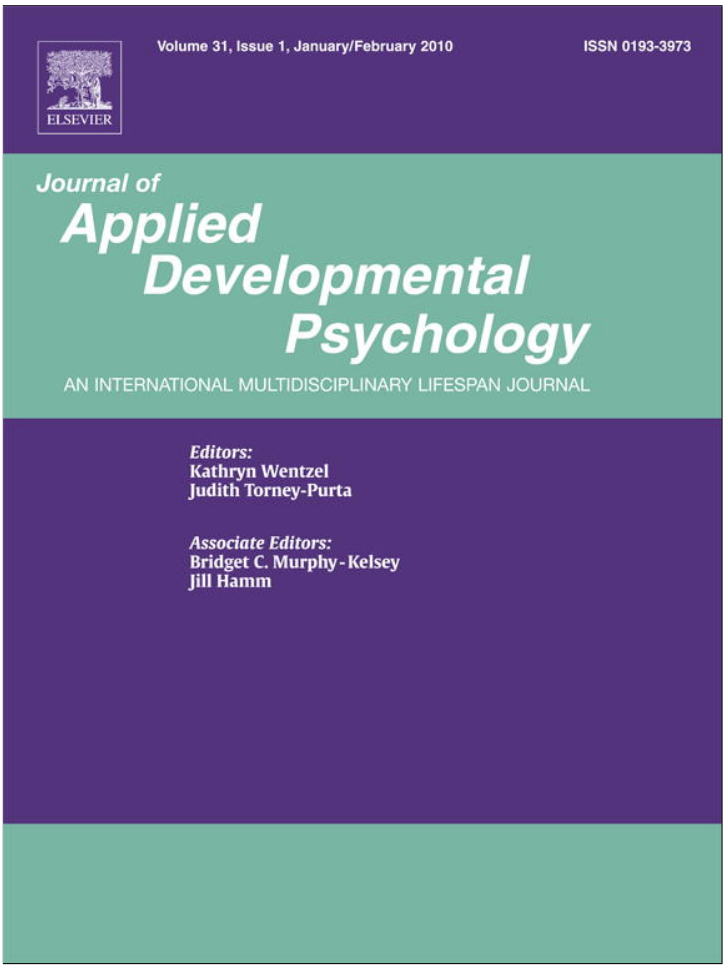

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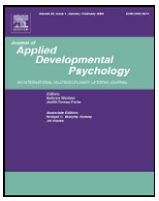

The roles of temperamental dispositions and perceived parenting behaviours in the use of two emotion regulation strategies in late childhood ☆

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ABSTRACT

In recent years, emotion regulation has re-emerged in the literature as a fundamental component of psychological functioning. The present study investigated the independent and interactive roles of temperamental dispositions and perceptions of parenting behaviors in the use of emotion regulation (ER) strategies in late childhood. A sample of 293 children (grades 4–6) completed measures of ER, temperament, and parenting behaviors. As hypothesized, higher scores on temperament-based Approach and perceived parental Care were associated with greater use of the ER strategy of Reappraisal, whereas lower levels of temperament-based Flexibility, Positive Mood Quality and perceived parental Care were associated with greater use of the ER strategy of Suppression. Results suggest that despite differing temperamental dispositions, the presence of a nurturing and supportive caregiving environment is important for the development of adaptive patterns of ER.

Introduction

A fundamental and long awaited agenda for research into the aetiology and prevention of mental health problems involves a more comprehensive understanding of the development of individual differences in emotional functioning and emotional competence (Cole, Michel, & Teti, 1994). Of note, poor regulation of emotions is implicated in more than half of the Axis I disorders included in the Diagnostic and Statistical Manual of Mental Disorders and in all of the Axis II disorders (Gross & Levenson, 1997; Repetti, Taylor, & Seeman, 2002). Difficulty regulating emotions is also predictive of poorer social competence and peer acceptance (Gottman, Katz, & Hooven, 1996; Gross & John, 2003).

To date, research studies contributing to understanding in this important area have typically focused on infancy, early childhood or adulthood. There remains a dearth of research examining the developmental periods of late childhood and adolescence. Given that these periods mark critical turning points in children's acquisition of cognitive, social and emotional skills as well as their development of autonomy (Cole et al., 1994; Gross & Munoz, 1995), research during these developmental periods is greatly needed.

According to Thompson (1994), the term emotion regulation (ER) refers to the processes, both extrinsic and intrinsic, that are responsible for recognizing, monitoring, evaluating and modifying emotional reactions. ER processes involve the initiation, enhancement and reduction of both positive and negative emotions (Gross, 1998b). The most adaptive means of expressing an emotion is in a situation specific manner and is dependent on both the demands of the immediate social context, as well as the goals of the individual (Cole et al., 1994; Gross & Thompson, 2007; Thompson, 1994; Thompson & Meyer, 2007). Inherent in this definition is the notion that ER encompasses both internal self-management, initiated and accomplished by the individual, as well

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as regulation externally influenced by others (Campos, Campos, & Barrett, 1989; Cole, Martin, & Dennis, 2004; Thompson, 1994). In the current study, the focus is on internal self-management.

According to Gross' (1998a) process-oriented approach, an emotion begins with an evaluation of emotion cues which, when attended to and evaluated in certain ways, triggers a coordinated set of response tendencies that involve experiential, behavioral and physiological systems. Specific ER strategies can therefore be differentiated along a "timeline of the unfolding emotional response" (John & Gross, 2004, p. 1302). It is proposed that these ER strategies can be executed consciously or automatically with little awareness or deliberation (Gross & John, 2003). At the broadest level, strategies may be classified as *antecedent-focused* and *response-focused*. Antecedent-focused strategies occur early in the emotion generative process and intervene before the emotion response tendencies have become fully activated. As such these strategies have the adaptive ability to modify the entire emotion sequence (John & Gross, 2004). By contrast, response-focused strategies come relatively late in the emotion generative process, with their effects limited to acting upon the behavioral aspects of the emotional response that has already been generated (John & Gross, 2004). Based on this temporal dichotomy, Gross and John (2003) and Gross and Levenson (1997) have conducted research related to two commonly used ER strategies, cognitive Reappraisal and expressive Suppression. Cognitive Reappraisal is an antecedent-focused strategy and involves redefining a potentially emotion-eliciting situation in such a way that its emotional impact is changed. For example, the outcome of a poor grade on an assignment may be reinterpreted from a perception of having failed to one of being provided with information for improved future performance. In contrast expressive Suppression is a response-focused strategy and involves the inhibition of ongoing emotion expressive behavior (John & Gross, 2004). For example, upon receiving information that one has been deliberately deceived, instead of showing one's anger, an individual retains their composure.

