

**A child-friendly tool to assess rumination in kids:**

**Relationships with mother psychopathology and family functioning**

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### Abstract

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Despite its well-recognized role as a predictor of psychopathological problems, to date rumination in childhood has received little attention. One of the possible causes of such neglect may rely in the absence of appropriate tools to assess rumination in this age group. To overcome this limitation, the present study first aimed at validating a child-friendly tool (Children Rumination Interview; CRI) to be used in a sample aged 7-12 years (n = 100; 50% females). Second, we hypothesized that maternal depression, family functioning and participants' emotion regulation skills would be associated with children' levels of rumination. Factor analysis on CRI scores yielded two main factors: personal life-related rumination and school-related rumination. Older and female participants showed higher tendencies to ruminate about school issues compared to their younger and male counterparts. Hierarchical regression analyses pointed to a crucial role of maternal rumination and familiar rigidity in both types of rumination. Personal life-related rumination was also specifically predicted by maternal depression and family enmeshment, whereas school-related rumination was significantly associated with children's emotional control and gender. Overall, the CRI appears as a promising tool to assess rumination in children. Results suggests partially different pathways to specific forms of ruminative thoughts.

*Keywords:* children; rumination; emotion regulation; maternal depression; family functioning

### **A child-friendly tool to assess rumination in kids:**

#### **Relationships with mother psychopathology and family functioning**

Rumination is a cognitive process characterized by an abstract, repetitive, and negative thinking style, therefore leading to the maintenance of negative emotions (Smith and Alloy 2009). Nolen-Hoeksema conceptualized rumination as a transdiagnostic symptom (Nolen-Hoeksema and Watkins, 2011), that is mainly associated with depression (Aldao et al. 2010; Rood et al. 2009), but also represents a risk factor for many other forms of psychopathology in young and adults, including anxiety (Mellings and Alden 2000; Verstraeten et al. 2011), binge eating (Nolen-Hoeksema et al. 2007), binge drinking (Nolen-Hoeksema et al. 2007), and self-harm behaviors (Hilt et al. 2008; Hoff and Muehlenkamp 2009).

In spite of its crucial role for the prevention of distress and the promotion of well being in children, to date the construct of rumination in childhood has received little attention in the scientific literature (Broeren, Muris, Bouwmeester, van der Heijden & Abee, 2011; Hilt et al. 2012). Most of the studies that investigated rumination in childhood focused on the relationship between maternal depression and depressive/ruminative symptoms in children (Gibb et al. 2012), and have been retrospectively conducted in adults, asking them to recall their ruminative style when they were children (Spasojevic and Alloy 2002). This is a relevant limitation considering that factors such as respondents' memory limitations, social desirability, and question comprehension have been proven to bias retrospective self-reports and to artificially inflate results (Schwarz 2007).

The non-retrospective instruments developed to assess rumination in children were derived from adult forms. For example, the most commonly used measure of rumination and distraction coping styles in child and adolescent populations is the Children's Response Styles Questionnaire (CRSQ; Abela, Brozina, & Haigh, 2002), modeled after the Response Styles Questionnaire (Nolen-Hoeksema & Morrow, 1991), that was developed for adults. This is also

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an important limitation, as it has been shown that cognitive theories of depression do not fully  
apply to child and adolescent populations. For example, it is possible that children do not have  
the cognitive abilities that are posited to play a role in adult depression (e.g., Garber et al.,  
1993). As a consequence, in fact, measures of cognitive vulnerability, originally developed for  
adults, may be poorly adapted for younger populations (e.g., Lakdawalla et al. 2007). An  
attempt to overcome such limit comes from Lopez (2006), who developed the Children's  
Responses to Imaginary Situations that Elicit Sadness (CRISES), composed by 6 vignettes  
depicting hypothetical sad situations. Children are asked how they would respond to each of  
these situations. However, this instrument does not consider a key feature of rumination, which  
is that, to be pathogenic, it has to be prolonged over time. Indeed there is the need to develop  
an instrument that a) is not retrospective, b) does not derive from measures originally developed  
for adult populations, and c) considers the fact that the rumination is a process prolonged by  
time.

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The early identification of ruminative processes in children is particularly important to  
prevent the development of a stable ruminative style in later stages of development. Broeren  
and colleagues (Broeren et al., 2011) examined the role of rumination in the vulnerability for  
emotional problems in non-clinical children aged 8–13 years. Authors found that rumination  
acted as partial mediators in the relation between neuroticism and symptoms of anxiety and  
depression. Rumination is in fact supposed to become stable and a risk factor for the  
development of several psychopathological symptoms (e.g., depression) during adolescence  
(Papadakis, Prince, Jones, & Strauman, 2006; Rood et al. 2009). Rumination also tends to  
increase with age, likely due to the amplified pressure that the school environment has on  
children as they grow (Gibb et al. 2012; Jose and Brown 2008).

