Experimental Manipulation of Intolerance of Uncertainty in Adults with Anorexia Nervosa and its Contribution to Eating Pathology

Maria-Sotiria Lafazanidou

Student number: 7765711

Department of Social and Behavioral Sciences, Utrecht University

201500819: Clinical Psychology Thesis

Dr. Lot Sternheim

7 February 2022

Abstract

Growing research highlights the relevance of Intolerance of Uncertainty (IU) in Anorexia Nervosa (AN). Recent findings show clinical levels of IU in AN, and increased IU is associated with greater degrees of negative mood and impairments in daily functioning. Despite its potential implications for treatment improvements, there are no experimental studies exploring changeability of IU in AN. Adopting an experimental paradigm used in anxiety samples, the aim of this study is to examine whether IU can be experimentally manipulated in AN and to investigate the contribution of IU to eating pathology (EP) in women with AN. Adult females with a DSM 5 AN diagnosis were recruited from a specialized eating disorder clinic. All participants completed the Eating Disorder Examination Questionnaire, Intolerance of Uncertainty Scale and visual analogue scales for state IU and EP before receiving either a high or low IU manipulation; after the manipulation levels of IU were assessed again. It was hypothesized that participants in the high IU condition would report significantly higher levels of eating pathology than participants in the low IU condition, post the manipulation. Results revealed clinical levels of IU in both groups. Against the expectations of the study, there were no differences between the high IU group and the low IU group after the manipulation, hence no analyses associations of IU on EP were implemented. Surprisingly, although in the high IU condition, levels of IU did not increase, in the low IU condition levels of IU reduced significantly, suggesting that malleability of levels of state IU in AN is feasible. Further experimental investigations into the changeability of IU are needed to improve our understanding of its contribution to AN development and maintenance.

Keywords: anorexia nervosa, intolerance of uncertainty, experimental manipulation, eating pathology

Anorexia nervosa disorder (AN) is part of the feeding and eating disorders which are characterized by a persistent disturbance of eating-related behavior resulting in the impairment of physical health or psychosocial functioning (American Psychiatric Association, 2013). More specifically, AN is characterized by a significantly low body weight, less than normally expected according to the developmental features, an intense fear of gaining weight and over-evaluation of self's body weight or shape (APA, 2013). The higher incidence of AN is in young women with the greatest risk of onset being between 10 and 24 years (Martinez-Gonzalez et al., 2020) and the 12-month prevalence among this group being approximately 0.4% (APA, 2013). Moreover, two subtypes of the disorder have been identified: restricting and binge-eating/purging type. The former type includes controlling weight through dieting and excessive exercise and the latter describes an individual engaging in binge eating or purging behavior (i.e., self-induced vomiting or misuse of laxatives) to reduce caloric intake, during the last 3 months (APA, 2013). Crossing from one subtype to the other is common (Eddy et al., 2008).

AN usually co-occurs with anxiety disorders such as generalized anxiety disorder/GAD, social anxiety disorder/SAD, and obsessive-compulsive disorder/OCD (Altman & Shankman, 2009; Godart et al., 2002). Related to this, AN patients show a tendency towards excessive worry (Startup et al., 2013), excessive organization, perfectionism (Wade et al., 2008), and cognitive inflexibility (Buzzichelli et al., 2018). These traits are hypothesized to contribute to the onset and/or maintenance of the eating disorder (Hambrook et al., 2012; Waller, 2008). The comorbid disorders often exist before the AN (Godart et al., 2000) and have a negative effect on the outcome of the disorder, demonstrating more hospitalizations and increased suicide risk (Brand-Gothelf et al., 2014). Hence, the importance of these factors in the

causation and course of AN need to be considered (Mattar et al., 2011; Pallister & Waller, 2008).

Anxiety research studies have shown that an important factor associated with SAD, GAD, worry, and OCD is Intolerance of Uncertainty (Boelen & Reijntjes, 2009; Dugas et al., 1998; Tolin et al., 2003). Intolerance of Uncertainty (IU) is defined as a predisposition to negatively perceiving and responding to uncertain information and situations irrespective of its outcomes (Dugas et al., 2001). It includes an excessive tendency to interpret ambiguity as threatening, to avoid uncertain situations or to endure them with intense anxiety and to perceive these events as unacceptable (Dugas et al., 2004; Shihata et al., 2016). Intolerance of Uncertainty comprises two dimensions; prospective IU and inhibitory IU (Carleton, 2012). Prospective IU represents cognitive threat assessments related to the future while inhibitory IU represents inhibition of behavior associated with uncertainty (Carleton et al., 2007). In more recent research, this fear of the unknows (Carleton, 2016) is suggested to play an important role in eating disorders (Konstantellou et al., 2011; Sternheim et al., 2017; Sternheim & Harrison, 2018).

