



**Utrecht University**

**Intolerance of Uncertainty After Recovery From Eating Disorders: Its Relation To Anxiety  
and Depression**

Karla Duarte

6829791

Master Thesis

Clinical Psychology

Supervisor: Dr. Lot Sternheim

Word count: 4927

July 2020

**Abstract**

Eating disorders (EDs) are grave psychiatric disorders. They are difficult to treat, and treatment often has suboptimal results that may partly be due to comorbidities such as anxiety and depression, which are related to more severe ED pathologies and seem to persist after recovery. Intolerance of Uncertainty (IU) has been previously linked to EDs, anxiety, and depression. This study examines whether IU continues to present a problem after recovery and whether it is related to anxiety and depression. Hypotheses are that 1) ED-recovered women will report more IU compared to non-ED controls 2) there is a relationship between IU and anxiety levels ED-recovered women, and 3) there is a relationship between IU and depression levels in ED-recovered women. Participants were recruited and surveyed online using three questionnaires: The EDE-Q, which assesses the severity of ED pathology, the IUS-12 which measures intolerance of uncertainty, and the DASS21, which screens for symptoms of anxiety, depression, and stress. Data was analyzed using a t-test and two linear regressions. Participants included forty-nine ED-recovered women and eighty-eight non-ED controls. A t-test confirmed that IU levels are higher in ED-recovered women compared to non-ED controls. Two linear regression analyses confirmed a positive relationship between IU, anxiety, and depression in ED-recovered women. Results suggest that IU continues to pose a problem after recovery and it is associated with increased anxiety and depression. IU comes forward as a relevant factor to possibly incorporate into ED relapse prevention programs, which need to be improved.

*Keywords:* Eating disorders, recovery, intolerance of uncertainty, anxiety, depression

## Contents

Introduction	4
Eating Disorders	4
Anxiety and Depression in EDs	5
Intolerance of Uncertainty, Anxiety, and Depression	6
Intolerance of Uncertainty and EDs	7
IU, Anxiety, and Depression After Recovery From an ED	8
Potential Clinical Implications	9
Study Aims and Hypotheses	10
Method	11
Participants	11
Instruments	11
Procedure	12
Data Analysis	13
Results	13
Assumptions of Normality, Homogeneity, and Outliers	13
Participants	14
Overall Scores	15
Hypothesis 1: ED-recovered women will report more IU compared to non-ED controls	15
Hypothesis 2: There is a relationship between IU and anxiety levels in ED-recovered women	16
Hypothesis 3: There is a relationship between IU and depression levels in ED-recovered women	16
Discussion	16
IU In ED-Recovered Women	16
IU, Anxiety, and Depression in ED-Recovered Women	18
Strengths, Limitations, and Future Directions	19
References	20

## **Introduction**

### **Eating Disorders**

Eating disorders (EDs) are grave psychiatric disorders that can have significant negative health consequences (American Psychiatric Association, 2013). They are difficult to treat and very impairing; globally, Anorexia Nervosa and Bulimia Nervosa are the 12th leading cause of disability as indicated by disability-adjusted life years (DALYs) (Hoek, 2016). Keski-Rahkonen & Mustelin (2016) report that 1-4 % of European women struggle with ED's in the course of their lives, but the authors highlight that only the minority of cases of EDs are discovered in the healthcare system, meaning that the numbers could realistically be higher.

The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5, APA, 2013) includes, among others, the following EDs: Anorexia Nervosa (AN), characterized by dissatisfaction with one's body leading to fear of weight gain that is avoided by a strict diet and/or excessive physical activity resulting in undoubtedly low body weight (Herpertz-Dahlmann, 2015); Bulimia Nervosa (BN) refers to a cycle of feelings of fatness, binge eating, and vomiting to avoid weight gain (Levinson et al., 2017); Binge-Eating Disorder (BED) defined by sensing lack of control and engaging in distressing binge-eating episodes where the person eats unusually large amounts of food in a short period of time (Brownley et al., 2016); and Eating Disorder Not Otherwise Specified (EDNOS), a heterogeneous disorder that includes several AN, BN and BED symptoms (Smink et al., 2012).

In general, EDs are difficult to treat and treatment for adults is only moderately effective (Schmidt et al., 2016). They are complex disorders with high levels of comorbidities (Herzog et al., 1996). Indeed, the commonly present comorbid depressive and anxiety symptomatology are likely to contribute to the low rates of treatment success (Levinson et al., 2017; Rosenbaum &

White, 2015; Sternheim et al., 2014). The importance of these pathologies for EDs is highlighted in the fact that they seem to be present even after recovery from an ED (Herpertz-Dahlmann & Remschmidt, 1993; O'Dwyer et al., 1996; Pollice et al., 1997; Holtkamp et al., 2005). The present study will investigate whether a factor known to predict anxiety and depression in people diagnosed with an ED namely IU, is also relevant to these pathologies in ED-recovered women.

