

RESEARCH ARTICLE

Emotion regulation and disordered eating behaviour in youths: Two daily-diary studies

Christine Dworschak¹  | Reuma Gadassi Polack^{2,3} | Julia Winschel² | Jutta Joormann² | Hedy Kober²

¹University of Zurich, Zurich, Switzerland

²Yale University, New Haven, Connecticut, USA

³The Academic College Tel Aviv Yaffo, Tel Aviv Yaffo, Israel

Correspondence

Christine Dworschak and Reuma Gadassi Polack.

Email: christine.dworschak@psychologie.uzh.ch and reuma.gadassipolack@yale.edu

Handling Editor: Beate Herpertz-Dahlmann

Funding information

The Israeli Council for Higher Education Postdoctoral Research Fellowship for Women; the National Institute of Mental Health, Grant/Award Number: R21 MH119552; European Union's Horizon 2020; the National Institute of Mental Health Translational Developmental Neuroscience Training Grant, Grant/Award Number: T32 #MH18268; the Foundation of the German Industry Scholarship

Abstract

Objective: Disordered eating cognitions and behaviours in childhood and adolescence have been identified as precursors for the development of eating disorders. Another important contributor to eating disorder risk is maladaptive emotion regulation. However, while the regulation of negative affect has been the focus of much research, the literature on the role of positive emotion regulation in eating pathology is extremely limited. The present study extends previous research by examining the regulation of both positive and negative affect in disordered eating using two waves of a daily diary design.

Method: Every evening for 21 days, 139 youths (8–15 years) reported their use of rumination, dampening, and disordered eating cognitions and behaviours. 1 year later, during the onset of the COVID-19 pandemic, 115 of these youths were followed-up.

Results: As predicted, higher levels of rumination and dampening were found to be associated with a higher frequency of weight concerns and restrictive eating on person-level (both Waves) and day-level (Wave 2). Further, a higher frequency of rumination at Wave 1 predicted increases in the frequency of restrictive eating 1 year later.

Conclusions: Our findings underline the importance of examining regulation of both positive and negative emotion in order to understand eating disorder risk.

KEYWORDS

adolescents, children, eating disorders, emotion regulation

Highlights

- The current study used two waves of a daily diary design to assess disordered eating in youths.

Jutta Joormann and Hedy Kober contributed equally to this work.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. European Eating Disorders Review published by Eating Disorders Association and John Wiley & Sons Ltd.

- Rumination was associated with disordered eating cross sectionally and longitudinally.
- We are the first to show that dampening is also associated with disordered eating.

1 | INTRODUCTION

Eating disorders (EDs) are serious mental illnesses with mortality rates among the highest of any mental disorder (e.g., Herpertz-Dahlmann, 2009). The onset of such conditions often occurs during adolescence, with Anorexia Nervosa developing at a younger age compared to Bulimia Nervosa and Binge Eating Disorder (Hudson et al., 2007; Micali et al., 2013). However, maladaptive eating behaviours (e.g., restriction, binging) and cognitions (e.g., body image concern) in childhood and early adolescence often precede the onset of EDs (Stice et al., 2002; Stice & Shaw, 2002) and have been found to be fairly common in youth (e.g., Clark & Tiggemann, 2006).

The prevalence of disordered eating cognitions and behaviours escalates disproportionately in girls relative to boys starting in adolescence (e.g., Crick & Zahn-Waxler, 2003). While girls are at higher risk for developing disordered eating patterns from early to mid-adolescence, no consistent age effects have been found in boys (e.g., Sancho et al., 2007). Consequently, by the age of 15 years, girls outnumber boys with disordered eating cognitions and behaviours by a ratio of 3:2 (Hautala et al., 2008) or 3:1 (Ferreiro et al., 2012). However, most previous studies on gender differences in disordered eating focused on adolescents only, and relied on retrospective self-reports.

Since maladaptive eating patterns are a precursor for the later development of eating disorders (e.g., Stice et al., 2017), it is important to identify risk factors of such maladaptive eating before symptoms escalate. In their conceptual model, Rapee et al. (2019) described changes in emotionality as one of the key changes during adolescence that might increase risk for the development of social-emotional disorders, such as eating disorders. This period in life is characterised by several challenges such as increased independence from caregivers, as well as hormonal and physiological changes (Somerville et al., 2010). On average, adolescents show more frequent, intense, and unstable expression of emotions compared to both children and adults (Bailen et al., 2018; Guyer et al., 2016) and report more negative affect (Henker et al., 2002).

Importantly, data has shown that negative affect is a risk factor for eating disorders (Keel & Forney, 2013).

Consistently, theoretical models of eating disorders have pointed at emotion regulation as an important factor contributing to the development of disordered eating cognitions and behaviours (e.g., Haynos & Fruzetti, 2011; Wonderlich et al., 2015). Emotion regulation is defined as one's ability to modify the experience and/or expression of their emotions (Gross & Thompson, 2007). An extensive body of research has demonstrated emotion regulation difficulties among individuals with eating pathology (e.g., Racine & Wildes, 2015). However, the investigation of specific emotion regulation strategies is important to gain a more fine-grained understanding of how emotion regulation contributes to eating disorder risk. One emotion regulation strategy that has received much attention in eating pathology research is *rumination*.

Rumination is defined as a mode of responding to negative emotion or mood by focussing passively and repetitively on one's symptoms (their causes and/or implications), without taking effective action to relieve them or to solve the problems that triggered their onset (Nolen-Hoeksema, 1991). In a recent meta-analysis including studies with both adults and adolescents, rumination was found to be both concurrently and prospectively positively associated with clinical and subclinical levels of eating psychopathology (Smith et al., 2018). Further, those with eating disorders reported higher levels of rumination compared to non-disordered controls.

Most previous studies on emotion regulation and unhealthy eating in youth have been based on retrospective self-report measures. However, research comparing retrospective reports on emotion regulation with data from studies that collected daily reports revealed divergence in results (Todd et al., 2004). This likely occurs because individuals are more prone to memory and other cognitive biases when reporting retrospectively (Schwarz et al., 2009), and thus rely on different information when making these two types of assessments (Todd et al., 2004). Hence, it has been recommended to apply intensive longitudinal designs (McMahon & Naragon-Gainey, 2020), including daily diaries and ecological momentary assessment (EMA).

A few studies in adults have examined associations among rumination or repetitive negative thinking and disordered eating using intensive longitudinal designs. In an EMA study in 66 individuals seeking eating disorder

treatment, a higher level of momentary repetitive negative thinking predicted higher subsequent body checking and weighting (Sala et al., 2019). Similarly, Kornacka et al. (2021) found that momentary rumination was predictive of emotional eating in a sample including both overweight/obese adults as well as healthy controls. Finally, in a sample of individuals with binge eating disorder, Svaldi et al. (2019) found rumination to be a significant predictor of subsequent binge eating episodes.

To our knowledge, only one study has examined the relationship between rumination and eating-related experiences in youths using an intensive longitudinal design. Kubiak et al. (2008) investigated the contribution of rumination to emotional eating in obese female adolescents ages 14–17 years under restricted dietary conditions, as part of a 6-week inpatient weight management course. In this study, participants were probed four times per day over 7 days about stressors/hassles that they experienced, as well as their mood, rumination, and desire to eat (they were also asked to report additional times when they encountered stress). Results indicated that ruminative thinking regarding stressors was significantly related to an increase in the individuals' desire to eat on a daily level. This suggests that rumination may be associated with eating-related difficulties. However, these results are limited by the small sample of in-patient female adolescents, the short assessment period, and the narrow focus on negative emotions and emotional eating as opposed to a variety of emotions and of eating behaviours.