More specifically, recent findings highlight that people with eating disorders, demonstrate higher levels of IU compared to healthy controls and that this is particularly true for those with AN (Sternheim et al., 2011a; 2017). In non-clinical sample, individuals with problematic eating attitudes also demonstrate higher levels of IU compared to individuals with normal eating attitudes (Konstantellou & Reynolds, 2010). Furthermore, in a qualitative study from Sternheim et al. (2011b) AN patients reported experiencing uncertainty as stressful and wanting to avoid this at all costs. Prominent sources of uncertainty were fear of negative evaluation by others and feelings of being imperfect. Uncertain situations led participants to anxiety and

feeling ‘out of control’, resulting in a strong desire for control which was reflected in extreme organizing and planning. In addition, research has shown that higher IU contributes significantly to higher eating pathology as an anxiety-related process in patients with AN (Sternheim et al., 2015) and eating disorders (Frank et al., 2012; Renjan et al., 2016). Even more, it has been found that IU is also related to other psychological symptoms in people with AN and eating disorders. For instance, in AN, IU could contribute to social problem-solving styles (Sternheim et al., 2020). In eating disorders patients, IU has an indirect effect on emotional functioning via overvaluation of eating, weight and shape (Renjan et al., 2016). Finally, in a study from Sternheim et al. (2011a), the authors found that IU has an effect on decision making in AN. Through a behavioral task, the researchers revealed that AN patients with high IU attribute greater importance in making the correct decision.

However, it has not yet been found whether there is a causal link of IU on AN patients, which could be very important in terms of treatment improvements.

Although evidence-based treatments for AN, such as cognitive behavioral treatment, Maudsley anorexia nervosa treatment, specialist supportive clinical management for adults and family-based treatment for adolescents (National Institute for Health and Care Excellence, 2017), have a realistic chance of recovery, there is widespread agreement that several challenges remain in the management of AN (Zipfel et al., 2015), especially due to high relapse rates (Keel & Brown, 2010). One factor that increases treatment complexity in AN is reported to be the high comorbidity with anxiety disorders (Keel & Brown, 2010). Therefore, a clearer understanding of how AN is linked with anxiety is needed, and one way of investigation this could be by targeting IU and exploring whether there is a causal effect of IU on AN. Thus, a strategy may be generated for developing more effective

therapies and new interventions that target specific anxiety-related components including IU. Hence, our aim is to target IU as an anxiety component, and to achieve this, an experimental study was devised.

In contrast to the anxiety literature, in AN literature there are no experimental studies exploring changeability of IU. Consequently, based on an anxiety experimental study from Meeten et al. (2012), where the researchers investigated the causal link between IU and perseverative worrying by manipulating IU, and found significant results, we intend to find out whether there can be manipulation of IU in AN patients and whether there is a causal effect of IU on eating pathology; either restrictive or purging/binge eating pathology. More specifically, the aim of the current study is to investigate the causal contribution of IU to eating pathology in people with AN. It was hypothesized that participants in the high IU condition would report significantly higher levels of either restrictive (more tendency to fasting, exercise) or purging/binge eating pathology (more tendency to losing control of food, vomiting) than participants in the low IU condition, post the manipulation. Therefore, it was predicted that IU would causally contribute to different components of eating pathology, such as behavioral and emotional tendencies.

Method

Participants

Thirty clinical patients with a DSM 5 AN diagnosis, who were receiving treatment at Altrecht Eating Disorders Rietveld in the Netherlands, were invited by e-mail to participate in the study. Because one participant voluntarily withdrew from the study, the sample resulted in a total of twenty-nine members, all of whom were adult women. The participants were informed that they would not benefit from the research

beyond the possible future contribution of the results to a better understanding of eating disorders. They were aware that they could withdraw their consent at any time and that anonymity was guaranteed. Ethical approval was obtained. The participants were recruited by the clinicians and if agreed they would be contacted by the researcher.

Materials

Intolerance of Uncertainty Scale

The Intolerance of Uncertainty Scale, short form (IUS-12) is a 12-item, short version of the original 27-item Intolerance of Uncertainty Scale (Freeston et al., 1994) that measures responses to uncertainty, ambiguous situations, and the future (Carleton et al., 2012). The 12 items are rated on a 5-point Likert scale ranging from 1 (*not at all characteristic of me*) to 5 (*entirely characteristic of me*). The IUS-12 has strong correlations with the original scale, r = .94 to .96 (Carleton et al., 2007) and has been shown to have two factors (McEvoy & Mahoney, 2011), prospective IU (7 items; e.g., "I can't stand being taken by surprise") and inhibitory IU (5 items; e.g., "When it's time to act, uncertainty paralyses me"), both with identically high internal consistencies, a = .85 (Carleton et al., 2007). In the present study the IUS-12 had a Cronbach's alpha of .89 and an average total reliability of .61. The IUS-12 was used to assess levels of IU. Higher IUS-12 scores are indicated higher IU responses (Carleton et al., 2007).