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It has also to be noted that crucial gender differences exist in rumination: Women have  
a greater predisposition to use a ruminative coping style than man, particularly in response to

1 depressed mood (Nolen-Hoeksema et al. 1999), and this gender difference has also been  
2 reported in adolescents (Mezulis et al. 2002; Peled and Moretti 2007). A plausible explanation  
3 for such gender disparities relies on the fact that the expression of internalizing emotions such  
4 as sadness are seen as typically feminine and are consequently encouraged in women  
5 (Wupperman and Neumann 2006), whereas other emotions such as anger are encouraged in  
6 males and discouraged in females (Cox et al. 2010).

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14 Coherently, the perception of stereotypically masculine behaviors both in males and  
15 females results negatively associated with rumination (Wuppermann and Neumann 2006).  
16 Therefore, girls characterized by a sense of identity that is strongly focused on femininity can  
17 be highly susceptible to rumination in the transition to pre-adolescence, especially in the  
18 presence of stress (Jose and Brown 2008). The existing literature, however, reports  
19 contradictory results on gender differences in rumination during development. Some studies  
20 failed to find gender differences (Abela et al. 2002; Abela et al. 2004; Abela et al. 2007), while  
21 others have shown a higher frequency of ruminative behaviors in girls than in boys (Broderick  
22 and Korteland 2004; Broeren et al., 2011; Burwell and Shirk 2007; Dam, Roelofs, & Muris,  
23 2014; Driscoll et al. 2009; Ziegert and Kistner 2002).

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Rumination in childhood has received little attention despite the fact that more than  
twenty years ago Nolen-Hoeksema (1991) suggested that parents play an important role in the  
development of a ruminative style in children. In her Response Styles Theory, Nolen-Hoeksema  
(1991) postulates that rumination is a consistent and durable cognitive style that is shaped  
during childhood by learning, conditioning and socialization processes within the family and  
peer groups. The author argues that depressive rumination is the result of a learning process  
related to the use of a passive –rather than active– coping style in response to negative affect.  
For example, children witnessing their mother responding to depressive symptoms with the use  
of ruminative thinking will "shape" their response to unpleasant events with a ruminative

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coping style that is similar to the one learned from the mother (Gibb et al. 2012; Goodman 2007).

A crucial role appears to be played by child's emotion regulation skills emerging as a consequence of a determined parenting style (Morris et al. 2007). A family environment characterized by high levels of negative emotionality and the constant presence of emotions such as sadness, guilt, and embarrassment may adversely affect the child's ability to regulate his/her emotions, and favor the appearance of ruminative symptoms and internalizing behaviors (Eisenberg et al. 2001; Halberstadt and Eaton 2002). For example, Hilt et al. (2011) found that a controlling and emotionally negatively-laden parenting style was a significant predictor of the development of a ruminative coping style in adolescence. Also, maternal difficulties in creating an empathic relationship emerged to be associated with avoidance and ruminative coping behaviors in children (Goodvin et al. 2006).

On the other hand, positive parenting practices focused on warmth and emotional nourishment have been associated with an appropriate emotional and social development (Pallini et al. 2014), and represent a protective factor for rumination in childhood (Katz and Hunter 2007). Ruijten, Roelofs, and Rood (2011) examined the links between quality of attachment relations with parents and peers, rumination, and depressive symptoms in a non-clinical sample of adolescents. They found that rumination partially mediated the relation between parental trust and symptoms of depression. Dam and colleagues (Dam et al., 2014) studied the relations between indices of peer attachment relationships (i.e., trust and communication), co-rumination (which can be defined as excessively discussing personal problems with peers), and symptoms of depression in a non-clinical sample of adolescents. Results suggested that co-rumination is positively related to symptoms of depression, but only when communication with peers is low.

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The structure of the family may also play an important role with respect to the development of children's ruminative tendencies. Unclear borders between parents and children, and a family organization characterized by control and the absence of a consistent style of education can lead to child's difficulties in achieving autonomy, and the adequate perception of his/her own effectiveness, increasing feelings of guilt, insecurity, and dependence from the family (Davies and Forman 2002). Conversely, families that are adequately able to manage daily stressors, by the use of a positive and supportive style, and in which family roles are clear but flexible, have a decreased risk to develop both internalizing and externalizing psychological symptoms compared to families defined as "disengaged" (Baiocco and Tafà 2009). Several evidences now exist that families with an enmeshment functioning can favor the development of both internalizing and externalizing symptoms in children (Baiocco et al. 2012; Davies et al. 2004). Consistently, Spasojevic and Lega (2002), and Manfredi and colleagues (2011) found a greater tendency to ruminate in adults who retrospectively reported to have had controlling parents and a family characterized by a rigid functioning.

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The first aim of the present study was to overcome the limits of existing methods to assess rumination in children and preadolescents (i.e., using questions derived from the adults' questionnaires; assessing it retrospectively; asking parents) and validate a child-friendly tool to assess perseverative cognition. Second, we aimed at investigating: a) the relationship between family dynamics and child's ruminative behavior, and b) how maternal depressive and ruminative symptoms may influence the development of ruminative tendencies in children and preadolescents aged between 7 and 12 years.

