1   Abstract

2   **Objective:** Rejection sensitivity (RS) and justice sensitivity (JS) are personality traits that are

3   characterized by frequent perceptions and intense adverse responses to the negative social

4   cues. Whereas there is good evidence for an association between RS, JS, and emotional

5   problems, no longitudinal studies have investigated their association with eating disorder

6   psychopathology (EDP) so far. Thus, the aim of this study was to examine the longitudinal

7   relation between RS, JS and EDP and whether these relations were mediated by emotional

8   problems. **Method:** Participants (N=769) reported on their RS, JS, and EDP at age 9-19 (T1),

9   11-21 (T2), and 14-22 years (T3) and emotional problems at T1 and T2. **Results:** There were

10   longitudinal associations between EDP and particularly anxious RS, observer and victim JS

11   in latent cross-lagged models. T1 EDP predicted higher T2 anxious RS, which predicted

12   more T3 EDP. T1 observer JS predicted more T2 EDP, which in turn predicted higher T3

13   observer JS. Furthermore, T1 EDP predicted higher T2 victim JS. A latent mediation model

14   showed only a direct effect of T1 observer JS on T3 EDP and that the effects of T1 EDP on

15   T3 RS and victim JS were mediated by T2 emotional problems. **Discussion:** RS—

16   particularly anxious RS—and JS may be involved in the development and maintenance of

17   EDP and should be considered by future research and in prevention and treatment of EDP.

18   Also, mental health problems may increase JS and RS traits in the long term.

19   *Keywords:* rejection sensitivity, justice sensitivity, eating disorder psychopathology,

20   emotional problems, longitudinal

1   Justice Sensitivity and Rejection Sensitivity as Predictors and Outcomes of Eating

2   Disorder Psychopathology: A 5-Year Longitudinal Study

3   Eating disorders (e.g., anorexia nervosa, bulimia nervosa, binge eating disorder)

4   (APA, 2013) are defined as maladaptive attitudes and behavior with respect to eating, weight,

5   and body image. Eating disorders are rare, affecting less than 2% of the population (Hoek &

6   van Hoeken, 2003). However, symptoms of eating disorder psychopathology (EDP), such as

7   body shape, eating and weight concerns and restrained eating, are more prevalent,

8   particularly in adolescent girls and range from 28% to 57% (Aime, Craig, Pepler, Jiang, &

9   Connolly, 2008; Croll, Neumark-Sztainer, Story, & Ireland, 2002; Jacobi, Hayward, de

10   Zwaan, Kraemer, & Agras, 2004). They often precede EDs (Jacobi et al., 2004; Tanofsky-

11   Kraff et al., 2011) and are associated with increased psychosocial strain (Goldschmidt, Wall,

12   Loth, Bucchianeri, & Neumark-Sztainer, 2014; Sehm & Warschburger, 2018). EDs have

13   long-lasting adverse effects on physical and mental health and may even be life-threatening

14   (Berkman, Lohr, & Bulik, 2007; Swanson, Crow, Le Grange, Swendsen, & Merikangas,

15   2011). Hence, understanding risk factors for EDP is important and may aid prevention and

16   intervention efforts in EDs.

17   Several risk factors for EDP are well-established and similar to the clinical diagnosis

18   of EDs, including female gender, body mass index, sociocultural pressure to be thin, body

19   dissatisfaction, problems in interpersonal relationships, and internalizing problems that show

20   bi-directional relations with EDP (Culbert, Racine, & Klump, 2015; Jacobi et al., 2004; Krug

21   et al., 2013; Lavender, De Young, & Anderson, 2010; Marmorstein, von Ranson, Iacono, &

22   Malone, 2008; Smith et al., 2018; Stice, 2002). Personality traits—specifically neuroticism—

23   are also associated with EDP (Keel & Forney, 2013; Levallius, Clinton, Bäckström, &

24   Norring, 2015; Lilenfeld, Wonderlich, Riso, Crosby, & Mitchell, 2006), suggesting that other

1   personality traits that are related to neuroticism and internalizing problems, such as justice

2   and rejection sensitivity (Schmitt et al., 2005), may be associated with EDP as well.

3   **Rejection Sensitivity and Justice Sensitivity**

4   Rejection sensitivity (RS) is defined as the tendency to anxiously or angrily expect,

5   perceive, and react to (alleged) rejection (Downey & Feldman, 1996). Justice sensitivity (JS)

6   is defined as the disposition to frequently perceive and negatively react to injustice (Bondü &

7   Elsner, 2015; Schmitt, Gollwitzer, Maes, & Arbach, 2005). Individuals' affective responses

8   depend on the perspectives from which injustice is perceived: Victim JS, the tendency to feel

9   being unfairly treated, is primarily associated with anger; observer JS, the tendency to

10   perceiving others being unfairly treated, is primarily associated with indignation; perpetrator

11   JS, the tendency to fear unfairly treating others, is primarily associated with guilt (Schmitt et

12   al., 2005). RS and JS are narrow personality traits that are distinct from the Big Five (Schmitt

13   et al., 2010).

14   **Potential Links Between Rejection Sensitivity, Justice Sensitivity, and Eating Disorder**

15   **Psychopathology**

16   Rejection- and justice-sensitive individuals are hypervigilant to and tend to ruminate

17   about accordant cues (London, Downey, Bonica, & Paltin, 2007; Schmitt, Neumann, &

18   Montada, 1995). Negative interpretations of cues of rejection and injustice cause adverse

19   behavior that may promote impairments in social relationships (Ayduk et al., 2001; Bondü et

20   al., 2017). This, along with feelings of loneliness, hopelessness, helplessness, or guilt

21   (Bondü, Sahyazici-Knaak, & Esser, 2017; Schmitt et al., 2005), may predispose individuals

22   high in these traits to internalizing problems and EDP (Mischoulon et al., 2011).

23   Accordingly, particularly anxious RS was associated with social anxiety, withdrawal, and

24   depression (Bondü et al., 2017; London et al., 2007; McDonald, Bowker, Rubin, Laursen, &

25   Duchene, 2010; Zimmer-Gembeck, Nesdale, Webb, Khatibi, & Downey, 2016). Particularly

1 victim and observer JS were associated with emotional problems, depressive symptoms, low

2 self-esteem, and anxiety symptoms (Bondü & Elsner, 2015; Bondü & Esser, 2015; Bondü &

3 Inerle, in revision; Bondü et al., 2017).

4   Sensitivities to negative social cues may promote EDP also by causing stress and

5 negatively biased interpretations of the situation (Liu, Kraines, Massing-Schaffer, & Alloy,

6 2014; Normansell & Wisco, 2017). EDP may be an avoidant problem-solving strategy for

7 coping with perceptions of rejection and injustice, potentially associated negative social

8 interactions, and adverse emotions (Downey, Mougios, Ayduk, London, & Shoda, 2004;

9 Gao, Assink, Cipriani, & Lin, 2017). Finally, RS, JS, and EDP may share underlying causes,

10 such as low self-esteem, dysfunctional thoughts including striving for perfection, or

11 unfavourable attributional styles (Chango, McElhaney, Allen, Schad, & Marston, 2012).

12   Indeed, one cross-sectional study revealed an indirect link between RS and

13 dysregulated eating behavior via emotional dysregulation in a small sample of college

14 students with Borderline Personality Disorder (Selby, Ward, & Joiner Jr., 2010). The

15 association between weight-related RS and bulimic symptoms was mediated via psychosocial

16 distress (Brenchley & Quinn, 2016; no association with disordered eating). Appearance-

17 related RS predicted disordered eating behavior (Park, 2007) and was positively related to

18 friends' restrictive dieting (Webb & Zimmer-Gembeck, 2014).