Based on a series of studies with young adults using their self-report Emotion Regulation Questionnaire, Gross and John (2003) found that individual differences in the use of Reappraisal and Suppression related in predictable ways to psychological and social functioning. Specifically, reappraisers were found to be more likely to negotiate stressful events by interpreting them in a more optimistic way, making active efforts to repair negative moods. Consequently they were found to experience and express more positive affect and less negative affect compared to individuals who used this strategy less frequently. These individuals also reported closer social relationships, greater self-esteem and life satisfaction and fewer depressive symptoms. In relation to Suppression, it was found that more frequent use was associated with considerable psychological costs. Specifically, suppressors were less successful at improving their mood, expressing and experiencing less positive affect. Whilst they *expressed* less negative affect compared to the level they were feeling, they *experienced* more negative affect than individuals who did not use this ER strategy. Furthermore, suppressors were found to report fewer and poorer quality relationships with others, lower levels of self-esteem and life satisfaction and more depressive symptoms. Knowledge of the ER strategies that individuals use in a given situation therefore has important implications for their affective experiences and interpersonal functioning. As such, an understanding of the developmental predictors of ER strategies is essential. Two proposed predictors are temperament and parenting behaviors (Southam-Gerow & Kendall, 2002).

Temperament and emotion regulation

Early temperamental characteristics that differentiate children from one another have been found to influence the kinds of ER skills and strategies children develop (Calkins, 2004; John & Gross, 2004). Based on a review of research with infants and young children, Southam-Gerow and Kendall (2002) have proposed that temperament "provides the blueprint and foundations from which and on which emotional development builds. Thus when considering the bricks and mortar that ER represent, an understanding of the blueprint and foundation is necessary" (p.191–192).

It has been found that children who experience extreme distress in response to particular types of events may become too disrupted to be able to generate constructive regulating behaviors (Calkins & Johnson, 1998). Similarly, an inhibited and withdrawn temperamental style has been associated with the use of help-seeking behaviors and emotional masking among both toddlers and young adults (Eisenberg, Fabes, & Murphy, 1995; Zimmermann & Stansbury, 2003).

Among young adults, personality traits, thought to develop from earlier temperamental dispositions, have been associated with specific ER strategies (John & Gross, 2004). For example, low extraversion, has been associated with expressive Suppression, whereas low neuroticism has been found to have a small association with cognitive Reappraisal. John and Gross (2004) have argued that individuals low in extraversion may employ Suppression more frequently as an attempt to minimize their potential rejection from others. In contrast, individuals low in neuroticism are not prone to extremely high levels of negative affect and therefore may be less overwhelmed by their negative emotions, making it easier for them to remain engaged in distressing situations long enough to find alternative ways of appraising the situation early in the emotion generative process (John & Gross, 2004).

In line with Kagan's (1997) construct of behavioral inhibition, research has consistently shown that individual differences characterized by a tendency to respond flexibly to environmental changes, to approach rather than withdraw from novel stimuli, and to experience positively valanced moods contribute to an individual's adaptability and psychological wellbeing (Windle, 1992a). Such research suggests that individual differences in characteristic behavioral styles play a significant role in the development of ER behaviors and strategies and consequently related development of psychopathology. For example, among adolescents, tendencies to withdraw from novel stimuli (Approach/Withdrawal), to be rigid in the face of environmental changes (Flexibility/Rigidity), and to experience negative moods (Mood Quality), have been shown to be predictive of depressive symptomatology (Windle, 1992b; Windle & Davies, 1999; Windle & Lerner, 1986; Windle & Mason, 2004) and delinquent behavior (Windle, 1992b). In addition, higher levels of Approach, Flexibility and Positive Mood Quality have been positively related to measures of general self worth and perceived competence among both 12-year-olds and college undergraduates

(Windle et al., 1986). Each of these dimensions has been proposed to represent an individual's adaptability in the face of stressful situations (Windle, 1992a).

Although the child's temperamental disposition or characteristic behavioral style plays an important role in laying the foundation for subsequent development, from the very outset temperament is shaped by the child's surrounding environment (Calkins & Hill, 2007; Southam-Gerow & Kendall, 2002). One important assumption of much of the research on the development of ER is that parental caregiving practices play an important contextual role in that they may magnify or minimize adaptive or maladaptive temperamental tendencies and emotion-related behaviors (Calkins, Smith, Gill, & Johnson, 1998; Southam-Gerow & Kendall, 2002; Thompson, 1994; Thompson & Meyer, 2007).

Perceived parenting behaviors and emotion regulation

The quality of parent–child interactions forms the basis of the attachment relationship and has been found to have profound implications for a child's experience, expression and regulation of emotion (Cassidy, 1994; Eisenberg, Spinrad, & Cumberland, 1998; Morris, Silk, Steinberg, Myers, & Robinson, 2007). According to Cassidy (1994), securely attached children develop an expectation that their emotion signals will be predictably and sensitively responded to. Thus securely attached children openly express and share their emotions. In contrast, insecurely attached children develop expectations that their emotion signals will be attended to only selectively or unpredictably. Consequently, insecurely attached infants are likely to develop maladaptive ER strategies including minimization, exaggeration and distortion (Calkins & Hill, 2007; Cassidy, 1994).

Based on attachment theory, Parker, Tupling, and Brown (1979) developed the Parental Bonding Instrument (PBI) to assess parenting styles along two bipolar dimensions: Care (ranging from affection and emotional warmth to indifference and neglect) and Overprotection (ranging from parental over-control to encouragement of autonomy). Studies using the PBI have consistently reported that there are significant associations between psychological distress including depressive symptomatology and lifetime diagnosis of depression among clinical and non-clinical samples of adolescents, and the combination of low Care and high Overprotection (e.g., McFarlane, Bellissimo, & Norman, 1995; Parker, 1983; Patton, Coffey, Posterino, Carlin, & Wolfe, 2001).

In line with these research findings, it has been argued that to enable children to practice and master their own regulation, parents need to allow appropriate autonomy in emotional situations (Southam-Gerow & Kendall, 2002). A parent who engages with and supports a child displaying negative emotions in a controlling and overprotective manner inhibits the child from experimenting with various ER strategies (Bell & Calkins, 2000; Fox & Calkins, 2003). These children consequently learn to depend on external support as their opportunities for developing a repertoire of optimal regulation strategies are limited. Empirical research with toddlers has suggested that maternal controlling behavior is related to less adaptive ER strategies (orienting to the object of frustration) and less physiological regulation during emotion-eliciting situations (Calkins & Johnson, 1998; Calkins et al., 1998). In contrast, maternal behavior characterized by encouragement, verbal guiding and support has been related to more adaptive ER strategies, including problem solving and distraction (Calkins & Johnson, 1998; Spinrad, Stifter, Donelan-McCall, & Turner, 2004).