Indeed, the literature on the role of positive emotion in adolescent's eating pathology is limited (Gilbert, 2012). Examining positive affect and its regulation, however, is a promising direction of investigation given that prior research has pointed at positive emotion dysregulation as important in eating pathology (Selby et al., 2019). To our knowledge, no studies to date have examined the role of regulation of positive affect in disordered eating. However, research in related fields, such as on reward processing in eating pathology, can inform the current investigation. In particular, aberrant reward processing and avoidance of positive emotions in adults has been linked with EDs. For example, Harrison et al. (2010) reported meta-analytic findings showing that patients with Anorexia Nervosa (current or in remission) display reduced reward sensitivity compared to healthy controls. Further, Lampard et al. (2011) observed that behavioural avoidance of positive affect, but not negative affect, was more prevalent in adults with eating disorders than in healthy controls. Interestingly, *dampening* is one specific positive emotion regulation strategy that has been found to reduce the

intensity and duration of positive affect (Feldman et al., 2008). It is defined as focussing on negative aspects of positive mood and/or a positive situation (Feldman et al., 2008). Given that dampening seems to lead to a down-regulation of positive affect, it might be an important element to consider in populations with disordered eating. However, although dampening has received some attention in clinical research (e.g., Young et al., 2019), it has been rarely examined in relation to eating pathology.

Generally, emotion regulation is particularly crucial in the face of stress (Kalokerinos et al., 2019). However, intensive longitudinal designs typically occur within the context of daily life, and consequently participants typically experience heterogeneous levels of stress. One way to address this shortcoming of intensive longitudinal designs is leveraging population-level stressors that can act as “natural” stress manipulation. A relevant stressor in this regard might be the onset of the Covid-19 pandemic, which has been described as a period of distress and uncertainty (Chahal et al., 2021). The initial stage of the pandemic included school closures and social distancing measures that disturbed children and adolescents' lives, putting them at increased risk for adverse mental health outcomes (e.g., Racine et al., 2021). With regard to eating psychopathology, Agostino et al. (2021) reported a more rapid onset and greater severity of Anorexia Nervosa in youth during, compared to before, Covid-19. Given those findings, it might be particularly important to investigate associations among emotion regulation and disordered eating in children and adolescents during the pandemic.

The current study extends previous research by (a) examining gender and age differences in daily eating behaviours in children and adolescents, (b) investigating daily associations between rumination and eating related constructs in both female and male undiagnosed youths, and (c) being the first to examine the role of dampening in youths' disordered eating cognitions and behaviours. To assess associations among rumination, dampening, and disordered eating cognitions and behaviours, we collected two waves of daily diaries 1 year apart. While Wave 1 examined these associations in typical everyday life, Wave 2 data were collected during the onset of the COVID-19 pandemic. This unique design allowed us to investigate these associations not only in the short-term (within waves), but also in the long-term (across waves). In order to capture a broad range of disordered eating symptoms in our sample, we decided to investigate weight concerns, restrictive eating, purging behaviour, and binge eating as distinct types of disordered eating cognitions and behaviours.

We tested the following hypotheses:

- (1) There will be gender and age differences in the frequency of disordered eating cognitions and behaviours, such that frequency of disordered eating cognitions and behaviours will be associated with age for girls only.
- (2) Rumination will be positively associated with disordered eating cognitions and behaviours.
- (3) Dampening will be positively associated with disordered eating cognitions and behaviours.

Hypotheses 2 and 3 were examined at the trait/person, state/day, and year (across waves) levels.

2 | METHODS

2.1 | Participants and procedure

The present report is part of a larger study on emotions, social experiences and eating behaviours in youths: The full details of the procedure have been described previously (e.g., Deng et al., 2021).

2.1.1 | Wave 1

Participants were recruited via flyers in the New Haven area, Facebook and craigslist. Advertisements invited children and adolescents aged 9–15 years to take part in a

daily-diary study about emotions and social interactions. Children and adolescents were included in the study if they were within the age range or about to turn 9 years old during the study, had daily access to an Internet-enabled device (e.g., laptop, smartphone) and consent from a legal guardian. A sample of 148 children and adolescents ages 8–15 (hereinafter, youths) completed daily diaries on a secure website (Qualtrics) over a period of 21 days between 1/31/2019 and 9/23/2019. After an initial lab session, youths received an email with a link to the same questionnaire every evening either at 7 PM or 9 PM (whichever was closest to their bedtime). Participants were instructed to complete the survey as soon as possible, before going to bed that night. The link expired after 14 h. Youths were contacted by phone once a week during the diary period to ensure compliance and to address technical difficulties (e.g., missing emails). Participants received \$40 if they completed at least 60% of the surveys, \$60 if they completed at least 90% and \$10 if they completed less than 60% of the surveys.

Nine participants completed <13 (60%) of the diary entries and were excluded from analyses. The final sample included 139 youths (94% of the original sample; $M_{AGE} = 11.89$, $SD = 2.14$). Youths completed a mean of 19.08/21 diary entries ($SD = 2.14$). Table 1 presents demographic characteristics for both waves of data. In a third wave of daily-diary data, which was collected one and a half years after Wave 2 and followed up $n = 80$ participants of Wave 2, youths were asked to report their Body Mass Index (BMI). $N = 65$ youths of these participants provided BMI data, which is presented in Table 2.

TABLE 1 Demographic characteristics and study variables by Wave.

	Wave 1	Wave 2
<i>N</i> (% girls)	139 (52.52%)	115 (53.90%)
Age	11.89 (SD = 2.14)	12.70 (SD = 2.12)
Diary days	19.08 (SD = 2.14)	25.90 (SD = 3.28)
Caucasian or white	97 (69.80%)	84 (73.00%)
American Indian, Native American, or Alaska native	2 (1.40%)	2 (1.70%)
Asian or Asian American	10 (7.20%)	7 (6.10%)
Black, African American, or African	10 (7.20%)	7 (6.10%)
Latino or Hispanic	9 (6.50%)	4 (3.50%)
Middle Eastern or Arab	5 (3.60%)	6 (5.20%)
Mixed/other	6 (4.30%)	5 (4.30%)
Rumination	$M = 0.81$ (SD = 0.55)	$M = 0.66$ (SD = 0.67)
Dampening	$M = 1.40$ (SD = 0.58)	$M = 0.92$ (SD = 0.74)

Note: Means and standard deviations of study variables (rumination, dampening) are calculated at the aggregated person level meaning that they correspond to the average frequency across diary days. See Table S2 for additional information about Weight Concerns and Restrictive Eating.

TABLE 2 Number of children/adolescents with healthy versus overweight/underweight BMI based on age and sex adjusted BMI Percentile (shown for participants shared between Waves; $n = 65$).

	Underweight	Healthy weight	Overweight	Obesity
N (%)	3 (4.62%)	49 (75.38%)	9 (13.85%)	4 (6.15%)

Note: Calculation and interpretation of age and sex adjusted BMI percentile based on the Child and Teen BMI Calculator of the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention, 2023). Underweight: BMI Percentile <5; Healthy weight: BMI Percentile between 5 and 84; Overweight: BMI Percentile between 85 and 94; Obesity: BMI Percentile >94.

2.1.2 | Wave 2

Participants from Wave 1 who indicated that they were interested in participating in additional studies were invited to participate in this 28-day daily-diary wave. Data collection took place during the acute onset of the COVID-19 pandemic between 3/30/2020 and 6/8/2020. We began 2 weeks after school closures in Connecticut and a few days after the 'stay at home' orders and mask mandate were issued.

After an initial online Zoom session, youths received an email with a link to the daily diary survey every evening, which expired after 16 h. Youths were instructed to complete the survey before going to bed. Participants received \$50 if they completed at least 60% of the surveys, \$70 if they completed at least 90% and \$10 if they completed less than 60% of the surveys.