19   Social-cognitive traits, such as RS and JS, reflect person-situation interactions

20 (Mischel & Shoda, 1995) and are, therefore, themselves shaped by social experiences.

21 Accordingly, depressive symptoms predicted higher subsequent anxious RS, angry RS, and

22 victim JS (Bondü et al., 2017; Marston, Hare, & Allen, 2010; McCarty, Vander Stoep, &

23 McCauley, 2007); bullying and victimization experiences predicted subsequent victim and

24 observer JS (Bondü, Rothmund & Gollwitzer, 2016). Hence, negative experiences may

25 increase expectations of similar events and increase hypervigilance to accordant cues, which

1   may in turn result in higher RS and JS (Bondü et al., 2017). Thus, associations between RS,

2   JS, and EDP may turn into a self-maintaining vicious circle.

3   **Emotional Problems as a Mediator**

4   This vicious circle may also be enhanced through emotional problems associated with

5   both RS and JS and EDP (Mitchell, Wolf, Reardon, & Miller, 2014). They may cause

6   additional strain, adverse emotional and cognitive states, as well as adverse negative social

7   perceptions, interpretations, expectations, and attributions. Accordingly, previous research

8   indicated that links between RS and EDP were explained by emotional problems (Brenchley

9   & Quinn, 2016; Selby et al., 2010). RS and JS, however, may promote emotional problems in

10   similar ways as EDP. In the present study, therefore, we examined potential bi-directional

11   mediation of the links between RS, JS, and EDP via emotional problems.

12   **The Present Study**

13   Preliminary cross-sectional evidence exists for associations between RS and EDP, but

14   several gaps in research require consideration: First, longitudinal designs in nonclinical

15   samples should examine prospective links between RS and EDP. Second, no study examined

16   the relation between JS and EDP so far. Third, the potential bi-directional mediating role of

17   emotional problems should be considered. Finally, the potential moderating role of gender

18   and age should be examined, because females are more likely to suffer from EDP than males

19   and because EDP become more prevalent during adolescence (Smink, van Hoeken, & Hoek,

20   2012). We, therefore, examined the bi-directional relations between RS, JS, and EDP in a

21   three-wave longitudinal study while considering the potential mediating role of emotional

22   problems and the potential moderating roles of gender and age. We expected:

23   1) Participants with EDP to report higher concurrent angry and anxious RS (1a, b) as well

24   as victim and observer JS than participants without EDP (1c, d);

1   2) T1 and T2 RS and JS to predict subsequent T2 and T3 EDP, respectively (2a), and T1

2   and T2 EDP to predict subsequent T2 and T3 RS and JS, respectively (2b);

3   3) T2 Emotional problems to mediate the association between T1 and T3 RS, JS, and EDP.

4   Finally, we explored gender and age differences in the links between RS, JS, and EDP.

5   **Method**

6   **Participants**

7   Participants were recruited from a previous study on developmental disorders in pre-school

8   and primary-school age. This study included a representative sample of 2,500 children from

9   the federal state of Brandenburg, Germany. We used the contact details of participating

10   families in order to recruit participants for the present study after further funding was

11   obtained. For the present study, participants were assessed between September 2011 and

12   October 2012 at ages 9-19 (T1), approximately 1.5 years later at ages 11-21 (T2), and

13   between 2015 and 2016 at ages 14-22 years (T3). Of the initial sample, 1665 children

14   participated in T1 and/or T2. In the present study, we included all 769 adolescents who

15   participated until T3 (46.2% retention rate). The mean age of these participants was 16.77

16   years (SD=2.01) at T3; 55.7% were females, 45.9% had parents with a university entrance

17   qualification. More males (N=498) than females (N=398) dropped out of the study (χ^2=20.9,

18   p<.001). Two MANCOVAs including RS, JS, EDP, and T1 age (T1: F(7, 1459)=15.263,

19   p<.001, η_p^2=.068; T2: F(6, 1276)=7.835, p<.001, η_p^2=.036) showed that participants who

20   remained in the study at T2 and T3, respectively, reported significantly higher observer

21   (p<.001, respectively) and perpetrator (p<.001, respectively) JS, less angry RS (p=.012 and

22   p<.001) and EDP (p=.001 and p=.019), as well as higher T1 age (p<.001) than participants

23   who dropped out.

24   **Measures**

1   **Eating Disorder Psychopathology.** We measured EDP with the German version of

2   the Eating Disorder Examination adapted for children (ChEDE) (Bryant-Waugh, Cooper,

3   Taylor, & Lask, 1996; Hilbert et al., 2013) in all participants at T1 and T2 and in participants

4   below 17 years of age at T3. Participants 17 years and older at T3 completed the adult Eating

5   Disorder Examination (EDE) (Fairburn & Beglin, 2008; Hilbert, de Zwaan, & Braehler,

6   2012). Both versions have good internal consistencies, high inter-rater reliability, and/or good

7   validity in detecting early-onset eating disorders (Frampton, Wisting, Overas, Midtsund, &

8   Lask, 2011; Hilbert et al., 2013). Both include 28 items on 4 subscales measuring eating

9   behavior problems ("Have you tried not to eat any foods that you like in order to change your

10   weight?") and negative body image ("You were dissatisfied with your weight?") in the last

11   28 days using different response options. We computed mean scores for all subscales and a

12   total score. Correlation patterns for participants who completed the same measure at all time

13   points and the ones who used a different measure at T3 were almost identical, suggesting that

14   the change in instrument did not influence ratings (Table 1). For cross sectional group-

15   comparisons, we used a cut-off score of +1.5 *SD* of the total score separately for each point of

16   measurement as an indicator of EDP. We chose this cut-off rather than the suggested mean

17   value of 22 that comes closer to a clinical definition of ED instead of reflecting sub-clinical

18   EDP. For all other analyses, we used continuous scores.

19   **Rejection Sensitivity (RS)**. We measured RS using a short version of the Child

20   Rejection Sensitivity Questionnaire (Downey, Lebolt, Rincon, & Freitas, 1998) in all

21   participants at T1 and T2 and in participants below 17 years of age at T3. The scale captured

22   anxious and angry RS with five situations including a possibility of rejection. Participants

23   indicated how anxious and angry they would feel (1=*not anxious/angry*, 6=*very*

24   *anxious/angry*) and how likely they think rejection would be (1=*very unlikely*, 6=*very likely*).

25   Anxious and angry RS scores were computed by adding the multiplied degree of

anxiety/anger and the likelihood of rejection per situation, divided by five (range: 0-30). The

questionnaire has good reliability and validity (Bondü et al., 2017; Downey & Feldman,

1996). Participants 17 years and older at T3 completed the adult version of the questionnaire

(Berenson et al., 2009) with nine situations including a possibility of rejection. Participants

indicated how anxious and angry they would feel (1=*not anxious/angry*, 6=*very*

anxious/angry) and how likely they think a positive interaction would be (1=*very unlikely*,

6=*very likely*). RS scores were computed by adding the multiplied degree of anxiety/anger

and the reversed score for the likelihood of positive interactions per situation, divided by

nine. The questionnaire has good validity and reliability (Berenson et al., 2009; Bondü &

Richter, 2016). Correlation patterns for participants who completed the same measure at all

time points and the ones who used a different measure at T3 were almost identical,

suggesting a comparability of ratings and an adequate reflection of the underlying trait (Table

1).

