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Using an Emotion Regulation Framework to Understand the Role of Temperament and Family Processes in Risk for Adolescent Depressive Disorders

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Although recent evidence implicates the importance of the family for understanding depressive disorders during adolescence, we still lack a coherent framework for understanding the way in which the myriad of developmental changes occurring within early adolescents and their family environments actually operate to increase adolescents' vulnerability to, or to protect them from, the development of depressive disorders. In this review we propose a framework that places the mechanisms and processes of emotion regulation at the centre of these questions. We argue that emotion regulation can provide an organising rubric under which the role of various factors, such as adolescent and parent temperament and emotion regulation, and parental socialization of child emotion, as well as the interaction amongst these factors, can be understood to account for the role of the family in adolescents' risk for depression. In particular, we posit that adolescent emotion regulation functions as a mechanism through which temperament and family processes interact to increase vulnerability to developing depression.

KEY WORDS: depression; emotion regulation; adolescents; family processes; temperament

Adolescence constitutes a time of particular risk for the onset of depressive disorders amongst adolescents, particularly girls (e.g., Angold and Costello, 2001; Birmaher *et al*., 1996; Kessler *et al*., 2001; Lewinsohn *et al*., 1993), resulting in an acceleration in the incidence of depression apparent from age thirteen onwards (Cole *et al*., 2002). In an effort to discover the mechanisms accounting for this increased incidence, researchers have examined the myriad of developmental changes that accompany the transition into adolescence. One notable change is an increase in the frequency and intensity of negative affect (Flannery *et al*., 1993; Larson and Lampman-Petraitis, 1989; Larson and Richards, 1991), which can act as a precursor to depression (Klein *et al*., 2002). This increase correlates with pubertal status (Flannery *et al*., 1993) and age (Larson and Richards, 1991) and appears to vary according to the social context. In particular, Larson and Richards (1991) reported that the increase was observed in the context of interactions with parents, but did not characterize the time spent with friends.

In this review, we propose a theoretical framework in which deficits in adolescents' emotion regulation capacities are a key factor in their heightened risk for depressive symptomatology and disorder. Although research suggests that children experience decreasing frequency of negative affect and reductions in overall emotional intensity in the period from early childhood to early adolescence, likely as a function of improved emotion regulation skills

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(Murphy *et al.*, 1999), the developmental demands of adolescence may overstress the regulatory skills of vulnerable adolescents. These developmental demands include increased conflict with parents (Collins, 1990), reduced support in the school environment (Seidman *et al.*, 1994), and the emotional challenges of early romantic and sexual experiences (Collins, 2003). As well, normative increases in autonomy seeking and the corresponding increase in time away from parents and other adults (Collins, 1990) mean that adolescents are negotiating more emotionally-challenging situations on their own. This may account for the increase in negative affect that occurs, for a substantial proportion of youth, around the onset of adolescence (Larson and Lampman-Petraitis, 1989). Of course, these normative developmental changes cannot account for the difficulties experienced by the minority of adolescents who experience significant depressive syndromes. We propose that variability in adolescents' ability to regulate emotions on their own may distinguish those adolescents who are able to weather these challenging developmental demands from those who experience significant symptomatology and impairment.

As depicted in Fig. 1, we propose that adolescents' ability to regulate their emotions is influenced by both innate temperament and parenting processes, both of which have been implicated in vulnerability to depression (Kaslow *et al.*, 1994; Klein *et al.,* 2002; Sheeber *et al.*, 2001). Temperament dimensions that are particularly relevant to emotion regulation include neuroticism/negative emotionality, extraversion/positive emotionality, and effortful control (see below). In this model, we conceptualize family processes as reflecting parents' own capacities for emotion regulation, and their approach to socializing children's emotional behaviour, both of which will be partially determined by parental temperament. We propose, moreover, that adolescent temperament and family processes have an interactive effect on the development of adolescent emotion regulation skills. Adolescent emotion regulation, in turn, mediates the relations between adolescent temperament and family processes on one hand, and adolescent depression on the other.

We will begin a discussion of the proposed model by defining the concept of emotion regulation and how self-regulation of emotional experience and expression has implications for individuals' affective experience and interpersonal functioning in general. Next, we will review research findings indicating the association between emotion regulation and depression. We will then discuss how individual differences in adolescents' development of emotion regulation have implications for their vulnerability to depression, and why adolescence is a key time for connecting emotion regulation and depression. Following this, we will review two sets of contributors (as well as their interactive effects) to these differences: temperament and family processes. The review of familial characteristics that shape adolescents' emotion regulation will focus on three family variables, namely parental emotion regulation, parental socialization of adolescent emotional behaviour and parental temperament. We consider how the proposed model may account for the gender differences in depression that emerge during adolescence. Finally, we suggest directions for research in adolescent emotion regulation and depression.

ADOLESCENT EMOTION REGULATION

A discussion of emotion regulation requires that it be distinguished from emotion *per se* (Cole *et al.*, 2004). Emotions refer to situation response

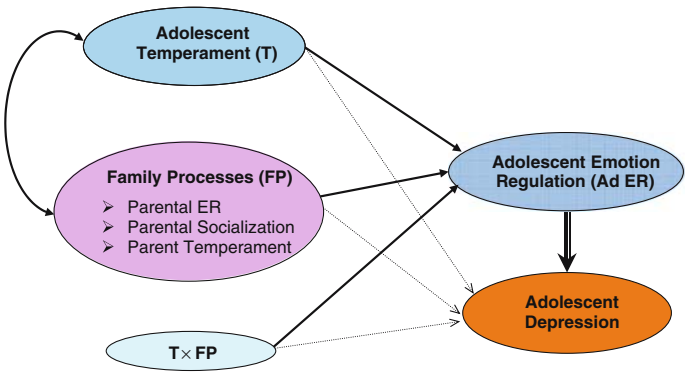

Fig. 1 The proposed model

tendencies that involve subjective feeling states, cognition and information processing, expressive displays, motivation, and physiological responses (Diamond and Aspinwall, 2003a). Importantly, these response tendencies can be modulated in such a way as to influence the shape of the final response (Gross, 1998a).