Eating Disorder Examination-Questionnaire

The Eating Disorder Examination-Questionnaire (EDE-Q) is a 36-item self-reported questionnaire adapted from the Eating Disorder Examination (EDE), an interview-based instrument (Cooper & Fairburn, 1987), and designed to assess the

range and severity of participant's eating attitudes and behaviors (Fairburn & Beglin, 1994). The EDE-Q includes 22 items assessing the core attitudinal features of ED psychopathology, which together comprise 4 subscales, assessing restraint (e.g., "Have you wanted your stomach to be empty?"), weight (e.g., "Have you been really scared that you might put on weight and get fat?"), eating (e.g., "Have you eaten in secret?") and shape (e.g., "How unhappy have you felt about your shape?") concerns over the previous 28 days, using a 7-point Likert scale ranging from 0 '*not one day*' to 6 '*every day*' (Fairburn & Beglin, 1994). Another 14 questions examine the frequency of core ED behaviors (e.g., "How often have you felt guilty after eating because of the effect on your shape and weight?"), meaning of how many times the behavior occurred over the previous 28 days (Fairburn & Beglin, 1994). The EDE-Q has shown reliability with the subscales demonstrating acceptable internal consistency (Luce & Crowther, 1999) and it has generally acceptable criterion validity (Mond et al., 2004). In the present sample the EDE-Q had a Cronbach's alpha of .9. It was used to assess levels of ED pathology. Higher EDE-Q scores are indicated higher ED psychopathology (Fairburn & Beglin, 1994).

Visual Analogue Scales for IU

Participants completed visual analogue scales (VAS) measuring their current feelings of IU. More specifically, they were asked to complete 100-point VAS, anchored with 0 (*not at all*) to 100 (*extremely*), to indicate (IU1) 'how uncertain you feel right now', (IU2) 'to what extent a feeling of uncertainty is annoying to you at the moment' and (IU3) 'how concerned you are about the uncertainty/unpredictability of the situation you have just described'. The VAS for IU were adapted from Meeten et al. (2012) experimental exploration study where the researchers chose these statements to measure cardinal features of the IU construct, such as negative beliefs

about uncertainty and its implications. In their research VAS for IU showed to have good validity and internal consistency as measures for current feelings of IU. The VAS measures for IU were applied at baseline, after the IU manipulation and at the end of the experiment.

Visual Analogue Scales for Eating Pathology

Participants completed visual analogue scales measuring their current state of eating pathology. They were asked to read seven statements and circle the correct number for them, from 1 (*not true at all*) to 5 (*completely true*). These seven VAS statements included: 'I am afraid of losing control over food', 'I am satisfied with my weight/figure', 'I feel the urge to vomit', 'I feel the urge to lax', 'I feel the urge to eat a lot', 'I feel the urge to fast' and 'I feel the urge to exercise'. The VAS for eating pathology were created by the clinical researchers of the present study to measure participants' current state of eating pathology, and they were applied at baseline and at the end of the experiment.

Procedure

Stage 1: consent and baseline measures

Participants were informed initially by clinicians about the kind of the experiment. They were informed that they would answer questions about anxiety and problems with eating, that they would read some stories and then answer questions again and that the duration of the experiment would last half an hour. Nevertheless, they were not told the full purpose of the investigation. After obtaining written informed consent, participants completed the IUS-12, EDE-Q, VAS eating pathology and 2-VAS IU, meaning the IU1 and IU2 VAS questions (time 1).

Stage 2: intolerance of uncertainty manipulation

Participants were randomly allocated to one of the two conditions: high IU or low IU. Then, the sample underwent the IU manipulation, which was based on Meeten's et al. (2012) experimental paradigm. The manipulation uses four sets of two small stories. In one set, the character (female called Sarah) has high IU and encounters an uncertain pension and dating dilemma where she is not self-confident. In the other set, the character (female called Sarah) has low IU and encounters an uncertain pension and dating dilemma where she is self-confident. In each of the scenarios, the uncertain situations have a potentially negative outcome. Participants in high IU condition read the stories where Sarah has high IU and participants in low IU condition read the stories where Sarah has low IU. Afterwards, they were asked 'How much do you identify with Sarah?' where they were needed to respond from 0 (*not at all*) to 100 (*totally*) for each dilemma. Lastly, all the 29 participants completed the 3-VAS IU, meaning the IU1, IU2 and IU3 VAS questions (time 2).

Stage 3: self-related material

Participants in high IU condition were asked to think of a scenario in which they were very uncertain and participants in low IU condition were asked to talk about their favorite tv show. Afterwards, they were asked 'How would you feel as the person in this scenario?' in both conditions.

