional responses, such stress reactions may actually be desirable and adaptive. This notion resonates with the work reviewed thus far, in that it implies that the ability to manipulate one's environment effectively, most notably under stress (i.e., coping), leads to healthy development.

In a related vein, Masten et al. (1991) reviewed conditions found to serve as protective factors in child development, citing responsive parenting, intellectual skill, social-cognitive ability, and Bandura's (1986) conception of self-efficacy as factors predictive of healthy development. Although all of these qualities are related to the degree of mastery and control one has over the environment, the construct of self-efficacy may be the most similar to the present notion of control. Self-efficacy, however, is related more to the idea of being able to perform, whereas the idea of control is more broadly related to all aspects of functioning and does not imply a behavioral response. In terms of learning theory, self-efficacy has been challenged as merely being one factor of a more general "outcome expectancy," and thus it has been argued that the self-efficacy concept has no unique explanatory power (see Biglan, 1987; Eastman & Marzillier, 1984; Lee, 1989). In the present model, control is related to the degree to which an organism has the possibility to influence opportunities for positive or negative reinforcement and is not specific to the organism's motor behavior. Nevertheless, as a concept related to the behavioral performance aspects of control, self-efficacy has been supported as a predictor of positive development (Masten et al., 1991).

In other examinations of protective factors, much has been made of the so-called "steeling effect" (e.g., Garmezy, 1986), that is, the tendency for certain stressors to actually "immunize" or enhance subsequent functioning of the individual. The phenomenon of "required helpfulness" (Rachman, 1979) is one such example. According to this principle, if high-risk children are called on to assist in the coping efforts of a larger system (e.g., family, community), this action may have beneficial effects. Elder (1974) described putative psychological benefits experienced by children of the Great Depression, some of whose efforts to contribute to the family welfare may have generated powerful mastery experiences for them.

Findings from animal literature also support the notion of a "steeling effect." Dienstbier (1989) reviewed evidence with rats and mice showing that early exposure to stressful manipulations such as shock or rough handling can actually lead to less fearful or reactive animals when exposed to subsequent threats (e.g., Denenberg, 1967; Levine, 1960). Hannum, Rosellini, and Seligman (1976) showed that although early experience with uncontrollable trauma produced later helplessness effects in rats, controllable trauma actually *immunized* the animals against later helplessness. Such findings demonstrate the complexity of the effects of stressors on development.

Physiological Arousal: Two Responses to Stressors

The understanding of these effects may best be derived from a closer examination of the physiology associated with exposure to stress. Dienstbier (1989) argued that there is evidence for two separate types of short-term physiological response to stress and described these as (a) a catecholamine response, involving the sympathetic nervous system (SNS) and adrenal medulla; and (b) a cortisol response, involving the HPA axis. Reviewing a great number of studies from both human and nonhuman populations, Dienstbier concluded that the long-term ill effects of stress are likely mediated by either catecholamine depletion or by chronic cortisol secretion. He reported that heightened catecholamine capacity is associated with increased performance (e.g., O'Hanlon & Beatty, 1976) and lower neuroticism scores (e.g., Forsman, 1981) and that high levels of basal cortisol are related to depression and anxiety (e.g., Anisman & LaPierre, 1982).

What appears to be responsible for the differential long-term effects of stress ("steeling" versus "helplessness" induction) relates back to the idea of prediction and control. Dienstbier (1989) stated that, "in a range of subjects from rats to mice to primates, exposure to stressors with minimal predictability, control, or feedback . . . results in heightened cortisol responses," and that "when stressful situations are sufficiently extended, they also lead to catecholamine depletion" (p. 86–87).

In describing what he terms *toughening,* Dienstbier (1989) described how intermittent stressors activate the catecholamine response, and in predictable situations or those allowing coping action, the cortisol response will be minimal (cf. "toughening up"; Miller, 1980). An organism experiencing these types of stressors will actually undergo an increase in catecholamine responding potential, ultimately leading to improvements in performance and functioning under later stress. So long as there are sufficient intervals between stressful events to allow catecholamine restoration and there is enough control or predictability to inhibit excessive HPA activity, the organism will benefit from this exposure. It appears, then, that Dienstbier has identified possible biological substrates of "steeling" and the development of mastery.