Emotion self-regulation develops as children internalize the explicit and implicit evaluations of their emotions by significant others and thus learn to assess their feelings in similar ways (Thompson & Meyer, 2007). In one study of 9 to 12-year-olds, punitive and parental minimization responses to children's emotions were related to lower levels of constructive coping (cognitive restructuring and support seeking) and higher levels of avoidant coping in peer conflict situations (Eisenberg, Fabes, & Murphy, 1996). Research has also indicated that harsh or unsupportive responses to children's emotional displays serve to heighten their emotional arousal and teach them to avoid rather than to understand and appropriately express their negative emotions (Berlin & Cassidy, 2003; Eisenberg et al., 1998). Berlin and Cassidy (2003) for example, found that maternal reports of greater control of their children's emotional displays were associated with children's increased likelihood of suppressing their emotions when winning or losing a challenging game. Related research suggests that children whose parents invalidate, criticize or avoid teaching them about emotions adopt fewer adaptive emotion regulation strategies and have generally poorer emotional adjustment (Lunkenheimer, Shields, & Cortina, 2007; Shipman et al., 2007).

Conversely, studies have demonstrated that children regulate their emotions more adaptively in the immediate context and acquire more constructive ER strategies when parents respond in an accepting and supportive way to their negative emotional displays (Eisenberg et al., 1996; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Ramsden & Hubbard, 2002). Gottman, Katz, and Hooven (1996), for example, reported that parents' validation of children's negative emotions, and their engagement in coaching their children to recognize and deal with emotions, was related to children's greater ability to regulate their emotions, which later predicted higher levels of social competence. Others have reported related findings. For example, children whose parents regularly discuss emotions with them have been found to demonstrate a more complex understanding of emotion experiences and expression (Denham, Renwick-DeBardi, & Hewes, 1994; Dunn, Brown, & Beardshall, 1991; Dunn, Brown, Slomkowski, Telsa, & Youngblade, 1991). There is general consensus that having a sophisticated understanding of emotions is an important ER competency (Kopp, 1992).

Emerging research suggests that the development of ER skills and strategies is a transactional process, dependent on both child and parent contributions (Calkins, 1994; Morris et al., 2007). Accordingly, Southam-Gerow and Kendall (2002) have proposed that parenting practices and caregiver characteristics have a moderating influence on outcomes associated with the child's temperament. As such, parenting behaviors have the power to shape the impact of the child's temperament on the development of ER strategies. For example, a negatively reactive child may be forced to rely on immature or ineffective ER strategies if his/her caregiver has not provided the appropriate and necessary emotional support (Calkins, 2004). Furthermore, caregiver behaviors that are cold and unsupportive may not only exacerbate certain genetically based predispositions but may even create certain risks that would not otherwise exist (Repetti et al., 2002).

Parenting and temperament

Research examining the interactive associations between temperament and parenting with childhood emotion regulation is relatively rare. With exception, Gilliom, Shaw, Beck, Schonberg, and Lukon (2002) reported that among low income families, preschool boys' negative emotionality at 18 months of age was predictive of lower rates of adaptive emotion regulatory behaviors (passive waiting) and higher rates of maladaptive regulatory behaviors (focusing on the object of frustration) at 3 years and 6 months of age only among children whose mothers employed hostile and harsh parenting behaviors. Similarly, in a related study (Nachmias, Gunnar, Mangelsdorf, Parritz, & Buss, 1996), heightened physiological stress reactions were found only for 18-month old toddlers who were both temperamentally inhibited and in attachment relationships characterized by controlling and intrusive caregivers.

The current study

The aim of this study was to assess the independent and interactive roles of specific temperament-based dimensions and children's perceptions of parenting behavior in the use of ER strategies in late childhood. Given the predominant focus on infancy in existing ER research, reliance on observational and parent-report methods predominates in the ER literature. With its focus on older children, this study used the complimentary method of self-report, a method more appropriate to this age-group given their cognitively more mature age (Soto, John, Gosling, & Potter, 2008; Walden, Harris, & Cartron, 2003).

In accordance with the above reviewed literature it was hypothesized that: (i) lower levels of temperamental Flexibility, Approach and Positive Mood Quality, would be associated with greater use of expressive Suppression and less use of cognitive Reappraisal, (ii) lower levels of parental Care and higher levels of parental Overprotection would be associated with greater use of Suppression and less use of Reappraisal, and (iii) perceived parenting behaviors would moderate the relationship between temperament and ER. Thus, inverse relations between Flexibility, Approach and Positive Mood Quality with expressive Suppression would be stronger when parental Care is high than when Care is low and the proposed positive relations between Flexibility, Approach and Positive Mood Quality with cognitive Reappraisal would be stronger when parental Care is high than when Care is low. The opposite trend was proposed for parental Overprotection such that, at high levels of Overprotection compared to low levels, the proposed inverse relations between the temperament variables and expressive Suppression would be stronger. Similarly, the proposed positive relationships between the temperament variables and cognitive Reappraisal would be weaker at high levels of parental Overprotection.

Findings related to these hypotheses are proposed to have potential applied implications regarding interventions aimed at teaching children and adolescents to recognize, regulate and express their emotions in a socially appropriate manner so as to lead to improved psychological wellbeing.

Method

Participants

The initial sample comprised 298 participants aged 9–12 years recruited during the fourth wave of a larger ongoing longitudinal study on emotional development and wellbeing in children and adolescents. Following data screening, the final sample comprised 293 participants, of which 158 were female (Mean age = 10.77, $SD = .86$) and 135 were male (Mean age = 10.78 $SD = .94$). Most participants were born in Australia (72.7%), spoke English at home (73.7%), and lived with two parents (76.5%). This is representative of the city of Melbourne (Australian Bureau of Statistics, 2007).

The majority of participants (91.1%) were recruited through primary schools in metropolitan Melbourne, Australia (Group A). Of the 25 state and independent primary schools contacted, four state schools agreed to participate. All students from grades four to six at these schools were invited to participate with the response rate within participating schools being 30.8%. The remaining participants (Group B) were recruited through the university email bulletin ($n = 18$; 6.1%) or were children in families with older siblings who had previously participated in the longitudinal study (Group C) ($n = 8$; 2.7%). In total, the sample comprised 18 sibling pairs from Groups A and B only. There were no significant differences in assessed measures by recruitment method, aside from parental Overprotection for Group C participants who scored significantly higher than the two remaining groups (school $M = 12.7$, $SD = 5.7$; email $M = 10.8$, $SD = 4.6$; siblings $M = 18.9$, $SD = 4.9$; $F(1, 290) = 5.79$, $p < .01$, $\eta^2 = .04$). However, given the small number of Group C participants, the difference is unlikely to have affected the overall study results.

