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Repetitive negative thinking predicts eating disorder behaviors: A pilot ecological momentary assessment study in a treatment seeking eating disorder sample

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ABSTRACT

Background: Repetitive negative thinking is a transdiagnostic process that occurs across several psychological disorders, including eating disorders. Individuals with eating disorders have higher levels of repetitive negative thinking than controls, and repetitive negative thinking is associated with eating disorder behaviors. However, no study has measured how momentary repetitive negative thinking may subsequently impact daily eating disorder behaviors and vice-versa.
Method: In the current study ($N = 66$, recently treated individuals recruited from an eating disorder treatment center), we examined the relationship between repetitive negative thinking and subsequent eating disorder behaviors and vice-versa using ecological momentary assessment.
Results: We found that higher momentary repetitive negative thinking predicted higher subsequent weighing and body checking. We also found that higher momentary meal-specific repetitive negative thinking predicted higher subsequent weighing and lower subsequent compensatory behavior. We also found that higher repetitive negative thinking predicted higher eating disorder symptoms at one-month follow-up.
Conclusion: There are short-term and long-term negative effects of repetitive negative thinking in the eating disorders. Targeting repetitive negative thinking may be important for decreasing eating disorder behaviors.

1. Introduction

Repetitive negative thinking (RNT) has been defined as excessive thinking about current concerns, problems, past experiences, or worries about the future (Ehring & Watkins, 2008). RNT is a transdiagnostic process that is commonly found across several psychological disorders, including eating disorders (Ehring & Watkins, 2008; Rawal, Park, & Williams, 2010), and exacerbates psychopathology (e.g., Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Two common forms of RNT are worry and rumination (Papageorgiou & Wells, 1999). Research has examined the relationship between average or trait levels of RNT and eating disorder symptoms. However, no study to date has examined the relationship between momentary RNT and eating disorder behaviors in everyday life.

1.1. Repetitive negative thinking and eating disorders

Compared to controls, individuals with eating disorders have elevated levels of RNT in the form of rumination (see Smith, Mason, & Lavender, 2018) and worry (Sternheim et al., 2012). Also, RNT (i.e., worry or rumination) is correlated with eating disorder symptoms (e.g., Startup et al., 2013). Furthermore, RNT is prospectively associated with eating disorder psychopathology (Nolen-Hoeksema, Stice, Wade, & Bohon, 2007; Sala & Levinson, 2016).

In addition to endorsing high RNT, individuals with eating disorders also have high disorder-specific RNT (i.e., repetitive thinking related to eating, shape and weight) (Cowdrey & Park, 2011). However, research on disorder-specific RNT and eating disorders has exclusively examined the relationship between trait disorder-specific RNT and eating disorder symptoms.

1.2. Assessing RNT in the context of eating disorders

Both eating disorder behaviors and RNT are transient. However, most studies on RNT and eating disorders to date have used self-report measures that require participants to retrospectively analyze their

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overall degree of engagement in RNT and eating disorder behaviors. A traditional self-report method of gathering psychological data has several limitations (Stone, Shiffman, Atienza, & Nebeling, 2007). No research study has measured how momentary RNT and disorder-specific RNT may impact daily eating disorder behaviors in individuals with eating disorders. It is important to assess the extent to which momentary RNT may impact daily eating disorder behavior in order to understand in the moment intra-individual relationships between RNT and eating disorder behaviors, which may be different from across person relationships. Furthermore, understanding the nature of the momentary relationship between RNT and eating disorder behavior may help us understand the real-world relationship between RNT and eating disorder behaviors.

Ecological momentary assessment (EMA) is an ideal way to assess the intra-individual relationships between transient RNT and eating disorder behaviors as they occur in everyday life. EMA is an assessment approach that tracks near real-time data by involving momentary ratings and repeated assessments over time, thus addressing some of the limitations and biases of retrospective reports and increasing ecological validity (Trull & Ebner-Priemer, 2009). EMA allows for the momentary examination of how RNT related to meals may be related to eating disorder behaviors, as it is a technique for detecting transient and context-dependent phenomenon. Additionally, EMA data can be analyzed with disaggregated cross-lag panel analyses (Hamaker, Kuiper, & Grasman, 2015), which allow us to test whether within-person deviations in RNT predict subsequent changes in eating disorder behaviors. In other words, these types of analyses are able to approximate quasi-causal relationships with naturalistic data by disaggregating variables, taking temporal precedence into account, and controlling for previous levels of the dependent variable (Hamaker et al., 2015).