Emotion regulation refers to the internal and transactional processes through which individuals modulate one or more components of emotion, often in the service of accomplishing their prioritized, situation-specific goals. It can occur with or without conscious awareness, and involve modification of either the emotion-eliciting situation or one's own response to it (Diamond and Aspinwall, 2003a; Eisenberg *et al.*, 2000; Gross, 1999b). Emotion regulation is a dynamic process involving multiple mechanisms that can occur independently or concurrently. These mechanisms influence the nature of emotional experiences and expressions, including their frequency, duration and intensity, and may bear significant implications for one's risk of developing depression.

Self-Regulation of Emotional Experience and Expression

Individuals exert considerable influence over which emotions they experience and how these emotions are expressed. Gross (1999a) distinguished five points in the emotion generative process at which emotion regulation may occur, the first four of which (situation selection, situation modification, attention deployment, and cognitive change) constitute antecedent-focused emotion regulation, whilst the final one (response modulation) is a form of response-focused emotion regulation. Strategies employed to regulate emotion at any point in the emotion generative process vary in their nature, effectiveness, and implications for the individual's psychosocial functioning.

For instance, the nature of self-regulation strategies has implications for interpersonal functioning. Gross and John (2003) reported that the use of reappraisal, that is, the re-evaluation of either one's situation or one's capacity to manage it, is associated with adaptive interpersonal functioning. In particular, individuals who use this strategy have a greater number of close relationships and are more well liked than individuals who do not. Conversely, individuals who are more reliant on response-focused strategies, such as suppression, report avoiding close relationships. Suppression primarily modifies the behavioural aspect of one's emotions, and is not helpful in reducing the experience of negative emotion. Gross and John (2003) have hypothesized that suppression thus creates in the individual a sense of incongruency and inauthenticity, which may lead to negative feelings about the self and alienate the individual from the self and from others. Indeed, ''suppressors'' were found to have interpersonal relationships that were not emotionally close, purportedly due both to their avoidance of emotional closeness and others' recognition of their emotional distance. Furthermore, they perceive themselves as having lower levels of social support, especially emotional support. This is important because low perceived social support has adverse consequences for psychosocial functioning (e.g., see review by Yap and Devilly, 2004), and perceived social support is a key protective factor against the onset of depression (McFarlane *et al.*, 1994).

Moreover, ''suppressors'' experience and express less positive affect and experience more negative affect than do individuals who do not use this emotion regulation strategy. Suppressors also report lower levels of self-esteem and life satisfaction, and more depressive symptoms. In contrast, reappraisers experience and express more positive affect and less negative affect, have fewer depressive symptoms, and report greater self-esteem and life satisfaction. It is noteworthy that both reappraisal and suppression use are correlated positively with perceiving one's emotion regulation efforts as generally successful. This implies that any differences in the correlates of reappraisal and suppression (e.g., suppression related negatively to efficacy of regulating negative mood) are not simply due to differences in the perceived success of these two regulation strategies (Gross and John, 2003).

Therefore, the emotion regulation strategy that individuals use in a given situation has important implications for their affective experience and interpersonal functioning. As adolescents enter the stage in life where the ability to forge and maintain peer relationships outside the family becomes a defining factor in their self-identity and social confidence, those who are less successful in this task, potentially related to their less adaptive emotion regulation strategies, may be at increased risk for developing depressive disorders (Deardorff *et al.*, 2003).

Emotion Regulation is Related to Depression

The ability to successfully regulate affective states is central to mental health, and emotion dysregulation figures prominently in mental illness (Gross and Munoz, 1995). This may be particularly true of depressive disorders, as they are characterized by deficits of positive affect and/or an excess of negative affect (NA; Gross and Levenson, 1997). Because depressive disorders involve dysfunction of both of the major affective systems (Cole and Kaslow, 1988; Gross and Munoz, 1995), failures or abnormalities in emotion regulation processes are likely to play a particularly critical role in their etiology. For example, Tomarken and Keener (1998) predicted that depressed individuals should display longer maintenance (i.e., greater ''temporal continuity'') of negative affect, and poorer ability to maintain positive affect. Consistent with this prediction, a recent study reported that depressed adolescents maintain depressive affective states for a longer duration than do their non-depressed peers during parent–adolescent interactions (Sheeber *et al*., 2000).

Relatedly, emerging evidence suggests that emotion dysregulation in at-risk or depressed individuals may be linked to deficits in the strategies they use to respond to negative emotional states. In particular, it seems that depressed adolescents have a more limited repertoire of emotion regulation strategies, use less effective strategies (i.e., less adaptive and more avoidance strategies), or fail to use strategies within their repertoire, and are less likely to believe that their strategies would be effective (e.g., Garber *et al*., 1995; Garber, *et al*., 1991).