### **Anxiety and Depression in EDs**

Anxiety and depression are often comorbid with EDs, with depression co-occurring in 20%-98% of cases and anxiety in 7%-65% of cases (O'Brien & Vincent, 2003; Salbach-Andrae et al., 2008). These disorders also often appear as precursors of EDs, specifically in the case of AN and BN (Fairburn & Brownell, 2005) and this comorbidity exacerbates ED symptomatology (Sternheim et al., 2015). Given that dysfunctional fear of gaining weight is one of the core symptoms of illnesses it does not come as a surprise that EDs are frequently paired with anxiety disorders (Levinson et al., 2017). It is estimated that 71% of AN cases are accompanied by at least one anxiety disorder such as Generalized Anxiety Disorder (GAD), the most frequent one, with a prevalence of 48.6% for AN restrictive type and 48.6% for AN binge eating-purging type (Godart et al., 2003). In the case of BN, Godart et al. (2003) report that 71% had suffered from at least one anxiety disorder during their lifetime, with social phobia being the most common one, followed by GAD.

On the other hand, the most common mental health disorder observed in women suffering from EDs is major depressive disorder (MDD) (Herzog et al., 1992; Fichter & Quadflieg, 2004; Kaye et al., 2008). Godart et al. (2015) found the prevalence for MDD in AN patients to be high (63.9% for AN-restrictive and 74.5% for AN-binge/purge patients) as well as in BN-patients (BN-NP: 78.9%; BN-P: 74.4%). Other studies (Hudson et al., 1987, Hudson et al., 1988, Brewerton,

1995, Herzog et al., 1999, Iwasaki et al., 2000, Herpertz-Dahlmann & Remschmidt, 1993) have found slightly lower prevalence numbers due to their population not being hospitalized or having less severe pathologies. However, the numbers don't differ crucially. MDD can appear before, during or after the ED (Godart et al., 2007), and it is associated with decreased self-efficacy, anxiety, impulsivity, low self-esteem, and increased treatment difficulty in BED (Araujo et al., 2010; Linde et al., 2004). Taking this into account, there is no doubt that anxiety and depression are important factors to consider in relation to ED treatment.

### **Intolerance of Uncertainty, Anxiety, and Depression**

Anxiety and depression share several risk factors that bridge them. One such factor is IU. The construct of IU has been widely defined by many authors. Initially, it was described as “*cognitive, emotional, and behavioral reactions to uncertainty in everyday life situations*” (Freeston et al., 1994, p. 792) and its conception has evolved in more recent contributions where IU is defined as “*a tendency to perceive the future and the possibility of uncertain events as uncomfortable*” (Gosselin et al., 2008, pp. 1427).

The initial IU model proposed by Dugas et al. (1998) has been widely used in the scientific community because it clearly lays out the importance of this characteristic in GAD (Mahoney & McEvoy, 2012). For a while, it was thought IU was more related to GAD compared to other anxiety disorders. More recently, researchers and clinicians are recognizing the importance of IU across a wide range of disorders such as Obsessive-Compulsive Disorder (OCD) (Holaway et al., 2006) which is related to Higher IU levels, as well as Social Anxiety Disorder (SAD) for which IU plays an important role (Boelen & Reijntjes, 2009).

Throughout the years IU's influence on depression has also been considered (Carleton et al., 2012) and debated. Jensen et al. (2016) indicate that associations between IU and depression

have not been steady, meaning that their relationship might solely be due to comorbidity between anxiety disorders and depression. Additionally, Dugas et al. (2004) mention that the fact that IU has a strong relationship with pathological worry makes it more relevant to anxiety disorders and not so much to depression; this is because IU is a core symptom of GAD. However, some studies have found that IU correlates more to depression than to anxiety (de Jong-Meyer et al., 2009) and that IU partly mediates the relationship between neuroticism and depression (van der Heiden et al., 2010; McEvoy & Mahoney, 2012). Nonetheless, it is possible to suggest that IU is connected to several psychological disorders and contributes to both anxiety and depression (Mahoney, & McEvoy, 2012b).

### **Intolerance of Uncertainty and EDs**

Research about IU in EDs is still in its infancy. However, IU has been found to contribute to ED pathology (Sternheim et al., 2015). A qualitative study in AN by Sternheim et al. (2011b) highlights that uncertainty is experienced very negatively and even threatening, to a point where it prevents the person from enjoying themselves and living to full potential. Moreover, a handful of studies confirm elevated levels of IU in EDs (Brown et al., 2017; Carleton et al., 2012; Frank et al., 2011; Konstantellou et al., 2011; McFadden et al., 2014; Sternheim et al., 2011; Stewart, 2009), although results are somewhat mixed. A comparison of the IU levels between AN and BN population has provided mixed results, with a study by Sternheim et al. (2011) showing lower levels in BN, and a study by Frank et al. (2011) showing similar levels in the two disorders. Regarding the BED population, some studies indicate they have a higher tolerance of IU, but when truly affected by it, individuals' decision-making capacities seem to suffer (Morris et al., 2015; Voon, 2015)

A systematic review and meta-analysis by Brown et al. (2017) confirms that IU is an important factor in eating pathology. Fear of uncertainty is related to perceptions of control (Barlow, 2004) and patients with AN and develop a need for control when they are exposed to uncertain situations (Sternheim et al., 2011b). Not being able to fulfill this need by controlling the future can cause anxiety (Alloy et al., 1990). These individuals cope by restricting their calorie intake, over-exercising, and purging, among other things. Restrictive behaviors provide ED-patients with a feeling of safety and familiarity (Sternheim et al., 2011) which serves as a coping mechanism for IU. In that sense, one may wonder what happens when someone recovered from an ED loses the coping mechanisms (restricting, purging, among others) that appear to be used to deal with the perceived lack of control reported when faced with stressors (Frank et al., 2011) such as anxiety regarding the uncertainty about the future.