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Based on the previously reviewed literature, we hypothesized that: 1) female and older participants will be characterized by higher levels of ruminative tendencies compared to boys and younger participants; 2) ruminative tendencies in our sample will be negatively correlated with self-reported emotion regulation capacities and positively correlated with maternal levels

of depression and rumination; 3) low levels of family functioning and high levels of rigidity and enmeshment will be associated with higher levels of rumination in the child/preadolescent.

## Method

### Participants

The sample was composed of 49 males and 51 females, aged between 7 and 12 years ( $N = 100$ ; average age =  $9.35 \pm 1.13$  years) who attended schools in medium-high socioeconomic status areas in the central regions of Italy. The schools were selected on the basis of their willingness to participate in the study as part of a scholastic health project ( $N = 3$ ). Only one school refused to participate to the research because it was enrolled in several projects. All participants were Caucasian native Italian speaker. None of the participants involved in the study had cognitive problems or had been treated for psychological problems. Participants' mothers were also enrolled in the study (average age =  $38.12 \pm 4.5$  years). All families consisted of two parents living together with their children. Mothers and fathers had high school or college degrees with a medium socioeconomic status (75%; 15% was high, and 10% was low).

### Procedure

After receiving consent of both the school headmaster and parents, and explaining the study procedures to children/preadolescents, they were handed an envelope containing a battery of self-report standardized questionnaires with the instruction of delivering it to their mothers. All the mothers returned the questionnaires and only three mothers did not completed the battery. Children/preadolescent's rumination was assessed through the semi-structured interview developed ad hoc for the aims of this study (Children Rumination Interview; CRI). In addition to the interview, participants were individually administered a battery of self-report standardized questionnaires. The average time needed to complete the session was 20-30 minutes. The rate of refusal to participate in research was low (less than 5%). The study has been approved by the ethics committee of the department of psychology



of development processes and socialization of Sapienza university of Rome.

## Measures

**Children Rumination Interview.** The Children Rumination Interview (CRI) is a children-friendly instrument that uses vignettes and cartoons to assess rumination tendencies in children and preadolescents aged 8 to 13 years (see Appendix 1). Compared to other self-report linguistic instruments, this illustrated tool has the advantage to be usable with samples speaking any language without the need to culturally adapt and validate potential translated versions. The CRI has two comparable versions, one for males and one for females, and depicts four unpleasant prototypical events that may trigger ruminative thoughts. Such events cover the range of possible situations occurring in children's life, portraying a child: 1) alone (i.e., looking at his/her broken toy); 2) with his/her parents (i.e., being reproached because his/her room is a mess); 3) with friends (i.e., being teased by his/her mates); 4) at school (receiving a bad grade from the teacher). For each of these cartoons, the child is first asked to describe the scene to ensure accurate understanding, then to report if the depicted event has ever occurred to him/her (if not, the interviewer skips to the next situation). As an important feature of rumination is the persistence of unpleasant thoughts over time, well beyond the occurrence of the event itself, each situation also includes three further vignettes in which the same event is represented as a cartoon in the children's head (see Appendix 1). Three different times after the occurrence of the event are depicted: a few hours after, before going to sleep, and the next day. For each of these three vignettes, the participant is asked to report on a 5-point Likert scale (from 1 = never to 5 = always), how often he/she happened to think over and over about the unpleasant event in a negative way for a few hours, until the end of the day, or even the day(s) after. In order to exclude other forms of repetitive thinking such as problem-solving or cognitive reappraisal of the situation, the experimenter points to the emotion depicted in the vignette character's face (i.e. sadness) when saying "in a negative way".

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The questionnaire is therefore composed of a total of 12 items (3 time points for each of the 4 prototypical situation). We summed the scores across the 4 prototypical situations with higher scores indicate higher level of rumination in children. Levels of sadness, happiness and anger may be optionally assessed at the beginning and the end of the task by the use of cartoons representing a Likert scale (from 0 = not at all to 5 = very much). A digital version of the CRI can be obtained by contacting the corresponding author.

**Children's Response Style Questionnaire:** The Children's Response Style Questionnaire (CRSQ; Abela et al. 2000) has been derived from the adults' Response Style Questionnaire (Nolen-Hoeksema and Morrow 1991). It is a self-report instrument consisting of 25 items divided into three subscales: rumination, distraction and problem solving. Respondents are asked to indicate how often (from 0 = almost never to 3 = almost always) they engage a specific behavior when they experience sadness (e.g. "When I am sad, I think about how alone I feel"). High scores indicate high levels of rumination, distraction and poor problem-solving skills. Cronbach's alpha in the present study ranged from .73 to .81 for the different subscales.