Research on social and familial processes related to depression also suggests that emotion dysregulation occurring within interpersonal contexts may be especially fundamental to depression. For example, Kobak and Ferenz-Gillies (1995) found that depressive symptoms were associated with older adolescents' difficulty regulating emotions so as to enable age-appropriate assertion of autonomy in interactions with their mothers. Moreover, depressed individuals often generate stress within interpersonal contexts (e.g., Davila *et al*., 1995), and inhibit the interpersonal expression of positive affect, while increasing interpersonal expressions of negative affect (e.g., Biglan *et al.,* 1985). Furthermore, the consistent finding that interpersonal contexts are amongst the most powerful precipitants of depressed states during adolescence (e.g., Monroe *et al*., 1999) suggests that emotion regulation within interpersonal contexts may have particular etiological significance**.**

DEVELOPMENT OF SELF-REGULATION OF EMOTIONAL EXPERIENCE AND EXPRESSION

Emotion regulation skills increase in number and complexity during mid- to late-childhood, especially through the internalization of mental means of emotion regulation such as those utilizing symbolic comprehension and self-reflection (Holodynski and Friedlmeier, 2006). The improvements in regulatory skill are likely facilitated by both cognitive growth, such as changes in social cognition, response inhibition, monitoring, and the capacity for abstract, reflective and hypothetical thinking (Steinberg, 2005) and socialization pressures that include peer and adult expectations for mature, socially-considerate, and gender-typical behaviour (Murphy *et al*., 1999; Saarni *et al*., 1998). This trend is continued in adolescence as increased autonomy confers additional responsibility for self-regulation (Graber and Brooks-Gunn, 1999; Pavlidis and McCauley, 2001). As well, the increased salience of social relationships in conjunction with cognitive abilities that enable adolescents to think about relationships abstractly, imagining future contingencies, and endeavouring to take others' perspectives (Asmussen and Larson, 1991), may stress regulatory strategies better-suited to the more concrete challenges experienced by their younger selves, and provide an impetus for broadening their repertoire of strategies to include a more sophisticated array of approaches. As noted earlier, individual differences in adolescents' regulatory skills influence their ability to cope with normative developmental (as well as non-normative) stressors and thus have implications for their vulnerability to depression (Gross, 1998a, b; Gross and John, 2003).

Adolescence as a Key Time for Connecting Emotion Regulation and Depression

It is worth noting that the proposed model is distinguished from existing models of emotional development in childhood (e.g., Eisenberg *et al*., 1999, 2001; Eisenberg and Zhou, 2000; Saarni and Crowley, 1990; Saarni *et al*., 1998) by its specific focus on the adolescent period, and the vulnerability of young people for developing depression via the mechanism of their emotion regulation. Current models have a more developmental (rather than developmental psychopathological) focus, and have

been based on research with younger children, from early childhood to early adolescence. They are hence less informative for addressing some of the challenges specific to the adolescent phase.

Adolescence is characterized by significant increases in affective reactivity, greater sensitivity to peer-related social interactions, and greater engagement with long-term and socially-complex goals (Nelson *et al*., 2005). These changes promote the skills necessary for greater independence from the family and the establishment of developmentally important peer and romantic relationships, but also create greater vulnerability to emotional and behavioral dysregulation (Spear, 2000; Steinberg, 2005). This is of particular relevance to the emergence of depression, as depression may be a quintessential disorder of emotion regulation, characterized by dysregulation of both positive and negative affects (Gross and Munoz, 1995). As such, the population-wide increase in the incidence of depression during adolescence may be fundamentally linked to this developmental increase in vulnerability to emotional and behavioural dysregulation.

Self-regulatory capacity also matures during adolescence, as behaviour and cognition are increasingly brought under the control of central executive functions. This control facilitates significant improvements in deductive reasoning, the efficiency and capacity of information processing, and the capacity for abstract, planned, hypothetical and multidimensional thinking (Steinberg, 2005). In the arena of affect regulation, these skills enhance the capacity to initiate new or alter ongoing emotional responses in the service of an individual's goals (Ochsner and Gross, 2005). Notably, the development of these self-regulatory skills is characterized by slower and more gradual maturation relative to the aforementioned changes in emotionality. This maturation is thought to be associated with significant remodelling in brain regions associated with social cognition, response inhibition, monitoring, emotion regulation, and the capacity for abstract, reflective and hypothetical thinking (Nelson *et al*., 2005; Paus, 2005).

During adolescence, significant changes also occur in the nature of family relations, which weaken external support for emotional and behavioural regulation. One of the primary developmental tasks for families of adolescents is renegotiating relationships such that the necessarily asymmetrical power structure evident between children and their parents starts to become more balanced, as adolescents are increasingly allowed more autonomy and input into family and personal decision-making (Amato, 1989; Baumrind, 1991; Eccles *et al*., 1993). These changes in parent–adolescent relationships necessarily mean that external contributors to adolescent affective and behavioural regulation, in the form of parental support and structure, are reduced at the same time increases in affective reactivity and social motivations provide more regulatory challenges.

Hence, one plausible reason why adolescence represents such a potent time of risk for the emergence of depression is that although increases in emotional arousability, novelty-seeking, and motivation for peer acceptance occur during early adolescence (especially around puberty), the maturation of the frontal lobes, increased connectivity within the brain, and associated enhancement of self-regulatory competence is not complete until late adolescence or early adulthood (Steinberg, 2005). As well, the transition into and through adolescence is characterized by a marked increase in unsupervised time (Collins, 1990). This developmentally normative "mismatch" between strong affective and behavioral impulses, and the adolescents' still limited capacity to regulate them, and reduced adult monitoring, means that early- to middle-adolescence is a period of heightened vulnerability to problems associated with poor regulation of affect and behaviour. Furthermore, as will be discussed, both temperamental and environmental factors are likely to play a role in determining the degree of mismatch, and therefore of vulnerability. For example, problems of increased affective arousability are likely to be particularly pronounced in individuals with temperamentally high levels of negative emotionality (NEM), or adverse emotion socialization processes in the home environment (e.g., punitive responses to emotion; high levels of parental discord). Indeed, NEM has been linked to risk for depressive disorder, such that it is associated with early-adolescent anxiety disorders, which in turn predicts later major depressive disorder (Kendler, 2002).