Two participants completed <13 diary entries and were excluded from analyses. The final sample included 115 youths (98% of the original sample; $M_{AGE} = 12.70$, $SD = 2.12$, age range = 9–17 years). Youths completed a mean of 25.90 diary entries ($SD = 3.28$).

2.2 | Measures

Only relevant measures from the larger study are described below. Given that this was a daily diary study, we only used a few items to assess the relevant constructs in order to reduce time and burden for participants. This is customary in intensive longitudinal studies and it has been shown that even single-item measures are robust in such studies (Song et al., 2022).

2.2.1 | Wave 1

Rumination

To assess rumination, we used two items from the *Rumination* subscale of the Children's Response Style Questionnaire (CRSQ; Abela et al., 2000). Instructions and items were adapted for daily diary use by asking participants to report the extent to which they had engaged in these responses to bad mood since the last

diary entry. Items were rated on 5-point scales, ranging from (0) *Not at all* to (4) *almost all of the time*. Intraclass Correlation (ICC) score was 0.40 for rumination.

The between-person and within-person reliabilities were 0.68 and 0.60 (calculated following Shrout & Lane, 2012).

Dampening

To assess dampening of positive emotions, we used two items from the *Dampening* subscale of the Responses to Positive Affect Questionnaire for Children (RPA-C; Bijttebier et al., 2012). Instructions, items, and the response scale were adapted for daily diary similarly to the items from the *Rumination* subscale (see above). ICC for dampening was 0.43. The between-person and within-person reliabilities were 0.66 and 0.41.

Disordered eating cognitions and behaviours

To assess problematic eating behaviours and cognitions, we adapted items from the self-report Eating Disorder Examination Questionnaire (EDE-Q 6.0; Fairburn & Beglin, 2008). Youths were asked to report on whether they had engaged in each behaviour/had each thought since the previous night (instead of referring to the last 28 days as in the EDE-Q). We used four scales: weight concerns (*feel fat, have a strong desire to lose weight or were afraid of gaining weight*), restrictive eating (*weigh yourself, deliberately try to limit the amount of food you ate*), binge eating (*eat what other people would consider as an unusually large amount of food, eat in secret*), purging (*make yourself vomit/take laxatives*). A dichotomous answer scale of (0) *no* and (1) *yes* was used (instead of indicating the number of days the behaviour/thought occurred as in the EDE-Q).

Similarly to other studies (Hudson et al., 2007; Micali et al., 2013), the base rate of binge eating and purging was low in our sample (see Table S1 supplementary material). Thus, only items corresponding to weight concerns and restrictive eating were included in the main analyses. We refer to these two constructs with *disordered eating cognitions and behaviours* as a superordinate term. The ICC scores were 0.76 for weight concerns and 0.47 for restrictive eating.

Control variables

Participants were asked to report their age and gender. With respect to gender, participants were asked to select their gender from three different answer options (*Male, Female, Other*).

2.2.2 | Wave 2

Rumination

Items as well as instructions were the same as in Wave 1 except that we used three instead of two items from the *Rumination* subscale of the CRSQ (Abela et al., 2000), with the goal of increasing reliability. ICC for rumination was 0.57. The between-person and within-person reliabilities were 0.74 and 0.61.

Dampening

Items and instructions were the same as in Wave 1 except that we used three instead of two items of the *Dampening* subscale of the RPA-C (Bijttebier et al., 2012) in order to increase reliability. ICC for dampening was 0.60. The between-person and within-person reliabilities were 0.76 and 0.59.

Disordered eating cognitions and behaviours

Items and instructions were the same as in Wave 1 except that we added one additional item to the restrictive eating scale (*exercised with the goal of losing weight*), which was created based on the EDE-Q 6.0 (Fairburn & Beglin, 2008). Based on the low variance in some of the items in Wave 1, we used a 5-point continuous answer scale ((0) *Not at all* to (4) *almost all of the time*), in order to better capture disordered eating cognition and behaviour symptoms in our community sample.

In line with Wave 1, only weight concerns and restrictive eating were included in the main analyses (referred to as *disordered eating cognitions and behaviours*). The ICC scores were 0.82 for weight concerns and 0.72 for restrictive eating. The between-person and within-person reliabilities were 0.92 and 0.59 for weight concerns and 0.94 and 0.68 for restrictive eating.

Control variables

As in Wave 1, participants were asked to report their age as well as gender (same answer options as in Wave 1). Additionally, as part of the initial consent session for Wave 2, Participants were asked to answer six questions regarding COVID-19 and its impact rated on a scale from (0) *not at all* to (100) *extremely*. As reported in a previous publication (Deng et al., 2021), these six items can be divided into two components, namely COVID-related worries and distress related to COVID-induced social restrictions/isolation.

2.3 | Data analysis

Data were analysed using the statistic software R version 4.1.0 (R Core Team, 2021).

2.3.1 | Gender and age differences in weight concerns and restrictive eating

To examine Hypothesis 1 linear regression models with gender and age as the independent variables and weight concerns/restrictive eating behaviour as the dependent variables were conducted. As post-hoc tests, correlations among age and outcome variables were computed separately for boys and for girls.

2.3.2 | Person-level analyses

We used general linear regression models to examine Hypotheses 2 and 3 at the person-level. Rumination/dampening scores were averaged across days and entered into the model as predictor variables, and weight concerns/restrictive eating behaviour were averaged and entered as outcome variables. As the inclusion of siblings in the study introduced non-independence to our data, we added a variable indicating familial membership to the model's random statement. However, because it was not statistically significant, it was not used in the final analyses.

2.3.3 | Day-level analyses

To examine Hypotheses 2 and 3 at the day-level, we calculated multilevel models. Using the R packages *nlme* (Pinheiro et al., 2021) and *lme4* (Bates et al., 2015), the models were estimated with Level 1 as the day-level and Level 2 as the person-level. Day-level predictors were then centred at the person-level means in order to make interpretation of intercepts clearer, and to separate Level 1 and Level 2 effects (Zhang et al., 2009). We entered covariates to the day-level models as (1) the lagged mean-centred outcome score (the previous day's outcome variable, added as a deviation from the mean score) and (2) the person-level mean outcome score (averaged across the entire diary period). Adding these covariates transformed the outcome into a residualized change score. For example, in the first model, predicting weight concerns from rumination, we added yesterday's weight concerns into the model, along with the individual's mean level of weight concerns. Including lagged weight concerns means that whatever effect we found for rumination would not include variance that is due to yesterday's

weight concerns and its effects on rumination, or on today's weight concerns. Moreover, we also entered (3) the person's mean score of the predictors (in the same example, adding an individual's mean level of rumination) as covariate, which allows separate estimation of person-level and day-level effects (Bolger & Laurenceau, 2013), and rules out 'third variables' as alternative explanations. The model used to assess day-level results was as follows:

Level 1 equation:

$$Y_{ik} \text{ (disordered eating cognition/behaviour of person } i \text{ on day } k) = \beta_{0i} + \beta_{1i} * (\text{lagged disordered eating cognition/behaviour [day } k-1]) + \beta_{2i} * (\text{ER strategy on day } k) + r_{ik}$$

Level 2 equations:

$$\beta_{0i} = \gamma_{00} + \gamma_{01} * (\text{mean disordered eating cognition/behaviour}) + \gamma_{02} * (\text{mean ER strategy}) + u_0$$

$$\beta_{1i} = \gamma_{10}; \beta_{2i} = \gamma_{20}$$

2.3.4 | Between-year analyses

To examine Hypotheses 2 and 3 across waves, we used linear regression models with rumination or dampening at Wave 1 as the predictor variable and weight concerns or restrictive eating behaviours at Wave 2 as the outcome variable, controlling for weight concerns and restrictive eating behaviours at Wave 1.