Indeed, all empirical studies indicate that higher levels of IU are linked to higher severity in ED pathology (Sternheim et al., 2017). This doesn't come as a surprise given that individuals who struggle to tolerate uncertainty often experience obsessions and compulsions (anxiety-related), among other symptoms (Brown et al., 2017) which operationalize into unhealthy ways to gain some sense of control over one's life. In that sense, IU can be seen as a transdiagnostic mechanism that has an influence on cognitions and behaviors often seen in anxiety disorders (Renjan et al., 2016)

### **IU, Anxiety, and Depression After Recovery From an ED**

Although IU's interaction with the recovered population has not been broadly researched, two studies provide us with a lead to open more doors. For instance, a neurobiology-focused study by McFadden et al. (2014) found that AN-recovered women's IU scores are lower than the AN population, to a point where they are comparable to healthy individuals. On the contrary,



Moskovich (2015) found that IU continues to be a problem for AN weight-recovered population. Regarding other EDs, there are currently no studies including individuals recovered from BN, BED, and EDNOS, which makes it difficult to generalize findings.

On the other hand, more research is available about anxiety and depression in people recovered from ED. A 7-year follow-up study by Herpertz-Dahlmann et al. (1996) revealed that patients with weaker outcomes of ED pathology showed increased levels of anxious and depressive psychopathology, which were comparable to that of adult-onset AN. This means that even if they no longer had the ED, their experience with comorbidities was similar to that of an ill person. A much longer 22-year follow-up study with recovered AN patients by Hsu et al. (1992) found that even though they had not experienced any mood disorder in the prior twelve months, anxiety disorders were present in two individuals. More recently, Holtkamp et al. (2005) found anxiety and depressive disorders to be present even after 3 years of complete recovery from an ED. In their study, evidence points towards anxiety and depressive features to have almost become personality traits in those who previously suffered from an ED. These studies provide us with valuable information, but they often had small sample sizes which made the results difficult to generalize. Therefore, it is necessary to conduct more research in the interplay of IU, anxiety, depression, and recovery from an ED.

### **Potential Clinical Implications**

Seeing high levels of anxiety and depression in recovered individuals, in combination with the promising initial evidence that IU is key to ED and the well-shown contribution of IU to anxiety and depression, it is logical to think that IU's influence after recovery from an ED needs to be further researched because it may lead to anxiety, depression, and potentially, relapse; which would then suggest a benefit for targeting IU in those who are in recovery from an ED. So far, IU

appears to hinder recovery from an ED, especially when individuals are faced with significant life changes that could lead them to fall back on the old safety behaviors to cope and obtain some sense of predictability (Kesby et al., 2017) Therefore, it seems relevant to consider adjusting treatment protocols for EDs, focusing both on preventing relapse and prevention of future anxiety disorders and/or depression, which could cause the recovered individuals to retreat into old habits and, potentially, the ED itself. If that were the case, relapse prevention interventions for EDs should be improved.

### **Study Aims and Hypotheses**

Despite the relevance of the connection between IU, anxiety, and depression, currently no studies are looking at this relationship in the recovered population. Therefore, this research aims to investigate the extent to which higher levels of intolerance of uncertainty have an influence on anxiety and depression in ED-recovered women. It is expected that higher levels of IU will lead to more depression and anxiety levels in the recovered population. More precisely, it is hypothesized that 1) ED-recovered women will report more IU compared non-ED controls, 2) there is a relationship between IU and anxiety levels in ED-recovered women, and 3) there is a relationship between IU and depression levels in ED-recovered women.

## Method

### Participants

The sample used in the current study consists of 137 females from Europe, North America, South America, Australia, and Asia, with ages ranging from 18 to 55 years. Participants were recruited and tested online from March to May 2020. The ED-recovered women were included in the study based on having previously received an ED diagnosis, having an EDE-Q score below the mean of 2.767 (indicating that ED pathology is most likely not present), and having a BMI between 18.5 and 30. The non-ED controls were included in the study based not having ever received an ED diagnosis, having an EDE-Q score below the mean, and having a BMI between 18.5 and 30. All data was anonymous and handled with ethical standards as described by the World Medical Association Declaration of Helsinki (2013).

### Instruments

**Eating Disorder Examination-Questionnaire (EDE-Q):** this is a 28-item questionnaire by (Fairburn & Beglin, 2008) developed from the Eating Disorder Examination (Fairburn & