

The Emotion Regulation Index for Children and Adolescents (ERICA): A Psychometric Investigation

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Abstract There is increased recognition of the importance of children learning how to regulate emotions in a functional and adaptive manner for healthy psychological development. However, there is a paucity of tools for assessing emotion regulation during the middle childhood and adolescent years. This study reports on the psychometric evaluation of the 16-item self-report Emotion Regulation Index for Children and Adolescents (ERICA) involving a sample of 1,389 (768 girls, 621 boys) Australian children and adolescents aged 9 to 16 years. Convergent validity for the ERICA is reported with measures of self-conscious emotions (shame, guilt), empathy, childhood depressive symptomatology, and the perceived parenting dimensions of Care and Overprotection. Construct validity assessment using Principal Components Analysis and Confirmatory Factor Analysis yielded three factors: (1) Emotional Control, (2) Emotional Self-Awareness, and (3) Situational Responsiveness. The ERICA was also found to have good internal consistency and to be relatively stable over a four week test-retest period and to be sensitive to age and sex differences. It is concluded that the ERICA is a psychometrically sound measure for the assessment of the identified key aspects of emotion regulation in children and adolescents.

Keywords Assessment · Emotion regulation · Childhood · Adolescence · Psychometrics

Over the past two decades, there has been an increased recognition of the importance for children's healthy psychological development, of learning how to regulate emotions in a functional and adaptive manner (Cole et al. 1994; Morris et al. 2007; Southam-Gerow and Kendall 2002). The importance of functional emotion regulation for the etiology, expression, and course of psychological disorders is also well recognized (Southam-Gerow and Kendall 2002). Indeed, 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 all of the Axis II disorders (Gross and Levenson 1997).

There is general agreement that emotion regulation (ER) incorporates the ability to access a range of emotions and to modulate or control (reduce or increase) the intensity and duration of an emotion (Cole et al. 1994; Thompson 1994). As defined by Thompson (1994), ER involves "the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features to accomplish one's goals" (p. 27–28). It has been noted that over time, children come to manage their feelings in a way that is consistent with their temperamental tendencies and other personality processes, such as their capacity for self-control (Cole et al. 1994).

Developmental research on ER has predominantly focused on the periods of infancy and early childhood (John and Gross 2004; Thompson 1994). Despite the more limited research focus on later childhood and adolescent periods, significant developments in emotion functioning and understanding during these years have been documented. These include a more sophisticated awareness of emotions and an increased capacity for strategic emotional responding such as the development of effortful control

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over the outward expression of emotions and inner feeling states (Kopp 1992; Southam-Gerow and Kendall 2002). Further, the ability to convey one's emotional experiences to others also develops during these years (Kopp 1992).

While highly dependent on maturational factors, the development of ER abilities occurs within the context of relationships, primarily the attachment relationship with caregivers (Maughan and Cicchetti 2002; Repetti et al. 2002; Southam-Gerow and Kendall 2002). According to Cassidy (1994), securely attached children develop an expectation that their emotion signals will be predictably and sensitively responded to, and consequently, they are more likely to openly express and share their emotions. In contrast, insecurely attached children develop expectations that their emotion signals will be attended to selectively or unpredictably and are consequently likely to develop maladaptive ER strategies including minimization, exaggeration and distortion (Calkins and Hill 2007; Cassidy 1994).

On the basis of attachment theory, Parker et al. (1979) developed the Parental Bonding Instrument (PBI), an instrument that assesses 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). Research related to these dimensions has demonstrated that parents who engage with a child's displays of negative emotions in a controlling and overprotective manner inhibit the child from experimenting with various ER strategies (Bell and Calkins 2000; Fox and Calkins 2003). Consequently, children learn to depend on external support for their ER. Also, research with young children has indicated that maternal controlling behavior is related to less adaptive ER strategies (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 and Johnson 1998; Eisenberg et al. 1996).

Optimal ER has also been strongly linked to self-conscious emotions such as guilt or shame (Campos 1995; Fischer and Tangney 1995). With respect to shame, Eisenberg (2000) contended that emotionally well-regulated children would be expected to manage their emotional arousal so that they are not overwhelmed by feelings of shame. In explaining the link between shame-proneness and compromised ER, Covert et al. (2003) postulated that shame leads to an impaired ability to generate effective solutions and also reduces self-confidence in the ability to implement those solutions. In contrast, guilt-prone individuals appear to take more responsibility for their actions and feel more control over whether they will repeat those actions (Covert et al. 2003;

Tangney et al. 1996). Additionally, empathy defined as an affective or emotional response stemming from the comprehension of another's emotional experience or state (Bryant 1982; Eisenberg 2000), has been directly linked to ER and emotional competence (Saarni 1999). Numerous studies have shown that empathy is positively associated with the ability to optimally moderate emotions (e.g., Eisenberg et al. 1998; Roberts and Strayer 1996).

Research investigating the relationship between ER skills and psychopathology has implicated several emotional competence deficits. Impoverished emotional awareness, poor emotional understanding, and dysregulated emotional expression have been found to be important predictors of depression and anxiety symptoms (Zeman et al. 2006). In particular, poor emotional awareness has been found to be predictive of self-reported depression (Penza-Clyve and Zeman 2002; Zeman et al. 2002). Also, Silk et al. (2003) have drawn particular attention to an ER component implicated in both internalizing and externalizing disorders and referred to as emotional dynamics. This ER component includes intensity, lability and down-regulation of emotional states. Accordingly, these researchers cite empirical work demonstrating that higher levels of lability (i.e., high degree of fluctuation in mood states) coupled with intense negative affect correlate with depressive symptomatology in young people.

Although existing research into ER has provided valuable insight into the construct, it is limited by a focus on behavioral or extrinsic aspects of ER and there remains a relative dearth of ER research examining the developmental periods of middle to late childhood and adolescence (Zeman et al. 2006). These periods mark critical turning points in children's acquisition of cognitive, social and emotional skills, and their development of autonomy (Cole et al. 1994; Gross and Munroz 1995). In particular, adolescents experience more frequent and intense emotions than younger or older individuals and the prevalence of a range of disorders increases markedly during the adolescent years (Silk et al. 2003). Further, it has been argued that the middle childhood years constitute a time of profound transformation related to emotion regulation (Gottman and Mettetal 1986). Thus, a better understanding of ER during this time is greatly needed.