From this analysis, it also appears the HPA axis may be more associated with anxiety and that the SNS-adrenal medullar axis may be more associated with fear. This conceptualization helps to unify the diversity of findings relating uncontrollability to inhibition or anxiety and to hypercortisolism (see Gray, Mineka, Kagan, and Sapolsky articles cited above). The fear response, on the other hand, appears to involve another system (i.e., Gray's [FFS; 1982]), the activation of which may have few deleterious effects, provided that the fear response is not without sufficient reprieve. Again, it is only when fear becomes unpredictable or uncontrollable (e.g., as with PD; Barlow, 1988), that the elicited apprehension leads to long-term impairment in functioning via the HPA system. Understanding fear and anxiety in terms of two separate subsystems of arousal fosters an enhanced understanding of the complexity of these emotions.

Conceptual Model and Implications

Considered together, the evidence reviewed suggests a number of important points. The idea that experience with lack of control may play an important role in the development of anxiety appears to be suggested by diverse areas of research. In addition, the biological correlates of chronic anxiety appear to be influenced to some degree by psychological variables, using the psychological interpretation of stressful events as either controllable or uncontrollable. In terms of how this sense of control develops, it may be that early experience with lack of control contributes to something of a psychological template, which at some point becomes relatively fixed and diathetic. Stated another way, this psychological dimension of a sense of control is possibly a mediator between stressful experience and anxiety, and over time this sense becomes a somewhat stable moderator of the expression of anxiety (see Figure 2). As mentioned earlier, all of these implications require careful and continued testing, as they are just beginning to find empirical support (e.g., Chorpita, Brown, & Barlow, in press).

In an effort to integrate these ideas regarding the structure of vulnerability for negative emotion and its associated developmental influences, Chorpita (in press) outlined a preliminary conceptual model (see Figure 3). Within this model, early experience with uncontrollable or unpredictable stimuli is described as influencing low perceptions of control, in a manner consistent with the literature on socialization and development of control-related cognitions (e.g., Carton & Nowicki, 1994). In accord with Gray's (1987) model, the immediate sequelae of these inputs are increased inhibition (i.e., BIS activity; also, Gray's "anxiety"), followed by the associated somatic outputs first documented by Kagan and colleagues (e.g., Kagan et al., 1987).

As one moves across time to a later developmental period, these control-related cognitions may intensify the activity of systems (e.g., Gray's BIS) underlying inhibition (Kagan et al., 1987) through the events outlined by Dienstbier (1989). Here, Chorpita (in press) offered the term *weakening* to describe the opposed end of Dienstbier's phenomenon, such that the long-term influence of perceptions of low control would bring about the ill effects of hypercortisolism for the BIS, increasing the likelihood of phenomena such as glucocorticoid feedback insensitivity and hence further BIS activation. In addition, the model allows for some temperamental stability, as would be expected given the strongly biological nature of these elements.

Another pathway by which vulnerability is carried forward concerns the cognitive information related to perceptions of control, which are represented as information stored in memory