On the other hand, poor development of regulatory capacities is likely to be associated with either temperamentally low levels of effortful control (EC), or inadequate external regulatory supports (e.g., limited parental monitoring, low family cohesion). Disorders associated with low levels of self-regulation have been linked to an "externalizing" path towards vulnerability for depression (Kendler

et al., 2002; 2006). It may be that in these individuals, problems in self-regulation that initially express themselves in poor regulation of behaviour and impulses, later also express themselves in the context of poor regulation of negative affect, as well as contribute to increasing environmental adversity that is linked to depression. In these ways, poor development of regulatory capacities can also be hypothesized to increase vulnerability to depression. In some individuals, a range of temperamental and neurobiological risk factors are likely to co-exist, resulting in both behavioural (i.e., externalizing) and depressive disorders. However, how these temperamental and contextual differences interact with the neurodevelopmental processes identified above is, as yet, poorly understood.

Next we turn our attention to contributors to individual variability in emotion regulation.

Affective Temperament and Emotion Regulation

Regulatory processes are shaped, in part, by temperamental predispositions (Gross, 1999a; Gross and John, 2003). Early individual differences in affective temperament, particularly those reflecting emotional negativity and reactivity, appear to influence the development of regulatory capacities (Fox and Calkins, 2003; Plomin and Stocker, 1989). In fact, the conceptual link between dispositional emotionality and emotion regulatory capacity is so close that at times the distinction between the two can be unclear. This problem arises most markedly in research with infants and young children, such that Eisenberg and colleagues (Cumberland-Li *et al*., 2003; Eisenberg *et al*., 2000) have noted that emotion and its regulation lie at the core of the conceptualization and measurement of early childhood temperament. That said an understanding of dispositional contributions to regulatory capacity necessitates articulating the distinction between the two. In this review, we define dispositional or temperamental emotionality as an enduring emotion-response tendency that is partly biologically-based, presents early in life, and is relatively consistent across situations and time (Cole *et al*., 2004; Goldsmith, 1993). Emotion regulation, as described earlier, refers to the processes by which these emotion-response tendencies, which arise as a function of temperamental predispositions and the characteristics of the eliciting situations, are altered, presumably in the service of goal attainment.

Dimensions of Temperament and Emotion Regulation

Three developmentally stable, higher-order temperament factors are particularly relevant to emotion regulation. The first two of these, Negative Emotionality (NEM) and Positive Emotionality (PEM), are clearly affective in nature and have consistently been implicated in depressive disorders in the form of heightened negative affect (NA) and diminished positive affect (PA; Chorpita *et al*., 2000; Joiner *et al*., 1996). The third fundamental temperament factor, Effortful Control (Rothbart *et al*., 2003), allows one to suppress affect-driven motivational and behavioural tendencies in order to align behaviour to achieve a conflicting goal. This dimension has clear relevance to aspects of emotion regulation.

NEM refers to general emotional distress and a susceptibility to negative emotions, consistent with the dimension of Neuroticism found in investigations of personality structure in both adults and children (Ellenbogen and Hodgins, 2004; Rothbart *et al*., 2000). NEM is common to the phenotypic structures of both depressive and anxiety disorders, and includes emotions such as sadness, anger, and fear (Shankman and Klein, 2003). NEM is associated with subsyndromal internalizing problems (Caspi *et al*., 1995) and is a vulnerability factor for the development of mood and anxiety disorders (Clark *et al*., 1994).

PEM refers to a person's ''zest for life'', as reflected in one's energy level and pleasurable engagement with the environment, and is related to the Extraversion dimension of personality. PEM includes traits such as enthusiasm and excitement seeking, and is posited to distinguish depression from anxiety, in that depression is specifically characterized by anhedonia or low PA (Clark and Watson, 1991). Though neuroticism and extraversion are not equivalent to NEM and PEM respectively, they are corresponding and highly correlated constructs, and thus for simplicity will be included in the broader terms NEM and PEM in this review.

Studies have consistently found associations between trait NEM and state measures of NA, and between trait PEM and measures of state PA (Gross *et al*., 1998). These relations, moreover, have been found to hold over periods as long as 10 years. Additionally, Gross *et al*. (1998) reported that these characteristics influence both tonic levels of emotion and emotional reactivity. Because NEM represents a susceptibility to experience NA, individuals high in NEM may face more challenges regulating their

excess NA, and if unsuccessful, may experience sustained, heightened NA characteristic of depressive disorders. In other words, their high levels of dispositional NEM may place greater strains on their emotion regulation capacities, and would therefore be more likely to result in a breakdown of these capacities, than would a person with a similar regulatory capacity but with less to regulate. Similarly, if PEM gives rise to more PA, individuals low in PEM may have more challenges maintaining everyday PA (which is lower due to their lower tonic levels of PA and lower positive reactivity), which if chronic, resembles the anhedonia characteristic of depression. Although most of the above-mentioned studies involved undergraduate samples, the trait-like stability of temperament suggests that similar findings would emerge in samples of younger adolescents.

Some temperament researchers propose that temperament not only consists of reactive temperament dimensions such as NEM, but also contains a regulative factor, namely Effortful Control (EC; Putnam *et al*., 2001; Rothbart and Bates, 1998; Rothbart *et al*., 2003; Tellegen, 1985). EC refers to processes serving to modulate reactivity, including approach/withdrawal, inhibitory control (inhibiting one's behaviour if necessary) and attentional control (the ability to focus and shift attention as required), and involves ''controlling'' or ''regulating'' one's behaviour or attention in specific situations (Muris and Ollendick, 2005; Putnam *et al*., 2001). According to the recent review by Muris and Ollendick, although there is relatively little evidence for the temporal stability of this temperament factor, available data suggests that it has fairly robust stability from toddlerhood through preschool and into early school years (Kochanska and Knaack, 2003; Kochanska *et al*., 1997). This supports the conclusion that it has trait-like qualities. However, there is evidence that this temperament factor may not be evident in early infancy, but emerges and develops from around age two to three, and is an outcome of the development of executive control of attention (Rothbart *et al*., 2003), consequent to brain maturation and interaction with the environment (Kochanska *et al*., 2000; Posner and Rothbart, 2000). This development enables children to gradually improve in their ability to regulate their emotions and control their behaviour (i.e., develop their emotion regulation ability), which may have important implications for their social competence and adjustment (Eisenberg *et al*., 2000, 2001 Fabes *et al*., 1999). In children who have low EC by nature or who fail to adequately develop this regulative trait and its corresponding emotion regulation ability, such normal developmental processes can be disrupted, placing them at particularly higher risk for developing psychological disorders (Muris and Ollendick, 2005). For example, 4–8 year-old children with low attentional and inhibitory regulation (components of EC) were more likely to have internalizing and externalizing problems respectively, as reported by teachers and parents (Eisenberg *et al*., 2001).