Related to this, several authors (e.g., Shields and Cicchetti 1997; Walden et al. 2003) have identified that a major obstacle to conducting ER research into these developmental periods is the lack of a validated age-appropriate measure. Given increased cognitive maturity and the largely internal and subjective nature of ER processes, self-report seems an appropriate assessment method during these developmental periods (Rohrbeck et al. 1991; Soto et al. 2008; Walden et al. 2003).

Thus, the aim of the current study is to report on the revision and psychometric evaluation of a self-report ER measure (i.e. Emotion Regulation Index for Children and Adolescents—ERICA) suitable for use with children and adolescents. The ERICA is a revision of Biesecker and Easterbrooks' (2001) self-report Emotion Regulation Checklist for Adolescents (ERCA). This measure was chosen for revision because of its strong theoretical foundations (Shields and Cicchetti 1995) and sound psychometric properties (Biesecker 2001). As documented by Shields and Cicchetti (1997) in relation to the original 24-item other-report version of this measure (i.e., the Emotion Regulation Checklist—ERC), items were designed to assess ER processes including “affective lability, intensity, valence, flexibility, and situational appropriateness” (p. 910). Two factors were reported for the ERC: (i) Lability/Negativity comprised items representing dysregulated negative affect, a lack of flexibility, and mood lability and (ii) Emotion Regulation comprised items describing emotional self-awareness, empathy, and situationally appropriate affective displays. Biesecker and Easterbrooks (2001) found the contents of Shields and Cicchetti's (1995) ERC measure to be appropriate for the adolescent developmental stage. Thus, in revising the measure, they retained the essence of the ERC items although the item wording and context for some items was revised to be more appropriate for the intended age-group. Thus, the ERCA assesses several important ER components culminating in the ability to manage emotions and behavior toward the achievement of one's intrapersonal or interpersonal goals.

However, the ERCA is appropriate for use only with adolescents aged 16 years or older. The present study reports on a revision of the ERCA designed to target a younger age range (i.e. 9 to 16 years). Revision of the measure for use with this younger age range will enable much needed investigation of the development of key ER components across the middle- to late- childhood and adolescent developmental periods.

Following revision of the ERCA, Biesecker (2001) investigated construct validity by determining the factor structure of the measure while convergent validity was investigated through correlations with conceptually and empirically related constructs, as reviewed above. With regard to the current research, it was expected that the components identified in the original measure would be found in the revised measure including characteristics related to emotional intensity, control and modulation, emotional self-awareness, and emotional responsiveness. On the basis of previous research, it was predicted that optimal or adaptive ER would be positively associated with parental care, empathy, and adaptive guilt but negatively associated with parental overprotection, shame and depressive symptoms. Given the proposed trait-like nature of ER

competencies (Cole et al. 1994), it was expected that self-reported ER would demonstrate stability over time. To this end, test-retest reliability was investigated over a four-week period. Internal consistency of the revised scale was also investigated. Finally, given consistent reports that girls are typically better regulated than boys and given evidence for gender-typic socialization of emotional behaviors, it was expected that girls would report more adaptive levels of ER compared to boys (Morris et al. 2007).

Method

Participants

As part of a larger study, 15 primary schools and 9 secondary schools located in Melbourne, a large Australian city, participated in the study. The larger study involved assessment of a number of constructs including ER, anxiety, attachment relationships, and personality, and their relationships with psychological wellbeing over a three-year period. Data were collected following approval from the University Ethics Committee and the Department of Education and Training. Only schools with approval from the school principal were involved and only children with parental consent, and who gave their own written consent participated.

Because the university ethics committee stipulated that forms be distributed to parents by their children via the schools, it not possible to determine with complete accuracy how many parents actually received the forms. Of the 1745 parents who it can be determined with certainty did receive forms, 1393 agreed to participate, resulting in an effective response rate of 80%. Four responses were eliminated because respondents did not provide details of their age or were aged over 16 years.

The 1389 participating children and adolescents (768 girls and 621 boys) ranged in age from 9 to 16 years ($M=12.09$, $SD=1.59$). The mean age for girls was 12.22 years ($SD=1.62$) and for boys was 11.93 years ($SD=1.54$). There were 801 primary school children (grades 4, 5, & 6) with a mean age of 10.96 years ($SD=0.91$). Of these, 417 were female and 384 male. There were 588 secondary school children (grades 7, 8, & 9) with a mean age of 13.63 years ($SD=0.86$). Of these, 351 were female and 237 male. For the purpose of analyses, comparisons were made across sex and school level groups so, hereafter, the age groups used will be referred to as “primary level” and “secondary level”.

Information regarding the demographic characteristics of the sample included parental occupation and birthplace. Occupational prestige was determined on the basis of parents' most recent paid employment and was classified according to the Australian Bureau of Statistics' Australian

Standard Classification of Occupations (Australian Bureau of Statistics 2001).

Given its close association with literacy levels, occupational status provides an appropriate measure of socioeconomic position (Jones and McMillan 2001). Occupation was classified into nine categories as indicated below with comparative percentages for the current sample and those reported in the 2001 Melbourne census data (reported in italics) by the Australian Bureau of Statistics. The largest proportion of the sample (11.57%) was employed in the “Professionals” category which compared with 21.09% in this category for the overall Melbourne population (also the largest percentage). The smallest proportion of the sample (1.15%) was classified into the “Advanced Clerical, Sales, and Service Workers” category as compared with 3.99% of the Melbourne population (also the smallest percentage). “Labourers and Related Workers” (10.13%; 7.52%), “Intermediate Clerical, Sales, and Service Workers” (9.70%; 17.23%), “Intermediate Production and Transport Workers” (8.84%; 8.09%), “Tradespersons and Related Workers” (7.76%; 12.01%), and “Associate Professionals” (7.18%; 11.68%) were among the other larger groupings. The remaining categories were “Managers and Administrators” (6.32%; 8.52%), and “Elementary Clerical, Sales, and Service Workers” (4.17%; 9.87%). A significant proportion of the sample (16.38%) did not provide occupational information and the remainder either were not engaged in paid employment (9.99%) or gave responses that could not be coded (6.82%).