Justice Sensitivity (JS). We measured JS with the 5-item short version of the Justice

Sensitivity Inventory for Children and Adolescents (Bondü & Elsner, 2015; Schmitt et al.,

2010) at all measurement points. The scale captures emotional and cognitive reactions to the

perception of injustice from the victim ("It makes me angry when I am treated worse than

others"), observer ("I am upset when someone is…"), and perpetrator ("I feel guilty when I

treat someone…") perspective with five items each. Response options ranged from 0=*totally*

disagree to 5=*totally agree*. The scale has good validity and reliability (Bondü & Elsner,

2015; Schmitt, Baumert, Gollwitzer, & Maes, 2010). We computed three separate mean

scores.

Emotional Problems. We measured emotional problems at T1 and T2 by the 5-item

subscale (e.g., "I am often unhappy, depressed or tearful") of the Strengths and Difficulties

Questionnaire (Goodman, 1997, 2001). Response options ranged from 0 *not true* to 2

1   *certainly true.* At T1, only participants from 11 years onwards (*N*=569) rated their emotional

2   problems. The measure has well-established reliability and validity (Goodman & Scott, 1999;

3   Klasen, Woerner, Rothenberger, & Goodman, 2003; Klasen et al., 2000).

4   **Covariates**. We included parents' highest educational achievement as an indicator of

5   socio-economic status and BMI standard deviation scores (BMI-SDS), computed as weight in

6   kilograms divided by the height in meters squared adjusted to percentiles of general weight

7   for each sex based on a German reference sample (Kromeyer-Hauschild et al., 2001).

8   **Procedure**

9   All participants attended voluntarily and with informed written consent. The

10   procedure was approved by the university ethics committee and the school ministry. Data can

11   be made available upon request.

12   **Analysis**

13   We first examined differences in our measures between participants with and without

14   EDP (+1.5 *SD*) controlling for gender and age, as well as gender differences controlling for

15   age at each time point via separate MANCOVAs.

16   We then conducted latent longitudinal analyses using M*plus* 8 (Muthén & Muthén,

17   1998-2015). RS subscales, JS subscales, and emotional problems were indicated by test-

18   halves, EDP was indicated by the four measure subscales. Standardized scores accounted for

19   differences in T3 measurements. Correlations between corresponding T1, T2, and T3

20   indicators, corresponding indicators of RS and JS subscales within one point of measurement,

21   T1 and T2 predictors, and T3 RS and JS subscales were allowed and estimated. We used a

22   maximum likelihood estimator. Missing data was replaced using the Full Information

23   Maximum Likelihood procedure.

24   Control variables were correlated, all other variables were regressed on the control

25   variables. *P*<.05 was considered significant for path coefficients (2-sided). To evaluate the

1 goodness of fit, we considered χ^2 tests and absolute fit indices (CFI, TLI, RMSEA, and

2 SRMR). We tested the significance of indirect pathways using the MODEL INDIRECT

3 command. We ran the models for the total group and then examined the moderating role of

4 sex and age (children: 9-12 years, adolescents: ≥13 years) in multi-group models with path

5 coefficients constrained to be equal and allowed to vary between groups. Furthermore, we

6 computed multi-group models for the two groups who used the same measures over time and

7 who used the adult versions at T3 to check whether results remained the same. Since results

8 hardly differed from results for age, we only report these findings.

9   In order to ensure that our measures had the same meaning across points of

10 measurement, we tested configural (parameters freely estimated), weak (factor loadings

11 constrained equal), strong (factor loadings and intercepts constrained equal), and strict (factor

12 loading, intercepts, and residual variances constrained equal) measurement invariance (MI)

13 separately for RS, JS, and EDP across the three time points and emotional problems across

14 two time points (T1 and T2). Given strong differences in the RS measures between T1/T2

15 and T3, we repeated the analyses only considering T1 and T2. To assess the model fit, we

16 inspected χ^2, χ^2-difference test and values of and changes in absolute fit indices. Non-

17 significant chi square values, CFI/TLI>0.95, RMSEA<0.05, SRMR<0.06, lower AIC/BIC,

18 and CFI decreases <.01 indicated good or negligible decreases in model fit (Cheung &

19 Rensvold, 2002).

20   We then analysed longitudinal associations between RS, JS, and EDP using cross-

21 lagged panel models including covariance terms, stability paths, and cross-lagged paths.

22 Thus, the model examined bi-directional associations between study variables while

23 controlling for their effects at earlier points in time. Finally, we used latent mediation models

24 including covariances, stability paths, and cross-lagged paths to examine whether T2

1 emotional problems mediated the longitudinal associations between T1 and T3 RS, JS, and

2 EDP. We adjusted all models for BMI-SDS and parental education.

3 **Results**

4 **Descriptive Data**

5   At T1, participants with EDP (6.9%) reported significantly higher anxious RS, angry

6 RS, victim JS, and emotional problems than the control group. At T2, individuals with EDP

7 (7.1%) reported higher anxious RS, angry RS, victim JS, observer JS, and emotional

8 problems. At T3, participants with EDP (9.9%) reported higher anxious and angry RS (Table

9 2). Girls reported higher observer JS, perpetrator JS, and EDP than boys at all measurements,

10 higher anxious RS at T2 and T3, and more emotional problems at T1 and T2. Anxious RS,

11 angry RS, victim JS, observer JS, and EDP as well as emotional problems were positively

12 correlated at all assessment points. RS and JS subscales were positively correlated (Table 3).

13 **Measurement Invariance**

14   Inspections of absolute fit indices and changes in indices suggested strong MI for

15 T1/T2/T3 JS and EDP and T1/T2 RS using z-standardized scores (Table 4). Hence, we

16 assumed strong MI for all three variables in structural-equation models. When assuming

17 strong MI also for T3 RS, results regarding MI and of subsequent models were almost

18 identical. Due to the strong changes in measurement at T3 for parts of the sample, however,

19 we continue with presenting findings for strong MI in RS only between T1 and T2. Although

20 our analyses indicated strict MI for emotional problems, we only assumed weak MI in the

21 mediation model, because the model assuming strong MI did not converge.

22 **Cross-Lagged Analysis**

23   Table 5 shows the fit indices for models in the total sample and for multi-group

24 analyses. All models fit the data well. RS, JS, and EDP had moderate to high stabilities over

25 time. Concerning the prediction of EDP from the sensitivity measures, T1 observer JS

1   predicted T2 EDP (β=.104*) and T2 anxious RS predicted T3 EDP (β=.139*). Concerning

2   the prediction of sensitivity measures from EDP, T1 EDP predicted T2 anxious RS (β=.103*)

3   and victim JS (β=.122**) and T2 EDP predicted T3 anxious RS (β=.105*) and observer JS

4   (β=.089*). Figure 1 reports all statistically significant paths for the total sample. For ease of

5   interpretation, non-significant parameters and links between RS and JS subscales were

6   omitted from the figure but retained in the model (all estimates reported in Table S1).

7   **Mediation Model including Emotional Problems**

8   Figure 2 shows the significant coefficients in the mediation model including T1 and

9   T2 emotional problems for the total sample (Table S2 for all estimates). Higher T1 observer

10   JS predicted more T3 EDP (β=.17**). More T1 EDP (β=.17**) predicted stronger T2

11   emotional problems. Stronger T2 emotional problems predicted higher T3 angry RS

12   (β=.24***), anxious RS (β=.43***), victim JS (β=.22***), and EDP (β=.34***). There were

13   significant indirect effects from T1 EDP on T3 anxious RS (β=.07*), angry RS (β=.04*), and

14   victim JS (β=.04*) via T2 emotional problems.