Preliminary evidence suggests that an individual's temperament is associated not only with the nature and intensity of emotional experience, but also with the regulation strategies one is inclined to use. Gross and John (2003) reported an association between individual differences in college students' use of reappraisal and suppression to regulate emotion and the personality traits of Neuroticism (NEM) and Extraversion (PEM). They found that reappraisal was negatively related to NEM, whereas suppression was negatively related to PEM. In other words, adolescents high in NEM may not only tend to experience more NA, but also be less inclined to use reappraisal, which might otherwise be effective in managing these excess negative emotions. Unfortunately, no study to-date has examined the direct association between the temperament dimension of EC and emotion regulation strategies, but theoretically one would expect high EC to be associated with a larger repertoire and more frequent use of effective strategies.

Several researchers suggest that children who are characterized by a combination of high NEM and low EC may be especially vulnerable to psychological disorders (Calkins and Fox, 2002; Lonigan and Phillips, 2001), because the emotional intensity and reactivity associated with high NEM is not buffered by the regulatory capacities associated with higher levels of EC (Muris and Ollendick, 2005). For example, children who are high in both NEM and EC would likely have better skills and strategies for regulating the negative emotions elicited by a stressful life situation than would those with high NEM and low EC. Unfortunately, the few studies that have specifically examined the role of emotionality and EC in the etiology of child psychopathology, have largely focused on externalizing disorders, though some have examined both internalizing and externalizing problems. Results have consistently demonstrated that older children with internalizing disorders score relatively high on NEM (especially fear) and low on EC compared to other children without psychological

problems (Eisenberg *et al*., 2001; Oldehinkel, 2001, 2004). This pattern of relationships has been replicated in recent self-report surveys of nonclinical children and adolescents (Muris *et al*., 2004; Muris and Ollendick, 2005). Two of these studies found a significant interaction effect of NEM and EC on psychological problems, indicating that the combination of high NEM and low EC (particularly attentional control) is associated with the highest levels of internalizing psychopathology (Muris and Ollendick, 2005). No study to-date has examined the association between EC and depressive symptomatology specifically.

Whilst theory suggests that dispositional tendencies predict regulatory behaviours, it is important to also consider that the use of ineffective strategies may contribute to manifest (if not latent) temperament. Given that mood disorders are likely to emerge from the exacerbation of ongoing sub-syndromal difficulties with emotion regulation (Kendler *et al*., 2004), these temperamental dimensions provide a promising way to understand how individual differences in emotion regulation emerge and subsequently shape the etiological paths towards case level.

In sum, it appears that differences in affective temperament predispose individuals to experience different tonic levels of positive and negative emotions as well as to be more or less reactive to emotion-eliciting stimuli. The regulative component of affective temperament also influences individuals' propensity to acquire and develop the capacity to regulate emotions and reactivity. We propose that very high levels of negative affectivity and reactivity to aversive events, low levels of positive affectivity and limited reactivity to positive events, as well as low levels of attentional and inhibitory control, challenge the regulatory processes of adolescents at risk for depression. Moreover, these temperament dimensions may have potential additive and/or interactive effects on risk for adolescent depression. Furthermore, given evidence that dispositional tendencies relate to the nature of emotion regulation strategies that individuals employ, it may be that the use of ineffective strategies accounts in part for these observed relations.

Family Processes and Emotion Regulation

Research indicates that the family caregiving environment plays a crucial role in children's development of emotion regulation skills (e.g., Cassidy, 1994; Field, 1994). More specifically, it has been postulated that parent–child interactions provide a formative influence on children's ability to regulate affect. Recent research on emotion socialization provides evidence that parental emotionality (especially NEM), as well as parental reactions to children's emotional displays, are associated with children's emotion regulation and social competence in both normative (Eisenberg *et al*., 1998) and physically maltreated (Shipman and Zeman, 2001) children. It is certainly acknowledged, nonetheless, that genetics account for a portion of the associations between parenting and child emotion regulation.

It has been proposed that caregivers provide "scaffolding" for a child's emotional development (Southam-Gerow and Kendall, 2002), and individuals' relationships with their parents set a developmental context for their emotion regulation in adolescence and young adulthood (Bell and Calkins, 2000). For example, it has been suggested that parental overcontrol in early childhood, which inhibits the development of child behaviours that would support autonomy when the caregiver is unavailable (or when the child is older), might directly translate into parental undermining of autonomy during adolescence. Consequently, adolescent offspring of overcontrolling parents may have more difficulties with emotion regulation, presumably because they have become dependent on extrinsic support and failed to develop intrinsic processes for regulating their emotions (Bell and Calkins, 2000; Fox and Calkins, 2003; Power, 2004). Evidence suggests that parental behaviours are associated with adolescents' regulation of dysphoric affect and experience of depressive symptomatology (e.g., Allen *et al*., 1994; Sheeber *et al*., 1997, 1998). In particular, poorer regulation and greater symptomatology are associated with parent–adolescent interactions that are low in support and autonomy, high in conflict and in which parental responses to depressive affect may inadvertently reinforce it.