With regard to cultural background, place of birth for both parents was coded. Of the 1389 participants, the largest proportion of participants had parents who were born in Australia (29.45%), followed by East Asia (18.50%), Africa or the Americas (9.94%), Europe (9.79%), and Central and Southern Asia (7.42%). A total of 986 had parents who were born in the same country and were included in the classifications above. However, for 21.31% of the participants, both parents were not from the same region and for a further 3.6%, country of birth information was not provided. Although the current sample is comparable with information provided by the Australian Bureau of Statistics, there is an over-representation of participants born in East Asia (as compared to 7.95% in the 2001 census records). This was expected given that participants with an East Asian background were deliberately targeted for recruitment to enable cultural comparisons for the larger study.

Measures

Emotion Regulation The Emotion Regulation Index for Children and Adolescents (ERICA) is a revised version of Biesecker and Easterbrooks’ (2001) Emotion Regulation

Checklist for Adolescents (ERCA). Biesecker and Easterbrooks’ 27-item ERCA was psychometrically evaluated with a sample of adolescents aged on average 16 years. The overall measure was reported to have good internal consistency ($\alpha=.81$). Also convergent validity was demonstrated through significant and moderate to strong correlations between the ERCA and the Inventory for Parent and Peer Attachment (Armsden and Greenberg 1987) and with the A-Cope (McCubbin et al. 1996), with higher ER scores correlating positively with higher scores on both the attachment and coping measures (Biesecker 2001).

For the present study, the ERCA items were revised to be appropriate for administration to children as young as 9 years of age. The language was simplified and appropriate substitutions were sought using The Australian Primary Thesaurus which is aimed at Australian children aged 10 to 12 years. As with Biesecker and Easterbrooks (2001), care was taken not to alter the original content and intent of the items. The authors of the ERCA were consulted and confirmed that in their opinion, this objective was met (D. Cicchetti, personal communication, April 6, 2006). A five-point Likert scale response format was retained (ranging from 1 = *Strongly Disagree* to 5 = *Strongly Agree*). The ERICA therefore differs from the ERCA predominantly with regard to item wording. All items were reworded. Examples of changes include; from the ERCA’s “cheerful” to “I am a happy person”, from “Respond positively to peers who are friendly/neutral” to “When other kids are friendly to me, I am friendly to them”, from “Impulsive” to “I do things without thinking about them first”. The revised items in the final version of the ERICA are provided in Table 1. This table also indicates items that are reversed scored, such that higher scores reflect more adaptive or functional ER.

Shame and Guilt The Test of Self-Conscious Affect—Adolescent (TOSCA-A; Tangney et al. 1990) is a self-report measure of Shame-Proneness, Guilt-Proneness, Detachment/Unconcern, Alpha Pride, and Beta Pride designed for use with adolescents aged 12 to 20 years (Tangney et al. 1996), but has been validated with children as young as 9 years of age (Watson and Gullone 2008). In the current study only the shame and guilt scales were used. The TOSCA-A consists of 10 negatively and 5 positively worded scenarios and associated responses that are designed to capture phenomenological aspects of shame and guilt. Participants are required to rate each shame and guilt response on a 5-point scale (i.e., 1 = *Very Unlike Me* to 5 = *Very Like Me*) to indicate their likelihood of responding in the manner depicted. An example scenario is “At lunchtime, you trip and spill your friend’s drink”. The shame response is “I would be thinking that everyone is watching me and laughing” and the guilt response is “I

Table 1 Varimax rotated factor loadings following principal components analysis of the ERICA ($n=695$)

ERICA Item		FI	FII	FIII
Factor I: Emotional Control				
16.	<i>I have trouble waiting for something I want</i>	.68	.13	.00
9.	<i>I am impatient</i>	.64	.09	.02
23.	<i>I annoy others by not minding my own business</i>	.62	-.07	.23
8.	<i>I have angry outbursts</i>	.61	.23	.04
12.	<i>I can be disruptive at the wrong times</i>	.56	-.24	.10
13.	<i>I get angry when adults tell me what I can and cannot do</i>	.56	.19	.14
21.	<i>I do things without thinking about them first</i>	.56	.00	.26
6.	<i>When things don't go my way I get upset easily</i>	.50	.22	-.22
Factor II: Emotional Self-Awareness				
15.	<i>I am a sad person</i>	.11	.69	.28
1.	I am a happy person	.09	.68	.32
5.	When I get upset, I can get over it quickly	.13	.64	-.15
19.	<i>I am quiet and shy, and I don't show my feelings</i>	-.06	.48	.00
4.	I handle it well when things change or I have to try something new	.15	.52	.04
Factor III: Situational Responsiveness				
7.	When other kids are friendly to me, I am friendly to them	.09	.16	.72
22.	When others are upset, I become sad or concerned for them	.04	-.06	.65
3.	When adults are friendly to me, I am friendly to them	.01	.21	.65
10.	<i>I enjoy seeing others hurt or upset</i>	.32	-.02	.60

ERICA items in *italics* are reverse scored.

would feel very sorry. I should have watched where I was going". A separate score is obtained for each scale, with higher scores reflecting higher levels of shame- and guilt-proneness.

The Shame and Guilt subscales of the TOSCA-A have been shown to have good reliability with samples of adolescents in grades 7 to 11 ($\alpha=.77$ to $.79$ and $\alpha=.81$ to $.84$ respectively) (Tangney and Dearing 2002). Similar coefficients were found in the present study (Shame, $\alpha=.77$ and Guilt, $\alpha=.82$). Sound validity for the TOSCA-A has been demonstrated via correlations with indices of psychopathology, interpersonal functioning, and family functioning (Tangney et al. 1996).