Stage 4: end of the experiment

Following termination of the experiment, participants completed the 3-VAS IU, VAS eating pathology and IUS-12 again (time 3). Then they were thanked for participating in the study and given the opportunity to ask questions.

Data analysis

The data were analyzed with IBM SPSS Statistics (version 27). More specifically, before the hypotheses could be considered, a randomization check of the data at baseline and a manipulation check were needed to examine whether they were successful. For the randomization check, independent samples t-tests were performed to assess mean group differences on the full IUS-12 and on the seven statements of VAS eating pathology. For the manipulation check, repeated measures Anova was used to test whether the means of the VAS IU at time 1, time 2 and time 3 were all equal in IU groups. To evaluate the outcomes, normality assumption, identification of outliers and homogeneity were checked firstly. Outliers with mild departures would remain in the study as they are not of concern (Field, 2013); yet, extreme outliers would be deleted from the study as they create a problem for the validity of the outcomes (Field, 2013). A significance of $p < .05$ had to be found, which indicates a significant effect.

Results

Demographics of participants

After the baseline stage of the experiment one participant withdrew from the study resulting in a total of 29 members, which were divided into the high IU group (n = 15) and the low IU group (n = 14). The sample includes females, aged 18-45 (M = 23.96, SD = 6.53) with age of onset of the disorder ranging between 8-31 (M = 17.45, SD = 4.17), duration of AN in years ranging between 0.5-27 (M = 6.53, SD = 6.43) and body mass index ranging between 10.5-18.4 (M = 15.95, SD = 2.11). Table 1 illustrates the mean and standard deviation scores of the demographic variables age, age of onset of AN, duration of AN in years and BMI of the participants.

Table 1

Mean and SD of the demographic variables of the participants

Demographics	Full sample	
	M	*SD*
Age	23.96	6.53
Age of onset of AN	17.45	4.17
Duration of AN in years	6.53	6.43
BMI	15.95	2.11

Note. $N = 29$ ($n = 14$ for low IU group, $n = 15$ for high IU group). BMI = body mass index; AN = anorexia nervosa; IU = intolerance of uncertainty.

Identification with the character Sarah

In stage 2 of the experiment, participants of the high and low IU groups read stories where the character Sarah had high IU or low IU respectively and needed to answer how much they identified with this character. Two participants did not respond between 0-100, resulting in a total of 27 participants who answered the question for each dilemma. The identification with Sarah for both two dilemmas ranged from 5 to 100 ($M = 51.88$, $SD = 29.17$) with the high IU group manifesting more identification ($M = 70.28$, $SD = 25.28$) from the low IU group ($M = 32.07$, $SD = 18.2$).

Randomization check

Before interpreting the results from independent samples t-tests, several assumptions were tested. A Shapiro-Wilk test was performed to determine the distribution of the IUS-12 and VAS eating pathology at baseline. The results showed a non-significant departure from normality for the IUS-12, $W(29) = .97$, $p > .05$ and

for the VAS eating pathology, $W(29) = .96$, $p > .05$. One participant from the low IU group was identified as an outlier, yet with only mild departure and therefore not of concern (Field, 2013). Furthermore, to check homogeneity, Levene's test was used. Assumption of homogeneity was not violated except on the second statement ('I am satisfied with my weight/figure') of VAS eating pathology ($F = 5.11$, $p < .05$), so the degrees of freedom were adjusted from 27 to 21.88, and on the fifth statement ('I feel the urge to eat a lot') of VAS eating pathology ($F = 51.28$, $p < .05$), so the degrees of freedom were adjusted from 27 to 15.02.

To evaluate the success of randomization, independent samples t-tests were performed to assess mean group differences at baseline on the IUS-12 and on the seven statements of VAS eating pathology. As can be seen in Table 2, there were no significant differences on the IUS-12 and on the seven statements of VAS eating pathology by high IU and low IU groups at baseline, except on the fifth statement of VAS eating pathology, $t(15.02) = -3.31$, $p < .05$, where the high IU group ($M = 2.33$, $SD = 1.44$) scored higher than the low IU group ($M = 1.07$, $SD = .26$). The results indicated that the randomization was successful. Effect sizes are reported using Cohen's *d* criteria, where a small effect size is reflected by a *d* of .2, a medium by a *d* of .5, and a large by a *d* of .8 (Cohen, 1992).