2.3.5 | Control variables

Because previous research has identified gender- (e.g., Striegel-Moore et al., 2009) and age-related differences (e.g., Peebles et al., 2006) in disordered eating cognitions and behaviours, we controlled for these variables in all analyses, adding them as moderators to our models. Additionally, we controlled for COVID-related worries and distress in the between-wave analyses.

3 | RESULTS

3.1 | Gender and age differences in weight concerns and restrictive eating

Table 1 and Table S2 show the distribution of the study variables for each wave. In both waves, participants only selected *Male* or *Female* as their gender; none of the

participants selected *Other*. Overall, there was an increase in weight concerns and restrictive eating between Wave 1 and Wave 2 (Table S2) for both boys and girls.

3.1.1 | Weight concerns

Wave 1

As predicted, we found a significant interaction between age and gender on the frequency of weight concerns ($B = 0.12$, $SE = 0.05$, $p = 0.02$). Analyses indicated a significant correlation between age and weight concerns for girls ($r_{(71)} = 0.46$, $p < 0.001$), but not for boys ($r_{(64)} = 0.16$, $p = 0.21$). No significant main effects of gender or age were found (gender: $B = 0.09$, $SE = 0.05$, $p = 0.10$; age: $B = 0.05$, $SE = 0.04$, $p = 0.25$). R-squared of the full model was 0.16 ($F_{(3135)} = 9.46$, $p < 0.001$). Figure S1 visualises the interaction effect.

Wave 2

As predicted, and similarly to Wave 1, there was a significant interaction between age and gender on the frequency of weight concerns ($B = 0.59$, $SE = 0.20$, $p = 0.004$). We found a significant correlation between age and weight concerns for girls ($r_{(61)} = 0.47$, $p < 0.001$), but not for boys ($r_{(50)} = -0.00$, $p = 0.98$). No significant main effects of gender or age were found (gender: $B = 0.36$, $SE = 0.20$, $p = 0.08$; age: $B = -0.00$, $SE = 0.15$, $p = 0.98$). R-squared of the full model was 0.15 ($F_{(3111)} = 7.60$, $p < 0.001$). Figure S2 visualises the interaction effect.

3.1.2 | Restrictive eating behaviour

Wave 1

We did not find any statistically significant effect of gender or age on the frequency of restrictive eating behaviours (age: $B = -0.00$, $SE = 0.02$, $p = 0.84$; gender: $B = -0.01$, $SE = 0.03$, $p = 0.79$; interaction of age and gender: $B = 0.02$, $SE = 0.03$, $p = 0.36$). R-squared was -0.01 ($F_{(3135)} = 0.47$, $p = 0.70$).

Wave 2

As predicted, we found a significant interaction between age and gender on the frequency of restrictive eating behaviours ($B = 0.35$, $SE = 0.13$, $p = 0.01$). We found a significant correlation between age and restrictive eating behaviour for girls ($r_{(61)} = 0.38$, $p = 0.002$), but not for boys ($r_{(50)} = -0.11$, $p = 0.46$). R-squared was 0.06 ($F_{(3111)} = 3.64$, $p = 0.02$). Figure S3 visualises the interaction effect.

3.2 | Person-level analyses

3.2.1 | Weight concerns

Wave 1

As predicted, a higher frequency of rumination was significantly associated with more frequent weight concerns (Table 3). The effect remained significant controlling for age, and gender. Further, a higher frequency of dampening was significantly related to more frequent weight concerns controlling for age (Table 3). After controlling for gender, this effect was no longer significant ($B = 0.10$, $SE = 0.07$, $p = 0.14$). There were no statistically significant moderation effects of gender or age (all $ps > 0.06$).

Wave 2

As predicted, a higher frequency of rumination was significantly related to more frequent weight concerns controlling for age and gender (Table 3). Additionally, a higher frequency of dampening was significantly associated with more frequent weight concerns. The effect remained significant after controlling for age and gender. There were no statistically significant moderation effects of gender or age (all $ps > 0.14$).

3.2.2 | Restrictive eating behaviour

Wave 1

As predicted, a higher frequency of rumination was significantly associated with more frequent restrictive eating behaviour (Table 3). The effect held controlling for age and gender. Moreover, a higher frequency of dampening was significantly related to more frequent restrictive eating behaviours controlling for age and gender.

There were no statistically significant moderation effects of gender or age (all $ps > 0.14$).

Wave 2

As predicted, a higher frequency of rumination was significantly related to more frequent restrictive eating behaviour (Table 3). The effect held controlling for age and gender. Additionally, a higher frequency of dampening was significantly associated with more frequent restrictive eating behaviour controlling for age and gender (Table 3). There were no statistically significant moderation effects of gender or age (all $ps > 0.29$).

3.3 | Day-level analyses

3.3.1 | Weight concerns

Wave 1

None of the day-level models predicting weight concerns from rumination and dampening were significant (Table 4).

Wave 2

As predicted, on days in which youths engaged in rumination more often (compared to their average frequency), there was a significant increase in the frequency of weight concerns controlling for age and gender (Table 4). Further, on days in which youths engaged in dampening more often (compared to their average frequency), there was a significant increase in the frequency of weight concerns controlling for age (Table 4). The effect did not hold when gender was added to the model ($B = 0.01$, $SE = 0.04$, $p = 0.73$). There were no statistically significant moderation effects of gender or age (all $ps > 0.07$).

	Predicted	Weight concerns				Restrictive eating			
		B	SE	t	95% CI	B	SE	t	95% CI
Wave 1	Intercept	0.01	0.05	0.22	-0.08, 0.10	0.00	0.02	0.04	-0.04, 0.04
	Rumination	0.26***	0.05	5.55	0.17, 0.35	0.10***	0.02	4.70	0.06, 0.14
	Intercept	0.01	0.07	0.17	-0.13, 0.16	-0.03	0.03	-0.84	-0.09, 0.04
	Dampening	0.15**	0.05	3.07	0.05, 0.24	0.08***	0.02	3.68	0.04, 0.12
Wave 2	Intercept	0.41**	0.14	3.06	0.15, 0.68	0.18*	0.08	2.17	0.02, 0.34
	Rumination	0.75***	0.14	5.19	0.46, 1.03	0.53***	0.09	6.17	0.36, 0.70
	Intercept	0.26	0.15	1.68	-0.05, 0.56	0.04	0.09	0.45	-0.14, 0.22
	Dampening	0.70***	0.13	5.41	0.44, 0.96	0.53***	0.08	6.95	0.38, 0.68

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE 3 Person-level results: Predicting weight concerns and restrictive eating behaviour from rumination and dampening (separate models for each strategy and each outcome).

TABLE 4 Day-level results: Predicting weight concerns and restrictive eating behaviour from rumination and dampening (separate models for each strategy and each outcome).