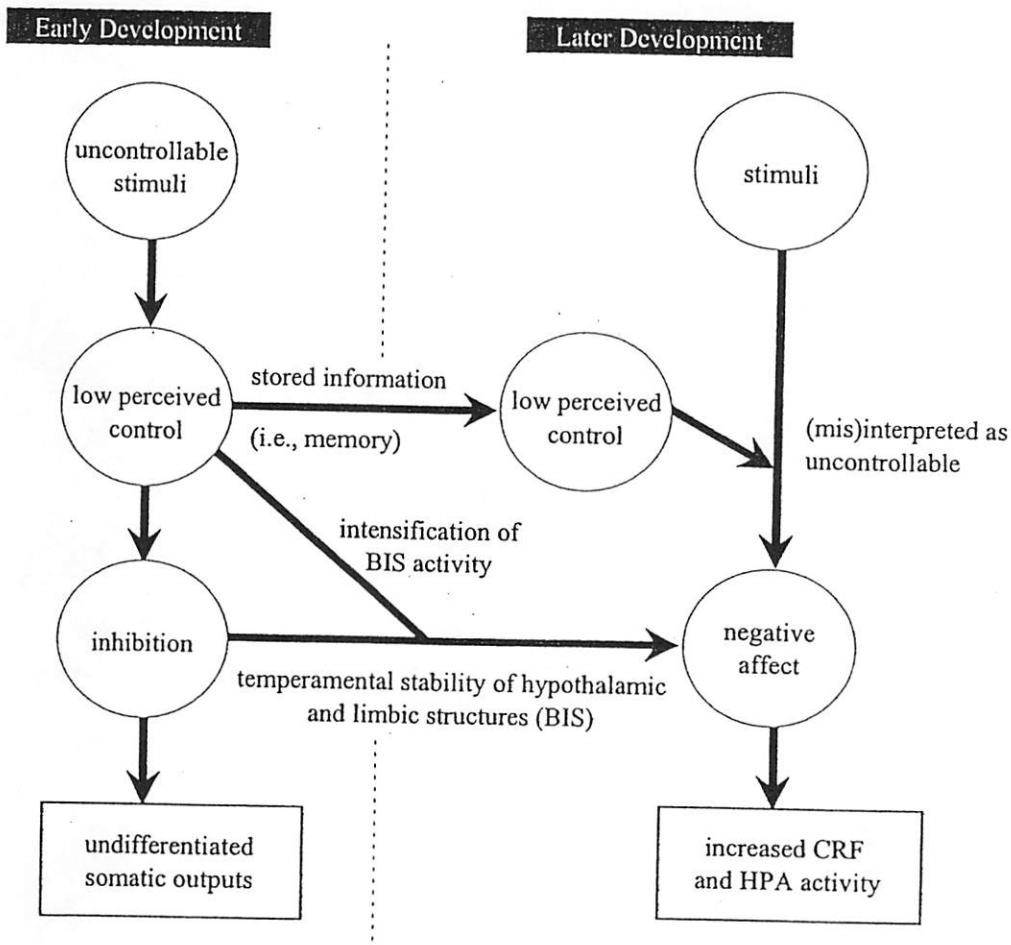

Figure 3. Model of the development of vulnerability for anxiety and depression. BIS = behavioral inhibition system; CRF = corticotropin releasing factor; HPA = hypothalamic pituitary adrenocortical.

(e.g., "stored regularities"; Gray & McNaughton, 1996). As Rotter (1966) suggested, this information would become increasingly resistant to new information over time, in that the accumulation of prior experience would have the increasing ability to dilute the effects of new information on generalized expectancies. One could then imagine that, given a history of experience with low control, interpretation or processing of events later in development (especially those for which cues for control are ambiguous) may become biased by prior information. The precise mechanisms and timing by which such biases might advance across development certainly await additional investigation. Indeed, although the role of cognitive biases is ubiquitous in adult models of anxiety and depression (McNally, 1996), little is known about when these control expectancies might become resistant to new information, for which children they occur, and as a result of which experiences they occur.

Regarding the output of these elements in later development, one could speculate (as our reading of Gray's model would predict) that such processing of stimuli should increase BIS activity, characterized in late development by the experience of negative affect. Further, at this later developmental period, previously undifferentiated somatic outputs of the BIS may become more focused on the HPA system (Dienstbier, 1989), yielding in certain individuals a profile more consistent with that of negative affect as observed in adults.

Implications

At present, the role of cognitive and psychological variables in the pathogenesis of anxiety requires clarification. Cole and Turner (1993) remarked that despite well-established theories of anxiety and depression, "surprisingly little empirical or theoretical work has been conducted on the emergence of these cognitive diatheses . . . most theorists point vaguely back to childhood events" (Cole & Turner, 1993, p. 271). They stated further that with regard to anxiety, structural (e.g., mediational vs. moderational) etiological models have simply not been tested. Because preliminary support for a mediational cognitive model exists for childhood depression (Cole & Turner, 1993; Turner & Cole, 1994), it has become an important empirical question to test such a model in the context of a general negative emotional factor (e.g., inhibition; see the four elements in the leftmost column of Figure 3).

Although some preliminary modeling has been conducted, much of the recent etiological research in this area has also failed to include a clinical validation of the self-reported symptoms (see Chorpita, in press, for an expanded clinical model). In addition, although experimental manipulations of immediate control have been conducted with normal children (e.g., Gunnar, 1980), similar work with clinical samples (e.g., Sanderson et al., 1989) is needed to test directly the immediate effects of low perceived control on the expression of fear and anxiety in children with anxiety disorders. This type of research is only just beginning.

Traditionally, much has been said about the difference between childhood and adult anxiety. However, there is need for clarification. Although the structural association among key elements appears to change with development (see Figure 2), the similarity of the elements themselves associated with childhood and adult anxiety appears to be strong and noteworthy (see Figure 3). Thus, factors influencing anxiety in adults may require increased attention in childhood research and, likewise, a greater understanding of the etiological and developmental aspects of perceived uncontrollability and anxiety may contribute to the understanding of adult disorders of emotion. Although clear and considerable differences exist in the classification, course, and expression between anxiety in childhood and adulthood, some differences may be more phenotypic than absolute. Future theorizing will likely benefit from continuing unification of existing models.

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