We propose that parental influences on child and adolescent emotion regulation are a function of parents' own emotion regulation, their affective temperament, and their responses to child emotional behaviours. Below, we discuss each of these components.

Parental Emotion Regulation

Parents' own emotion dysregulation has been implicated as a factor relevant to children's emotional development. Parents' reciprocity of negative

affect and difficulty returning to a neutral or positive affective state during conflictual interactions within the family, both of which can be thought of as indices of emotion dysregulation, have been shown to predict children's emotional and behavioural adjustment (Carson and Parke, 1996; Compton *et al*., 2003). Children from families characterized by difficulty in de-escalating negative emotions may not learn effective skills for recognizing or managing their affect (Dunn and Brown, 1994; Lindahl *et al*., 1998; Lindahl and Markman, 1990). For instance, Lindahl *et al*. (1998) reported that mothers' use of negative conflict-resolution strategies was strongly related to children's negative affective escalation in interaction with peers.

Relatedly, research on families experiencing chronic marital conflict or parental depression (Compton *et al*., 2003; Cummings and Davies, 1994; Cummings *et al*., 2000, 2002; Katz and Gottman, 1991, 1993) indicates that parents in these families display more emotional dysregulation in family interactions. Such family environments have consistently been shown to have adverse effects on child functioning, including poorer emotional understanding and regulation, and the development of adolescent depression (e.g., Southam-Gerow and Kendall, 2002). Family environments characterized by high levels of poorly regulated hostility have also been reported to account substantially for adolescent depressive symptomatology (Reiss *et al*., 1995) and to place clinically vulnerable people at elevated risk for relapse (Coiro and Gottesman, 1996).

It is important to keep in mind, moreover, that children and adolescents contribute to the emotional environment of the home, and hence, influence the environment in which they are raised. Findings from a 9-year, prospective study of family interactions between parents and adolescents demonstrated the reciprocal nature of expressed negative affect within the family (Kim *et al*., 2001). In particular, parents' and adolescents' initial levels of expressed negative emotion were associated with increases in expression of such emotion by each party over time. In another study involving interactions between mothers and their sons aged 7–9, Lindsey *et al*. (2002) found that it was not the emotional behaviour of either mother or son, but the pattern of reciprocating negative emotions that mediated the relationship between marital conflict and boys' peer relationships. This suggests that in some circumstances it is the emotional quality that emerges during interactions between people that is important in predicting outcomes.

Parental Socialization of Emotion Regulation

Though the majority of research on emotion socialization has focused on very young children (e.g., Cole and Kaslow, 1988; Fox, 1994; see also reviews by Keenan, 2000; and Southam-Gerow and Kendall, 2002), preliminary evidence suggests that older children and early adolescents may learn to regulate their emotional arousal through parents' responses to their emotional behaviour (e.g., Eisenberg *et al*., 1996, 1999). Eisenberg *et al*. (1996) reported that school-aged children's negative emotionality was inversely related to maternal problem-focused reactions and positively related to mothers' minimizing responses and fathers' punitive or distress responses. In addition, children were more likely to use avoidant strategies and less likely to use constructive ones if their mothers responded to negative affect with minimizing or punitive responses. Eisenberg *et al*. (1998) proposed that parental negative reactions to children's emotional displays are likely to heighten arousal, resulting in dysregulated behaviour and the undermining of children's ability to explore and experience emotions in an adaptive way. Similarly in an adolescent sample, Sheeber *et al*. (2005) have recently reported that fathers' adverse responses to adolescent emotional behaviour, as well as mothers' own affective dysregulation, were associated with adolescent emotion regulation difficulties and depressive symptomatology.

Relevant evidence has also been obtained in research on school-aged children with depressed mothers. Depressed mothers have been found to respond to their children's negative affect with more directive, less supportive, and less problem-solving behaviour than did mothers in a comparison sample. In turn, both mother and child generated fewer and poorer strategies for responding to negative affect and had lower expectations that their strategies would be effective when compared to families of healthy women (Garber *et al*., 1991).

Conversely, more regulated and non-hostile expressions of emotion, combined with acceptance of children's emotional expressions, seem to be associated with children's ability to understand and cope with emotions as well as with indices of psychological adjustment. Based on their longitudinal, biopsychosocial assessment of parenting behaviour, children's emotion regulation, and children's developmental outcomes, Gottman and colleagues (e.g., Gottman *et al*., 1996; 1997) reported that parents' validation of children's negative emotions, and their engagement in

coaching their child in recognizing and coping with these emotions, were related to children's emotion regulation abilities, which were in turn predictive of depressive symptomatology at early adolescence. A recent study with early adolescents found that adolescents whose mothers use more coaching strategies with them reported lower levels of internalizing symptomatology, and those whose mothers are more accepting of their anger and sadness had a more positive view of their physical appearance (Katz and Hunter, in press). Taken together, research findings indicate that parental responses to child negative affect characterized by acceptance, coaching, and problem solving are positively associated with children's adaptive responses to negative affect and inversely associated with depressive symptomatology.

Parental Temperament

Parents' responses to the child may also be influenced by their own temperament characteristics and emotion regulation capacities. Cumberland-Li *et al*. (2003) found that maternal dispositional emotionality and regulation influence the emotional quality of their interactions with their children, which in turn influence their children's emotional competence and adjustment. In particular, they reported that mothers prone to negative emotion tended to be relatively low on positive expressivity in parent–child interactions, which in turn predicted poorer psychosocial functioning on the part of the children.

Relatedly, it is likely that parents' temperament and ability to regulate their own emotions play a part in the way they socialize their children's emotion regulation. In this regard, Gottman and colleagues (1996, 1997) propose that parents' meta-emotion philosophy, that is their beliefs about and attitudes toward their own and others' emotions, is an important influence on parental emotion regulation and socialization. It could also be postulated that parents' meta-emotion is itself influenced by their own temperament and socialization experiences with their parents, but this has not been investigated to-date.