15   **Differences by Gender and Age**

16   Regarding the multi-group models examining the potential moderating role of gender

17   and age, models with paths allowed to vary between groups showed better fits than models

18   with paths constrained to be equal (Table 5). Regarding gender differences, in males, higher

19   EDP predicted lower RS, but higher emotional problems predicted higher RS and lower

20   observer JS. In females, JS also predicted subsequent EDP. Regarding age differences, there

21   was a direct association between T1 observer JS and T3 EDP (β=.23**) and an indirect link

22   between T1 EDP and T3 anxious RS in children, whereas there were no associations between

23   JS, RS and EDP in adolescents (Table 6).

24   **Discussion**

1   The present study is the first to investigate longitudinal associations between rejection

2   sensitivity (RS), justice sensitivity (JS), and eating disorder psychopathology (EDP).

3   Participants with EDP reported higher RS at all measurement points, higher T1 and T2 victim

4   JS and higher T2 observer JS than controls. EDP was bi-directionally associated with

5   observer JS and anxious RS in cross-lagged models. When emotional problems were

6   considered, only T1 observer JS was directly associated with T3 EDP, whereas T1 EDP had

7   indirect effects on T3 angry RS, anxious RS, and victim JS via T2 emotional problems. Thus,

8   emotional problems are an important mediator in the association between RS, JS, and EDP.

9   The pattern of findings differed between males and females: EDP was a predictor of RS in

10   males, but an outcome of JS in females. Finally, associations between RS, JS, and EDP (and

11   emotional problems) were more pronounced in children than in adolescents.

12   **Links and Potential Ways of Effect**

13   Longitudinal, bi-directional links between anxious RS and EDP suggest a self-

14   maintaining circle of the two. This finding is in line with previous research showing bi-

15   directional links between depressive symptoms and RS (Bondü et al., 2017). Thus, targeting

16   anxious RS in therapy may help preventing EDP and counteract the emergence of a

17   potentially self-maintaining vicious circle of perceived rejection and EDP. Findings from the

18   mediation model, however, suggest that EDP may be a predictor rather than a consequence of

19   RS because only the indirect effects of EDP on angry and anxious RS remained evident.

20   Our findings add to the existing research showing mostly indirect links between RS

21   and EDP (McClure Brenchley & Quinn, 2016; Park, 2007; Selby et al., 2010; Webb &

22   Zimmer-Gembeck, 2014). In line with expectations, emotional problems also mediated the

23   link from EDP on the sensitivity traits. Contrasting previous research, emotional problems

24   did not mediate the link from RS or JS to EDP. This is presumably due to the fact that unlike

25   previous research, we controlled for the (high) stability of emotional problems. When T1

1   emotional problems were not considered in the mediation model, indirect links from T1

2   anxious and angry RS to T3 EDP were also evident.

3   Among JS perspectives, observer JS revealed the strongest links with EDP: a direct

4   link held stable even when emotional problems were considered. Hence, the present study

5   adds to the growing body of research relating JS to mental health problems (Bondü & Elsner,

6   2015; Bondü et al., 2017) and showing its unique addition to incremental variance.

7   Individuals high in observer JS negatively respond to witnessing others' unfair treatment

8   (Schmitt et al., 2005), an often uncontrollable event. Self-controllable behavior, such as

9   eating behavior, may then be used to compensate for the perceived loss of control in social

10 contexts. In addition, individuals with eating disorders may engage in behavior, such as

11 restricting, to change or avoid negative emotions (Wildes, Ringham, & Marcus, 2010). In

12 addition, EDP indirectly predicted higher victim JS. Hence, mental health problems may

13 increase the vulnerability to feeling negatively treated, which may then work to maintain

14 existing mental health problems.

15   Our findings suggest that RS and JS may be the result or symptom of mental health

16 problems, including EDP and emotional problems. Increased mental strain, negative

17 emotions, and dysfunctional cognitions associated with these problems may hinder the ability

18 to adequately cope adverse social experiences, impede social relationships due to the

19 tendency to adversely respond towards others' behavior, or promote perceptions of rejection

20 and injustice by increasing negative interpretations of ambiguous cues (Bondü et al., 2017).

21 Indeed, the sensitivity to negative social cues, the tendency to make more unfavorable social

22 comparisons, and feelings of shame were higher in individuals with eating disorders in

23 comparison to controls (Cardi, Di Matteo, Gilbert, & Treasure, 2014; Treasure, Corfield, &

24 Cardi, 2012).

25 **Moderating Effects of Gender and Age**

1   In boys, EDP predicted lower RS in the mediation model, whereas emotional

2   problems predicted higher RS, suggesting that emotional problems, rather than EDP, foster a

3   vulnerability to social problems in boys. In girls, observer JS predicted higher and perpetrator

4   JS predicted lower EDP. These findings suggest that particularly girls suffer from

5   uncontrollable negative social experiences and that EDP may be the consequence of these

6   experiences or a strategy to cope with them. More research is needed to disentangle these

7   differential gender effects. More associations between RS, JS, and EDP (and emotional

8   problems) were found in children than in adolescents. Increases in EDP (and emotional

9   problems) are often observed at the transition from childhood to adolescence which is

10   represented in the childhood group (Aime et al., 2008; Allen, Byrne, La Puma, McLean, &

11   Davis, 2008). Thus, being sensitive to social cues may make particularly vulnerable during a

12   developmental period that is burdened with a number of challenges, including changes in

13   appearance, the emergence of sexual attraction, growing independence, and increasing

14   academic demands.

15   **Limitations and Outlook**

16   The strengths of the current study include a large sample size, longitudinal

17   assessments of RS, JS, and EDP, considering the mediating effect of emotional problems, and

18   examining moderator effects. Limitations include the large number of drop-outs and the use

19   of different RS measures. However, an adaptation at T3 seemed necessary in order to account

20   for relevant rejection experiences in this age range including partner interactions.

21   Furthermore, findings suggested a strong correspondence between measures. Splitting the

22   sample reduced statistical power in highly complex multi-group models. Similarly,

23   controlling for T1 emotional problems in the mediation model resulted in the need to replace

24   numerous missing data. Therefore, we were also unable to include all T2 measures in the

25   mediation model. Thus, future research should replicate the present findings in a larger

1   sample, may focus on other age groups, specific eating problems, other forms of internalizing

2   problems, should examine potential explanations for differential links between EDP and

3   sensitivities among girls and boys, and include neuroticism as a covariate to investigate

4   whether the links between RS, JS, and EDP remain stable.

5   Our findings highlight bi-directional links and that interpersonal sensitivity factors

6   may be involved in the development and maintenance of EDP. Practitioners and researchers

7   should consider their role in order to disentangle the vicious circle between negative social

8   experiences and EDP and in prevention and intervention measures in order to minimize the

9   burden associated with EDP and eating disorders.

References

Aime, A., Craig, W. M., Pepler, D., Jiang, D., & Connolly, J. (2008). Developmental pathways of eating problems in adolescents. *Int J Eat Disord, 41*(8), 686-696. doi:10.1002/eat.20561

Allen, K. L., Byrne, S. M., La Puma, M., McLean, N., & Davis, E. A. (2008). The onset and course of binge eating in 8- to 13-year-old healthy weight, overweight and obese children. *Eat Behav, 9*(4), 438-446. doi:10.1016/j.eatbeh.2008.07.008

American Psychological Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA.