	Predicted	Weight concerns					Restrictive eating				
		B	SE	DF	t	95% CI	B	SE	DF	t	95% CI
Wave 1	Intercept	-0.01	0.00	2153	-1.90	-0.01, 0.00	-0.00	0.00	2153	-0.39	-0.01, 0.00
	Daily rumination	0.01	0.01	2153	0.85	-0.01, 0.02	0.01	0.01	2153	1.43	-0.00, 0.02
	Mean rumination	0.00	0.00	136	1.20	-0.00, 0.01	-0.00	0.00	136	-1.22	-0.01, 0.00
	Mean outcome	1.00***	0.01	136	187.64	0.99, 1.01	1.03***	0.01	136	106.26	1.01, 1.04
	Lagged outcome	0.12**	0.04	2153	2.95	0.04, 0.19	0.08*	0.03	2153	2.56	0.02, 0.14
	Intercept	0.00	0.00	2153	0.08	-0.01, 0.01	-0.01	0.01	2153	-1.04	-0.02, 0.01
	Daily dampening	-0.00	0.01	2153	-0.02	-0.01, 0.01	0.01	0.00	2153	1.38	-0.00, 0.02
	Mean dampening	-0.00	0.00	136	-0.73	-0.01, 0.00	0.00	0.01	136	0.79	-0.01, 0.01
	Mean outcome	1.00***	0.01	136	197.98	0.99, 1.01	1.01***	0.02	136	51.31	0.97, 1.05
	Lagged outcome	0.12**	0.04	2153	3.03	0.04, 0.19	0.09**	0.03	2153	2.70	0.02, 0.15
Wave 2	Intercept	-0.01	0.01	2502	-1.00	-0.03, 0.01	-0.01	0.01	2502	-1.19	-0.03, 0.01
	Daily rumination	0.05*	0.03	2502	2.12	0.00, 0.11	0.06**	0.02	2502	2.70	0.02, 0.10
	Mean rumination	0.00	0.01	112	0.04	-0.02, 0.02	0.01	0.01	112	0.70	-0.01, 0.03
	Mean outcome	1.00***	0.01	112	142.98	0.99, 1.02	1.00***	0.01	112	90.63	0.98, 1.03
	Lagged outcome	0.35***	0.04	2502	9.93	0.28, 0.42	0.25***	0.04	2502	6.98	0.18, 0.32
	Intercept	-0.01	0.01	2502	-0.89	-0.03, 0.01	-0.01	0.01	2502	-0.87	-0.03, 0.01
	Daily dampening	0.07*	0.03	2502	2.38	0.01, 0.13	0.05*	0.02	2502	2.13	0.00, 0.09
	Mean dampening	0.00	0.01	112	0.11	-0.02, 0.02	0.00	0.01	112	0.26	-0.02, 0.02
	Mean outcome	1.00***	0.01	112	142.68	0.99, 1.01	1.01***	0.01	112	86.10	0.98, 1.03
	Lagged outcome	0.35***	0.04	2502	9.76	0.28, 0.42	0.25***	0.03	2502	7.07	0.18, 0.31

Note: Values from the hierarchical linear models can be interpreted as unstandardised regression coefficients (β coefficients).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.3.2 | Restrictive eating behaviour

Wave 1

None of the day-level models predicting restrictive eating behaviour from rumination or dampening were significant (Table 4).

Wave 2

As predicted, on days in which youths engaged in rumination more often (compared to their average frequency), there was a significant increase in the frequency of restrictive eating behaviours controlling for age and gender (Table 4). Further, on days in which youths engaged in dampening more often (compared to their average frequency), there was a significant increase in the frequency of restrictive eating behaviours controlling for age (Table 4). The effect did not hold when gender was entered into the model ($B = 0.04$, $SE = 0.03$, $p = 0.24$). There were no statistically significant moderation effects of gender or age (all $ps > 0.28$).

3.4 | Between-wave analyses

As hypothesised, a higher frequency of rumination in Wave 1 significantly predicted a higher frequency of restrictive eating behaviours in Wave 2 controlling for age at wave 1, gender, and COVID-related worries and distress (Table 5). No moderation effects of gender or age were found (all $ps > 0.09$). We did not find significant effects predicting restrictive eating behaviour from dampening or predicting weight concerns from rumination or dampening.

4 | DISCUSSION

The present study examined the role of emotion regulation, gender, and age in disordered eating cognitions and behaviours among children and adolescents. We extend upon previous research on emotion regulation and disordered eating in several ways.

		Wave 2							
		Weight concerns				Restrictive eating			
Predicted		<i>B</i>	<i>SE</i>	<i>t</i>	95% CI	<i>B</i>	<i>SE</i>	<i>t</i>	95% CI
Wave 1	Intercept	0.33**	0.12	2.88	0.10, 0.56	0.07	0.09	0.79	-0.11, 0.25
	Rumination	-0.04	0.13	-0.29	-0.31, 0.23	0.32**	0.10	3.22	0.12, 0.52
	Outcome	2.77***	0.23	11.80	2.30, 3.23	2.26***	0.37	6.09	1.53, 3.00
	Intercept	0.25	0.18	1.41	-0.10, 0.61	0.07	0.15	0.46	-0.22, 0.36
	Dampening	0.04	0.12	0.35	-0.20, 0.29	0.17	0.10	1.69	-0.03, 0.36
	Outcome	2.71***	0.21	12.63	2.29, 3.14	2.53***	0.37	6.82	1.80, 3.27

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4.1 | Gender and age differences in weight concerns and restrictive eating

Our results show that, as expected, there were age and gender differences in the frequency of disordered eating cognitions and behaviours. We found that for girls (but not boys), the frequency of weight concerns was significantly and positively associated with age in both data waves. Moreover, in Wave 2, we found that for girls (but not boys), the frequency of restrictive eating behaviours was significantly and positively associated with age. Our findings are consistent with results of prior studies showing gender differences in disordered eating cognitions and behaviours in adolescence (e.g. Ferreiro et al., 2012; Hautala et al., 2008). Puberty has been found to be a critical risk period for the development and onset of eating disorders in girls (Klump, 2013); in turn, this may be related to girls' physical development, which brings about changes that are often subject to societal criticism (e.g., gaining body fat, rounding of body shape; Croll, 2005). These changes can contribute to an increased body dissatisfaction among adolescent girls (Bearman et al., 2006; Croll, 2005; O'Dea & Abraham, 1999). Since girls seem to be at a higher risk for developing disordered eating cognitions and behaviours, interventions should focus on girls in particular to prevent the development of an eating disorder.

Interestingly, while we did find gender and age differences in the frequency of restrictive eating behaviours in Wave 2, we did not detect them in Wave 1. This is consistent with the overall increase in both weight concerns and restrictive eating in Wave 1 and Wave 2. From a methodological perspective, this could also be due to the more sensitive continuous measure of disordered eating symptoms used in Wave 2 compared to the dichotomous answer scale used in Wave 1. Consequently, we may simply not have been able to capture gender and

age differences in restrictive eating behaviours in Wave 1. Alternatively, given that our participants aged 1 year between waves, this finding may suggest that restrictive eating pathology increases to a greater degree as girls age, hence gender and age differences could only be detected in Wave 2 when the participants were older. More research must be done to shed light on the mechanisms underlying gender and age differences in restrictive eating behaviours in children and adolescents.

4.2 | Person-level results

When examining individual differences on the person-level, we found robust significant associations between rumination and disordered eating cognitions and behaviours across both waves. As predicted, youths who engaged in rumination more often reported weight concerns and restrictive eating behaviours more frequently. Our findings suggest that rumination in response to negative affect may play a substantial role in driving youths' disordered eating cognitions and behaviours; these findings are in line with previous research (e.g., Smith et al., 2018). However, while the vast majority of past studies on children and adolescents used single self-report assessments (cf., Kubiak et al., 2008), which are influenced by several biases (e.g., recall), the person-level results from this study rely on an aggregate of multiple daily assessments, and thus are more robust (McMahon & Naragon-Gainey, 2020).

Importantly, our study expands upon previous research by not only investigating the role of regulation of negative affect but also the regulation of positive affect in youths' disordered eating cognitions and behaviours. As predicted, we found that children and adolescents who engaged in dampening more often reported weight concerns and restrictive eating behaviours more frequently. This finding was robust as it was replicated across both

TABLE 5 Between-waves analyses: Predicting Wave 2 weight concerns and restrictive eating behaviour from wave 1 rumination and dampening (separate models for each strategy and each outcome).

data waves and is in line with previous research showing that patients with eating disorders show avoidance of positive affect (Lampard et al., 2011). However, the current results offer a more nuanced understanding by demonstrating that a regulatory process such as dampening might play a key role in disordered eating cognitions and behaviours. Our findings underline the need for more research on positive emotion regulation in disordered eating and lay the foundation for new directions in eating disorder research.