Table 2

Means for baseline measures and independent measures t-tests

Baseline measure	IU low		IU high		*t*	*p*	Cohen's *d*
	M	*SD*	*M*	*SD*			

IUS-12	39.5	9.05	42.93	7.86	-1.09	.28	-.4
VASEP1	3.92	1.14	4.26	1.43	-.69	.49	-.25
VASEP2	1.42	.64	1.2	.41	1.12	.27	.42
VASEP3	2	1.51	2.06	1.48	-.11	.9	-.04
VASEP4	2.14	1.51	1.46	1.24	1.31	.19	.49
VASEP5	1.07	.26	2.33	1.44	-3.31	.005*	-1.19
VASEP6	3.71	1.38	4.2	1.2	-1.01	.32	-.37
VASEP7	4	.78	4.4	.73	-1.41	.16	-.52

Note. $N = 29$ ($n = 14$ for low IU group, $n = 15$ for high IU group). VASEP1 = statement 1, VASPEP2 = statement 2, VASEP3 = statement 3, VASEP4 = statement 4, VASEP5 = statement 5, VASEP6 = statement 6, VASEP7 = statement 7 of VAS eating pathology at baseline.

*$p < .05$.

Manipulation efficacy check

Before interpreting the results from repeated measures Anova, required assumptions were tested. A Shapiro-Wilk test was performed to check normality assumption. The results showed that the assumption of normality was not violated except on low IU group at time 2 VASIU, $W(14) = .77$, $p < .05$ and on high IU group at time 3 VASIU, $W(15) = .79$, $p < .05$. That was in line with the requirements because repeated measures Anova only require approximately normal data (Field,

2013). One participant from the low IU group with extreme different scores was deleted from the analysis and two other outliers were also identified yet remained due to mild departures and therefore not of concern (Field, 2013). Furthermore, Mauchly's test indicated that the assumption of sphericity was met, $x^2(2) = .52$, $p > .05$ and Levene's test did not indicate any violation of homogeneity.

The results from repeated measures Anova determined that mean VASIU scores did not differed significantly across the three time points (VASIU on time 1, VASIU on time 2, VASIU on time 3) by low IU and high IU groups, $F(2,52) = .759$, $p > .05$. Table 3 illustrates the means for VASIU measures at three times by low and high IU groups and Table 4 demonstrates the results from repeated measures Anova. Although the results for the Anova did not indicate a significant time effect, in Figure 1 it seems that this is mostly due to the high IU group. In the low IU group, it seems that at time 2 and 3 the scores dropped significantly.

Table 3

Means of VASIU measures at the three times by low and high IU groups

Manipulation	IU low		IU high		Total	
measure	*M*	*SD*	*M*	*SD*	*M*	*SD*
VASIU1	75.53	21.01	83.76	11.26	79.94	16.71
VASIU2	65.79	7.98	72.51	17.89	69.39	14.35
VASIU3	65.61	16.35	80	19.75	73.32	19.35

Note. N = 28 (n = 13 for low IU group, n = 15 for high IU group) because one participant was identified as an extreme outlier. VASIU1 = the 2 VASIU questions at baseline/time 1; VASIU2 = the 3 VASIU questions at time 2; VASIU3 = the 3 VASIU questions at time 3.

Table 4

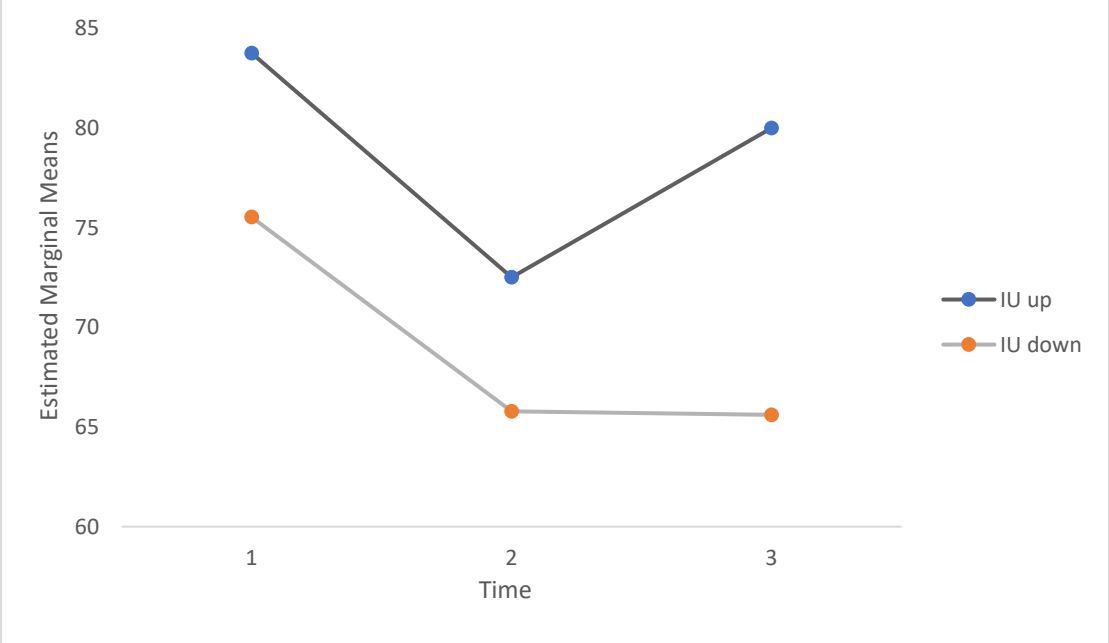
Repeated measures Anova results

Measure	*F*	*p*
Time*IU low, IU high [a]	.759	.473
IU low, IU high	3.956	.057

[a] Reflects the interaction.