1.3. The current study

In the current pilot study, we examined the relationship between RNT and subsequent eating disorder behaviors and vice-versa. We also explored whether within-person findings differ from between-person findings. Finally, we examined whether higher RNT and any eating disorder behaviors that were significantly associated with RNT would predict higher eating disorder symptoms at one-month follow-up. Based on previous literature, we hypothesized that: (1) higher RNT and meal-specific RNT would predict higher subsequent eating disorder behaviors and vice-versa, representing a self-reinforcing cycle; (2) mean individual RNT and meal-specific RNT levels and eating disorder behaviors would predict higher eating disorder symptoms at one-month follow-up; and (3) not all across-person relationships would hold within-person.

2. Methods

2.1. Participants

Sixty-six individuals diagnosed with an eating disorder participated in the current study. Please see Table 1 for demographic and diagnostic descriptions.

Table 1
Demographics and diagnostic descriptions.

	n (%)	Range
Age (***M, SD***)	24.98 (7.31)	14–41
Female	64 (97.0%)	
BMI (***Median, SD***)	20.66 (3.46)	13.89–32.28
Ethnicity		
European American	56 (84.8%)	
Asian	3 (4.5%)	
Hispanic	3 (4.5%)	
Black	1 (1.5%)	
Multiracial	2 (3.0%)	
Not Reported	1 (1.5%)	
Diagnosis		
AN	40 (60.6%)	
Atypical AN	14 (21.2%)	
BN	6 (9.1%)	
Low Frequency BN	1 (1.5%)	
OSFED	5 (7.6%)	
Other Diagnoses		
Anxiety Disorder	41 (62.1%)	
Depressive Disorder	38 (57.6%)	
OCD	13 (19.7%)	
PTSD	7 (10.6%)	
In Treatment	49 (74.2%)	
Age Started Treatment	18.45 (5.38)	
Average tx Hours/Week	2.50 (4.53)	
Medications	34 (51.5%)	
Type of Treatment		
Outpatient	45 (62.8%)	
Residential	3 (4.5%)	
Intensive Outpatient	2 (3.0%)	
Partial Hospital	1 (1.5%)	

Note. BMI = Body Mass Index; AN = Anorexia Nervosa; BN = Bulimia Nervosa; OSFED = Other Specified Feeding or Eating Disorder; OCD = Obsessive Compulsive Disorder; PTSD = Post-Traumatic Stress Disorder. Some participant reported being engaged in more than one type of treatment.

2.2. Measures

2.2.1. Eating disorder diagnostic scale (EDDS; Stice, Telch, & Rizvi, 2000)

We used the DSM-5 self-report version of the EDDS to diagnose eating disorders the day before beginning the EMA protocol. The EDDS has adequate psychometric properties (Stice, Fisher, & Martinez, 2004).

2.2.2. Eating disorder inventory-2 (EDI-2; Garner, Olmstead, & Polivy, 1983)

We used the EDI-2 to assess eating disorder symptoms at follow-up. The EDI-2 is a self-report questionnaire that measures core features associated with eating disorder psychopathology. In this study, we utilized the three main EDI-2 subscales: (1) drive for thinness (DT), (2) body dissatisfaction (BD), and (3) bulimic symptoms (BN). Participants responded to the items on a scale ranging from 1 (*never*) to 6 (*always*). The EDI-2 has good internal consistency as well as good convergent and discriminant validity and is frequently used by clinicians for the assessment of eating disorder symptoms (Garner et al., 1983). In the current sample, BD ($\alpha = 0.91$) exhibited excellent internal consistency, and DT ($\alpha = 0.88$) and BN ($\alpha = 0.78$) exhibited good internal consistency.

2.2.3. Other psychological diagnoses

We asked participants "Which other diagnoses have you been given, if any?" to assess for any other psychological diagnoses.