Berenson, K. R., Gyurak, A., Ayduk, O., Downey, G., Garner, M. J., Mogg, K., . . . Pine, D. S. (2009). Rejection sensitivity and disruption of attention by social threat cues. *J Res Pers, 43*(6), 1064-1072. doi:10.1016/j.jrp.2009.07.007

Berkman, N. D., Lohr, K. N., & Bulik, C. M. (2007). Outcomes of eating disorders: a systematic review of the literature. *Int J Eat Disord, 40*(4), 293-309. doi:10.1002/eat.20369

Bondü, R., & Elsner, B. (2015). Justice Sensitivity in Childhood and Adolescence. *Social Development, 24*(2), 420-441. doi:10.1111/sode.12098

Bondü, R., & Richter, P. (2016). Linking forms and functions of aggression in adults to justice and rejection sensitivity. *Psychology of Violence, 6*(2), 292-302. doi:10.1037/a0039200

Bondü, R., Sahyazici-Knaak, F., & Esser, G. (2017). Long-Term Associations of Justice Sensitivity, Rejection Sensitivity, and Depressive Symptoms in Children and Adolescents. *Frontiers in psychology, 8*, 1446-1446. doi:10.3389/fpsyg.2017.01446

Bryant-Waugh, R. J., Cooper, P. J., Taylor, C. L., & Lask, B. D. (1996). The use of the eating disorder examination with children: a pilot study. *Int J Eat Disord, 19*(4), 391-397. doi:10.1002/(sici)1098-108x(199605)19:4<391::Aid-eat6>3.0.Co;2-g

Cardi, V., Di Matteo, R., Gilbert, P., & Treasure, J. (2014). Rank perception and self-evaluation in eating disorders. *Int J Eat Disord, 47*(5), 543-552. doi:10.1002/eat.22261

Chango, J. M., McElhaney, K. B., Allen, J. P., Schad, M. M., & Marston, E. (2012). Relational stressors and depressive symptoms in late adolescence: rejection sensitivity as a vulnerability. *J Abnorm Child Psychol, 40*(3), 369-379. doi:10.1007/s10802-011-9570-y

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating Goodness-of-Fit Indexes for Testing Measurement Invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 9*(2), 233-255. doi:10.1207/S15328007SEM0902_5

Croll, J., Neumark-Sztainer, D., Story, M., & Ireland, M. (2002). Prevalence and risk and protective factors related to disordered eating behaviors among adolescents: relationship to gender and ethnicity. *J Adolesc Health, 31*(2), 166-175.

Culbert, K. M., Racine, S. E., & Klump, K. L. (2015). Research Review: What we have learned about the causes of eating disorders - a synthesis of sociocultural, psychological, and biological research. *J Child Psychol Psychiatry, 56*(11), 1141-1164. doi:10.1111/jcpp.12441

Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *J Pers Soc Psychol, 70*(6), 1327-1343. doi:10.1037/0022-3514.70.6.1327

Downey, G., Lebolt, A., Rincon, C., & Freitas, A. L. (1998). Rejection sensitivity and children's interpersonal difficulties. *Child Dev, 69*(4), 1074-1091.

Downey, G., Mougios, V., Ayduk, O., London, B. E., & Shoda, Y. (2004). Rejection sensitivity and the defensive motivational system: insights from the startle response to rejection cues. *Psychol Sci, 15*(10), 668-673. doi:10.1111/j.0956-7976.2004.00738.x

Fairburn, C. G., & Beglin, S. (2008). Eating Disorder Examination Questionnaire (EDE-Q 6.0). In C. G. Fairburn (Ed.), *Cognitive behavior therapy and eating disorders* (pp. 309-313). New York: Guildford Press.

Frampton, I., Wisting, L., Overas, M., Midtsund, M., & Lask, B. (2011). Reliability and validity of the Norwegian translation of the Child Eating Disorder Examination (ChEDE). *Scand J Psychol, 52*(2), 196-199. doi:10.1111/j.1467-9450.2010.00833.x

Gao, S., Assink, M., Cipriani, A., & Lin, K. (2017). Associations between rejection sensitivity and mental health outcomes: A meta-analytic review. *Clin Psychol Rev, 57*, 59-74. doi:10.1016/j.cpr.2017.08.007

Goldschmidt, A. B., Wall, M. M., Loth, K. A., Bucchianeri, M. M., & Neumark-Sztainer, D. (2014). The course of binge eating from adolescence to young adulthood. *Health Psychol, 33*(5), 457-460. doi:10.1037/a0033508

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: a research note. *J Child Psychol Psychiatry, 38*(5), 581-586.

Goodman, R. (2001). Psychometric properties of the strengths and difficulties questionnaire. *J Am Acad Child Adolesc Psychiatry, 40*(11), 1337-1345. doi:10.1097/00004583-200111000-00015

Goodman, R., & Scott, S. (1999). Comparing the Strengths and Difficulties Questionnaire and the Child Behavior Checklist: is small beautiful? *J Abnorm Child Psychol, 27*(1), 17-24.

Hilbert, A., Buerger, A., Hartmann, A. S., Spenner, K., Czaja, J., & Warschburger, P. (2013). Psychometric evaluation of the eating disorder examination adapted for children. *Eur Eat Disord Rev, 21*(4), 330-339. doi:10.1002/erv.2221

Hilbert, A., de Zwaan, M., & Braehler, E. (2012). How frequent are eating disturbances in the population? Norms of the eating disorder examination-questionnaire. *PloS one, 7*(1), e29125-e29125. doi:10.1371/journal.pone.0029125

Hoek, H. W., & van Hoeken, D. (2003). Review of the prevalence and incidence of eating disorders. *Int J Eat Disord, 34*(4), 383-396. doi:10.1002/eat.10222

Jacobi, C., Hayward, C., de Zwaan, M., Kraemer, H. C., & Agras, W. S. (2004). Coming to terms with risk factors for eating disorders: application of risk terminology and suggestions for a general taxonomy. *Psychol Bull, 130*(1), 19-65. doi:10.1037/0033-2909.130.1.19

Keel, P. K., & Forney, K. J. (2013). Psychosocial risk factors for eating disorders. *Int J Eat Disord, 46*(5), 433-439. doi:10.1002/eat.22094

Klasen, H., Woerner, W., Rothenberger, A., & Goodman, R. (2003). [German version of the Strength and Difficulties Questionnaire (SDQ-German)--overview and evaluation of initial validation and normative results]. *Prax Kinderpsychol Kinderpsychiatr, 52*(7), 491-502.

Klasen, H., Woerner, W., Wolke, D., Meyer, R., Overmeyer, S., Kaschnitz, W., . . . Goodman, R. (2000). Comparing the German versions of the Strengths and Difficulties Questionnaire (SDQ-Deu) and the Child Behavior Checklist. *Eur Child Adolesc Psychiatry, 9*(4), 271-276.

