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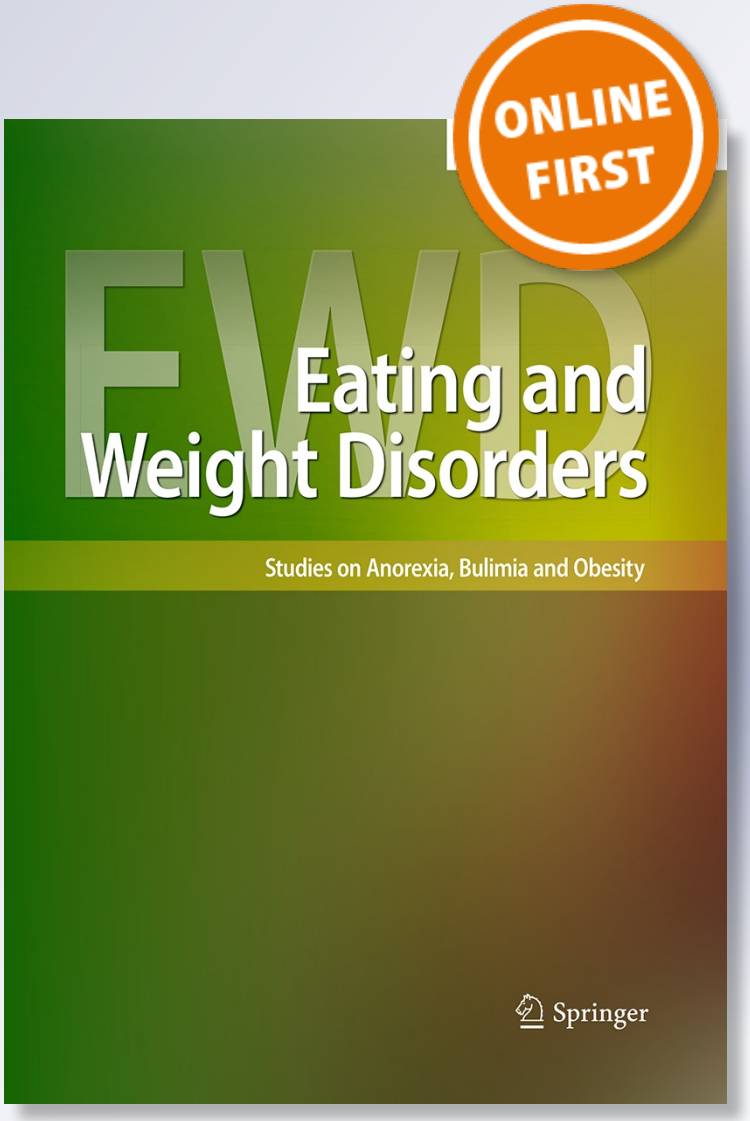

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ORIGINAL ARTICLE

Rumination mediates the relationship between peer alienation and eating pathology in young adolescent girls

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Abstract
Purpose This study examined whether rumination, the tendency to passively and repeatedly dwell on negative events, mediated the relationship between peer alienation and eating disorder symptoms among adolescent girls.
Methods Participants included 101 girls (ages 10–14; 47 % Hispanic, 24 % African American) who completed questionnaires regarding peer relationships, symptoms of eating pathology, rumination, and depressive symptoms.
Results Girls who reported experiencing more peer alienation reported a higher degree of pathological eating symptoms. The relationship between peer alienation and eating pathology was mediated by rumination, even after controlling for depressive symptoms.
Conclusions This study extends previous work indicating that rumination is a cognitive mechanism that may contribute to the development and/or maintenance of eating pathology. The findings suggest that adolescents who feel alienated by their peers might be particularly susceptible to engaging in ruminative thinking that can lead to or exacerbate eating problems.

Keywords Rumination · Peer alienation · Eating pathology

Christina Roberto is a Robert Wood Johnson Foundation Health & Society Scholar.

We were saddened by the loss of Susan Nolen-Hoeksema who passed away before this paper went to press.

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Introduction

Concerns about peer relationships and evaluation increase in early adolescence [1–3], heightening the ability of interpersonal relationships to influence emotional development of adolescent girls during this period. Some research has shown that feelings of alienation from one's peers were associated with pathological eating symptoms, including restrained eating, binge eating, and purging [4–6]. In a study of 9- and 10-year-old girls, poor friendship quality (lack of acceptance and intimacy) was related to multiple symptoms of eating pathology including poor body image, body dissatisfaction, and restrained eating [5]. Another study of adolescent girls found that negative friendship qualities (i.e., conflict with and alienation from friends) were associated with disordered eating even when controlling for depressive symptoms [6]. Although these two studies observed a relationship between social alienation and eating pathology, the potential mechanisms for such a relationship remain unknown.