Perceived Parenting 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 to report on current perceived parenting (Herz and 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).

The original PBI has been shown to have sound psychometric properties. Three-week test-retest reliability coefficients were reported to be $.76$ (Care) and $.63$ (Overprotection) (Parker et al. 1979). Predictive validity has also been reported in 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 $.81$ (Overprotection) and $.90$ (Care), for a sample of 238 adolescents. Gullone and Robinson (2005) reported sound validity and internal consistency for 282 children and adolescents, ranging in age between 9 and 15 years. Comparable internal consistency was found in the current study (Overprotection $\alpha=.79$; Care $\alpha=.86$).

Empathy The Index of Empathy for Children and Adolescents (IECA; Bryant 1982) consists of 22 statements that

assess cognitive and affective components of empathy. Participants are required to endorse the response that best applies to them. Various response formats have been used, with the current study adopting a four-point scale ranging from 1 = *Strongly Disagree* to 4 = *Strongly Agree*. Example items include “It makes me sad to see a girl who can’t find anyone to play with” and “It’s hard for me to see why someone else gets upset” (reverse scored). Higher scores reflect higher levels of empathy.

The IECA has been reported to have adequate internal consistency reliability ($\alpha=.81$ for fourth graders and .83 for seventh graders) and good convergent validity with moderate to strong correlations with other empathy measures. Cronbach’s alpha coefficients in the current study were .68 for primary school children and .78 for those attending secondary school.

Depressive Symptomatology The Children’s Depression Inventory (CDI; Kovacs 1992) is a frequently used self-report instrument with well established psychometric properties. It assesses depressive symptoms in children and adolescents aged to 17 years (Kovacs 1992). Each item consists of three statements reflecting differences in symptom severity. For each item, the respondent is required to select the statement that describes them best over the past two weeks. Example items include “I do most things okay; I do many things wrong; I do everything wrong” and “I hate myself; I do not like myself; I like myself”. In the current study, to satisfy the university’s ethics requirements, the item assessing suicide ideation was not included. The remaining 26 items were each assessed on a scale from 0 to 2, with total scores ranging from 0 to 52 and with high scores reflecting higher levels of depressive symptomatology.

The psychometric properties of the CDI are well established. It has been shown to have good test-retest reliability, internal consistency, and construct validity (Kovacs 2003). Kovacs (2003) reported mean scores of 9.98 ($SD=7.29$) for a sample of 1,128 7 to 17 year-old boys and girls. In the present study, CDI scores ranged from 0 to 47 ($M=10.79$, $SD=8.13$). Kovacs reported a Cronbach’s alpha coefficient of .87 with a sample of 860 public school students.

Procedure

Questionnaires were counterbalanced and completed in small groups in a quiet room at school during school hours. Participation was voluntary and students were free to cease their involvement at any time. It was emphasized that there were no right or wrong answers and that participants should answer according to what was most true for them. A first administrator read the instructions and each item in turn to

the group while a second addressed individual queries. The time required to complete the questionnaires varied from 30 to 45 minutes and depended largely on grade level.

Results

Analysis Plan and Data Screening

Prior to analysis, data-related integrity issues were examined. Outliers were reviewed and recoded to a raw score one unit smaller (or larger) than the next most extreme score in the distribution. Given that there were fewer than .05% missing data points and that these occurred randomly across cases, it was considered acceptable to replace missing item values with item means.

Corrected item-total correlation coefficients for the ERICA were calculated for the overall sample and for each of the two school levels separately. Three items (“*I need to be close to someone all the time*”, “*I am super active*”, “*If I am friendly to people, and they are nasty to me, I get angry with them*”) with negative or low item-total correlations (i.e. $<.3$) were excluded from further analyses.

The total sample was split into two subsamples matched for age and sex. The first subsample comprised of 695 participants (age: $M=12.09$ years, $SD=1.60$ years) and their data were used for Principal Components Analysis (PCA). The second subsample was composed of 694 participants (age: $M=12.09$ years, $SD=1.59$ years) and their data were subjected to Confirmatory Factor Analysis (CFA). The PCA and CFA assessing the construct validity of the ERICA are reported below followed by test-retest analyses, and school level and sex difference analyses for the ERICA total subscale scores. Convergent validity analyses include correlations between the ERICA total and subscale scores with the empathy and self-conscious emotions measures as well as the depressive symptoms and perceived parenting dimensions measures.

Principal Components Analysis

Prior to performing the PCA, the suitability of data was assessed. The correlation matrix revealed the presence of many coefficients of .3 and above, the Kaiser-Meyer-Olkin value was .81, exceeding the recommended value of .6 (Kaiser 1974) and the Bartlett’s Test of Sphericity (Bartlett 1954) reached statistical significance.

The initial PCA yielded a number of items with significant cross-loadings on more than one factor. This resulted in the elimination of the following six items: (i) When I get upset, I hurt myself; (ii) I can say when I feel sad, angry, or scared; (iii) I change quickly from being very happy to being very sad; (iv) I get angry with other kids

even when they are friendly to me; (v) I pick on other people; and (vi) I depend on my friends too much.

The 17 remaining items of the ERICA were again subjected to PCA. This analysis revealed the presence of three components with eigenvalues exceeding one. On the basis of this and scree plot inspection, three components were retained for further investigation. This decision was supported by the results of Parallel Analysis, which showed only three components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size.

Varimax rotation revealed the presence of simple structure (Thurstone 1947) with all three components showing a number of strong loadings and all variables loading substantially on only one component. The three-component rotated solution explained a total of 42.75% of the variance. Based on item content, these factors were identified as: (i) Emotional Control—assessing socially inappropriate emotional expressions and responses (all items in this factor are reverse scored), (ii) Emotional Self-Awareness—assessing emotional recognition and flexibility, up regulation of positive affect and down regulation of negative affect, and (iii) Situational Responsiveness—assessing social sensitivity and socially appropriate emotional responding in social situations. The three factors contributed 17.74%, 12.54%, and 12.47% of the variance respectively. Table 1 shows the factor loadings for the 17 items which formed the final scale.