2.2.4. EMA daily life daily habits questionnaire

This questionnaire was developed by adapting questions for EMA use from the State Version of the Repetitive Thinking Questionnaire (RTQ; McEvoy, Mahoney, & Moulds, 2010) and the Eating Disorder Examination-Questionnaire (EDE-Q, Fairburn & Beglin, 1994).

2.2.5. RNT

Directions for RNT were as follows: *Please reflect on your last meal/snack. Please rate the following statements based on HOW YOU FELT DURING the meal/snack. Please use a one (not at all true) to five (very true) scale.* RNT was assessed by asking participants to rate the extent to which they agreed with the following statements: (1) *I had thoughts or images about all my shortcomings, failings, faults, mistakes;* (2) *I had thoughts or images that I wont be able to do my job/work because I feel so badly.* RNT showed moderate internal consistency with a Spearman-Brown coefficient of 0.80. Meal-specific RNT was assessed by asking

participants to rate the extent to which they agreed with the following statements: (1) *Once I started thinking about the meal, I couldn't stop;* (2) *I had thoughts or images of the meal that I tried to resist thinking about*; (3) *I knew I shouldn't have thought about the meal, but I couldn't help it;* and (4) *I had thoughts or images about the meal and wishing it had gone better; and (5) I had thoughts or images of the meal that were difficult to forget.* Meal-specific RNT exhibited excellent internal consistency (α = 0.94).

2.2.6. Eating disorder behaviors

Directions for the eating disorder behaviors were as follows*: Please rate how much you have engaged in the following behaviors since your last meal/check-in using 1 (not at all) to 6 (a lot): restriction, weighing, body checking, vomiting or other compensatory behavior, excessive exercise,* and *binge eating.*

2.2.7. Trait version of the repetitive thinking scale (RTQ; McEvoy et al., 2010)

The RTQ is a measure of perseverative negative thinking that has been validated in clinical samples (McEvoy et al., 2010). Participants responded to items on a one (*not true*) to five (*very true*) scale. We included the trait version of the RTQ scale in order to verify that our RNT items adequately capture the construct. Both RNT and meal-specific RNT had moderate correlations with the trait RTQ measure at baseline (*rs* = 0.35-0.37).

2.3. Procedures

Participants were recruited after discharging from either a residential or partial hospitalization treatment program at an eating disorder clinic or from an alumni list gathered at the same eating disorder clinic. Participants were invited to participate in a study of daily habits in general and specifically around meals. All procedures were completed online and through a mobile application. Participants provided informed consent and then completed an online survey through RedCap asking about eating disorder symptoms, behaviors, treatment history, and demographics. After completion of the online survey, participants were given instructions on how to download and access a mobile application measuring daily habits (please see http://www.christophermetts.com/status-post). This application notified participants four times a day for one week. Participants were asked to provide a twelve-hour window of time during which they could be notified. They were also asked to provide the times around which they generally eat meals and snacks, and assessments were random around these time-points (i.e., within a four hour block) in order to hit as many meal and snack times as possible while taking into account the variation of meal and snack times. After receiving a prompt, participants had 20 minutes to respond before the survey expired. One month after completion of the mobile application questions, participants were emailed the EDI-2. Participants were compensated based on the number of times they responded to the mobile application questionnaires and could receive up to 25 dollars for participation. This study was approved by the Institutional Review Board at Washington University in St. Louis.

2.4. Statistical analyses

Data were analyzed with SPSS using multilevel modeling (MLM). MLM is robust to missing data (Quené & Van den Bergh, 2004); therefore, we were able to include all data. Furthermore, MLM allows for the examination of relations within individuals over-time. We first tested whether RNT predicted future eating disorder behaviors and vice-versa. We employed within subject cross-lag panel analyses (Hamaker et al., 2015). In these analysis, RNT at time 1 was entered as a predictor of eating disorder behaviors at time t+1, controlling for eating disorders symptoms at the previous time-point (t), and vice-versa, for eating disorder behavior predicting RNT. As suggested by recent research (Hamaker et al., 2015), time varying predictors (TVPs) were disaggregated into the participants' mean across all 28 assessments (TVP_{mean}; the between-person component) and their deviation from their mean at each session ($TVP_{deviation;}$ the within-person component; $TVP_{dev} = TVP_{raw} - TVP_{mean}$). We used fixed predictor variables and random intercepts. Effect sizes were computed by transforming the *t*-statistic from the models into a *d* effect size.