Measures

Emotion regulation

A revision for children (i.e. The Emotion Regulation Questionnaire for Children and Adolescents; ERQ-CA (MacDermott, Betts, Gullone & Allen, submitted for publication) of the original 10-item adult Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) was used to assess ER. This is a measure of the two ER strategies of cognitive Reappraisal (six items) and expressive Suppression (four items). For the revised version, items were simplified to enhance comprehension by children. For example, Suppression items include "I control my feelings by not showing them" and Reappraisal items include "I control my feelings about things by changing the way I think about them". The response scale was reduced from a 7-point to a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Scores range from 6 to 30 for the Reappraisal scale and 4 to 20 for the Suppression scale, with higher scores representing greater use of that particular regulation strategy.

Sound psychometric properties have been reported for the original ERQ with both younger and older adults (Gross & John, 2003; John & Gross, 2004). Test–retest reliability across 3 months was 0.69 for both Reappraisal and Suppression. Convergent validity has been demonstrated by associations with measures of coping and mood management, and discriminate validity reported along the personality dimensions of ego control and cognitive ability (Gross & John, 2003).

Psychometric analysis of the ERQ-CA by MacDermott et al. (submitted for publication) with a sample ranging in age between 9 and 16 years, has demonstrated it to have good internal consistency (Reappraisal, $\alpha = .81$; Suppression, $\alpha = .69$) and adequate 4-week test–retest reliability (Reappraisal, $r = .54$; Suppression, $r = .59$). In the current study, internal consistency coefficients were highly comparable (Reappraisal, $\alpha = .79$; Suppression, $\alpha = .62$) with those reported by MacDermott et al. (submitted for publication). Using confirmatory factor analysis, MacDermott et al. (submitted for publication) reproduced the two factors found by Gross and John (2003) for the adult version of the measure. A model comprising two unrelated factors was found to provide good fit for the data on a number of fit indices (see MacDermott et al. for details). Discriminant validity of the ERQ-CA has also been reported in relation to adolescent depression risk status (Betts, Gullone, & Allen, 2009).

Temperament

The Revised Dimensions of Temperament Survey child self-report scale (DOTS-R; Windle & Lerner, 1986) was used to assess individual differences in characteristic behavioral styles (Windle & Lerner, 1986). It is described by the authors as being suitable for administration to children from the late elementary school years through to the high school years (i.e., from early to late adolescence). Of the 10 DOTS-R subscales, in the current study, the three subscales reflecting adaptability (Windle, 1992a) were used. The three subscales included Approach–Withdrawal (seven items), Flexibility–Rigidity (five items) and Mood Quality (seven items). Given that higher scores reflect a greater tendency to approach novelty, to respond flexibly to changes in the environment, and to experience positive moods, these dimensions are labeled Approach, Flexibility and Positive Mood Quality respectively. Example items include "I usually move toward new objects shown to me" (Approach) "When things are out of place, it takes me a long time to get used to it" (reverse scored-Flexibility), and "I laugh and smile at a lot of things" (Positive Mood Quality). The response format was reduced from a 4-point to a 3-point Likert scale (1 = not true, 3 = very true) to simplify use with younger children. Scores range from 7 to 21 for the Approach and Positive Mood scales and 5–15 for the Flexibility scale.

Cronbach's alpha coefficients for the three scales have been uniformly high (Approach = 0.85, Flexibility = 0.78, Positive Mood Quality = 0.89) and 6-week test–retest correlations for a sample of late adolescents have ranged from 0.59 to 0.75 (Windle & Lerner, 1986). Convergent validity with measures of perceived psychosocial functioning has been demonstrated (Windle & Lerner, 1986; Windle et al., 1986). In the current study, lower internal consistency coefficients were demonstrated (Approach $\alpha = .57$; Flexibility $\alpha = .58$; Positive Mood Quality $\alpha = .80$).

Parenting behaviors

The Parental Bonding Instrument (PBI; Parker et al., 1979) was used to assess children's perceptions of parental behaviors along two bipolar dimensions: the 12-item Care dimension (high scores reflect greater warmth and nurturance) and the 13-item Overprotection dimension (higher scores reflect greater intrusiveness and control). Originally developed for adults to retrospectively report perceptions of parenting, it has been revised and validated for use with children and adolescents (Herz & Gullone, 1999). Example items include "My mother/father speaks to me with a warm and friendly voice" (Care) and "My mother/father tries to control everything I do" (Overprotection). Respondents were required to answer items for only one parent on a 4-point Likert scale (0 = strongly disagree, 3 = strongly agree). Scores range from 0 to 36 for the Care dimension and 0 to 39 for the Overprotection dimension. In the current study, 77% of participants answered the PBI for their mother, 21% for their father, and 2% about another type of guardian. There were no significant differences between Overprotection scores for mothers ($M = 12.9$, $SD = 5.5$), fathers ($M = 12.5$, $SD = 6.7$), and other guardians ($M = 13.0$, $SD = 5.0$; $p > .05$). Analysis of variance indicated a significant effect of caregiver for Care scores ($F(1, 290) = 3.22$, $p < .05$, $\eta^2 = .02$); however, Scheffé post hoc comparisons indicated no significant differences between scores for mothers ($M = 30.0$, $SD = 5.0$), fathers ($M = 28.2$, $SD = 5.8$), and other guardians ($M = 28.0$, $SD = 4.6$; $p > .05$). Further, it was found that the study results were similar when reports for mothers and fathers were analyzed separately. As such, PBI results were not separated by caregiver.

The original PBI has been shown to have sound psychometric properties. Three-week test–retest reliability coefficients were reported to be 0.76 (Care) and 0.63 (Overprotection) (Parker et al., 1979). Predictive validity has also been reported through a number of studies examining psychopathology. For example, people with depressive disorders have been found to score higher on the Overprotection dimension but lower on the Care dimension compared to non-depressed adults (see, Parker, 1983; Patton et al., 2001). For the revised version of the PBI, Herz and Gullone (1999) reported good convergent validity with self-esteem and good internal consistency coefficients of 0.81 (Overprotection) and 0.90 (Care), for a sample of 238 adolescents. Further, Gullone and Robinson (2005), reported sound validity and internal consistency with a sample of 282 children and adolescents ranging in age between 9 and 15 years. Comparable internal consistency was found in the current study (Overprotection $\alpha = .78$; Care $\alpha = .84$).

Procedure

Approvals were obtained from the institutional ethics committee, Department of Education, and Catholic Education Office. Schools were contacted by phone and invited to take part in the study. All schools who agreed were visited by the first author who spoke to children in grades four to six and distributed child and parent explanatory and consent forms. Questionnaires were

administered on the second school visit to all children who had been given parental consent and who had themselves given assent. Questionnaires were counterbalanced and administered to participants in groups during school hours and in a room away from regular classes. Each questionnaire item was read aloud by the first author and questionnaire pack completion took approximately 40 min with some variation depending upon the age of the participant. Participants recruited by email or as siblings of participants recruited through the school were posted the questionnaires for completion to their home to be returned in reply-paid envelopes. All participants received a gift voucher for their participation.