Confirmatory Factor Analysis

Using Analysis of Moment Structures (Arbuckle 2006) a CFA was conducted on the data set from the second sample. Maximum likelihood estimation was chosen because the data were normally distributed. Based on the Exploratory Factor Analysis (EFA), a three-factor model was hypothesized to be confirmed in the measurement portion of the model. Figure 1 shows the final CFA model.

Given the sensitivity of Chi-square tests to sample size and model complexity, additional fit statistics are recommended (Floyd and Widaman 1995). A better measure using the χ^2 statistic is to divide it by the degrees of freedom so that, the smaller the value, the better the fit. The literature provides a number of thresholds for reasonable fit; 3.0 or less (Carmines and McIver 1981) and between 1.0 and 2.0 (Hair et al. 1998). Thus, the following goodness-of-fit indices were used to assess the degree of fit between the model and the sample: Tucker Lewis Index (>.90 acceptable, >.95 excellent) (Hu and Bentler 1995; Tucker and Lewis 1973), the Comparative Fit Index (>.90 acceptable, >.95 excellent) (Bentler 1990; Hu and Bentler 1995), Incremental Fit Index (>.90 acceptable, >.95 excellent) (Hoyle and Panter 1995; Hu and Bentler 1995), and Root

Mean Square error of approximation ($\leq .06$ good, $< .05$ excellent) (Floyd and Widaman 1995; Hu and Bentler 1995).

Four models were tested. Model 1 was the 17-item three-factor model generated by the EFA. This provided an acceptable fit for the data on all indices. Output from the CFA indicated a high correlation between two error terms on Factor 1 indicating that the respective items “I have trouble waiting for something I want” and “I am impatient” tapped into the same concept. Thus, the item “I am impatient” was deleted as it had the lower loading. Model 2 was not found to result in any appreciable improvement.

On the basis of the CFA modification indices, Model 3 incorporated covariance between 3 further sets of error terms: $e_{19} \leftarrow \rightarrow 20$; $e_{13} \leftarrow \rightarrow 14$; and $e_{11} \leftarrow \rightarrow 13$. This model resulted in an improvement on all indices whereby $\chi^2 / df < 2$, IFI > .95, CFI > .95, TLI = .94, and RMSEA = .04.

Finally, a fourth Model was tested wherein, rather than incorporating covariance between the error terms as described in Model 3, two offending items were deleted; “I am a sad person” from the Emotional Self-Awareness factor, and “I enjoy seeing others hurt or upset” from the Situational Responsiveness factor. The resultant model showed an excellent fit but the reduction in the number of items on the Emotional Self-Awareness factor from 4 to 3 and on the Situational Responsiveness factor from 5 to 4 had an adverse impact on the reliability of these factors. It was, therefore, decided to retain both items. Thus, the model tested in all subsequent analyses is Model 3, consisting of 16 items. Fit indices for each model tested are presented in Table 2.

The 16 remaining items of the ERICA were again subjected to PCA. The three-component rotated solution explained a total of 43.18% of the variance. As with the original PCA, these factors were identified as: Emotional Control, Emotional Self-Awareness, and Situational Responsiveness and contributed 16.98%, 13.29%, and 12.91% of the variance respectively.

A PCA was conducted for each sex, school level (primary or secondary) and sex X school level groupings to determine the invariance of the factor structure. Results indicated that the factor structure remained constant with the same three factors emerging in all cases with only slight variation in the percentages explained by the individual factors.

The amount of variance explained by the three factor solution varied between 39.92% (for male primary school students) and 45.67% (for male secondary school students). Emotional Control emerged as Factor 1 for all groups and explained from 16.13% (male primary school) to 18.66% (female primary school) of variance. Percentage variance explained by the Emotional Self-Awareness factor ranged from 11.19% (male primary school) to 15.16% (male

Fig. 1 Final confirmatory factor analysis (CFA) model of the Emotion Regulation Index for Children and Adolescents ($n=694$)