The lower level, or level one data, consisted of the repeated measures that were collected at each assessment (e.g., RNT, eating disorder behavior). The level one data were nested within level two units (i.e., participants). Level one modeled the association between eating disorder behavior and RNT as follows:

$$Outcome_{(t+1)i} = b_{0i} + b_{1i*}TVPmean_i + b_{1i*}TVPdev_{it} + b_{2i}*outcome_{ti} + \varepsilon_{it}$$

$Outcome_{(t+1)i}$ is the outcome (eating disorder behavior, RNT) for individual i at t+1, $TVPmean_i$ is the participants' mean across all 28 assessments for the predictor variable (RNT, eating disorder behavior), $TVPdev_{it}$ is the participants deviation from the mean at each assessment for the predictor variable (RNT, eating disorder behavior), $outcome_{ti}$ is the level of the outcome variable at time t, and ε_{it} is the error for individual i at assessment t. Outcome was included as a predictor of $outcome_{t+1}$ to control for the possibility that the outcome caused increases in the predictor variable, rather than vice-versa.

In addition, we conducted a regression to test whether mean individual RNT and eating disorder behaviors (over the one-week EMA assessment period) predicted higher eating disorder symptoms at one-month follow-up (Time 2) while controlling for baseline eating disorder symptoms (Time 1).

3. Results

3.1. Descriptive statistics

Please see Table 2 for descriptive statistics. Compliance averaged 74% (range = 14–100%).

3.2. Cross-lag panel models

3.2.1. RNT

In regards to within-person (TVP_{dev}) findings, higher RNT significantly predicted higher subsequent weighing (*d* = 0.29, *b* = 0.17, *SE* = 0.04, *95% CI* = 0.09-,24, *p* < .001) and body checking (*d* = 0.23, *b* = 0.16, *SE* = 0.05, *95% CI* = 0.06-0.26, *p* = .001), but did not significantly predict subsequent restriction, compensatory behaviors, excessive exercise, or binge eating (*ps* > .34). No eating disorder behavior predicted subsequent RNT (*ps* > .08).

Table 2
Means, standard deviations and range of RNT and eating disorder behaviors.

Variable	*M (SD)*
RNT	
RNT	1.90 (1.11)
Meal-specific RNT	1.94 (1.07)
Eating disorder behaviors	
Restriction	2.22 (1.53)
Weighing oneself	1.59 (1.45)
Body checking	3.02 (1.87)
Compensatory behavior	1.31 (0.97)
Excessive exercise	1.63 (1.30)
Binge eating	1.28 (1.00)

Note. M = Mean; *SD* = Standard Deviation. Range = 1 (not at all true) - 5 (very true) for RNT and 1 (not at all) – 6 (a lot) for eating disorder behavior.

In regards to between-person (TVP_{mean}) findings, higher RNT significantly predicted higher binge eating ($d = 1.08$, $b = 0.19$, $SE = 0.06$, *95% CI* = 0.08-0.31, $p = .001$), weighing ($d = 1.11$, $b = 0.56$, $SE = 0.16$, *95% CI* = 0.24-0.88, $p < .001$), body checking ($d = 1.50$, $b = 0.58$, $SE = 0.12$, *95% CI* = 0.33-0.82, $p < .001$), restriction ($d = .83$, $b = 0.29$, $SE = 0.11$, *95% CI* = 0.07-0.52, $p = .011$), and excessive exercise ($d = 0.85$, $b = 0.31$, $SE = 0.12$, *95% CI* = 0.08-0.54, $p = .010$), but did not predict compensatory behavior ($p = .15$). In the reverse, higher binge eating ($d = 1.06$, $b = 0.29$, $SE = 0.11$, *95% CI* = 0.05-0.52, $p = .018$), excessive exercise ($d = 0.97$, $b = 0.20$, $SE = 0.08$, *95% CI* = 0.04-0.37, $p = .019$), body checking ($d = 1.68$, $b = 0.21$, $SE = 0.05$, *95% CI* = 0.11-0.31, $p < .001$), weighing ($d = 1.20$, $b = 0.21$, $SE = 0.07$, *95% CI* = 0.07-0.34, $p = .004$), and restriction ($d = 1.32$, $b = 0.20$, $SE = 0.06$, *95% CI* = 0.08-0.32, $p = .002$) predicted higher RNT. Compensatory behavior did not predict RNT ($p = .15$).