Results

Data analyses summary

With the alpha level set at 0.05 for all inferential tests, mean group differences in the temperament, parenting and ER variables by age (9–10 years compared to 11–12 years) and sex were investigated using three 2×2 multivariate analyses of variance. Pearson's Product Moment correlation analyses between the study variables were followed by a series of hierarchical multiple regression analyses to determine whether the temperament and parenting subscales predicted the ER variables of cognitive Reappraisal and expressive Suppression. These hierarchical regression analyses were also conducted, in accordance with Holmbeck (1997), to examine whether the parenting dimensions of Care and Overprotection moderated the relationship between temperament and the ER variables.

Prior to analysis, the data were screened for missing values and outliers. This resulted in the exclusion of five cases: one case was missing the PBI, and four cases contained univariate outliers (standardized z-scores ± 3.29). No multivariate outliers were detected. Missing item responses (0.4%) were replaced with the series mean for cases with no more than 20% of item responses missing from any one subscale. Although distribution histograms for the ER, temperament and parenting variables indicated that these variables were skewed, no adjustments were deemed necessary given the sample size (Harris, 1985). When testing the significance of individual predictors, Tabachnick and Fidell (2007) recommend that $N \geq 104 + m$ (where m is the number of predictors). The number of cases well exceeds this criterion in the current sample.

Age-group and sex differences

To investigate whether perceived parenting, temperament and ER strategies scores varied as a function of age-group and sex, three 2 (age-group) $\times 2$ (sex) between subjects multivariate analyses of variance (MANOVA) were performed separately for each group of variables (i.e., parenting, temperament, ER strategies). The MANOVA with the parenting dimensions as the dependent variables yielded no significant main effect for age-group. (F (2, 288) = 2.49, $p > .05$, $\eta^2 = .02$), nor sex (F (2, 288) = 0.26, $p > .05$, $\eta^2 = .00$). Further, no significant interaction effect was found between age-group and sex (F (2, 288) = 0.07, $p > .05$, $\eta^2 = .00$).

The analysis with the ER strategies entered as the dependent variables yielded a significant main effect for age-group (F (2, 288) = 3.39, $p < .05$; $\eta^2 = .02$), but not for sex (F (2, 288) = 2.82, $p > .05$; $\eta^2 = .02$). No significant interaction effect between age-group and sex was found (F (2, 288) = 0.10, $p > .05$; $\eta^2 = .00$). Univariate analyses showed that Reappraisal significantly differed by age-group ($F(1, 289) = 6.80$, $p < .05$; $\eta^2 = .02$) with children in the older age-group (11–12 years) being more likely to report using this strategy compared to those in the younger age-group (9–10 years). See Table 1 for means and standard deviations.

Finally, the MANOVA examining the temperament variables as dependent yielded a significant sex group effect ($F(3, 287) = 3.37$, $p < .05$; $\eta^2 = .03$) but not an age-group effect (F (3, 287) = 2.37, $p > .05$; $\eta^2 = .02$). There was also no significant interaction effect between sex and age-group (F (3, 287) = 0.32, $p > .05$; $\eta^2 = .00$). Univariate analyses revealed that, Positive Mood Quality differed between males and females (F (1, 289) = 8.97, $p < .01$; $\eta^2 = .03$), with females reporting significantly higher levels of Positive

Table 1
Means and standard deviations for parenting, temperament and emotion regulation strategies by age and sex.

	Overall	Males	Females	9–10 years	11–12 years
	($n = 293$)	($n = 135$)	($n = 158$)	($n = 173$)	($n = 120$)
Measure	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Parenting					
Care	29.58 (5.19)	29.35 (4.92)	29.79 (5.42)	29.71 (5.08)	29.40 (5.37)
Overprotection	12.79 (5.71)	12.80 (6.02)	12.79 (5.45)	13.26 (5.50)	12.12 (5.96)
Temperament					
Approach	15.69 (2.36)	15.74 (2.29)	15.66 (2.42)	15.43 (2.40)	16.08 (2.25)
Flexibility	11.61 (1.89)	11.51 (1.93)	11.70 (1.86)	11.45 (1.86)	11.84 (1.91)
Positive Mood Quality	18.30 (2.77)	17.78 (2.88)	18.74 (2.59)**	18.21 (2.91)	18.43 (2.56)
Emotion regulation strategies					
Reappraisal	21.64 (3.90)	21.60 (3.98)	21.68 (3.84)	21.15 (3.88)	22.35 (3.84)*
Suppression	10.53 (2.92)	10.95 (2.95)	10.16 (2.86)	10.47 (2.87)	10.61 (3.01)

Note. Significant MANOVA univariate analysis differences are noted with asterisks.
*$p < .05$. **$p < .01$.

Mood Quality compared to males. Due to the significant findings for age-group and sex, these two variables were controlled for in subsequent regression analyses.

Pearson's product moment correlations

Table 2 presents the inter-correlations between the temperament, parenting and ER variables. As shown in the table, Reappraisal was significantly positively correlated with Approach, Positive Mood Quality and Care and significantly negatively correlated with Overprotection. In addition, Suppression was significantly negatively correlated with Approach, Flexibility, Positive Mood Quality and Care and positively correlated with Overprotection. The coefficient between Reappraisal and Suppression was not found to be significant, suggesting that these two ER scales tap into unique constructs.

Hierarchical multiple regression analyses

A regression analysis was performed to investigate whether participants' Suppression scores could be predicted from the temperament and parenting variables, as well as examining whether the two parenting variables (i.e., Care and Overprotection) have a moderating effect on the relationship between the temperament variables and the ER strategy of Suppression. Age (as a continuous variable) and sex (0 = male, 1 = female) were entered at step one. Sex but not age was found to be a significant predictor. The temperament variables (Approach, Flexibility and Positive Mood Quality) were entered at step two and together explained 12.2% of the variance in Suppression (F change (3, 287) = 13.52, $p<.001$). The parenting variables of Care and Overprotection, were entered at step three and together explained a further significant 2.6% of variance in Suppression (F change (2, 285) = 4.44, $p<.01$). The interaction between the temperament and parenting variables was entered at step four of the regression. To represent the interaction term, the proposed moderating parenting variables and the temperament-based predictor variables were first centered and then multiplied together (Aiken & West, 1991). A significant interaction term would indicate that the relationships between the temperament variables and Suppression were significantly different across the different levels of parental Care and Overprotection.