Kromeyer-Hauschild, K., Wabitsch, M., Kunze, D., Geller, F., Geiß, H. C., Hesse, V., . . . Hebebrand, J. (2001). Perzentile für den Body-mass-Index für das Kindes- und Jugendalter unter Heranziehung verschiedener deutscher Stichproben. *Monatsschrift Kinderheilkunde, 149*(8), 807-818. doi:10.1007/s001120170107

Krug, I., Penelo, E., Fernandez-Aranda, F., Anderluh, M., Bellodi, L., Cellini, E., . . . Treasure, J. (2013). Low social interactions in eating disorder patients in childhood and adulthood: a multi-centre European case control study. *J Health Psychol, 18*(1), 26-37. doi:10.1177/1359105311435946

Lavender, J. M., De Young, K. P., & Anderson, D. A. (2010). Eating Disorder Examination Questionnaire (EDE-Q): norms for undergraduate men. *Eat Behav, 11*(2), 119-121. doi:10.1016/j.eatbeh.2009.09.005

Levallius, J., Clinton, D., Bäckström, M., & Norring, C. (2015). Who do you think you are? - Personality in eating disordered patients. *Journal of Eating Disorders, 3*, 3. doi:10.1186/s40337-015-0042-6

Lilenfeld, L. R., Wonderlich, S., Riso, L. P., Crosby, R., & Mitchell, J. (2006). Eating disorders and personality: a methodological and empirical review. *Clin Psychol Rev, 26*(3), 299-320. doi:10.1016/j.cpr.2005.10.003

Liu, R. T., Kraines, M. A., Massing-Schaffer, M., & Alloy, L. B. (2014). Rejection sensitivity and depression: mediation by stress generation. *Psychiatry, 77*(1), 86-97. doi:10.1521/psyc.2014.77.1.86

London, B., Downey, G., Bonica, C., & Paltin, I. (2007). Social Causes and Consequences of Rejection Sensitivity. *Journal of Research on Adolescence, 17*(3), 481-506. doi:10.1111/j.1532-7795.2007.00531.x

Marmorstein, N. R., von Ranson, K. M., Iacono, W. G., & Malone, S. M. (2008). Prospective associations between depressive symptoms and eating disorder symptoms among adolescent girls. *Int J Eat Disord, 41*(2), 118-123. doi:10.1002/eat.20477

Marston, E. G., Hare, A., & Allen, J. P. (2010). Rejection Sensitivity in Late Adolescence: Social and Emotional Sequelae. *J Res Adolesc, 20*(4), 959-982. doi:10.1111/j.1532-7795.2010.00675.x

McCarty, C. A., Vander Stoep, A., & McCauley, E. (2007). Cognitive features associated with depressive symptoms in adolescence: directionality and specificity. *J Clin Child Adolesc Psychol, 36*(2), 147-158. doi:10.1080/15374410701274926

Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review, 102*(2), 246-268. doi:10.1037/0033-295X.102.2.246

Mischoulon, D., Eddy, K. T., Keshaviah, A., Dinescu, D., Ross, S. L., Kass, A. E., . . . Herzog, D. B. (2011). Depression and eating disorders: treatment and course. *Journal of affective disorders, 130*(3), 470-477. doi:10.1016/j.jad.2010.10.043

Mitchell, K. S., Wolf, E. J., Reardon, A. F., & Miller, M. W. (2014). Association of eating disorder symptoms with internalizing and externalizing dimensions of psychopathology among men and women. *Int J Eat Disord, 47*(8), 860-869. doi:10.1002/eat.22300

Normansell, K. M., & Wisco, B. E. (2017). Negative interpretation bias as a mechanism of the relationship between rejection sensitivity and depressive symptoms. *Cogn Emot, 31*(5), 950-962. doi:10.1080/02699931.2016.1185395

Schmitt, M., Baumert, A., Gollwitzer, M., & Maes, J. (2010). The Justice Sensitivity Inventory: Factorial Validity, Location in the Personality Facet Space, Demographic Pattern, and Normative Data. *Social Justice Research, 23*(2), 211-238. doi:10.1007/s11211-010-0115-2

Schmitt, M., Gollwitzer, M., Maes, J., & Arbach, D. (2005). Justice Sensitivity: Assessment and Location in the Personality Space. *European Journal of Psychological Assessment, 21*(3), 202-211. doi:10.1027/1015-5759.21.3.202

Schmitt, M. J., Neumann, R., & Montada, L. (1995). Dispositional Sensitivity to Befallen Injustice. *Social Justice Research, 8*(4), 385-407. doi:10.1007/bf02334713

Sehm, M., & Warschburger, P. (2018). Prospective Associations Between Binge Eating and Psychological Risk Factors in Adolescence. *Journal of Clinical Child & Adolescent Psychology, 47*(5), 770-784. doi:10.1080/15374416.2016.1178124

Smink, F. R. E., van Hoeken, D., & Hoek, H. W. (2012). Epidemiology of eating disorders: incidence, prevalence and mortality rates. *Current psychiatry reports, 14*(4), 406-414. doi:10.1007/s11920-012-0282-y

Smith, K. E., Mason, T. B., Leonard, R. C., Wetterneck, C. T., Smith, B. E. R., Farrell, N. R., & Riemann, B. C. (2018). Affective predictors of the severity and change in eating psychopathology in residential eating disorder treatment: The role of social anxiety. *Eat Disord, 26*(1), 66-78. doi:10.1080/10640266.2018.1418314

Stice, E. (2002). Risk and maintenance factors for eating pathology: a meta-analytic review. *Psychol Bull, 128*(5), 825-848.

Swanson, S. A., Crow, S. J., Le Grange, D., Swendsen, J., & Merikangas, K. R. (2011). Prevalence and correlates of eating disorders in adolescents. Results from the national comorbidity survey replication adolescent supplement. *Arch Gen Psychiatry, 68*(7), 714-723. doi:10.1001/archgenpsychiatry.2011.22

Tanofsky-Kraff, M., Shomaker, L. B., Olsen, C., Roza, C. A., Wolkoff, L. E., Columbo, K. M., . . . Yanovski, J. A. (2011). A prospective study of pediatric loss of control eating and psychological outcomes. *J Abnorm Psychol, 120*(1), 108-118. doi:10.1037/a0021406

Treasure, J., Corfield, F., & Cardi, V. (2012). A three-phase model of the social emotional functioning in eating disorders. *Eur Eat Disord Rev, 20*(6), 431-438. doi:10.1002/erv.2181

Wildes, J. E., Ringham, R. M., & Marcus, M. D. (2010). Emotion avoidance in patients with anorexia nervosa: initial test of a functional model. *Int J Eat Disord, 43*(5), 398-404. doi:10.1002/eat.20730

Table 1. *Bivariate correlations between a) Eating Disorder Psychopathology at all assessment points for participants who used the same measure and who used a different measure at T3 and b) Rejection Sensitivity at all assessment points for participants used the same measure and who used a different measure at T3*

	1	2	3
Eating Disorder Psychopathology			
Same measure at all measurement points			
1. T1	1		
2. T2	.58**	1	
3. T3	.26**	.56**	1
Different measure at T3			
1. T1	1		
2. T2	.58**	1	
3. T3	.56**	.63**	1
Anxious Rejection Sensitivity			
Same measure at all measurement points			
1. T1	1		
2. T2	.46**	1	
3. T3	.30**	.42**	1
Different measure at T3			
1. T1	1		
2. T2	.46**	1	
3. T3	.30**	.45**	1
Angry Rejection Sensitivity			
Same measure at all measurement points			
1. T1	1		
2. T2	.42**	1	
3. T3	.28**	.40**	1
Different measure at T3			
1. T1	1		
2. T2	.42**	1	
3. T3	.29**	.39**	1

**p<.01

Table 2

Internal Consistencies, Mean Values, Standard Deviations, and Group Differences for all Measures