4.3 | Day-level results

Interestingly, day-level associations among rumination, dampening, and disordered eating cognitions and behaviours were found only in Wave 2, during COVID-19 onset. Specifically, we found that on days in which youths used rumination and dampening more often (compared to their average frequency), there was a significant increase in the frequency of weight concerns and restrictive eating behaviours. Several differences between Wave 2 and Wave 1 may have contributed to uncovering day-level associations in Wave 2 only: first, as previously mentioned, the scale of measurement for disordered eating items in Wave 2 was much more sensitive than in Wave 1. Second, participants aged 1 year between Wave 1 and Wave 2; previous research has shown that disordered eating cognitions and behaviours are more pronounced as youths (particularly girls) grow older (e.g., Sancho et al., 2007), as was the case in the current sample. This is also consistent with the overall increase in weight concerns and eating behaviours between waves. Third, Wave 2 data collection was conducted during COVID-19, a period of increased stress. As exposure to stress has been linked to increases in negative affect (Deng et al., 2021) and psychopathology in adolescence (Monroe et al., 1999), associations between rumination, dampening, and disordered eating cognitions and behaviours may have been particularly pronounced in Wave 2. In line with previous research (e.g., Kubiak et al., 2008), our findings emphasise the crucial role played by both rumination and dampening in conferring risk for disordered eating cognitions and behaviours on a day-to-day basis. However, we extend previous findings by investigating the role of regulation of both positive and negative affect, by examining different disordered eating cognitions (e.g., weight concerns) and behaviours (e.g., restrictive eating) in younger and undiagnosed children and adolescents, and by investigating these associations during a period of increased stress, and using an intensive longitudinal design.

4.4 | Between-year-level results

On the between-year level, rumination and restrictive eating behaviours were found to be associated such that the frequency of rumination at Wave 1 predicted the frequency of restrictive eating behaviours at Wave 2. This finding suggests that levels of rumination in childhood and adolescence are associated not only with short-term but also with long-term increases in the frequency of restrictive eating behaviours. This is in line with previous research that shows a robust association between rumination and restrictive eating behaviours (e.g., Startup et al., 2013). However, while most previous studies used single assessments of self-reports, our results are based on multiple day assessments and thus are more robust (McMahon & Naragon-Gainey, 2020). Importantly, the effects we found held when adjusting for COVID-related worries and distress, and therefore are more likely explained by a developmental change than by a COVID-stress related change. However, we acknowledge that our research design does confound the effect of development with the effect of COVID-stress and they cannot be fully separated. Importantly, we have also published other reports based on these data directly investigating the effect of the COVID pandemic on youth's mental health (see for example Deng et al., 2021).

Interestingly, significant between-year associations were found only for rumination and restrictive eating and not for dampening or weight concerns. This suggests that, while in the short-term both rumination and dampening are associated with increases in the frequency of weight concerns and restrictive eating behaviours, in the long-term the association among rumination and restrictive eating is most pronounced. Importantly, while items on the weight concern scale only assessed the frequency of *thoughts* related to participants' own weights and/or shapes, the items used to assess restrictive eating behaviours asked about the frequency of *behaviours* participants used to actively control their own weights and/or shapes, thus assessing the more severe disordered eating symptoms (i.e., that can lead to pathological weight loss). Finding that rumination is most predictive of the more severe disordered eating symptoms we assessed is in line with and supports previous research pointing at the role of rumination as a transdiagnostic risk factor for psychopathology (e.g., Aldao et al., 2010).

4.5 | Implications

Results from the current study have practical implications. Our findings reveal that a tendency to engage more frequently in rumination and dampening is associated

with disordered eating-related behaviours and cognitions among youths. Children and adolescents frequently using rumination and dampening to regulate their emotions could benefit from interventions teaching them to regulate their emotions in more adaptive ways. As our findings suggest that girls are at higher risk for developing disordered eating cognitions and behaviours, interventions should focus on girls in particular in order to prevent the development of eating disorders.

4.6 | Limitations

Results of the current study have to be considered in light of several limitations. First, this is not an experimental study; thus, our ability to conclude causality is limited. Future experimental studies are needed to fully uncover the causal pathways linking emotion regulation to disordered eating cognitions and behaviours in youths. Second, although this is a daily diary study, it is nevertheless possible that biases associated with retrospective self-reports were not completely overcome. However, because we asked participants to report their eating behaviours and cognitions from the last 24 h, retrospective reporting bias was far reduced compared to studies relying on self-reported behaviour from the last few weeks or months (as is typically done in self-report questionnaires). Third, our study sample of children and adolescents was a community sample and information on Body Mass Index (BMI) was available only from a third wave of data collected one and a half year after Wave 2 and for only $n = 65$ participants of the current sample. We therefore do not know how many participants in our sample suffered from clinical levels of eating disorders. However, the limited variance and frequency of disordered eating cognitions and behaviours observed in the current study as well as the information on BMI collected in Wave 3 suggest that this sample is mostly subclinical and within the normal BMI range. Future studies are needed to examine whether our findings generalise to clinical populations and whether they are moderated by BMI. Fourth, the inclusion of only cis-gender youths limits the generalisability of our findings; future research should use more sensitive measures for gender and investigate associations among emotion regulation and disordered eating behaviours and cognitions in samples including children and adolescents with transgender and non-binary gender identities.

4.7 | Summary

The current study is a unique investigation of the role of emotion regulation in youths' disordered eating

cognitions and behaviours. We extend previous research by examining regulation of both positive and negative affect in disordered eating cognitions and behaviours using two waves of an intensive longitudinal design with one wave of data collected during the onset of the COVID-19 pandemic. Our findings show that maladaptive emotion regulation contributes to the development of disordered eating cognitions and behaviours in children and adolescents. Importantly, we found that not only the regulation of negative affect (rumination) but also the regulation of positive affect (dampening) plays an important role in disordered eating, such that youths who used dampening more often engaged in unhealthy eating behaviours and thoughts more frequently. Indeed, associations between emotion regulation and disordered eating cognitions and behaviours were found to be particularly pronounced during periods of increased stress, such as during the onset of the COVID-19 pandemic. Our study lays the foundation, and hopefully serves as a catalyst, for future research exploring the role of positive affect and its regulation in disordered eating.

ACKNOWLEDGEMENTS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 786064, the National Institute of Mental Health Translational Developmental Neuroscience Training Grant (T32 #MH18268), The Israeli Council for Higher Education Postdoctoral Research Fellowship for Women, awarded to Dr. Gadassi Polack, the National Institute of Mental Health R21 MH119552 awarded to Dr. Joormann and Dr. Kober and the Foundation of the German Industry Scholarship awarded to Christine Dworschak. The authors thank Itay Polack Gadassi for his help setting up the study, and to Ralitzia Gueorguiva for advice regarding data analysis. The authors also thank the research assistants who helped with data collection and the families who participated.

Open access funding provided by Universitat Zurich.

CONFLICT OF INTEREST STATEMENT

The authors have no relevant financial or non-financial interests to disclose.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the second author upon request. Codes are available on OSF (https://osf.io/fgqj/?view_only=a99e20ba16784a0397d7787eda57dc0b).