As can be seen in Table 3, in the final step, Flexibility, and the interaction between Approach and Care were found to provide unique contributions to Suppression. Although sex was found to provide a significant unique contribution to Suppression in the first step, following the entry of additional variables it was no longer significant. Similarly, while Positive Mood Quality was found to explain significant unique variance in the first step, following the entry of additional variables, it was no longer a significant predictor. Examination of the standardized beta coefficients revealed that Flexibility explained the most variance in Suppression, such that at low levels of Flexibility, children reported higher levels of Suppression. To explore the significant interaction effect between Approach and Care, slopes for low Care and high Care (i.e., ± 1 SD) were plotted and tested for significance according to procedures described by Aiken and West (1991). As can be seen in Fig. 1, the negative relationship between Approach and expressive Suppression appeared much stronger when parental Care was high than when Care was low with the slope for low Care appearing slightly positive. Statistical analyses indicated that when Care was high, Approach was significantly negatively related to Suppression ($\beta = -0.21$, $p<.01$). In contrast, when Care was low, Approach was not significantly related to Suppression ($\beta = 0.07$, $p>.05$).

A second regression analysis was performed to investigate whether participants' Reappraisal scores could be predicted from temperament and parenting variables. Age and sex were initially entered in the regression analysis. Contrary to the analysis with Suppression as the dependant variable, in this analysis sex was not found to be a significant predictor but age was significant. The temperament variables were entered at step two and together explained 12.6% of the variability in Reappraisal (F change (3, 287) = 13.98, $p<.001$). The parenting variables were entered next at step three and together explained a further significant 2.2% of the variance (F change (2, 285) = 3.72, $p<.05$). The interactions between temperament and parenting variables were entered at step four of the analysis and were not found to reach significance.

As can be seen in Table 4, in the final step, only the Approach and Care variables were found to explain significant unique variance in Reappraisal scores. Results indicated that at higher levels of each of Approach and Care, children reported higher levels

Table 2
Correlations between temperament, parenting and emotion regulation strategies ($n = 293$).

Subscale	1	2	3	4	5	6
Temperament						
1. Approach						
2. Flexibility	0.22**					
3. Mood	0.30**	0.24**				
Parenting						
4. Care	0.25**	0.17**	0.31**			
5. Overprotection	−0.24**	−0.37**	−0.24**	−0.48**		
Emotion regulation strategies						
6. Reappraisal	0.35**	0.03	0.19**	0.23**	−0.17**	
7. Suppression	−0.13*	−0.31**	−0.24**	−0.25**	0.24**	0.06

*$p<.05$. **$p<.01$, one-tailed.

Table 3
Summary of hierarchical regression analysis for parenting and temperament variables used to predict suppression ($N = 293$).

Variable	*B*	*SE B*	β
Step 1			
Age	−0.01	0.19	−0.00
Sex	−0.79	0.34	−0.14*
	$R = .14$		
	Adjusted $R^2 = .01$		
Step 2			
Age	0.19	0.18	0.06
Sex	−0.56	0.33	−0.10
Approach	−0.05	0.07	−0.04
Flexibility	−0.42	0.09	−0.27**
Positive mood quality	−0.16	0.06	−0.15**
	$R = 0.37$		
	Adjusted $R^2 = 0.13$		
Step 3			
Age	0.16	0.18	0.05
Sex	−0.57	0.32	−0.10
Approach	−0.01	0.07	−0.01
Flexibility	−0.37	0.09	−0.24**
Positive mood quality	−0.12	0.06	−0.11
Care	−0.08	0.04	−0.14*
Overprotection	0.03	0.03	0.06
	$R = 0.41$		
	Adjusted $R^2 = 0.15$		
Step 4			
Age	0.13	0.18	0.04
Sex	−0.60	0.33	−0.10
Approach	−0.01	0.07	−0.01
Flexibility	−0.30	0.10	−0.20**
Positive mood quality	−0.11	0.07	−0.12
Care	−0.09	0.04	−0.15*
Overprotection	0.03	0.03	0.06
Approach × Care	−0.04	0.02	−0.18**
Approach × Overprotection	−0.01	0.01	−0.05
Flexibility × Care	−0.01	0.02	−0.03
Flexibility × Overprotection	−0.01	0.02	−0.02
Positive mood quality × Care	0.00	0.01	0.01
Positive mood quality × Overprotection	−0.02	0.01	−0.12
	$R = .44$		
	Adjusted $R^2 = 0.16$		

* $p < .05$. ** $p < .01$.

of Reappraisal. Although age was initially found to be a significant predictor, following the subsequent entry of the additional variables, it was no longer significant. Examination of the standardized beta coefficients revealed that Approach explained the largest amount of unique variance in Reappraisal scores.

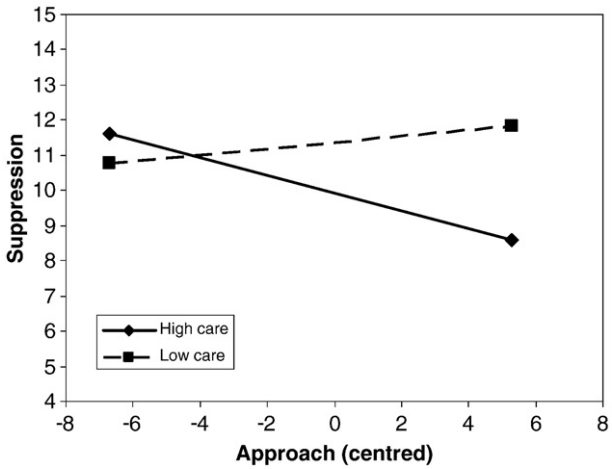

Fig. 1. A graphical plot of the relation between child temperament-based Approach and the emotion regulation strategy of Suppression as moderated by parental Care.

Table 4
Summary of hierarchical regression analysis for parenting and temperament variables used to predict reappraisal ($n = 293$).

Variable	*B*	*SE B*	β
Step 1			
Age	0.53	0.26	0.12*
Sex	0.09	0.46	0.01
	$R = 0.12$		
	Adjusted $R^2 = 0.01$		
Step 2			
Age	0.33	0.24	0.07
Sex	0.01	0.44	0.00
Approach	0.54	0.10	0.32**
Flexibility	−0.16	0.12	−0.08
Positive mood quality	0.15	0.08	0.11
	$R = 0.38$		
	Adjusted $R^2 = 0.13$		
Step 3			
Age	0.36	0.24	0.08
Sex	0.03	0.43	0.00
Approach	0.49	0.10	0.30**
Flexibility	−0.21	0.12	−0.10
Positive mood quality	0.10	0.09	0.07
Care	0.10	0.05	0.13*
Overprotection	−0.03	0.05	−0.05
	$R = 0.40$		
	Adjusted $R^2 = 0.14$		
Step 4			
Age	0.36	0.24	0.08
Sex	−0.08	0.44	−0.01
Approach	0.46	0.10	0.28**
Flexibility	−0.25	0.13	−0.12
Positive mood quality	0.12	0.09	0.09
Care	0.11	0.05	0.15*
Overprotection	−0.04	0.05	−0.06
Approach × Care	0.04	0.02	0.13
Approach × Overprotection	0.01	0.02	0.04
Flexibility × Care	0.02	0.03	0.04
Flexibility × Overprotection	0.00	0.02	0.01
Positive mood quality × Care	0.00	0.02	−0.00
Positive mood quality × Overprotection	−0.02	0.02	−0.08
	$R = 0.43$		
	Adjusted $R^2 = 0.15$		

*$p < .05$. **$p < .01$.