T1	α	Total (N=708) M (SD)	EDP (N=49, 6.9%) M (SD)	Controls (N=659, 93.1%) M (SD)	F	η_p^2	Boys (N=315, 44.5%) M (SD)	Girls (N= 393, 55.5%) M (SD)	F	η_p^2
Victim JS	.78	2.67 (1.12)	3.16 (1.04)	2.64 (1.12)	6.03*	.008	2.69 (1.13)	2.66 (1.12)	0.621	.001
Observer JS	.84	3.05 (1.11)	3.28 (1.04)	3.03 (1.12)	0.48	.001	2.81 (1.13)	3.24 (1.06)	24.913***	.034
Perpetrator JS	.88	3.57 (1.19)	3.52 (1.09)	3.57 (1.20)	0.48	.001	3.30 (1.23)	3.78 (1.11)	31.176***	.042
Anxious RS	.67	7.47 (3.33)	9.12 (3.80)	7.35 (3.26)	15.02***	.021	7.23 (3.28)	7.66 (3.36)	3.652	.005
Angry RS	.71	4.44 (2.58)	4.98 (3.12)	4.39 (2.53)	5.34*	.008	4.66 (2.67)	4.26 (2.49)	3.207	.005
Emot. Prob.	.61	2.27 (1.85)	3.88 (2.21)	2.13 (1.75)	29.40***	.050	1.74 (1.53)	2.69 (1.99)	36.45***	.061
EDP[1]	.87	8.84 (4.39)	[21.84 (4.09)	7.87 (2.46)]			7.88 (3.46)	9.61 (4.89)	25.625***	.035

T2	α	Total (N=702) M (SD)	EDP (N=50, 7.1%) M (SD)	Controls (N=652, 92.9%) M (SD)	F	η_p^2	Boys (N=321, 45.7%) M (SD)	Girls (N= 381, 54.3%) M (SD)	F	
Victim JS	.80	2.74 (1.06)	3.45 (0.87)	2.69 (1.05)	21.14***	.029	2.66 (1.07)	2.82 (1.04)	2.948	.004
Observer JS	.88	3.01 (1.10)	3.47 (0.94)	2.97 (1.10)	5.02*	.007	2.74 (1.08)	3.22 (1.06)	34.701***	.047
Perpetrator JS	.89	3.53 (1.17)	3.44 (1.16)	3.53 (1.17)	2.26	.003	3.23 (1.22)	3.76 (1.06)	36.502***	.050
Anxious RS	.68	7.05 (3.12)	8.51 (3.33)	6.89 (3.02)	11.45***	.016	6.53 (2.81)	7.40 (3.22)	16.805***	.023
Angry RS	.69	3.82 (2.15)	4.20 (2.37)	3.75 (2.06)	3.96*	.006	3.86 (2.02)	3.71 (2.14)	0.421	.001
Emot. Probl.	.70	2.37 (2.02)	4.30 (2.43)	2.22 (1.91)	37.29***	.051	1.62 (1.57)	3.00 (2.14)	90.198***	.114
EDP[1]	.90	9.32 (4.97)	[23.50 (4.21)	8.23 (2.84)]			7.72 (3.09)	10.65 (5.71)	65.744***	.086

T3	α	Total (N=686) M (SD)	EDP (N=68, 9.9%) M (SD)	Controls (N=618, 90.1%) M (SD)	F	η_p^2	Boys (N=295, 43.0%) M (SD)	Girls (N= 391, 57.0%) M (SD)	F	
Victim JS	.77	2.98 (0.98)	3.28 (0.83)	2.95 (0.99)	3.12	.005	2.82 (0.98)	3.11 (0.95)	14.599***	.021
Observer JS	.87	3.18 (1.03)	3.46 (1.08)	3.14 (1.02)	1.19	.002	2.91 (1.02)	3.38 (1.00)	35.718***	.050
Perpetrator JS	.88	3.63 (1.09)	3.69 (1.28)	3.62 (1.08)	0.84	.001	3.35 (1.14)	3.84 (1.02)	33.468***	.047
Anxious RS[1]	.80/.78	6.93 (3.84)	10.12 (5.17)	6.58 (3.50)	39.73***	.055	5.86 (3.14)	7.75 (4.12)	44.933***	.062
Angry RS[1]	.73/.81	3.66 (2.19)	4.77 (2.82)	3.53 (2.08)	19.45***	.028	3.58 (2.08)	3.72 (2.28)	0.788	.001
EDP[1]	.90/.92	9.89 (5.84)	[24.49 (5.82)	8.88 (3.35)]			7.97 (3.29)	12.27 (6.59)	105.116***	.133

Note: MANCOVA results comparing participants above the cut off (+ 1.5 *SD*) in eating disorder psychopathology (EDP) and controls as well as boys and girls. All multivariate main effects significant. EDP scores not included in the MANCOVAs on differences between participants above the cut-off and controls. [1]Internal consistencies separately for the different measures for participants up to/older than 16 years of age.

Table 3

Bivariate Correlations Between Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. Age																							
2. Gender	.06																						
3. Education	.07	-.09*																					
4. BMI-SDS	.09**	-.03	-.12**																				
Victim Justice Sensitivity																							
5. T1	.25**	-.01	.01	-.03																			
6. T2	.20**	.08*	.00	-.03	.43**																		
7. T3	.08*	.13**	.05	-.04	.35**	.45**																	
Observer Justice Sensitivity																							
8. T1	.11**	.19**	-.02	.09*	.43**	.20**	.21**																
9. T2	.10*	.23**	-.03	.04	.20**	.41**	.18**	.44**															
10. T3	.13**	.21**	.04	.02	.18**	.23**	.42**	.37**	.44**														
Perpetrator Justice Sensitivity																							
11. T1	-.05	.20**	-.01	-.01	.08*	.08	.06	.52**	.35**	.25**													
12. T2	.05	.23**	.01	-.01	.05	.14**	.03	.35**	.61**	.31**	.48**												
13. T3	.11**	.20**	.03	.04	.10*	.12**	.18**	.30**	.37**	.55**	.33**	.47**											
Anxious Rejection Sensitivity																							
14. T1	-.11**	.05	-.07	.06	.20**	.09*	.12**	.10*	.06	-.001	.04	.00	.01										
15. T2	-.15**	.15**	-.14**	.02	.12**	.24**	.15**	.07	.11**	.03	.04	.04	.01	.46**									
16. T3	-.05	.24**	-.08	.03	.11**	.16**	.22**	.14**	.09*	.07	.04	.03	.05	.29**	.43**								
Angry Rejection Sensitivity																							
17. T1	-.16**	-.09*	-.08	.04	.23**	.11**	.11**	.04	.01	-.07	-.08*	-.06	-.04	.70**	.32**	.18**							
18. T2	-.23**	-.02	-.18**	.02	.10**	.17**	.08*	.06	.03	-.04	-.02	-.09*	-.09*	.32**	.68**	.24**	.42**						
19. T3	-.04	.02	-.12**	.05	.13**	.17**	.20**	.10**	.004	-.01	-.05	-.09*	-.04	.23**	.31**	.62**	.28**	.38**					
Emotional Problems																							
20. T1	.10*	.25**	-.08	.10*	.25**	.17**	.19**	.20**	.14**	.14**	.13**	.11**	.16**	.29**	.31**	.28**	.18**	.19**	.14*				
21. T2	.12**	.35**	-.04	.06	.20**	.28**	.18**	.18**	.18**	.12**	.11**	.09*	.07	.22**	.39**	.34**	.11**	.22**	.16**	.52**			
Eating Disorder Psychopathology																							
22. T1	.20**	.19**	-.05	.34**	.20**	.16**	.11**	.08*	.08*	.09*	-.05	-.03	.04	.18**	.16**	.16**	.11**	.12**	.07	.40**	.33**		
23. T2	.12**	.29**	-.05	.29**	.13**	.26**	.14**	.14**	.17**	.12**	.03	-.01	-.003	.08*	.22**	.23**	.02	.12**	.15**	.28**	.42**	.58**	
24. T3	-.01	.36**	-.01	.23**	.12**	.18**	.18**	.18**	.13**	.12**	.07	.02	.03	.11**	.19**	.42**	.03	.08*	.25**	.27**	.34**	.40**	.58**