Figure 1

Changes in scores of VASIU at the three times by low and high IU groups



Note. The line graph shows the changes in scores of VASIU at time1, time 2 and time 3 of the experiment by low and high IU groups.

Discussion

The aim of the current study was to explore changeability of IU in AN and to investigate the contribution of IU to eating pathology in people with AN. In line with previous literature (Sternheim et al., 2011a; 2017), clinical levels of IU were found in the sample. The randomization check confirmed no significant differences in levels of IU and eating pathology between the low IU and high IU groups before the manipulation. In contrast with the experimental study from Meeten et al. (2012), where the researchers revealed statistically significant results in increasing and decreasing levels of IU in a non-clinical population, in the current research there were no statistically significant differences between low IU and high IU groups after the manipulation. Hence, an investigation of IU on eating pathology could not be implemented.

More specifically, the results from RMA showed that there were no statistically significant differences across the three time points that VASIU (IU1, IU2, IU3 VAS questions) were completed by low and high IU groups. This outcome arises mostly due to the high IU group manipulation. Particularly, as it seems from the figure 1 in results section, in the low IU condition, where participants read scenarios with little degree of uncertainty, IU levels reduced significantly; state IU levels decreased immediately after reading the scenarios (time 2), and at the end of the experiment after applying self-related material (time 3), IU levels dropped slightly even more. In the high IU condition, IU levels also dropped down in time 2 of the experiment; yet, after participants in the high IU group were asked to think a scenario

in which they were very uncertain and to talk about their feelings on that, IU levels picked up again. It seems that in the high IU condition the scenarios did not work in increasing the uncertainty of the participants; instead their IU levels dropped down. In time 3 of the experiment we saw that the IU levels of the IU high condition increased again which indicates that a personal story, where the character is the person herself, is more representative in revealing uncertainty.

One possible explanation for the lack of increasing IU levels in participants in time 2 could be the following: The IU levels in AN patients are already quite high (already clinical levels), hence a manipulation aimed at further increasing them may not work. Furthermore, the current study examined a manipulation of IU in AN patients by manipulating IU and checking its efficacy in the present moment. Therefore, another reason could be that the effect of the manipulation on increasing levels of IU becomes visible later during the daily life of the participants, because probably only in every-day situations they can experience the actual uncertainty. Considering, also, the clinical baseline levels of IU in this study's group, quite possibly then for this patient group, the anticipation for the uncertain elements of every-day situations may be more intolerable than the experience of situations outside the daily life. This resounds with a much-used definition of IU as a "fear of the unknown" (Carleton, 2016). Hence, in the high IU condition, it seems that the uncertainty of the experiment, the 'fear' of what will happen and participants' interpretation of ambiguity as threatening (Dugas et al., 2004) at that time are worse than the experiment itself, which eventually relieved their uncertainty symptoms. This phenomenon could be understood by the two subscales of IU: prospective and inhibitory (Carleton, 2012). It is possible that the scenarios of the experiment affected mainly the prospective dimension of IU of the participants in high IU group, which

represents cognitive threat assessments related to the future (Carleton et al., 2007). While initially the IU levels were intense, the experiment itself could alleviate the symptoms associated with the prospective dimension of the IU construct.

In conclusion, even though the high IU group manifested more identification with the character Sarah – however, this identification with the character is not as representative as in a personal story where the character is the person herself - in the scenarios than the low IU group (which was to be expected as the whole sample had clinical levels of IU; thus, the high IU group would be identified more with Sarah), and against our expectation, a manipulation condition in which participants read scenarios that involved a high degree of uncertainty did not increase state levels of IU in females with AN. Surprisingly, in the low IU condition, where participants read scenarios with little degree of uncertainty, IU levels reduced.

Limitations and future directions

The first limitation concerns the sample. The fact that the size of the sample was small, and a non-clinical sample was not included in the study, may influence the variety of the variables (Field, 2013). A larger variety may be found in a larger sample which could reveal different outcomes. Also, another limitation concerns the generalizability of the results. Although AN patients often have similar age, age of onset of the disorder, duration of AN in years and BMI, still not all women who meet the diagnostic criteria for AN have the same characteristics. Altrecht Eating Disorders Rietveld is a highly specialized treatment center for AN that usually hosts severe ill patients. People with less severe AN symptoms may have different levels of IU and reveal different results. It is thus important to be careful generalizing outcomes.