Interactive Influences of Temperament and Family Processes

As reflected in our model, researchers have proposed that intrapersonal and transactional processes interact in the development of emotion regulation skills. For instance, child temperament may influence and shape child emotion regulation, not only as an intrinsic factor but also in interaction with extrinsic factors such as caregiver response to the child (according to the child's temperament) (Fox and Calkins, 2003). Indeed, recent studies have found that the influence of temperament and parenting processes on adolescent risk for depression is not independent, but bidirectional (Lengua and Kovacs, 2005), moderating each other's impact on adolescent depressive symptoms (Oldehinkel *et al*., 2006). Hence, while child temperament may evoke different parental responses, the impact of these parenting processes on adolescent emotion regulation and adjustment may in turn depend on the adolescent's temperament. In addition, parenting processes may further shape adolescent temperament, changing the course of the impact of child temperament on the parent–adolescent relationship and on adolescent emotion regulation and risk for depression. These patterns of interactions are dynamic and transactional, influencing and building on one another to shape subsequent interactions and experiences. Such dynamic processes occurring at different developmental periods alter the developmental trajectory of emotion regulation and related capacities (Diamond and Aspinwall, 2003b). Where these processes involve dysregulated affective behaviours from one or both parties, they can contribute to an adverse family emotional climate of escalating aversive exchanges typically seen in families of children with internalizing (e.g., Sheeber *et al*., 2000) and externalizing problems (e.g., Patterson *et al*., 1990).

For instance, as described by Eisenberg *et al*. (2000), individual-environment transactions promote continuity of one's dispositional style and its associated outcomes. Their research, which has focused mainly on externalizing problem behaviours as outcomes, suggests that early temperamental differences in emotionality and regulation evoke responses from the interpersonal environment that reinforce the child's initial tendencies. For example, bidirectional relations between child behaviour problems and parents' negative reactions to children's emotions emerged in a 3-wave longitudinal study of emotion regulation and externalizing behaviour in middle childhood (Eisenberg *et al*., 1999). In a more recent 2-wave longitudinal study with children aged 8–11, Lengua and Kovacs (2005) found bidirectional relations between child temperament and parenting dimensions of acceptance and inconsistent parenting. Time 1 maternal inconsistent parenting predicted Time 2 child irritability and fearfulness, whilst only

child irritability at Time 1 predicted inconsistent parenting at Time 2. Unfortunately, few other longitudinal studies have looked at bi-directional parent–child effects, and similar work focusing on internalizing problems (or depressive symptomatology more specifically) as outcomes has been even scarcer.

Finally, Fox and Calkins (2003) contend that a description of individual differences in emotion regulation is not simply an identification of the different strategies that may be used in particular emotionally arousing situations. Rather, the developmental process by which these strategies are acquired (often in interpersonal, transactional contexts) is itself subject to individual differences and must thus be taken into consideration. For instance, the child's eventual development of a repertoire of regulatory strategies may be influenced by parental responses to their negative emotionality (NEM). Parents who respond to the negative affective expressions of their children with high NEM traits in an emotion coaching manner are more likely to nurture the development of more adaptive emotion regulation skills and strategies in these children (Gottman *et al*., 1996; 1997).

In sum, the associations among child temperament, parenting processes and adolescent emotion regulation and depression are complex. Given that both temperament and parenting processes contribute to risk for depression in adolescence, accounting for both is necessary to improve our identification of risk and early prevention of subsequent depressive disorders.

Accounting for Adolescent Gender Differences in Depression

Studies have consistently found gender differences in depressive symptoms to be minimal in the 11–13 year-old age group, but emerging from 13 to 15 years of age (e.g., Hankin *et al*., 1998; Ormel *et al*., 2005b). By 15 years of age, female adolescents are twice as likely as their male peers to have experienced a depressive episode, and this gender difference is maintained into adulthood (Cyranowski *et al*., 2000). Insofar as emotion regulation functions as a risk mechanism for the development of adolescent depression, our proposed model presents possible explanations to account for some of these gender differences.

Firstly, female preadolescents have higher levels of negative emotionality (namely fearfulness and shyness) than males (Oldehinkel *et al*., 2004, 2006; Ormel *et al*., 2005a). Given that higher NEM is associated with higher levels of negative affect and poses greater challenges to emotion regulation, female adolescents may be temperamentally predisposed to regulatory difficulties and, hence, be at greater risk for developing depression.

Secondly, a few earlier studies have found that parental depression may have a more detrimental impact on female adolescents. This may be the case both because in families where a parent is depressed, negative family interactions are more likely to occur with a daughter than with a son (Johnson and Jacob, 1997; Tarullo *et al*., 1994) and because female adolescents may be more susceptible to the effect of negative family interactions (Davis *et al*., 1998; Hops *et al*., 1990). Researchers have suggested that females' greater vulnerability may be due to the intensity of the mother–daughter relationship (Youniss and Ketterlinus, 1987), and to increasing societal demands on them to maintain interpersonal relationships, especially within the family (Crick and Zahn-Waxler, 2003; Davies and Windle, 1997; Keenan and Hipwell, 2005). More specifically, female adolescents' greater susceptibility to depression given adverse family processes may operate through the impact of such family processes on the development of these adolescents' emotion regulation ability. Nonetheless, this possibility has yet to be investigated.