ORCID

Christine Dworschak  <https://orcid.org/0000-0003-3485-4656>

REFERENCES

- Abela, J. R. Z., Rochon, A., & Vanderbilt, E. (2000). *The children's response styles questionnaire*. McGill University.
- Agostino, H., Burstein, B., Moubayed, D., Taddeo, D., Grady, R., Vyver, E., Coelho, J. S., & Dominic, A. (2021). Trends in the incidence of new-onset anorexia nervosa and atypical anorexia nervosa among youth during the COVID-19 pandemic in Canada. *JAMA Network Open*, *4*(12), e2137395. <https://doi.org/10.1001/jamanetworkopen.2021.37395>
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*(2), 217–237. <https://doi.org/10.1016/j.cpr.2009.11.004>
- Bailen, N. H., Green, L. M., & Thompson, R. J. (2018). Understanding emotion in adolescents: A review of emotional frequency, intensity, instability, and clarity. *Emotion Review*, *11*(1), 63–73. <https://doi.org/10.1177/1754073918768878>
- Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*(1), 1–48.
- Bearman, S. K., Presnell, K., Martinez, E., & Stice, E. (2006). The skinny on body dissatisfaction: A longitudinal study of adolescent girls and boys. *Journal of Youth and Adolescence*, *35*(2), 217–229. <https://doi.org/10.1007/s10964-005-9010-9>
- Bijttebier, P., Raes, F., Vasey, M. W., & Feldman, G. C. (2012). Responses to positive affect predict mood symptoms in children under conditions of stress: A prospective study. *Journal of Abnormal Child Psychology*, *40*(3), 381–389. <https://doi.org/10.1007/s10802-011-9579-2>
- Bolger, N., & Laurenceau, J.-P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. Guilford Press.
- Centers for Disease Control and Prevention. (2023). BMI percentile calculator for Child and teen. Retrieved from: <https://www.cdc.gov/healthyweight/bmi/calculator.html>
- Chahal, R., Kirshenbaum, J. S., Miller, J. G., Ho, T. C., & Gotlib, I. H. (2021). Higher executive control network coherence buffers against puberty-related increases in internalizing symptoms during the COVID-19 pandemic. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, *6*(1), 79–88. <https://doi.org/10.1016/j.bpsc.2020.08.010>
- Clark, L., & Tiggemann, M. (2006). Appearance culture in nine-to 12-year-old girls: Media and peer influences on body dissatisfaction. *Social Development*, *15*(4), 628–643. <https://doi.org/10.1111/j.1467-9507.2006.00361.x>
- Crick, N. R., & Zahn-Waxler, C. (2003). The development of psychopathology in females and males: Current progress and future challenges. *Development and Psychopathology*, *15*(3), 719–742. <https://doi.org/10.1017/S095457940300035X>
- Croll, J. (2005). Body image and adolescents. In J. Stand & M. Story (Eds.), *Guidelines for adolescent nutrition services* (pp. 155–166). University of Minnesota.
- Deng, W., Gadassi Polack, R., Creighton, M., Kober, H., & Joormann, J. (2021). Predicting negative and positive affect during COVID-19: A daily diary study in youths. *Journal of Research on Adolescence*, *31*(3), 500–516. <https://doi.org/10.1111/jora.12646>
- Fairburn, C. G., & Beglin, S. J. (2008). Eating disorder examination questionnaire (EDE-Q 6.0). In C. G. Fairburn (Ed.), *Cognitive behavior therapy and eating disorders* (pp. 309–314). Guilford Press.
- Feldman, G. C., Joormann, J., & Johnson, S. L. (2008). Responses to positive affect: A self-report measure of rumination and dampening. *Cognitive Therapy and Research*, *32*(4), 507–525. <https://doi.org/10.1007/s10608-006-9083-0>
- Ferreiro, F., Seoane, G., & Senra, C. (2012). Gender-related risk and protective factors for depressive symptoms and disordered eating in adolescence: A 4-year longitudinal study. *Journal of Youth and Adolescence*, *41*(5), 607–622. <https://doi.org/10.1007/s10964-011-9718-7>
- Gilbert, K. E. (2012). The neglected role of positive emotion in adolescent psychopathology. *Clinical Psychology Review*, *32*(6), 467–481. <https://doi.org/10.1016/j.cpr.2012.05.005>
- Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3–24). Guilford Press.
- Guyer, A. E., Silk, J. S., & Nelson, E. E. (2016). The neurobiology of the emotional adolescent: From the inside out. *Neuroscience and Biobehavioral Reviews*, *70*, 74–85. <https://doi.org/10.1016/j.neubiorev.2016.07.037>
- Harrison, A., O'Brien, N., Lopez, C., & Treasure, J. (2010). Sensitivity to reward and punishment in eating disorders. *Psychiatry Research*, *177*(1–2), 1–11. <https://doi.org/10.1016/j.psychres.2009.06.010>
- Hautala, L. A., Junnila, J., Helenius, H., Väänänen, A.-M., Liuksila, P.-R., Räihä, H., Välimäki, M., & Saarijärvi, S. (2008). Towards understanding gender differences in disordered eating among adolescents. *Journal of Clinical Nursing*, *17*(13), 1803–1813. <https://doi.org/10.1111/j.1365-2702.2007.02143.x>
- Haynos, A. F., & Fruzzetti, A. E. (2011). Anorexia nervosa as a disorder of emotion dysregulation: Evidence and treatment implications. *Clinical Psychology: Science and Practice*, *18*(3), 183–202. <https://doi.org/10.1111/j.1468-2850.2011.01250.x>
- Henker, B., Whalen, C. K., Jamner, L. D., & Delfino, R. J. (2002). Anxiety, affect, and activity in teenagers: Monitoring daily life with electronic diaries. *Journal of the American Academy of Child and Adolescent Psychiatry*, *41*(6), 660–670. <https://doi.org/10.1097/00004583-200206000-00005>
- Herpertz-Dahlmann, B. (2009). Adolescent eating disorders: Definitions, symptomatology, epidemiology and comorbidity. *Child and adolescent psychiatric clinics of North America*, *18*(1), 31–47. <https://doi.org/10.1016/j.chc.2008.07.005>
- Hudson, J. I., Hiripi, E., Pope, H. G., Jr., & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biological Psychiatry*, *61*(3), 348–358. <https://doi.org/10.1016/j.biopsych.2006.03.040>
- Kalokerinos, E. K., Erbas, Y., Ceulemans, E., & Kuppens, P. (2019). Differentiate to regulate: Low negative emotion differentiation is associated with ineffective use but not selection of emotion-regulation strategies. *Psychological Science*, *30*(6), 863–879. <https://doi.org/10.1177/0956797619838763>
- Keel, P. K., & Forney, K. J. (2013). Psychosocial risk factors for eating disorders. *International Journal of Eating Disorders*, *46*(5), 433–439. <https://doi.org/10.1002/eat.22094>
- Klump, K. L. (2013). Puberty as a critical risk period for eating disorders: A review of human and animal studies. *Hormones and Behavior*, *64*(2), 399–410. <https://doi.org/10.1016/j.yhbeh.2013.02.019>