**Emotion Regulation Index for Children and Adolescents:** The Emotion Regulation Index for Children and Adolescents (ERICA; MacDermott et al. 2010) is a self-report instrument that assesses emotional adjustment in children and adolescents. The questionnaire consists of 17 items on a 5-point Likert scale (from 1 = never to 5 = always) and assesses three key emotional regulation components: a) emotional control (8 items), whose items are indicative of emotion dysregulation or inappropriate emotional expression (e.g. "I get angry when adults tell me what I can and cannot do"); b) emotional self-awareness (5 items), whose items are indicative of emotional awareness and modulation (e.g. "I am a sad person"); c) situational responsiveness (4 items), which includes items to assess empathy and affectivity that is appropriate to situational demands (e.g. "I enjoy seeing others hurt or upset"). To facilitate the

1 interpretation of results, in the present study higher scores correspond to maladaptive  
2 emotional regulation. Cronbach's alpha in the present study ranged from .78 to .80.  
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4 **Rumination Response Scale:** The Rumination Response Scale (RRS; Nolen-Hoeksema and  
5 Morrow 1991) was administered to participants' mothers to assess their depressive rumination  
6 tendencies. The RRS is composed of 22 items that assess how often people engage in responses  
7 to depressed mood that are self-focused (e.g., I think "Why do I react this way?"), symptom-  
8 focused (e.g., I think about how hard it is to concentrate), and focused on the possible  
9 consequences and causes of one's mood (e.g., I think "I won't be able to do my job if I don't  
10 snap out of this") on a four-point scale (from 1 = never to 4 = always). Cronbach's alpha in the  
11 present study was .81.  
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14 **Centre for Epidemiological Studies Depression:** The Centre for Epidemiological Studies  
15 Depression (CES-D; Radloff 1977) was administered to participants' mothers to assess the  
16 occurrence of depressive symptoms. The CES-D consists of 20 items rated on a 4-point scale:  
17 from rarely or never (if the symptom was observed for less than a day over the previous week)  
18 to often or all the time (if the symptom was observed for 5/7 days). Cronbach's alpha in the  
19 present study was .74.  
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22 **Family Adaptability and Cohesion Evaluation Scale – IV:** The Family Adaptability and  
23 Cohesion Evaluation Scale - IV (FACES IV; Olson, 2011) is a self-report questionnaire that  
24 assesses family functioning through 6 scales: two balanced (cohesion and adaptability), and  
25 four unbalanced scales designed to tap low and high cohesion (disengaged and enmeshed) and  
26 flexibility (rigid and chaotic). The FACES consists of 24 items and responses are given on a 5-  
27 point Likert scale (from 1 = strongly disagree to 5 = strongly agree). In the present study, we  
28 used only the two balanced scales (cohesion and adaptability combined to create a dimension  
29 of familiar functioning), the enmeshed scale, and the rigid scale. Cronbach's alphas for all the  
30 subscales ranged between .71 (enmeshed scale) and .83 (familiar functioning).  
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## Statistical analyses

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The statistical analyses were performed with SPSS (IBM) and Lisrel for Windows. An explorative factor analysis was conducted on the 12 items of the Children Rumination Interview, using the Principal Axis Factoring (PAF) followed by an oblimin rotation. Confirmatory Factor Analysis (CFA) was performed to determine the appropriateness of CRI's two-factor model. A factorial 2 X 2 Multivariate Analysis of Variance (MANOVA) was conducted to test for the effect of gender and age on rumination, using as dependent variables the factors and the total score of the CRI. Pearson correlations were performed to analyze the associations between the main outcome variables of the study. Lastly, a series of hierarchical regressions were performed using scores on the CRI factors as dependent variables and child's emotion regulation abilities and maternal and family functioning as predictors.

## Results

### Factorial analysis of the CRI

A factor analysis using oblimin rotation was used to analyse data. According to the examination of the eigenvalues and the scree plot, yielded to the extraction of two interpretable factors that accounted for the 45.03% of the total variance (Table 1). The first factor accounted for the 32.12% of the variance, with factor loadings ranging from .36 to .66 (mean factor loading of .53). It was named "rumination about personal life" (consisting of the 9 items that assess ruminative thoughts following a negative event occurring with peers, parents, and alone). The second factor accounted for the 12.90% of the variance, with factor loadings ranging from .64 to .72 (mean factor loading of .67), and it was named "school-related rumination" (consisting of the 3 items assessing rumination following a negative event occurring at school). High scores indicate high levels of rumination in the two life contexts. The CRI showed good internal consistency: Cronbach's alpha was .80 for the rumination about personal life dimension and .74 for the school related rumination dimension.

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Confirmatory Factor Analysis (CFA) was performed to determine the appropriateness of CRI's two-factor model. We decided to use the following fit indices, recommended by several authors: a) the root mean square error of approximation (RMSEA), b) the comparative fit index (CFI), and d) the non-normed fit index (NNFI). The RMSEA is utilized for evaluating approximate fit: values between .05 and .08 are indicative of fair fit. For AGFI, CFI, and NNFI values above 0.95 are preferred, but should not be lower than 0.90 (Kaplan, 2000). All the fit indices showed acceptable model fit:  $\chi^2 (df = 53) = 66.82, p = 0.096$ ,  $CMIN/df = 1.26$ ,  $RMSEA = 0.05$ ,  $CFI = 0.95$ , and  $NNFI = 0.94$ .