Discussion

The aims of the present study were to examine the direct and interactive roles of a number of temperament-based variables and perceived parenting behaviors in the use of ER strategies during late childhood. On the whole, the data provided support for the hypotheses that temperament-based variables and perceived parenting behaviors are associated with children's use of the specific ER strategies of expressive Suppression and cognitive Reappraisal. However, the hypothesis that perceived parenting behaviors would moderate the relationship between temperament and ER strategies was only partially supported.

Suppression use

As hypothesized, lower levels of the temperamentally based variables of Positive Mood, Approach behavior, and Flexibility were associated with greater use of Suppression. These findings are consistent with those reported by Gross and John (2003) with their sample of young adults. Specifically, in line with the current inverse association between Positive Mood and Suppression use, Gross and John (2003) found lower levels of self-esteem, optimism, and life satisfaction to be inversely associated with Suppression use. Also, consistent with the present finding of an inverse association between Approach behavior and Suppression use, Gross and John (2003) found an inverse association between extraversion and Suppression use. Thus, children and adolescents who scored higher on Suppression are more likely to experience lower levels of psychological wellbeing.

The current finding of an inverse relationship between temperamental Flexibility and Suppression suggests that children who are unable to emotionally respond in a flexible manner that is best suited to the situation are more likely to adopt the less functional ER strategy of Suppression. This finding is consistent with the conceptualization of emotion dysregulation, which is thought to reflect states of rigidity, where one's affective response to environmental demands lacks breadth and flexibility (Cole et al., 1994; Gross & John, 2002; Gross & Munoz, 1995). The present findings therefore have relevant applied implications and suggest that interventions

aimed at teaching children and adolescents to recognize their emotions and to express them in a socially appropriate manner are likely to lead to improved psychological wellbeing.

In relation to perceived parenting, as hypothesized, lower levels of parental Care were associated with greater Suppression use. This is in accordance with previous research which has demonstrated that when caregivers fail to provide children with emotional support, children are more likely to view their own and others' emotions as negative or threatening. Consequently, they are more likely to avoid opportunities to meaningfully explore and deal with their emotions (e.g., Cassidy, 1994; Eisenberg et al., 1996, 1998; Morris et al., 2007). That the relationship between expressive Suppression and temperamental Approach behavior was different depending upon the level of perceived parental Care reinforces the importance of parental Care. Specifically, at high levels of Care, Approach behavior was significant negatively related with Suppression however at low levels of Care, the relationship between Approach and Suppression was not significant. This finding suggests that parental Care can act as a buffer against potential risk (i.e., low Approach). The current findings are therefore supportive of proposals previously put forth by others that without the presence of a nurturing and supportive caregiving environment, children's development of confidence in their own abilities to effectively regulate emotions is compromised. Instead, they gradually learn to suppress or escape from heightened emotional arousal (Repetti et al., 2002).

Also, as expected, the bivariate correlation analyses showed that perceived parental Overprotection was positively associated with Suppression use. This finding is consistent with previous research illustrating that negative and controlling parenting behavior is related to less adaptive ER development (Berlin & Cassidy, 2003; Calkins & Johnson, 1998; Nachmias et al., 1996). It is noteworthy that, although the expected association was found between Suppression and Overprotection in bivariate analyses, in the multivariate analysis including parental Care and the temperament variables, parental Overprotection was no longer found to be a significant correlate suggesting that it plays a relatively less important role in Suppression use.

Reappraisal use

As hypothesized, higher levels of the temperamentally based variable of Approach behavior were associated with greater use of Reappraisal. This finding suggests that individuals with a tendency to approach novel stimuli are more likely to use a proactive and approach style (antecedent) ER strategy that involves evaluating, reinterpreting or reframing the situation to alter its emotional impact. The dynamic nature of this ER strategy is consistent with a temperamental style characterized as engaging and uninhibited. The present results are consistent with past research demonstrating the predominantly adaptive nature of the temperamental tendency to approach or move toward new objects, persons or situations (Windle, 1992a,b; Windle & Davies, 1999; Windle et al., 1986). It should be noted, however, that there is some research to suggest that high levels of temperamental approach may increase risk for behavioral problems, particularly when combined with low ER competencies (see Polak-Toste & Gunnar, 2006 for a review).

A significant bivariate correlation was also found between Positive Mood and Reappraisal. This is in line with Gross and John's (2003) findings of a positive association between Reappraisal and wellbeing indicators including self-esteem, optimism, and life satisfaction. It is, however, worth noting that the relationship between Positive Mood and Reappraisal was not confirmed in the multivariate analysis where a unique significant relationship was found only between Reappraisal use and Approach.

With regard to perceived parenting, as expected higher levels of parental Care were associated with greater use of cognitive Reappraisal. This is consistent with previous research demonstrating that children acquire more functional ER strategies such as self-distraction, positive thinking and problem solving when parents respond in an accepting and supportive way to their emotional displays (Calkins & Johnson, 1998; Eisenberg et al., 1996; Gilliom et al., 2002; Spinrad et al., 2004). It is also consistent with Gottman et al.'s (1996) findings which demonstrated that parents' attention to, and positive evaluation of emotions, through explicit discussion of how to best manage them, was related to children's adaptive ER abilities and social competence.

When examining the bivariate relationship between Reappraisal use and perceived parental Overprotection, a significant negative association was found as expected. However, as with analyses related to Suppression use in the multivariate analysis, parental Overprotection was not found to be a significant predictor variable.

Temperament, parenting and ER

On the whole, the demonstrated relationships between the temperament-based variables and ER strategies are consistent with theoretical propositions that temperament, to a significant degree, underpins the development of ER (Calkins, 1994; Calkins & Hill, 2007) and that the presence of certain temperamental predispositions predicts the use of specific regulatory strategies (Gross & Thompson, 2007; John & Gross, 2004; Southam-Gerow & Kendall, 2002).