- Kornacka, M., Czepczor-Bernat, K., Napieralski, P., & Brytek-Matera, A. (2021). Rumination, mood, and maladaptive eating behaviors in overweight and healthy populations. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, 26(1), 273–285. <https://doi.org/10.1007/s40519-020-00857-z>
- Kubiak, T., Vögele, C., Siering, M., Schiel, R., & Weber, H. (2008). Daily hassles and emotional eating in obese adolescents under restricted dietary conditions—The role of ruminative thinking. *Appetite*, 51(1), 206–209. <https://doi.org/10.1016/j.appet.2008.01.008>
- Lampard, A. M., Byrne, S. M., McLean, N., & Fursland, A. (2011). Avoidance of affect in the eating disorders. *Eating Behaviors*, 12(1), 90–93. <https://doi.org/10.1016/j.eatbeh.2010.11.004>
- McMahon, T. P., & Naragon-Gainey, K. (2020). Ecological validity of trait emotion regulation strategy measures. *Psychological Assessment*, 32(8), 796–802. <https://doi.org/10.1037/pas0000827>
- Micali, N., Hagberg, K. W., Petersen, I., & Treasure, J. L. (2013). The incidence of eating disorders in the UK in 2000–2009: Findings from the general practice research database. *BMJ Open*, 3(5), e002646. <https://doi.org/10.1136/bmjopen-2013-002646>
- Monroe, S. M., Rohde, P., Seeley, J. R., & Lewinsohn, P. M. (1999). Life events and depression in adolescence: Relationship loss as a prospective risk factor for first onset of major depressive disorder. *Journal of Abnormal Psychology*, 108(4), 606–614. <https://doi.org/10.1037/0021-843X.108.4.606>
- Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, 100(4), 569–582. <https://doi.org/10.1037/0021-843x.100.4.569>
- O'Dea, J. A., & Abraham, S. (1999). Onset of disordered eating attitudes and behaviors in early adolescence: Interplay of pubertal status, gender, weight, and age. *Adolescence*, 34(136), 671–679.
- Peebles, R., Wilson, J. L., & Lock, J. D. (2006). How do children with eating disorders differ from adolescents with eating disorders at initial evaluation? *Journal of Adolescent Health*, 39(6), 800–805. <https://doi.org/10.1016/j.jadohealth.2006.05.013>
- Pinheiro, J., Bates, D., DebRoy, S., & Sarkar, D., & R Core Team. (2021). nlme: Linear and nonlinear mixed effects models. R package version 3.1-152. Retrieved from: <https://CRAN.R-project.org/package=nlme>
- Racine, N., McArthur, B. A., Cooke, J. E., Eirich, R., Zhu, J., & Madigan, S. (2021). Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: A meta-analysis. *JAMA Pediatrics*, 175(11), 1142–1150. <https://doi.org/10.1001/jamapediatrics.2021.2482>
- Racine, S., & Wildes, J. (2015). Dynamic longitudinal relations between emotion regulation difficulties and anorexia nervosa symptoms over the year following intensive treatment. *Journal of Consulting and Clinical Psychology*, 83(4), 785–795. <https://doi.org/10.1037/ccp0000011>
- Rapee, R. M., Oar, E. L., Johnco, C. J., Forbes, M. K., Fardouly, J., Magson, N. R., & Richardson, C. E. (2019). Adolescent development and risk for the onset of social-emotional disorders: A review and conceptual model. *Behaviour Research and Therapy*, 123, 103501. <https://doi.org/10.1016/j.brat.2019.103501>
- R Core Team. (2021). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Retrieved from: <https://www.R-project.org/>
- Sala, M., Brosio, L. C., & Levinson, C. A. (2019). Repetitive negative thinking predicts eating disorder behaviors: A pilot ecological momentary assessment study in a treatment seeking eating disorder sample. *Behaviour Research and Therapy*, 112, 12–17. <https://doi.org/10.1016/j.brat.2018.11.005>
- Sancho, C., Arija, M. V., Asorey, O., & Canals, J. (2007). Epidemiology of eating disorders: A two year follow up in an early adolescent school population. *European Child and Adolescent Psychiatry*, 16(8), 495–504. <https://doi.org/10.1007/s00787-007-0625-0>
- Schwarz, N., Kahneman, D., & Xu, J. (2009). Global and episodic reports of hedonic experience. In R. Belli, D. Alwin, & F. Stafford (Eds.), *Calendar and time diary: Methods in life course research* (pp. 157–174). Sage.
- Selby, E. A., Panza, E., & Plasencia, M. (2019). Positive emotion dysregulation in eating disorders and obesity. In J. Gruber (Ed.), *The Oxford handbook of positive emotion and psychopathology* (pp. 424–443). Oxford University Press.
- Shrout, P. E., & Lane, S. P. (2012). Psychometrics. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 302–320). The Guilford Press.
- Smith, K. E., Mason, T. B., & Lavender, J. M. (2018). Rumination and eating disorder psychopathology: A meta-analysis. *Clinical Psychology Review*, 61, 9–23. <https://doi.org/10.1016/j.cpr.2018.03.004>
- Somerville, L. H., Jones, R. M., & Casey, B. (2010). A time of change: Behavioral and neural correlates of adolescent sensitivity to appetitive and aversive environmental cues. *Brain and Cognition*, 72(1), 124–133. <https://doi.org/10.1016/j.bandc.2009.07.003>
- Song, J., Howe, E., Oltmanns, J. R., & Fisher, A. J. (2022). Examining the concurrent and predictive validity of single items in ecological momentary assessments. *Assessment*, 30(5), 1662–1671. <https://doi.org/10.1177/10731911221113563>
- Startup, H., Lavender, A., Oldershaw, A., Stott, R., Tchanturia, K., Treasure, J., & Schmidt, U. (2013). Worry and rumination in anorexia nervosa. *Behavioural and Cognitive Psychotherapy*, 41(3), 301–316. <https://doi.org/10.1017/S1352465812000847>
- Stice, E., Gau, J. M., Rohde, P., & Shaw, H. (2017). Risk factors that predict future onset of each DSM-5 eating disorder: Predictive specificity in high-risk adolescent females. *Journal of Abnormal Psychology*, 126(1), 38–51. <https://doi.org/10.1037/abn0000219>
- Stice, E., Presnell, K., & Spangler, D. (2002). Risk factors for binge eating onset in adolescent girls: A 2-year prospective investigation. *Health Psychology*, 21(2), 131–138. <https://doi.org/10.1037/0278-6133.21.2.131>
- Stice, E., & Shaw, H. E. (2002). Role of body dissatisfaction in the onset and maintenance of eating pathology: A synthesis of research findings. *Journal of Psychosomatic Research*, 53(5), 985–993. [https://doi.org/10.1016/S0022-3999\(02\)00488-9](https://doi.org/10.1016/S0022-3999(02)00488-9)
- Striegel-Moore, R. H., Rosselli, F., Perrin, N., DeBar, L., Wilson, G. T., May, A., & Kraemer, H. C. (2009). Gender difference in the prevalence of eating disorder symptoms. *International Journal of Eating Disorders*, 42(5), 471–474. <https://doi.org/10.1002/eat.20625>

- Svaldi, J., Werle, D., Naumann, E., Eichler, E., & Berking, M. (2019). Prospective associations of negative mood and emotion regulation in the occurrence of binge eating in binge eating disorder. *Journal of Psychiatric Research, 115*, 61–68. <https://doi.org/10.1016/j.jpsychires.2019.05.005>
- Todd, M., Tennen, H., Carney, M. A., Armeli, S., & Affleck, G. (2004). Do we know how we cope? Relating daily coping reports to global and time-limited retrospective assessments. *Journal of Personality and Social Psychology, 86*(2), 310–319. <https://doi.org/10.1037/0022-3514.86.2.310>
- Wonderlich, S. A., Peterson, C. B., & Smith, T. L. (2015). *Integrative cognitive-affective therapy for bulimia nervosa: A treatment manual*. Guilford Press.
- Young, K. S., Sandman, C. F., & Craske, M. G. (2019). Positive and negative emotion regulation in adolescence: Links to anxiety and depression. *Brain Sciences, 9*(4), 76. <https://doi.org/10.3390/brainsci9040076>
- Zhang, Z., Zyphur, M. J., & Preacher, K. J. (2009). Testing multilevel mediation using hierarchical linear models: Problems and

solutions. *Organizational Research Methods, 12*(4), 695–719. <https://doi.org/10.1177/1094428108327450>

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Dworschak, C., Polack, R. G., Winschel, J., Joormann, J., & Kober, H. (2023). Emotion regulation and disordered eating behaviour in youths: Two daily-diary studies. *European Eating Disorders Review, 31*(5), 655–669. <https://doi.org/10.1002/erv.2993>