### **Rumination about personal life and school-related rumination: gender and age differences**

A 2 x 2 factorial MANOVA was performed to test for the effect of gender and age (9 years vs. 10-12 years) on the two CRI factors and the total score. Significant gender (Wilks'  $\lambda = 0.88$ ;  $F_{(3,94)} = 4.14, p < .01, \eta^2 = 0.12$ ) and age (Wilks'  $\lambda = 0.82$ ;  $F_{(3,94)} = 6.87, p < .01, \eta^2 = 0.18$ ) effects emerged. The analysis did not yield any gender X age interaction effect (Wilks'  $\lambda = 0.99$ ;  $F_{(3,94)} = 0.20, p = .89, \eta^2 = 0.01$ ). The decomposition of the univariate effects highlighted significant differences for school-related rumination and for the total score of the CRI. As to age, a difference between younger and older children emerged for self-reported levels of school-related rumination ( $F_{(1,96)} = 14.31, p < .01, \eta^2 = .13$ ), and levels of rumination irrespective of the context (CRI total score;  $F_{(1,96)} = 4.21, p < .05, \eta^2 = .04$ ). Compared to younger children (7-9 years), older participants (10-12 years) reported the highest average scores of rumination both in classroom settings (7-9 years: 2.10,  $SD = 0.76$ ; 10-12 years: 2.78,  $SD = 0.92$ ), and irrespective of the context (7-9 years: 2.19,  $SD = 0.57$ ; 10-12 years: 2.46,  $SD = 0.60$ ). As to gender differences, females got higher scores on school-related rumination ( $M = 2.75, SD = 0.91$ ) compared to males ( $M = 2.13, SD = 0.80$ ),  $F_{(1,96)} = 11.03, p < .001, \eta^2 = .10$ ).

## **Relationship between children's rumination and emotion regulation, mother psychopathology, and family functioning**

The correlations between the CRI's factors and the other administered questionnaires are reported in Table 2. A low-to-moderate correlation emerged between school-related rumination and the different ERICA's dimensions that measured child's emotion regulation capacities ( $r = .43$  for difficulties in emotional control,  $r = .35$  for the lack of emotional awareness, and  $r = .31$  for the low situational responsiveness). The correlations between rumination about personal life issues and the different dimensions of emotion regulation measured by the ERICA emerged to be non significant (ranging from  $r = .12$  to  $r = .25$ ).

Mothers' depressive rumination (RRS) was positively associated with children' rumination (CRI) about personal life ( $r = .46$ ;  $p < .05$ ) and rumination about school issues ( $r = .33$ ;  $p < .05$ ). Also, mothers' depressive symptoms (CES-D) were significantly correlated with rumination about personal life issues ( $r = .48$ ,  $p < .05$ ). The total score of the CRI positively correlated with both the rigidity ( $r = .41$ ;  $p < .05$ ) and the enmeshment ( $r = .48$ ;  $p < .05$ ) dimensions of the FACES. Conversely, the dimension of the FACES measuring an adequate and positive family functioning was negatively correlated with both school-related rumination ( $r = -.21$ ,  $p < .01$ ) and rumination about personal life ( $r = -.20$ ;  $p < .01$ ).

### **Predictors of rumination about personal life and school-related rumination**

Two distinct hierarchical regression analyses were performed to test the role of child, maternal, and family characteristics in predicting the two factors derived from the CRI (see Table 3). First, gender and age were included (Step 1). Second, children's emotion regulation capacities were entered (Step 2). Then, maternal variables such as levels of depression and depressive rumination were entered (Step 3). Fourth, family functioning variables derived from the FACES were entered (Step 4). High levels of child's rumination about personal life issues were significantly associated with high maternal rumination ( $\beta = .23$ ;  $t = 2.56$ ;  $p < .01$ ),

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depression ( $\beta = .329$ ;  $t = 3.64$ ;  $p < .001$ ), familiar enmeshment ( $\beta = .20$ ;  $t = 2.27$ ;  $p < .05$ ), and rigidity ( $\beta = .22$ ;  $t = 2.35$ ;  $p < .05$ ). High levels of school-related rumination were significantly related to being a female ( $\beta = .27$ ;  $t = 3.39$ ;  $p < .001$ ), having low emotional control as measured by ERICA ( $\beta = .19$ ;  $t = 2.06$ ;  $p < .05$ ), high maternal rumination ( $\beta = .19$ ;  $t = 2.21$ ;  $p < .05$ ), and having a more rigid family ( $\beta = .22$ ;  $t = 2.33$ ;  $p < .05$ ).

### Discussion

The present study provides evidence that the CRI could be implemented as a reliable measure of rumination in different life contexts in children aged 7-12 years. Factor analysis yielded two main factors, i.e. rumination about personal life and rumination about school issues. Interestingly, the last factor mirrors previous studies conducted in adults that suggest the existence of a work-related form of rumination (e.g., Cropley et al. 2015; Querstret and Cropley 2012). Here, we take this assumption a step further, showing that school-related rumination and personal-life rumination in children may be selectively influenced by different factors.