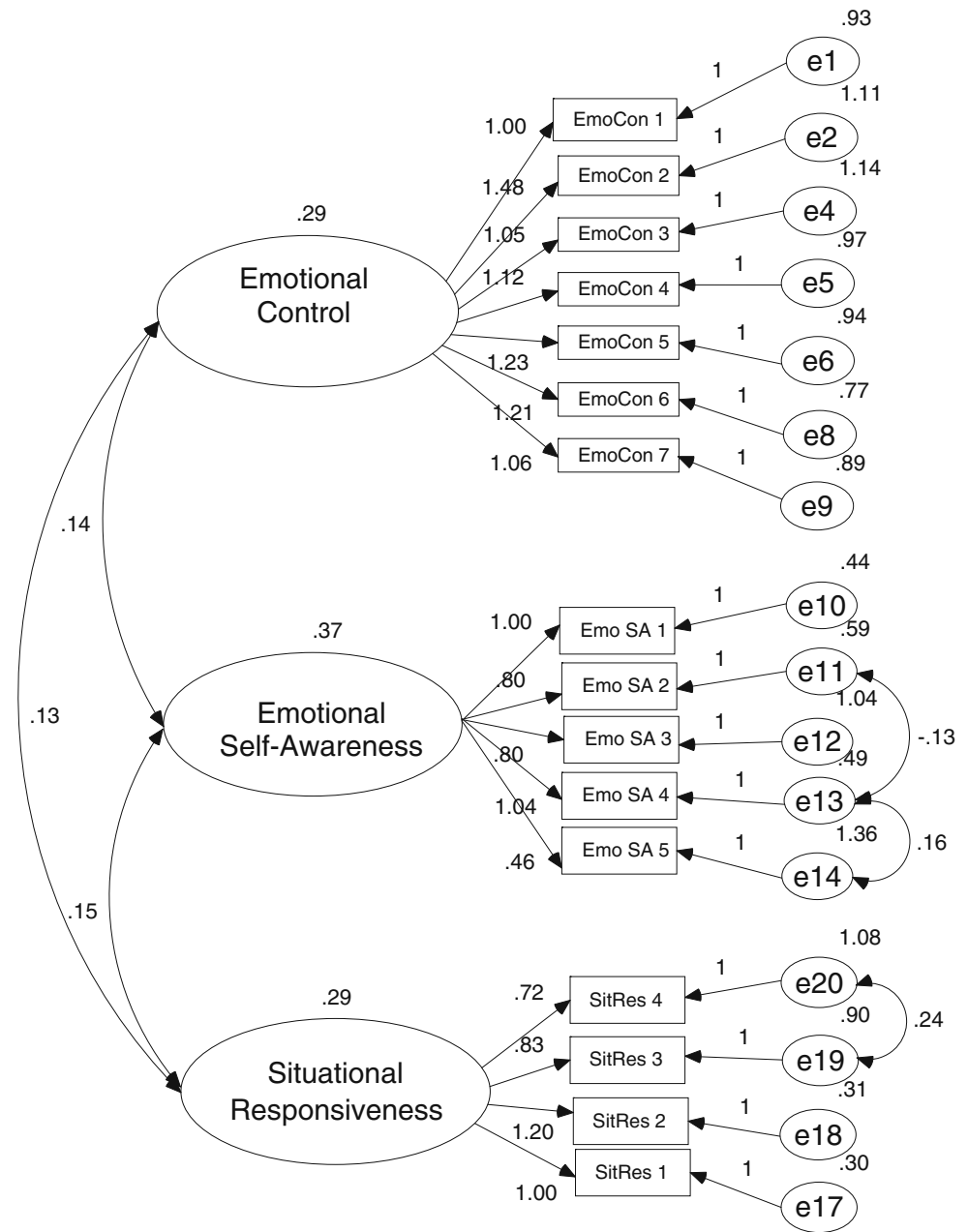


Table 2 Goodness-of-fit indices for the confirmatory factory analysis (CFA) of the ERICA

Model	χ^2	df	χ^2/df	IFI	TLI	CFI	RMSEA
Model 1: Three Factor 17-item	300.66	116	2.59	.91	.90	.91	.05
Model 2: Three Factor 16-item	264.11	101	2.62	.91	.90	.91	.05
Model 3: Three Factor 16-item covariance among error terms	189.04	98	1.93	.95	.94	.95	.04
Model 4: Three Factor 14-item	129.47	74	1.75	.96	.95	.96	.03

All items in Models 1 through 4 are ERICA items. IFI = Incremental Fit Index; TLI = Tucker Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation.

secondary school). The Situational Responsiveness factor explained from 12.31% (female primary school) to 13.98% (female secondary school) of variance.

Reliability and Temporal Stability for the Overall ERICA and its Subscales

The ERICA was administered on two occasions, four weeks apart to a test-retest sample comprising 150 of the 1,389 participants. There were 56 primary level children (27 girls, 29 boys) and 94 secondary level children (54 girls, 40 boys). Test-retest reliability for the overall ERICA was .77 for entire sample, .75 for the primary level children and .83 for the secondary level participants. The overall ERICA scale yielded a Cronbach's alpha of .75.

Four-week test-retest reliability for the ERICA factors was as follows: (1) Emotional Control: overall sample (.76), primary school level (.73), secondary school level (.82), (2) Emotional Self-Awareness: overall sample (.64), primary school level (.53), secondary school level (.71), and (3) Situational Responsiveness: overall sample (.74), primary school level (.75), secondary school level (.72).

The Emotional Control factor demonstrated good internal consistency with a Cronbach's alpha of .73. Reliability coefficients for the Emotional Self-Awareness and Situational Responsiveness factors fell below Nunally's threshold of .70 (i.e., $\alpha = .60$ and $.64$ respectively). Since these scales comprise only five and four items respectively, mean inter-item correlations as recommended by Briggs and Cheek (1986) were also calculated. The mean inter-item correlations for Situational Responsiveness (.32) and for Emotional Self-Awareness (.25) fell within Briggs and Cheek's (1986) recommended range of .2 to .4.

School Level and Sex Differences for the Overall ERICA and its Subscales

Means and standard deviations for the ERICA total and subscale scores were calculated such that a higher score represents more optimal or adaptive regulation of emotions. Means and standard deviations for the overall sample, each school level (primary and secondary) and sex group are provided in Table 3.

A 2 (school level) by 2 (sex) factor ANOVA with the ERICA total score as the dependent variable yielded a significant main effect for both school level [$F(1, 1386) = 9.53, p < .01$] and sex [$F(1, 1386) = 10.03, p < .01$]. No significant interaction effect between school level and sex was found. As can be seen in Table 3, the school level main effect resulted from the primary level group scoring significantly higher on the ERICA compared to the secondary level group. The sex effect resulted from girls scoring higher than boys.

To investigate school level and sex differences on the subscales of the ERICA, a 2 (school level) by 2 (sex) factor MANOVA was conducted. This analysis yielded a significant multivariate main effect for school level [Wilks' Lambda = .98, $F(3, 1383) = 9.73, p < .001$, Partial Eta² = .02], for sex [Wilks' Lambda = .92, $F(3, 1383) = 38.04, p < .001$, Partial Eta² = .08] and a significant multivariate interaction effect [Wilks' Lambda = .99, $F(3, 1383) = 4.96, p < .01$, Partial Eta² = .01]. Follow-up univariate tests indicated a significant school level effect only for the Emotional Control factor [$F(1, 1385) = 24.70, p < .001$, Partial Eta² = .02], a significant sex effect only for the Situational Responsiveness factor [$F(1, 1385) = 85.26, p < .001$, Partial Eta² = .06] and a significant sex by school level effect only for the Situational Responsiveness factor [$F(1, 1385) = 56.82, p < .001$, Partial Eta² = .01]. As can be seen in Table 3, the school level effect for Emotional Control factor resulted from the primary level participants scoring higher on this factor than the secondary level participants. The sex effect for the Situational Responsiveness factor resulted from girls scoring significantly higher than boys and the significant interaction effect for this same factor resulted from secondary school level girls ($M = 17.28, SD = 2.05$) scoring higher than primary school level girls ($M = 16.87, SD = 2.59$) with the reverse being true for boys who scored lower at the secondary school level ($M = 15.51, SD = 2.78$) compared to the primary school level ($M = 15.94, SD = 2.76$).