3.2.2. Meal-specific RNT

In regards to within-person findings (TVP_{dev}), higher meal-specific RNT significantly predicted higher subsequent weighing ($d = 0.24$, $b = 0.14$, $SE = 0.04$, *95% CI* = 0.06-0.22, $p < .001$) and lower subsequent compensatory behavior ($d = -0.16$, $b = -0.07$, *SEs* = 0.03, *95% CI* = −0.13 to −0.01, $p = .01$), but did not predict subsequent binge eating, restriction, body checking, or excessive exercise (*ps* > .07). No eating disorder behavior predicted subsequent meal-specific RNT (*ps* > .12).

In regards to between-person findings (TVP_{mean}), higher meal-specific RNT significantly predicted higher binge eating ($d = 1.15$ $b = 0.21$, $SE = 0.06$, *95% CI* = 0.10-0.33, $p = .001$), weighing ($d = 1.24$, $b = 0.63$, $SE = 0.16$, *95% CI* = 0.30-0.96, $p < .001$), body checking ($d = 1.40$, $b = 0.55$, $SE = 0.13$, *95% CI* = 0.29-0.80, $p < .001$), and restriction ($d = 0.86$, $b = 0.32$, $SE = 0.12$, *95% CI* = 0.08-0.55, $p = .009$), but did not predict compensatory behavior or excessive exercise (*ps* > .08). In the reverse, higher binge eating ($d = 1.19$, $b = 0.34$, $SE = 0.12$, *95% CI* = 0.10-0.59, $p = .007$), body checking ($d = 1.49$, $b = 0.20$, $SE = 0.05$, *95% CI* = 0.10-0.30, $p < .001$), weighing ($d = 1.20$ $b = 0.22$, $SE = 0.06$, *95% CI* = 0.09-0.35, $p = .002$), and restriction ($d = 1.28$, $b = 0.21$, $SE = 0.06$, *95% CI* = 0.09-0.33, $p = .002$) predicted higher meal-specific RNT. Excessive exercise and compensatory behaviors did not predict meal-specific RNT (*ps* > .18).

3.3. Prospective follow-up

3.3.1. RNT

Higher mean levels of RNT predicted higher bulimic symptoms at one-month follow up ($\beta = .12$, $p = .05$). Higher mean levels of RNT trended towards predicting higher drive for thinness at one-month follow up ($\beta = .16$, $p = .06$), and did not predict subsequent body dissatisfaction ($p = .29$).

3.3.2. Meal-specific RNT

Higher mean levels of meal-specific RNT predicted higher drive for thinness ($\beta = .17$, $p = .05$) and bulimic symptoms ($\beta = .12$, $p = .05$) at one-month follow up, but did not predict future body dissatisfaction ($p = .65$).

3.3.3. Eating disorder-behaviors

Higher mean levels of weighing trended towards predicting body dissatisfaction at one-month follow up ($\beta = .12$, $p = .08$), and did not predict future drive for thinness or bulimic symptoms (*ps* > .17). Higher mean levels of body checking trended towards predicting higher drive for thinness ($\beta = .16$, $p = .06$) at one month follow-up, and did not predict future bulimic symptoms or body dissatisfaction (*ps* > .53). Compensatory behaviors did not predict drive for thinness, bulimic symptoms or body dissatisfaction at one-month follow up (*ps* > .20).