Gender: 1=male, 2=female; **p<.01; *p<.05; T1: Time1, T2: Time 2; T3; Tine 3

Table 4

Measurement Invariance for Justice Sensitivity, Rejection Sensitivity, and Eating Disorder Psychopathology

	χ^2	*df*	*p*	χ^2-difference test	RMSEA	CFI	TLI	SRMR	BIC	AIC
Justice Sensitivity										
Configural	91.125	63	.012		.024 [.012; .034]	.997	.992	.019	29158.115	28572.834
Weak	98.140	69	.020	$\Delta\chi^2(6)=7.015, p=.319$	.022 [.009; .032]	.997	.993	.019	29122.259	28564.849
Strong	99.227	75	.032	$\Delta\chi^2(6)=1.087, p=.982$	.020 [.006; .031]	.997	.994	.019	29086.475	28556.935
Strict	121.220	81	.003	$\Delta\chi^2(6)=21.993, p<.001$	.025 [.015; .034]	.995	.991	.025	29068.598	28566.929
Rejection Sensitivity										
Configural	40.492	21	.007		.035 [.018; .051]	.996	.988	.016	14285.476	13964.964
Weak	41.702	25	.019	$\Delta\chi^2(4)=1.210, p=.876$	.029 [.012; .045]	.997	.991	.016	14260.105	13958.174
Strong	41.890	30	.073	$\Delta\chi^2(5)=0.188, p=.999$	.023 [.000; .038]	.998	.995	.016	14227.068	13948.362
Strict	48.985	33	.036	$\Delta\chi^2(3)=7.095, p=.068$	.025 [.007; .039]	.997	.994	.019	14214.227	13949.457
Emotional Problems										
Configural	15.908	1	<.001		.140 [.085; 204]	.973	.837	.025	6864.004	6803.702
Weak	15.936	2	<.001	$\Delta\chi^2(1)=.028, p=.867$	.096 [.056; .141]	.975	.924	.025	6857.393	6801.731
Strong	15.936	3	.001	$\Delta\chi^2(1)=.000, p=1.00$	.075 [.042; .113]	.976	.953	.025	6850.755	6799.731
Strict	16.062	4	.003	$\Delta\chi^2(1)=.126, p=.723$	.063 [.033; .096]	.978	.967	.025	6844.242	6797.856
Eating Disorder Psychopathology										
Configural	139.000	39	<.001		.058 [.048; .068]	.987	.978	.030	16621.262	16384.363
Weak	162.372	45	<.001	$\Delta\chi^2(6)=23.372, p=.001$	.058 [.049; .068]	.985	.978	.036	16604.764	16395.735
Strong	163.387	51	<.001	$\Delta\chi^2(6)=1.015, p=.985$	.054 [.044; .063]	.985	.981	.036	16565.907	16384.749
Strict	167.055	53	<.001	$\Delta\chi^2(2)=3.668, p=.159$	.053 [.044; .062]	.985	.982	.038	16556.286	16384.418

Please note that findings presented above show measurement invariance across all assessment points for justice sensitivity and eating disorder psychopathology, and across T1 and T2 for rejection sensitivity

Table 5

Model Fit Indices for the Cross-Lagged Panel Analysis and the Mediation Model

	χ^2	*df*	*p*	RMSEA	CFI	SRMR
Cross-Lagged Analysis (Covariance, stability & cross-lags)						
Model 1 Total sample	1155.83	723	<.001	.028 [.025; .031]	.980	.035
Model 2 Multi-group analysis by sex-all paths free	2406.40	1482	<.001	.040 [.037; .043]	.956	.052
Model 3 Multi-group analysis by sex-all paths equal	2526.27	1588	<.001	.039 [.036; .042]	.955	.060
Model 4 Multi-group analysis by age-all paths free	2372.55	1482	<.001	.041 [.038; .044]	.958	.049
Model 5 Multi-group analysis by age-all paths equal	2535.87	1588	<.001	.041 [.038; .044]	.955	.057
Mediation Analysis						
Model 1 Total sample	627.235	407	<.001	.027 [.022; .031]	.984	.033
Model 2 Mediation model by sex-all paths equal	1477.468	909	<.001	.040 [.037; .044]	.958	.058
Model 3 Mediation model by sex-all paths free	1359.857	845	<.001	.040 [.036; .044]	.962	.052
Model 4 Mediation model by age-all paths equal	1431.410	909	<.001	.040 [.036; .044]	.962	.054
Model 5 Mediation model by age-all paths free	1345.976	845	<.001	.040 [.036; .045]	.964	.048

Notes. χ^2, chi-square; df, degrees of freedom; CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.
*Control variables were age at first assessment and BMI-SDS.

Table 6

Significant Effects in the Sub-Group Analysis by Sex and Age for the Cross-Lagged Panel Model and the Mediation Model

	β	SE	*p*
Cross-Lagged Panel Analysis			
Sex			
Male			
EDP T1 ⟶ Observer JS T2	.14	.07	.038
EDP T2 ⟶ Observer JS T3	.15	.06	.018
Angry RS T2 ⟶ EDP T3	.18	.09	.045
Female			
EDP T1 ⟶ Anxious RS T2	.15	.07	.027
EDP T2 ⟶ Perpetrator JS T3	-.12	.06	.038
Age			
Childhood			
Observer JS T1 ⟶ EDP T2	.18	.07	.008
Anxious RS T2 ⟶ EDP T3	.27	.11	.012
EDPT2 ⟶ Anxious RS T3	.19	.06	.002
Adolescence			
EDP T2 ⟶ Observer JS T3	.13	.06	.034
Mediation Model			
Sex			
Male			
Direct Effects			
EDP T1 ⟶ Anxious RS T3	-.24	.07	.001
EDP T1 ⟶ Angry RS T3	-.18	.08	.016
Emotional Problems at T2 ⟶ EDP T3	.24	.07	.001
Emotional Problems at T2 ⟶ Anxious RS T3	.40	.07	<.001
Emotional Problems at T2 ⟶ Angry RS T3	.25	.08	.002
Emotional Problems at T2 ⟶ Observer JS T3	-.18	.07	.013
Indirect Effects			
Perpetrator JS T1 ⟶ EDP T3	-.08	.04	.048
Female			
Direct Effects			
Observer JS T1 ⟶ EDP T3	.24	.08	.002
Perpetrator JS T1 ⟶ EDP T3	-.14	.07	.050
EDP T1 ⟶ Emotional Problems T2	.18	.09	.034
Emotional Problems at T2 ⟶ EDP T3	.25	.08	.001
Emotional Problems at T2 ⟶ Anxious RS T3	.31	.08	<.001
Emotional Problems at T2 ⟶ Angry RS T3	.20	.08	.018
Age			
Children			
Direct Effects			
Observer JS T1 ⟶ EDP T3	.23	.08	.003
Emotional Problems T2 ⟶ EDP T3	.54	.09	<.001
EDP T1 ⟶ Emotional Problems T2	.23	.10	.017
Emotional Problems T2 ⟶ Anxious RS T3	.64	.10	<.001
Emotional Problems T2 ⟶ Angry RS T3	.41	.09	<.001
Emotional Problems T2 ⟶ Victim JS T3	.30	.09	<.001
Adolescents			
Direct Effects			
Emotional Problems T2 ⟶ EDPT3	.31	.12	.011
Emotional Problems T2 ⟶ Anxious RS T3	.27	.12	.024

EDP: Eating Disorder Psychopathology; RS: Rejection Sensitivity; JS: Justice Sensitivity; T1: Assessment at Time 1; T2: Assessment at Time 2; T3: Assessment at Time 3.