Convergent Validity

Convergent validity correlations are presented in Table 4. As shown in the table, the ERICA total score was positively and moderately correlated with guilt, empathy, and perceived parental care. It was negatively correlated with shame, depression, and perceived parental overprotection. The same general pattern of correlations was found for the subscales with the exceptions of shame with the Situational Responsiveness factor and guilt and empathy with the Emotional Self-Awareness factor, for which no significant correlations were found. Of note, the overall and sub-scales score correlations with depression are among the strongest, particularly that between depression and the Emotional Self-Awareness factor. Not surprisingly, empathy and guilt were particularly strongly positively correlated with Situational Responsiveness.

Discussion

Based on a recognized paucity of assessment measures of ER for the child and adolescent periods (e.g., Shields and Cicchetti 1997; Walden et al. 2003; Zeman et al. 2006), the major aim of the current study was to revise and validate a

Table 3 Means and standard deviations for the total ERICA and its sub-scales by sex and school level

	ERICA <i>M (SD)</i>	EC <i>M (SD)</i>	ES <i>M (SD)</i>	SR <i>M (SD)</i>
Primary (<i>N</i> =801)	57.10 (8.34)	22.00 (5.22)	18.67 (3.18)	16.42 (2.72)
Secondary (<i>N</i> =588)	55.87 (7.38)	20.62 (4.75)	18.68 (3.25)	16.57 (2.52)
Boys (<i>N</i> =621)	55.88 (8.04)	21.24 (5.11)	18.86 (3.22)	15.78 (2.78)
Girls (<i>N</i> =768)	57.14 (7.87)	21.56 (5.04)	18.53 (3.20)	17.06 (2.37)
Overall Sample (<i>N</i> =1,389)	56.58 (7.97)	21.42 (5.07)	18.68 (3.21)	16.48 (2.64)

EC = Emotional Control; ES = Emotional Self-Awareness; SR = Situational Responsiveness.

self-report ER measure applicable for use with children and adolescents. Such a measure will enable much needed research into ER during these periods which mark critical turning points in development (Cole et al. 1994; Gross and Munroz 1995; Silk et al. 2003). The present results which demonstrate that the ERICA is a valid and reliable measure of ER for children and adolescents aged between 9 and 16 years are discussed in detail below.

First, on the basis of theoretical and empirical work in this area, and given the demonstrated ability of the original version of the ERICA (i.e. Shields and Cicchetti's 1995 ERC) to assess key components of ER including lability and negative affect, as well as competencies including emotional control, self-awareness, empathy and situationally sensitive or appropriate emotion expression, it was expected that construct validity assessment of the revised measure (i.e. the ERICA) would yield factors largely reflective of these ER components. The results supported these expectations in part. Specifically, Shields and Cicchetti identified two factors for their original measure (i.e. the ERC) while in the current study three factors emerged. Such may be indicative of greater differentiation in ER competencies with an increase in age given that Shields and Cicchetti's (1995) sample was on average younger than that in the present study which

included adolescents. Despite the differences found in the factor structures for the ERC and the ERICA, it is noteworthy that the construct validity outcomes of the ERICA are supported through the CFA. Moreover, the structure was shown to be invariant across age (i.e., school level) and sex groupings.

The first ERICA factor (i.e., Emotional Control) includes content similar to that described by Shields and Cicchetti (1995) in the ERC Lability/Negativity factor but also includes content relevant to the ERC Emotion Regulation factor. Items in the ERICA Emotional Control factor are reflective of dysregulated negative affect or inappropriate emotional displays (e.g., When things don't go my way, I get upset easily; I have angry outbursts.).

The second ERICA factor (Emotional Awareness) includes items reflective of emotional self-awareness (e.g., I am a happy person) and of emotional modulation (e.g., When I get upset, I can get over it quickly) and reflects overlapping components of Shields and Cicchetti's (1995) Emotion Regulation factor. It has been consistently proposed that emotional awareness and recognition are central to development of competent ER (Manstead and Fischer 2000; Saarni 1999; Zeman et al. 2002).

The third ERICA factor (Situational Responsiveness) includes items assessing empathy (e.g., I enjoy seeing others hurt or upset—reverse scored) and situationally appropriate affective displays (e.g., When other kids are friendly to me, I am friendly to them) which are also included in Shields and Cicchetti's (1995) ERC Emotion Regulation factor. This factor assesses the ability to react or behave in a socially or situationally appropriate manner, that is, to be sensitive to social cues and to respond appropriately. This is a highly desirable component of any measure of ER since emotionally competent functioning is dependent on an ability to regulate emotions in flexible and adaptive ways in response to the demands of the social context (Gratz and Roemer 2004; Saarni 1999).

Reliability analyses for ERICA total factor scores indicated adequate internal consistency, with reliability coefficients ranging from .64 to .73 for the three factors and .75 for the overall ERICA (Nunnally 1978). Test-retest analyses supported the predicted stability of ER competencies over time

Table 4 Pearson correlations between the ERICA total and sub-scales scores with shame, guilt, empathy, depression, and parental care and overprotection

	ERICA			
	Total	EC	ES	SR
Shame	-.27	-.23	-.33	.02 ns
Guilt	.38	.26	.08 ns	.53
Empathy	.29	.16	.07 ns	.50
Depression	-.60	-.42	-.60	-.29
Parental Care	.47	.29	.40	.29
Parental Overprotection	-.36	-.25	-.37	-.16

EC = Emotional Control; ES = Emotional Self-Awareness; SR = Situational Responsiveness; ns = Nonsignificant. All significant correlations are significant at the $p < .001$ level.

(Cole et al. 1994) with retest coefficients over the four week testing period for the ERICA total score ranging between .75 for primary level children and .83 for secondary level children.

Convergent validity analyses yielded additional support for the validity of the ERICA. It is particularly noteworthy that the ERICA total score significantly correlated in the predicted directions with all of the convergent validity measures. As expected and consistent with previous research, higher ERICA total scores indicating more functional ER were found to correlate positively with adaptive guilt (Campos 1995; Fischer and Tangney 1995), empathy (Saarni 1999), and parental care (Calkins and Johnson 1998; Eisenberg et al. 1996). Also as expected, ERICA total scores were found to correlate inversely with shame (Covert et al. 2003), depressive symptomatology (Zeman et al. 2006) and parental overprotection (Bell and Calkins 2000; Fox and Calkins 2003). Convergent validity correlations with the ERICA factors were found to generally be consistent with total score correlations.

Given that the Emotional Control factor includes externalizing components of ER, it is not surprising that a positive relationship between this factor and TOSCA-A Guilt (i.e., a tendency towards personal action and reparation) and a negative relationship with TOSCA-A Shame (i.e., a tendency towards not feeling in control and global negative self-evaluation) were found. Indeed, this factor correlated significantly and in the expected directions with all of the convergent validity constructs but most notably with depressive symptomatology (cf., Zeman et al. 2006). This finding supports literature pointing to emotional control as being central to the regulation of one's emotions toward the achievement of intrapersonal or interpersonal goals (Cole et al. 1994; Thompson 1994; Zeman et al. 2006).

With regard to the Emotional Self-Awareness factor, given the documented importance of these competencies for wellbeing (e.g., Zeman et al. 2006), the present findings of negative correlations with TOSCA shame, depressive symptomatology, and parental overprotection as well as the significant positive correlation found with parental care are supportive of theoretical understanding and available empirical evidence. Specifically, it has been proposed that if able to manage their emotional arousal, children are less likely to be overwhelmed by negative feelings including shame and depressive symptomatology (e.g., Eisenberg 2000). With respect to parenting, responding in an overprotective and controlling manner (i.e., overprotective parenting) to emotional displays has been proposed to interfere with children's development of ER competencies (e.g., Calkins et al. 1998). Conversely, the positive correlation found with parental care is also supportive of theory and research showing that parental encouragement, guidance and support is predictive of adaptive ER devel-

opment (e.g., Eisenberg et al. 1996). Also, not surprisingly, neither guilt nor empathy correlated with this factor. These findings provide evidence for divergent validity since this factor reflects self focus and understanding rather than the social emphasis indicative of guilt and empathy.

Finally, the Situational Responsiveness factor incorporating items reflective of social understanding and social sensitivity (e.g., "When others are upset, I become sad or concerned for them" and "When other kids are friendly to me, I am friendly to them") positively correlated with empathy, guilt, and parental care, negatively correlated with depressive symptomatology and did not correlate with shame. Given the socially oriented nature of empathy and adaptive guilt, these positive correlations provide support for the validity of this factor. Conversely, given the self-focused nature of depression (e.g., Mor and Winquist 2002), the negative correlation found between CDI scores and this factor provides additional convergent validity support. The lack of a significant correlation with shame is more difficult to interpret. Given proposals that shame-proneness is linked with compromised ER (Covert et al. 2003), a negative correlation would have been expected and indeed, the first two ERICA factors did correlate negatively with shame. That the Situational Responsiveness factor did not correlate with shame may be reflective of the somewhat divergent nature of accurately perceiving and responding to social situations (i.e., Situational Responsiveness) and negatively evaluating oneself (i.e., shame). This contrasts with the more self-evaluative nature of the ERICA items loading onto the first two factors (e.g., I am a happy person; I am impatient). Future research is needed to confirm such an interpretation.

Group difference analyses indicated that the ERICA is sensitive to age (year level) and sex differences. As expected and consistent with Morris et al. (2007), girls were found to score higher on the overall ERICA compared to boys. It was also found that the younger group of participants scored higher than the older group. Although it is reasonable to expect that older children should score higher, in that their ER skills should be better developed, this finding may have resulted from the fact that ER competencies become more automatic and therefore less effortful and conscious with time (Cole et al. 1994; Gross and Thompson 2007; Thompson 1994). Alternatively, Underwood (1997) has pointed out that it is not necessarily the case that older children will choose to regulate their emotions more given evidence that older girls have been found to more openly express anger in certain situations compared to younger girls. Another possibility is that the additional demands presented by developmental changes during adolescence may increase or create emotion regulation difficulties in vulnerable individuals (Yap et al. 2007).

When looking at the ERICA factors, significant sex differences were found only on the Situational Responsiveness factor and age differences were found only on the Emotional Control factor. The differences were found to be in the same direction as those for the overall scale. Given well documented research that girls are more sensitive to social situations and generally more empathic, the finding relating to the Situational Responsiveness factor further supports the validity of the ERICA. Finally, an interaction between age and sex was found for the Situational Responsiveness factor such that scores on this factor were higher for older compared to younger girls but the opposite was true for boys. This finding may have resulted from a strengthening of gender role differentiation with an increase in age.

Notwithstanding the significant contribution that this study makes, it is not without its limitations. Most notably, although ER largely involves internal processes that are not directly observable, self-report data clearly constitute only one pathway of assessment. Thus future research needs to examine the role played by ERICA self-reports within a more comprehensive multi-method, multi-informant assessment framework of ER during childhood and adolescence (e.g., physiological assessment; behavioral observation). Such could provide necessary additional validation of certain items. For example, children's endorsements of whether they are happy or sad may or may not necessarily reflect awareness of their emotions. Also, further work to replicate the factor structure in other samples may be useful given potential conceptual heterogeneity of items.

In conclusion, the current study provides support for the reliability and validity of the ERICA for self-report assessment of ER. This study demonstrates that it is a sound tool for the assessment of ER competences including emotional control, emotional self-awareness and situational responsiveness in children and adolescents aged between 9 and 16 years. Given the lack of a suitable measure of emotion regulation during the middle childhood and adolescent years, the present study makes an important contribution to the developmental literature.

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