With regard to relationships between perceived parenting behaviors and ER strategy use, the findings yielded in this study are consistent with the proposal that certain parenting practices predict children's ability to regulate emotions in immediate and long term contexts (Bell & Calkins, 2000; Calkins, 2004; Southam-Gerow & Kendall, 2002). In addition, the current findings indicate that, in comparison to parental Overprotection, caring parenting behaviors may be more important for the development of ER strategies. In previous research using the PBI, the Care dimension has consistently been demonstrated to be more strongly associated with psychological wellbeing compared with the Overprotection dimension. In particular, several studies have demonstrated that a perceived lack of parental Care is better able to predict depression than high perceived levels of Overprotection (Parker, 1983; Patton et al., 2001; Rey, 1995). Indeed, caregiving that is available, sensitive and warm forms the very foundation of the secure attachment relationship between parent and child (Cassidy, 1994). Consistent with this, the current findings suggest that high levels of parental care may compensate for the risk posed by overprotective and controlling parenting

behaviors. The findings also suggest that it is the presence of a supportive and nurturing caregiving environment that is the more important of the two parenting dimensions in providing children with the resources to develop adaptive ER behaviors.

That overprotective and controlling parenting behaviors were not found to be significant unique predictors of either of the two ER strategies assessed may also be due to the specific developmental period assessed in the current study, such that adverse effects of controlling and intrusive parenting behaviors on the development of adaptive self-regulation of emotions may be particularly applicable to the developmental periods of infancy and early childhood and less so to late childhood. It is at the early ages that the independent regulation of emotion and the associated necessary skills and abilities develop (Thompson, 1994). By late childhood, the unique contribution made by overprotective parenting behaviors to ER may be less marked since more autonomy is likely to have developed by this age.

While the interaction between temperament and parenting variables, on the whole was not supported, there was some support for the proposal that parental Care moderates the relationship between the temperamental tendency to Approach novel situations and the use of Suppression. Specifically, it was found that the negative relationship between Approach and Suppression was attenuated at high levels of Care whilst at low levels of Care, Approach was found to predict Suppression behavior. This latter finding is consistent with the theoretical proposition that despite the presence of resilient temperament tendencies (high levels of Approach), caregiver behaviors that are cold and unsupportive may interfere with optimal ER development (i.e. low Suppression; Repetti et al., 2002). It could also be that temperament moderates the relationship between parenting behaviors and the use of specific ER strategies. There is some empirical support for this proposition in studies demonstrating that a child's temperamental disposition may increase the vulnerability to experiencing or even fostering poor parenting practices, and thereby increase the likelihood of maladaptive social and emotional outcomes (Colder, Lochman, & Wells, 1997; Kochanska, 1991).

Limitations of the current study

Notwithstanding the novel findings provided by the current research, there are notable limitations. While findings consistent with the proposed hypotheses were found between the temperament-based, parenting and ER variables, the explained variance in regulation strategies was moderately low. One possible explanation for this is that the parenting behaviors assessed were limited to one parenting model (i.e., Parker et al., 1979) and the included temperament-based dimensions were limited to three of the 10 proposed by Windle and colleagues. Inclusion of other, perhaps more pertinent parenting behaviors, such as parental responses to children's emotion displays (c.f. Gottman et al., 1996), and additional temperament-based dimensions, such as the ability to maintain focus (low levels of distractibility) or the tendency to stay with an activity for long periods of time (high levels of persistence) may have shed further light on the way in which children's temperament and parenting experiences relate with the two regulation strategies examined herein.

Another important consideration involves the fact that all of the study constructs were assessed only via self-report. Although it has been argued that self-reports from children should be viewed with caution, such reports may contain valuable information not available in the reports of other informants, and this is likely to be especially so regarding assessment of children's emotions. Walden et al. (2003) have argued that children's own reports may in fact more accurately reflect their behavior and emotions across situations compared to third-party reports. After all, children are better able to report on their internal emotional experiences than are outside observers. Further, it has been shown that children's self-reports are correlated with physiological indicators of emotional functioning (Harter, 1982). Nevertheless, self-report may also be confounded by reporter bias. For example, it may be that temperamental style influences the ways in which children answer questions about their parenting and emotion experiences. Thus, while the inclusion of a self-report measure offers the advantage of capturing subjective internal ER processes, the use of a multi-method measurement approach, including third party reports could potentially enable the assessment of non-conscious processes involved in ER as well as observable behaviors related to the constructs of interest. In addition, although children's perceptions of parenting behaviors are important, future research may also benefit from examining potential differences in children's reports regarding their parenting experiences for mothers and fathers separately since research has suggested that children's emotional development may be differentially influenced by mothers versus fathers (e.g. Denham & Kochanoff, 2002). Finally, consistent with the use of cross-sectional data, cause-and-effect relationships were unable to be inferred from the data. Future research requires the use of longitudinal data, which will enable a comprehensive analysis of the continuity and/or discontinuity in ER across developmental periods.

Conclusions

The current study provides support for the hypotheses that both temperament and perceived parenting behaviors additively predict the use of the two specific ER strategies of cognitive Reappraisal and expressive Suppression. The findings of unique significant relationships between Suppression and temperamental Positive Mood Quality and Flexibility as well as between Reappraisal and temperamental Approach suggest that different temperament dispositions relate to ER strategies in diverse ways such that individuals may have tendencies towards the development and use of particular types of regulatory strategies. In contrast, the parental dimension of Care emerged as a significant unique predictor of both ER strategies. This suggests that despite differing temperamental tendencies, the presence or lack of a nurturing and supportive caregiving environment is of particular importance for children's functional ER development.

The current study represents the first known empirical demonstration of relationships between ER, temperament-based factors, and perceived parenting behaviors during the developmental period of late childhood. This study is significant given that,

despite the recognition that psychology is currently in the midst of an "emotion revolution" (Fischer & Tangney, 1995), the majority of research continues to focus on conceptualization, treatment, and prevention paradigms within a cognitive–behavioral framework. It remains the case that the vast majority of theoretical models and related research programs have not adequately considered the role of emotion or emotion regulation in development and psychopathology (Izard, 2002; Southam-Gerow & Kendall, 2002).

By placing ER at the centre of investigation, the current findings have contributed to the identification of individual and family factors that shape the trajectory towards potentially adaptive and maladaptive ER. These findings can be used to inform research in the development of interventions and social skills programs which aim to promote psychological adjustment and well being. Future research is needed to replicate the current findings and to extend them by incorporating more comprehensive assessments of temperament dimensions and parenting behaviors. Such research will contribute to a more sophisticated understanding of the roles played by children's dispositional styles and their parenting experiences in their development of emotion regulation strategies. Further, given the "potentially limitless number of ER strategies" (Gross & John, 2003), future research examining additional strategies of ER would be of value.

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