First, older and female children showed higher tendencies to ruminate about school issues compared to their younger and male counterparts. The effect of age is not surprising if we consider that our age range encompasses the transition from elementary to middle school (at 11 years). Such transition has been extensively studied as a model of environmental stress, mostly due to renegotiation of peer relations. A study conducted on 688 students showed that the middle school transition and individual vulnerability jointly predict peer exclusion and victimization trajectories up to the year after the transition (Shell et al. 2014).

As to gender differences, present data are consistent with boys reporting higher self-esteem and life satisfaction than girls during transition to adolescence (e.g., Moksnes and Espnes 2013). Consistently, a meta-analysis found small but significant differences in rumination between boys and girls in childhood ( $d = .14$ ) and adolescence ( $d = .36$ ), with girls more likely to ruminate than boys (Johnson and Whisman 2013). Our data suggests that such

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effect sizes may increase if different types of rumination are taken into account. Overall, results point to the fact that gender disparities in rumination may emerge early during the development.

Results from the hierarchical regression analyses emphasize the association of maternal rumination and familiar rigidity with both school-related and personal life-related rumination in children. The first is a relatively well-established finding that has been replicated in both depressed (e.g., Gibb et al. 2012) and non-pathological mothers (Waller and Rose 2013). A recent study suggested that mothers contribute to the development of rumination in their children both explicitly through their suggestions about how to cope, and implicitly through the context of the mother-adolescent relationship (Stroud and Fitts in press). A high rigidity mirrors the inability to adjust to changes occurring in the family and in the environment. Coherently, rigid families have been associated with a wide range of internalizing and externalizing behaviors in childhood (e.g., Hollenstein et al. 2004). Our group has previously demonstrated that cognitive rigidity is a key ingredient of rumination that makes the latter the default response to stress (Ottaviani et al. 2015). Indeed, the ability to flexibly adjust to a changing environment is associated with more adaptive coping strategies, and a decreased likelihood to develop depressive symptoms (Kato 2015).

The other examined variables particularly predicted either child's school-related or personal life-related rumination. Personal life-related rumination was specifically predicted by maternal depression and family enmeshment, with the entire model accounting for up to 68 % of the variance of children's levels of rumination. Maternal depression is one of the most studied antecedents of rumination in children (e.g., Woody et al. 2016). Interestingly, current data indicate that maternal depression may be a specific predictor of rumination on determined issues instead of a generic predictor of rumination, suggesting potential different developmental pathways. As to boundary disturbances in the family, Waller and Rose (2010) found that mother-adolescent co-rumination was significantly related to enmeshment in the relationship.



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Jacobvitz et al. (2004) found that, after controlling for maternal depression and the effects of other family patterns, enmeshed family patterns forecast children's depressive symptoms, including rumination.

Above and beyond shared predictors, school-related rumination was also significantly associated with children's emotional control and gender, and the entire model accounted up to 68 % of the variance of children's levels of rumination. Being a woman and perceiving to have socially inappropriate emotional expressions resulted associated with higher levels of rumination about school. Given that higher levels of rumination reflect the fact that the child perceives school as more threatening, it is plausible that the more vulnerable individuals are less likely to develop more adaptive coping responses to threat (e.g., Verkuil et al. 2010).

Our correlational analysis further shows that children's difficulties in emotion regulation (i.e., emotional control and situational responsiveness) are associated with higher levels of school-related rumination.

This result is in line with a previous study showing a positive association between rumination and a poor ability to regulate emotion, especially in school contexts (Halberstadt and Eaton 2002). It has to be noted that such consistency of findings further supports the capability of the CRI to replicate data previously obtained with different assessment tools. Present results indicate a general contribution beyond context for rigidity and a context-specific contribution for enmeshment. Similarly, at the parent's level, maternal rumination contributes to child's rumination beyond context. However, maternal depression only predicts personal-life related rumination. Finally, at the child's level, a child's emotional control predicts rumination only when it relates to school.

The current study is not without limitations. First, its cross-sectional nature prevents us from drawing causal inferences. To infer causation on the relationship between family functioning, maternal depression, children's emotion regulation skills and children's school-

1 related or personal life-related rumination longitudinal studies are needed. The second major  
2 limitation is the focus on the mothers' psychopathological traits, neglecting the role of the  
3 fathers. Although a meta-analysis on this topic found stronger associations between maternal  
4 than paternal psychopathology and the presence of internalizing problems in children  
5 (Connell and Goodman 2002), a more recent review points to the role of fathers' behaviors in  
6 children's psychopathology. Third, given the crucial role played by rumination on school-  
7 related issues, it would have been interesting to include a measure of parental perception of  
8 children's schooling and marks in the analyses. Lastly, future studies are needed to replicate  
9 current findings on the validity of the CRI in both healthy and psychopathological samples of  
10 children and in a more diverse cultural and ethnic environment.  
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24         Limitations notwithstanding, the CRI appears as a promising tool to assess rumination  
25 about both school and personal issues. To the best of our knowledge, this is the first study that  
26 developed a child-friendly instrument to assess rumination in kids and further examined the  
27 association of ruminative thoughts on different topics with children's emotion regulation  
28 skills, maternal depressive symptoms, and family functioning.  
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39 **Ethical approval:** All procedures performed in studies involving human participants were in  
40 accordance with the ethical standards of the institutional and/or national research committee  
41 and with the 1964 Helsinki declaration and its later amendments or comparable ethical  
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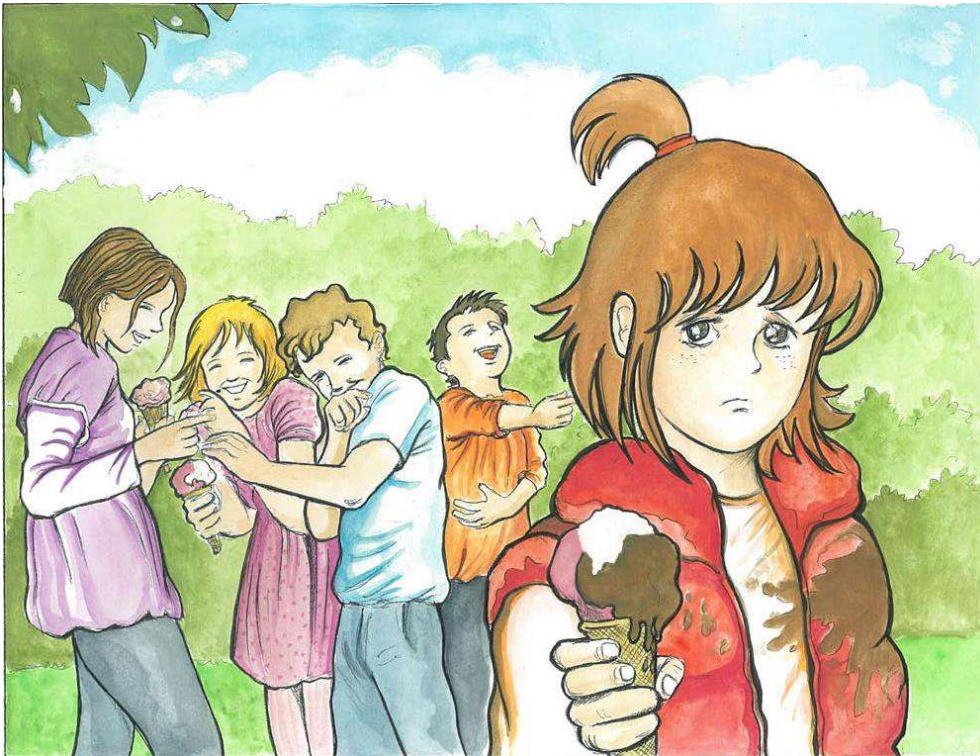
Running head: RUMINATION IN KIDS

## Appendix 1

### Children Rumination Interview (female version)

**Situation number 2.** A picture portraying a child with friends (i.e., being teased by her mates).

#### Vignette stimulus



**Situation number 2.** Time 1: a few hours after.

**Vignette stimulus**



**Situation number 2.** Time 2: before going to sleep.

**Vignette stimulus**



Situation number 2. Time 3: the next day.

Vignette stimulus

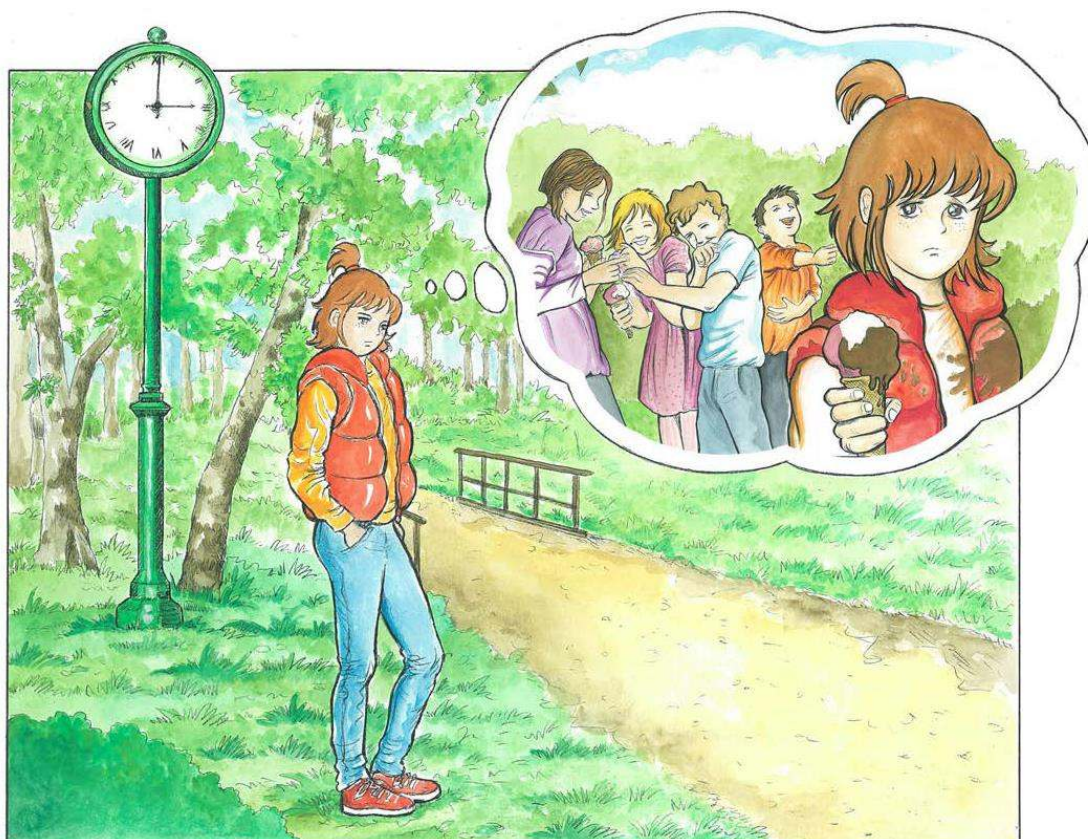


Table 1

Sorted rotated factor loading matrix for the 12 items in 2 scales (maximum likelihood analysis with direct oblimin oblique rotation)

Item	Factor 1	Factor 2
	Rumination about personal life	School-related rumination
Ruminative thoughts alone T1	0.44	0.02
Ruminative thoughts alone T2	0.75	-0.26
Ruminative thoughts alone T3	0.63	0.02
Ruminative thoughts with peers T1	0.43	0.25
Ruminative thoughts with peers T2	0.56	0.03
Ruminative thoughts with peers T3	0.59	0.06
Ruminative thoughts with parents T1	0.65	0.03
Ruminative thoughts with parents T2	0.71	-0.07
Ruminative thoughts with parents T3	0.58	0.21
Rumination thoughts at school T1	-0.10	0.84
Rumination thoughts at school T2	0.08	0.75
Rumination thoughts at school T3	0.11	0.75
Eigenvalues	3.85	1.55
% explained variance	32.12	12.91

*Note.* T1 = Time 1: Few hours after; T2 = Time 2: before going to sleep; T3 = Time 3: next day.

Disengaged; CO=Balanced Cohesion; E=Enmeshed; F=Balanced Flexibility; R=Rigid; C=Chaotic.

Table 2

Correlations between the two factors of the Children Rumination Interview (CRI) and the main variables of the study

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. CRI – Rumination about personal life	1	.37**	.94**	.24*	.12	.25*	.46**	.48**	-.21*	.41**	.40**
2. CRI – School-related rumination		1	.68**	.43**	.35**	.31**	.33**	.21*	-.20	.23	.43**
3. CRI – Total score			1	.36**	.23*	.32**	.49**	.46**	-.25*	.41**	.48**
4. ERICA – Emotional control				1	.44**	.20	.16	.21*	-.19	.13	.30**
5. ERICA – Emotional self-awareness					1	.20*	.09	-.01	-.04	.11	.25*
6. ERICA – Situational responsiveness						1	.11	.08	.03	.13	.19
7. RRS – Maternal rumination							1	.35**	-.23*	.27**	.29**
8. CES-D – Maternal depression								1	-.33**	.23*	.13
9. FACES IV- Familiar functioning									1	-.25*	-.32**
10. FACES IV – Emmeshed family										1	.33**
11. FACES IV – Rigid family											1

Note: CRI = Children Rumination Interview; ERICA = Emotion Regulation Index for Children and Adolescents; RRS = Rumination Response

Scale; CES-D = Centre for Epidemiological Studies Depression Scale; FACES = Family Adaptability and Cohesion Evaluation Scale. \*  $p < .05$ ; \*\* $p < .01$ .



Table 3

## Hierarchical regression models

	Rumination about personal life				School-related rumination			
	B	SE B	$\beta$	R <sup>2</sup> AR <sup>2</sup>	B	SE B	$B$	R <sup>2</sup> AR <sup>2</sup>
<b>Step 1: Gender and Age</b>								
Gender	-.004	.103	-.003		.497	.147	.274*	
Age	.001	.048	-.001		.115	.068	.143	
<b>Step 2: Child (ERICA)</b>								
Low emotional control	.005	.012	.037		.034	.016	.189**	
Low emotional self-awareness	-.002	.017	-.013		.033	.023	.126	
Low situational responsiveness	.039	.025	.130		.071	.036	.165	
<b>Step 3: Mother (RRS, CES-D)</b>								
Rumination	.013	.005	.226*		.016	.007	.194**	
Depression	.023	.006	.329*		-.001	.009	-.007	
<b>Step 4: Family (FACES-IV)</b>								
Familiar functioning	.011	.014	.067		-.006	.021	-.024	
Emmeshed family	.032	.014	.197**		-.001	.020	-.004	
Rigid family	.034	.015	.223**		.048	.021	.220**	
<b>Total R<sup>2</sup></b>	<b>.68</b>				<b>.68</b>			

Note: Beta values refer to weights after including predictors at step 4. \*\*p < .05; \*p < .001.