Furthermore, the current research examined a manipulation of IU in AN in the present moment and offered no evidence. Future research should focus more on finding effect on other periods in time than the present moment of the experiment. It would also be fruitful to examine in more detail the duration of the reduced levels of IU that occur after an IU manipulation in AN patients. For instance, for how long they remain low. More information on the time impact of an IU manipulation would provide details on the malleability of IU and could help to refine IU reduction in a therapy that targets IU. In addition, it would be important for future studies to assess further reasons for the non-success of the manipulation, to improve our understanding about the contribution of IU to development and/or maintenance of AN. For instance, the role of the two dimensions of the IU construct need to be further examined in relation to their impact on participants' responses. Also, further evidence is needed to examine whether the uncertainty of the experiment or other relevant situations in AN people are indeed worse than the experiment or the relevant situations themselves. For these purposes, more experimental designs are required.

Strengths and implications

This study is the first experimental study that examines the contribution of IU to AN disorder by aiming to manipulate IU in female patients with AN. Although no statistically significant differences were found after the manipulation between the low IU and the high IU condition, in the low IU group there was a significant reduction of state IU levels post the manipulation. In line with a research study from Sternheim & Harrison (2018), where the authors revealed that reducing IU in patients with AN after an intervention is feasible, the current study also provides evidence that reducing state IU in AN patients is achievable. The reduction of IU in AN patients could aim at

treating anxiety components and subsequently at reducing the severity of the AN, where it is known that the high comorbidity with anxiety disorders increases treatment complexity (Keel & Brown, 2010). Therefore, the present experimental study enlarges the evidence base of reducing IU in AN patients; yet, further investigation is needed to examine whether this could provide a strategy for the treatment of AN.

Conclusion

The present findings did not offer evidence on causal effect of IU on AN, neither they managed to investigate the contribution of IU to eating pathology in AN patients. The results did not support the expectations of the study. Although, increasing state IU levels in AN did not work, it was found that reducing state IU in AN female patients is feasible. Seeing the clinical relevance of IU in AN, further experimental investigations into the changeability of IU are needed to improve our understanding of its contribution to AN development and maintenance.

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Appendix

Informatie Brief

Geachte mevrouw,

Wij vragen u vriendelijk om mee te doen aan een onderzoek naar de invloed van angst op het dagelijks functioneren bij mensen met een eetstoornis. U wordt hiervoor uitgenodigd omdat er bij u anorexia nervosa is vastgesteld. U beslist zelf of u wilt meedoen. Voordat u de beslissing neemt, is het belangrijk om meer te weten over het onderzoek. Lees deze informatiebrief rustig door. Bespreek het met partner, vrienden of familie. Hebt u na het lezen van de informatie nog vragen? Dan kunt u terecht bij de onderzoeker op dit project Dr Lot Sternheim (email: l.sternheim@altrecht.nl).

Wat is het doel van het onderzoek?

Resultaten uit eerdere studies en klinische observaties laten zien dat mensen met anorexia nervosa een verhoogde mate van angst hebben, en hier ook veel last van ervaren. Mensen met anorexia nervosa geven bijvoorbeeld vaak aan dat de angst die ze ervaren hun dagelijks leven op een negatieve manier beïnvloedt. Maar er is op dit moment nog weinig bekend over op welke manier angst invloed uitoefent, en op welke gebieden deze invloed het sterkst is Dit onderzoek wil uitvinden of angst een invloed heeft op het dagelijks functioneren van mensen met anorexia nervosa.

Hoe wordt het onderzoek uitgevoerd?

Dit onderzoek wordt uitgevoerd door middel van vragenlijsten.

Wat wordt er van u verwacht?

Om goed te kunnen onderzoeken of angst een invloed heeft op het dagelijks functioneren van mensen met anorexia nervosa zult u gevraagd worden aantal vragen te beantwoorden met betrekking tot angst, problemen omtrent eten, en uw dagelijks functioneren. Daarna zullen we u vragen een verhaaltje te lezen en opnieuw een aantal vragen te beantwoorden met betrekking tot angst en problemen omtrent eten. In totaal zal de duur van het onderzoek een half uur duren gaat het om een eenmalig bezoek. U kunt op ieder moment gedurende de behandeling meedoen.

Wat zijn mogelijke voor- en nadelen van deelname aan dit onderzoek?

Aan dit onderzoek zijn, behalve tijdsinvestering, geen nadelen verbonden. U heeft zelf geen voordeel van deelname aan dit onderzoek. Voor de toekomst kan het onderzoek wel nuttige gegevens opleveren en zullen we een beter inzicht verkrijgen in eetstoornissen. Daarnaast is uit soortgelijke onderzoeken is gebleken dat participanten het vaak leuk vinden om mee te doen.