FUTURE DIRECTIONS FOR RESEARCH AND TREATMENT

Some suggestions for future research are clearly implied by our review and proposed model (see Fig. 1). Firstly, prospective longitudinal studies are needed to evaluate the hypothesized casual relationships amongst parent and child temperament, parental socialization, parent and child emotion regulation, and psychopathology. For example, multi-wave longitudinal data could clarify the influence of temperament and parenting on adolescent emotion regulation, as well as whether emotion regulation mediates the influence of these factors on risk for depression. In particular, studies directed at the transition into adolescence are needed to understand how early influences on emotion regulation translate into risk for emerging depression during later adolescence when the prevalence of depression is increasing sharply. Moreover, an increased focus on the role of parent and adolescent gender would provide a better understanding of the contribution of affect regulation skills to the gender disparity in

affective disorder. As well, the use of multi-method, multi-source measurements of temperament, emotion regulation and psychopathology would provide a more comprehensive assessment than exists to date of the relations among temperament, emotion regulation and psychopathology across reporters.

Observational research, in particular, may contribute to our ability to address the question raised by Gross (1999b), ''How can one tell when emotion is regulated?''. By observing family interactions and coding for various dimensions of emotional responses, their contingencies and trajectories during semi-structured parent–child interaction tasks, we may be able to gain a better understanding of child and parental strategies for regulating affect. This is consistent with Cole and colleagues' (2004) suggestion that observing change in emotional behavior, as a function of presumably regulatory processes will provide the clearest evidence on which to base inferences that emotions are regulated. Importantly, observational methods also have the potential to capture the dynamics of the emotion regulation process, and thus contribute more to the understanding of emotion regulation than methods which focus solely on static emotion valence, e.g., self-reported emotion regulation strategies or affective measures. Such methodology would also enable the examination of parents' responses to their child's emotions, and hence provide real-time measurement of parental socialization. Other useful methods for measuring dynamic emotion regulation and socialization processes include psychophysiological measures of emotional processes (Bradley, 2000) and more fine-grained analyses of facial expressions while individuals are engaged in family interaction tasks, which could be facilitated by recent developments in automated recognition of facial expression (Cohn, 2005).

Future research needs to address the dearth of knowledge about the role that positive emotionality plays in emotion regulation capacity. The relation between PEM and symptoms have been hitherto largely neglected because early models of temperament viewed emotionality as a single bipolar dimension with negative and positive emotionality on opposite poles (Lengua *et al*., 1999). However, there is evidence in the adult and child literature that NEM and PEM are separate although correlated dimensions.

Notably, researchers have begun to discuss the relevance of studying regulation of both negative and positive emotions (e.g., Derryberry *et al*., 2003; Gross and John, 2003; Lengua *et al*., 1999). Indeed, evidence on the quality and style of parenting by depressed mothers (who typically evidence both high NA and low PA) suggests that they may provide poor modelling for the child with regards to regulation of both negative and positive emotions (Cohn *et al*., 1986; Field, 1984; Field *et al*., 1985).

Some studies have also emphasized that PEM has separate and independent effects on developmental outcomes from those of NEM. In their investigation of children of divorce, Lengua *et al*. (1999) found that child PEM and NEM had independent and potentially additive effects on children's risk or resilience in response to divorce or other stressors. In particular, whilst NEM was related to higher levels of symptoms, PEM was related to lower levels of symptoms; and this pattern of findings was consistent across reporters, providing strong evidence that relations between these constructs are independent of common method variance. Moreover, the effects of PEM on symptoms were independent of the effects of NEM.

Lengua *et al*. (1999) propose that low PEM, which is characterized by the absence of pleasurable engagement, may lead to unrewarding experiences and may be related to apathy and anhedonia components of depression. In addition, they note that relations between PEM and symptoms may reflect the effects of a broader temperament construct, such as surgency, or the behavioural activation system, which involves approach and responsiveness to rewards. Other researchers have found that an under-reactive appetitive system (low PA) may contribute to depressive problems, in which individuals have deficits in reward anticipation and generation of approach responses to pleasant stimuli (e.g., Henriques *et al*., 1994; MacLeod and Salaminiou, 2001; Sloan *et al*., 2001).

Finally, an additional direction for future work would be to examine the specificity of the proposed model to depression. We hypothesize that aspects of the model would likely be relevant to other disorders given the overlap in symptoms, rates of comorbidity, and the equifinality of psychopathological pathways (Cicchetti and Rogosch, 2002; Mineka *et al*., 1998). For example, NEM is likely to be associated with increased risk for a range of disorders, including anxiety and substance use disorders (Kendler and Prescott, 2006). However, PEM may be specific to risk for depressive disorders (Chorpita, 2002; Joiner and Lonigan, 2000), and behavioural inhibition (Schwartz *et al*., 1999) may be specific to fear and

anxiety problems. Similarly, though it is likely that difficulty with enabling autonomy is a feature common to families of anxious youth (Hudson and Rapee, 2002), it is possible that parental modelling and socialization of specific negative emotions may vary across diagnostic groups. In this model we chose to focus on depressive disorders for two reasons: firstly, depression is characterized by the dysregulation of *both* negative *and positive* affect and hence is of particular interest in a model of emotion regulation (Gross and Munoz, 1995). Secondly, given our interest in the role of the family in socializing emotion regulation, and the wide range of findings indicating that depression is specifically responsive to social and interpersonal contingencies (Allen and Badcock, 2003), depression appears to be a model condition within which to initially examine the interaction between individual differences, parenting processes and psychopathological outcomes.

CONCLUSION

In sum, this review has presented an emotion regulation framework as a generative conceptual and integrative framework for understanding the role of temperament and family processes, and their interaction, in the increase in prevalence of depression during the adolescent years. By considering intrapersonal and interpersonal mechanisms of emotion regulation, we proposed an integrative model with emotion regulation at the centre of dynamic, transactional interrelationships amongst various proposed risk factors and adolescent depression, whereby adolescent emotion regulation functions as a mediator through which temperament and family processes may contribute to the development of adolescent depression. Like any conceptual model, this one awaits empirical testing to refine and verify the complex system of relationships.

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