4. Discussion

We used a mobile EMA application to test if there were significant relationships between momentary RNT and subsequent eating disorder behaviors and vice-versa. We found that, within persons, higher momentary RNT predicted higher subsequent weighing and body checking. In addition, we found that higher momentary meal-specific RNT predicted higher subsequent weighing and lower subsequent compensatory behaviors. However, eating disorder behaviors did not predict subsequent RNT. Across persons, higher RNT predicted higher eating disorder behaviors (except for compensatory behaviors) and vice-versa. Higher meal-specific RNT predicted higher eating disorder behaviors (except for compensatory behaviors and excessive exercise) and vice-versa. We also found that higher RNT and meal-specific RNT predicted higher eating disorders symptoms at one-month follow-up.

Within persons, higher RNT and meal-specific momentary RNT predicted higher subsequent weighing, and higher RNT also predicted higher subsequent body checking. Our findings suggest that individuals with eating disorders may cope with RNT by engaging in weighing and body checking behaviors. Surprisingly, we also found that higher meal-specific RNT predicted lower subsequent compensatory behaviors. It may be that if participants know they will not be engaging in compensatory behaviors after a meal, they ruminate about the meal more. Alternatively, this finding may be because individuals with eating disorders cope with higher meal-specific RNT by weighing. If an individual checks their weight and learns that they have not gained weight, it may reduce their need to engage in compensatory behaviors. This relationship between RNT and weighing/checking behaviors may also explain why RNT was not related to restriction, excessive exercise, or binge eating; RNT may lead to reassurance-seeking behaviors (i.e., weighing and body checking), and successful reassurance may deter further eating disorder behaviors, at least in the short-term. These findings differ from others, who found that rumination predict the onset of binge eating (Nolen-Hoeksema et al., 2007). This difference may be because Nolen-Hoeksema et al. (2007) examined longitudinal between-person relationships, whereas we tested momentary within-person relationships. This difference could also be because Nolen-Hoeksema et al. (2007) used a sample of female adolescents, whereas we used a sample of patients with nearly exclusively AN or atypical eating disorders.

Against hypothesis, we found that, within persons, no eating disorder behavior predicted subsequent RNT. This finding suggests that although individuals with eating disorders may cope with RNT by engaging in eating disorder behaviors, eating disorder behaviors neither exacerbate nor relieve RNT in the moment. These findings also differ from those of Nolen-Hoeksema et al. (2007), which suggest that higher bulimic symptoms predicted higher rumination over time. However, Nolen-Hoeksema et al. (2007) examined the longitudinal relationship between bulimic symptoms and rumination and did not test momentary rumination. It may be that eating disorder behaviors predict RNT across individuals and in the long-term, but not within individuals and/or in the short-term.

Across persons, higher RNT predicted higher binge eating, weighing, body checking, excessive exercise and restriction. Similarly, higher binge eating, weighing, body checking, excessive exercise, and restriction predicted higher RNT. These findings suggest that individuals who are higher in RNT are more likely to engage in many eating disorder behaviors, which is consistent with other literature (e.g., Startup et al., 2013). Similarly, higher meal-specific RNT predicted higher binge eating, weighing, body checking, and restriction and vice-versa. Interestingly, RNT did not predict compensatory behaviors across persons. Additionally, meal-specific RNT did not predict compensatory behavior or excessive exercise. It may be that excessive exercise and compensatory behaviors are driven by processes outside of RNT (e.g., emotion regulation). Overall, these findings suggest that across-person relations between RNT and eating disorder behaviors differ from within-person relations.

In regards to long-term findings, we found that higher RNT and meal-specific RNT over the EMA assessment period predicted higher bulimic symptoms at one-month follow-up. In addition, higher mean meal-specific RNT predicted higher drive for thinness at one-month follow-up. These finding are in line with findings from other research suggesting that RNT exacerbates psychopathology (e.g., Nolen-Hoeksema et al., 2007). Higher RNT about meals and eating disorder symptoms may increase individuals' drive for thinness and bulimic symptoms over time, as restricting and bulimic symptoms may allow individuals to avoid repetitive negative thoughts. These findings suggest that there may be long-term negative effects of RNT.