Some theorists have argued that eating disorder (ED) symptoms, particularly binge eating and purging, serve to distract an individual from unwanted thoughts or feelings of distress [7].

If this is the case, the relation between peer alienation and eating pathology might be explained by a mechanism that exacerbates negative thoughts and feelings about the alienation. One such mechanism is rumination, the

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tendency to passively and repeatedly dwell on negative events, their causes, and consequences [8]. Rumination involves brooding about past and present events in a passive way; thus, girls who experience peer alienation may think about negative social interactions wondering why they went poorly to better understand the social alienation. Unfortunately, rather than increase social support, rumination appears to have the opposite effect [8].

Rumination has also been related to eating pathology among adolescents and adults. Studies of adult women with and without an ED have shown that coping style in response to stress predicts symptoms of anorexia nervosa (AN) and bulimia nervosa (BN) [9, 10]. In one prospective study, cognitive avoidance was related to the onset of AN, while rumination predicted the onset of BN [10]. Another longitudinal study of adolescents by Nolen-Hoeksema, Stice and colleagues [11] found that rumination predicted increases in future bulimic symptoms. The authors suggest that bulimic symptoms may serve the function of escaping from rumination; restricting one's eating might also serve a similar function. A study by Rawal and colleagues [12] also found that individuals with sub-clinical and clinical eating disorders reported higher levels of depressive rumination and experiential avoidance as well as more positive beliefs about the benefits of rumination relative to healthy controls.

In summary, previous research has demonstrated that peer alienation and rumination are related to eating pathology. However, it is unclear whether both are independent correlates of eating pathology or whether rumination might be a mechanism that links peer alienation to eating pathology. Therefore, the aims of this study were to examine the relation between peer alienation, rumination, and ED symptoms among a group of young adolescent girls. The study focused on girls because they are more likely to engage in rumination compared to boys [13] and have higher rates of eating pathology. We focused on disordered eating attitudes and behaviors more generally because symptoms typically occur on a continuum and even sub-clinical levels of disordered eating may have serious health impacts and predict future psychopathology. We hypothesized that greater feelings of peer alienation would be associated with increased eating pathology and this relationship would be mediated by rumination.

Materials and methods

Participants

Participants included 101 girls (ages 10–14, $M = 12.7 \pm 1.14$) in the Northeastern USA recruited via advertisements in newspapers and from public schools for a study on adolescent well-being. The ethnic composition of the sample was 47 % Hispanic and 53 % non-Hispanic, and the racial composition was 73 % Caucasian, 24 % African American, and 3 % other. The median family household income was 38,000 US dollars which is well below the state and national averages, and mothers' education levels were as follows: 12 % did not finish high school, 26 % had a high school diploma, 41 % had some college, 15 % had a 4-year college degree, and 6 % had a graduate degree. The mean BMI for the sample was 22.13 ± 5.68 kg/m^2 (range 12.9–42.3 kg/m^2).

Procedure and measures

Eight participants came to the laboratory and data for the remaining participants were collected during home visits. Informed consent was obtained from participants' mothers and assent was obtained from adolescents. Participants completed measures in a room alone with an experimenter who was available to answer questions. Participants were paid 20 US dollars for their participation. The study was approved by Yale University's Institutional Review Board.

Peer alienation

The peer alienation subscale from the Inventory of Parent and Peer Attachment (IPPA) [14] was used to assess peer alienation. It includes seven items about close friends (e.g., I feel alone or apart when I am with my friends). Participants rate the accuracy of each item on a scale from 1 to 5 (1 = almost never or never true; 5 = almost always or always true). Higher scores on this subscale indicate a stronger degree of peer alienation. The IPPA peer scale has demonstrated good internal consistency ($\alpha = 0.92$), test–retest reliability ($\alpha = 0.86$), and validity [14]. Internal consistency for the peer alienation subscale for the present sample was adequate ($\alpha = 0.74$).