Wat gebeurt er als u niet wenst deel te nemen aan dit onderzoek?

U beslist zelf of u meedoet aan het onderzoek. Deelname is vrijwillig. Als u besluit niet mee te doen, hoeft u verder niets te doen. U hoeft niets te tekenen. U hoeft ook niet te zeggen waarom u niet wilt meedoen. U krijgt tenminste 48 uur bedenktijd voor het verlenen van uw toestemming. Als u wel besluit mee te doen kunt u zich altijd bedenken en toch stoppen. Ook tijdens het onderzoek. Dit verander niets aan de behandeling die u krijgt.

Wat gebeurt er als het onderzoek is afgelopen?

Het onderzoek zal aflopen als er voldoende deelnemers mee gedaan hebben, te weten 30. Na afloop van het onderzoek zullen de onderzoekers, indien u dit wenst, u op de hoogte brengen van de resultaten die voortvloeien uit dit onderzoek.

Wat gebeurt er met uw gegevens?

De gegevens die door ons verzameld worden zullen strikt vertrouwelijk worden opgeslagen. Alleen de onderzoekers die direct bij het onderzoek betrokken zijn hebben toegang tot de (gecodeerde) gegevens van dit onderzoek. Uw antwoorden zullen niet geassocieerd zijn met uw naam, maar slechts met een anoniem proefpersoonnummer. Persoonlijke gegevens (naam op het toestemmingsformulier en contactgegevens) worden apart bewaard. Wij zijn verplicht uw onderzoeksgegevens 15 jaar te bewaren. Daarvoor geeft u toestemming als u meedoet aan dit onderzoek. Als u dat niet wilt, kunt u niet meedoen aan dit onderzoek.

Wordt uw huisarts en/of behandelend specialist geïnformeerd bij deelname?

Zoals standaard procedure is op Rintveld laten wij uw huisarts na de intake schriftelijk weten dat u uitgenodigd kunt worden om mee te doen aan wetenschappelijk onderzoek tijdens uw behandeling op Rintveld. Wij zullen uw huisarts niet specifiek van uw deelname aan deze studie op de hoogte brengen, nog van resultaten op persoonsniveau.

Zijn er extra kosten/is er een vergoeding wanneer u besluit aan dit onderzoek mee te doen?

Er is geen vergoeding voor deelname aan het onderzoek. Afspraken voor dit onderzoek zullen zo veel mogelijk gecombineerd worden met al bestaande afspraken om reistijd en kosten zo laag mogelijk te houden.

Wilt u verder nog iets weten?

Als u vragen heeft over de gang van zaken rond het onderzoek dan kunt u dit melden aan de onderzoeker of aan uw behandelend arts. Het onderzoeksteam is bereikbaar via

tel 030-6965477.

Hoe te handelen bij klachten?

Als u klachten heeft kunt u dit melden aan de onderzoeker of aan uw behandelend arts. Mocht u ontevreden zijn over de gang van zaken bij het onderzoek en een klacht willen indienen dan kunt u contact opnemen met de Klachtencommissie van Altrecht. Deze is bereikbaar via tel. 030 225 61 58.

Met vriendelijke groet,

Lot Sternheim

Senior Onderzoeker

Toestemmingsformulier

De invloed van angstklachten op het dagelijks functioneren van mensen met anorexia nervosa.

Versie 1.0 mei 2014

- Ik heb de informatiebrief voor de proefpersoon gelezen. Ik kon aanvullende vragen stellen. Mijn vragen zijn genoeg beantwoord. Ik had genoeg tijd om te beslissen of ik meedoe.
- Ik weet dat meedoen helemaal vrijwillig is. Ik weet dat ik op ieder moment kan beslissen om toch niet mee te doen. Daarvoor hoef ik geen reden te geven.

- Ik weet dat sommige mensen mijn gegevens kunnen zien (te weten de onderzoekers van dit project).
- Ik geef toestemming om mijn gegevens te gebruiken, voor de doelen die in de informatiebrief staan.
- Ik geef toestemming om mijn onderzoeksgegevens tot 15 jaar na afloop van dit onderzoek te bewaren.

Ik wil de uitslag van het onderzoek op groepsniveau/ individueel ontvangen

ja

nee

Ik vind het goed om aan dit onderzoek mee te doen.

Naam proefpersoon:

Handtekening: Datum : __ / __ / __

Ik verklaar hierbij dat ik deze proefpersoon volledig heb geïnformeerd over het genoemde onderzoek.

Als er tijdens het onderzoek informatie bekend wordt die de toestemming van de proefpersoon zou kunnen beïnvloeden, dan breng ik hem/haar daarvan tijdig op de hoogte.

Naam onderzoeker (of diens vertegenwoordiger):

Handtekening: Datum: __ / __ / __