4.1. Research and clinical implications

There are several clinical implications that stem from this work. First, this research suggests that if patients engage in excessive weighing and/or body checking, RNT should be assessed and targeted in treatment. Mindfulness is an adaptive counterpart to RNT (Shapiro, Oman, Thoresen, Plante, & Flinders, 2008) and may be a promising strategy for decreasing both repetitive negative thoughts and eating disorder behaviors. For example, findings from a previous study show that there is an inverse relationship between certain aspects of mindfulness and future eating disorder behaviors (Sala & Levinson, 2017). Further, emotion regulation skills training could be another effective intervention in targeting RNT, as rumination is a maladaptive emotion regulation strategy that typically occurs in the absence of adaptive emotion regulation skills (Farb, Anderson, & Segal, 2012). Additionally, eating disorder interventions should continue to target weighing and body checking. Cognitive behavioral therapy for eating disorders targets weighing and body checking (Fairburn, 2008). Finally, exposure and response prevention therapy could target spending a certain amount of time without weighing or body checking when a patient experiences repetitive negative thoughts. Future research should explore the mechanisms by which higher momentary RNT leads to higher subsequent weighing and body checking (e.g., increases in negative affect). In addition, future studies should explore the content of the RNT in individuals with eating disorders, so that the RNT could be better targeted during treatment.

4.2. Study limitations

This study extends previous research by focusing on how RNT and meal-specific RNT contribute to subsequent eating disorder behaviors and eating disorder symptomatology at follow-up. A major strength of the study is the use of EMA. This study is the first EMA study to assess how RNT and meal-specific RNT relate to eating disorder behaviors in an eating disorder sample. However, there are limitations to this study. First, we had a relatively small sample size, and replication in a larger sample is needed. Second, these analyses were conducted in a recently treated sample. However, recently discharged individuals from treatment are often symptomatic, and our sample met criteria for an eating disorder. Furthermore, most participants were still receiving treatment in other settings. Nonetheless, the period after acute higher-level treatment may represent a period of relatively lesser symptoms, which could contribute to some of the non-significant findings. We also cannot determine if these results generalize to the large percentage of individuals with eating disorders who do not seek treatment (Hart, Granillo, Jorm, & Paxton, 2011). Third, we used a self-report diagnostic interview to determine diagnosis. However, there is a strong literature behind the usage of the EDDS (e.g., Stice et al., 2000; Stice et al., 2004). Fourth, the sample consisted of primarily women. Future investigations should examine these relationships in men. Fifth, we used less assessments per day than other EMA studies in the field (e.g., Haynos et al., 2015). It is possible that the study had too few assessments to reliably capture the momentary relationship between RNT and eating disorder behaviors. Furthermore, we were unable to analyze whether these relations differ across times of the day. We used an application through RedCap that generated prompts within particular time windows but unfortunately did not record the exact time stamp. Future research should examine whether these relations differ across times of the day. Sixth, we combined individuals with different eating disorders in the study, and most of our sample consisted of individuals with AN or atypical AN. It is unclear the extent to which these results generalize to individuals with other eating disorders. We also did not assess illness duration. Future research should examine the extent to which these findings may differ among different eating disorder diagnoses and by illness duration, as we were under-powered to do so. Seventh, the means for some eating disorder behaviors were on the lower end, likely due to the fact that participants had recently completed intensive treatment. Therefore, the statistical power to examine the relations for some variables may have been limited due to restriction of range. Finally, the study was not experimental, and thus, we cannot claim causality.

5. Conclusions

Overall, we found that higher RNT predicted higher subsequent weighing and body checking. In addition, we found that higher meal-specific RNT predicted higher subsequent weighing and lower subsequent compensatory behavior. This pattern of results suggests that individuals with eating disorders may engage in weighing and body checking to cope with RNT. Last, we found that higher RNT predicted higher eating disorder symptoms at one-month follow-up, suggesting that, in addition to momentary effects, there may be negative longer-term effects of RNT. Our research begins to outline how higher RNT can impact certain eating disorder behaviors and symptoms. We hope that future research will expand on this research to test if interventions targeting RNT will reduce subsequent eating disorder behaviors, leading to decreased suffering in individuals with eating disorders.

Ethical standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Declaration of conflicting interests

None.

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