Eating disorder pathology

The Children's Eating Attitudes Test (ChEAT) [15] was used to measure pathological eating attitudes and behaviors. This 26-item measure assesses attitudes and behaviors that are associated with AN and BN. Participants rate how often they engage in behaviors or have beliefs about food using a 1–6 scale (1 = never, 6 = always). All items with a response of 6 are recoded to a score of 3, items rated 5 are recoded to a score of 2, and items rated a 4 are recoded to 1. Items with responses ranging from 1 to 3 are recoded to 0. A total score was computed (possible range of 0–78). The ChEAT has demonstrated good test–retest reliability [15], internal consistency, and convergent validity [16]. Internal consistency for the present sample was adequate ($\alpha = 0.70$).

For descriptive purposes, past year diagnoses for AN and BN were assessed using the Computerized Diagnostic Interview Schedule for Children IV (C-DISC), a reliable and valid structured clinical interview [17]. A trained interviewer administered the C-DISC to the adolescent girls.

Rumination

The rumination subscale from the Children's Response Style Questionnaire (CRSQ) [18] was used to assess rumination. This 13-item subscale asks participants to rate how often they engage in each response (e.g., think about a recent situation wishing it had gone better) when they feel sad, using a 4-point scale (1 = almost never, 4 = almost always). The subscale demonstrated excellent reliability for the present sample ($\alpha = 0.91$).

Depressive symptoms

The Children's Depression Inventory (CDI) [19], a 27-item questionnaire, was used to assess severity of cognitive and behavioral depressive symptoms. Each CDI item contains three statements, and participants check the item that has been most true for them during the previous 2 weeks (e.g., I am sad once in a while, I am sad many times, I am sad all the time), with items scored 0 through 2. A total score was computed with a higher score indicating a higher level of depressive symptoms. We removed one item on the CDI that assesses suicidality based on feedback from the IRB. The CDI has demonstrated good psychometric properties including reliability and validity [20]. Internal consistency in the present sample was high ($\alpha = 0.86$).

Body mass index (BMI) percentile

Body mass index (kg/m^2) was obtained by asking participants' mothers to report their daughters' height and weight. Most mothers had this information from recent visits to the pediatrician. If the mothers did not have this information, adolescents were asked to self-report height and weight to determine BMI. BMI percentile was determined based on child's age and gender.

Statistical analyses

First, Pearson correlations among all variables were conducted. We then performed a mediation analysis to examine the direct effect of peer alienation on eating pathology as well as the indirect effect of peer alienation on eating pathology mediated by rumination. An SPSS macro provided by Preacher and Hayes [21] was used to test the proposed mediation model. This macro uses a bias-corrected bootstrapping sampling procedure, which produces confidence intervals for the indirect effects (5,000 bootstrapped samples were drawn).

Results

Correlations among all variables, along with means and standard deviations, are presented in Table 1. None of the participants met full past year diagnostic criteria for AN or BN. Eating pathology measured by the ChEAT was significantly correlated with peer alienation and rumination. BMI percentile was not significantly correlated with other measures. Depressive symptoms were related to peer alienation, eating pathology symptoms, and rumination; thus, it was included as a covariate in the mediation model.

Figure 1 displays the results from the mediation analysis. The effect of peer alienation on rumination was significant (0.726, $p < 0.001$) as was the effect of rumination on eating pathology (0.250, $p = 0.004$). The total effect of peer alienation on eating pathology was also significant (0.392, $p = 0.004$). However, when rumination was added to the model as a mediator, the effect of peer alienation on eating pathology was no longer significant (direct effect 0.199, $p = 0.141$; indirect effect 0.181, CI 0.078–0.340). These results indicate that rumination fully mediated the relationship between peer alienation and eating pathology. Including depressive symptoms as a covariate did not change the indirect effect, and it was a significant predictor in the *a* path (from peer alienation to rumination).

Table 1 Means, standard deviations, and correlations among variables

	1	2	3	4	5
1. Peer alienation	–				
2. Eating pathology symptoms	0.31**	–			
3. Rumination	0.49**	0.38**	–		
4. Depressive symptoms	0.42**	0.34**	0.61**	–	
5. Body mass index percentile	−0.04	0.03	0.08	0.14	–
Means	15.07	7.27	9.49	6.45	77.22
Standard deviations	5.21	6.45	7.94	5.84	30.01
Observed range	10–35	0–31	0–31	0–25	0–99.60

* $p < 0.05$, ** $p < 0.01$. Ranges for questionnaire measures (minimum–maximum): peer alienation (7–35), eating pathology symptoms (0–78), rumination (0–39), depressive symptoms (0–52)

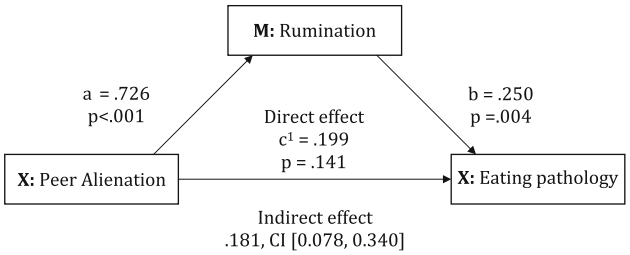

Fig. 1 Results of a meditational model showing associations among peer alienation, the proposed mediating variable (rumination), and eating pathology. Peer alienation was measured by the Inventory of Parent and Peer Attachment; eating pathology was measured by the Children's Eating Attitudes Test; rumination was measured by the Children's Response Style Questionnaire. Different paths in the mediation model are represented by *a*, *b*, and *c*

Discussion

This study revealed that perceptions of peer alienation were significantly associated with eating pathology among a sample of young adolescent girls. Furthermore, rumination mediated this relationship, and these findings held while controlling for depressive symptoms. Although data are cross-sectional, this model offers the possibility that girls may engage in pathological eating behaviors to avoid negative thoughts about peer relationships.

Rumination is a perseverative cognitive process that tends to amplify negative emotional cognitions. Because of the strong relationship between social approval and disordered eating [22], it is not surprising that rumination accounted for the link between cognitions regarding peer alienation and disordered eating attitudes and behaviors. Although interpretation of the data is limited by the cross-sectional design, this pattern has the potential to be self-perpetuating. For example, research has found that engaging in rumination may lead to decreases in social support over time [23, 24], perpetuating feelings of alienation. Similarly, rumination and disordered eating have been shown to have a reciprocal relationship. One recent study with adolescents found that, over the course of 4 years, rumination predicted future bulimic symptoms, which in turn predicted future rumination [11]. It may be the case that peer alienation begins a cycle of rumination and eating pathology, which maintain one another. A prospective study design would be necessary to test this idea.

This study adds to the growing literature suggesting that rumination is a transdiagnostic risk factor for multiple types of psychological symptoms [8]. An important question to consider is why adolescents who ruminate experience divergent symptom profiles (e.g., disordered eating verus self-injurious behavior, depression, anxiety, etc.) [25]. This study focused on rumination as it is typically conceptualized as a repetitive, passive focus on negative mood states. Other recent research has considered disorder-specific rumination. For example, one study showed that a tendency to ruminate about eating, weight, and shape, specifically, predicted eating disorder symptoms after controlling for depression and anxiety [26]. It would be interesting to more closely examine the content of rumination and its predictive value for symptom specificity.

Additionally, it would be interesting to further examine the functional role of eating pathology in the model. It is possible that disordered eating behavior serves as an escape from ruminative self-focus, or that both rumination and disordered eating behaviors serve as an escape from cognitions related to peer alienation. Future work could experimentally examine the relation between cognition and pathological eating behaviors. One step toward this would be to examine thought content before and after engagement in maladaptive eating behaviors to determine whether binge eating, purging, and/or restriction are negatively reinforced by quelling ruminative thoughts, but in turn fuel eating disorder-specific rumination.

It is important to interpret findings from the present study considering its limitations. First, as we discussed above, the study was cross-sectional, precluding causal interpretations. Second, although we measured depression levels and BMI in the current study, it would be helpful to include multiple measures and/or informants of these constructs in future research. In particular, parent-reported height and weight may limit the validity of BMI. Additionally, because we over-sampled racial/ethnic-minority girls, future work should examine whether this model will pertain to boys and other populations, such as older adolescents or young adults who are more likely to experience bulimic symptoms. Work on rumination and depression suggests that it applies to males, even though fewer males engage in rumination compared to females [13, 27]. It may be the case that peer alienation in other contexts (e.g., sports competence) predicts eating pathology for boys and that rumination mediates such a relationship.

This study has several strengths including the use of a large, community sample of racially and ethnically diverse adolescents. The results suggest that it is especially important to target secondary prevention efforts toward girls who engage in rumination and are at high risk of developing EDs. In addition, ED prevention efforts among adolescents might be bolstered by focusing on the development of adaptive coping styles, rather than the reduction of eating disorder-specific risk factors. Such coping skills might include healthy distraction (e.g., calling a friend, going for a walk), problem-solving (e.g., figuring out ways to improve social interactions), and/or mindfulness exercises (e.g., accepting thoughts and feelings), as an alternative to rumination when feelings of distress are encountered regarding peer relationships [28]. Research on

the best ways to disseminate these kinds of skill-building experiences among adolescents is needed.

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Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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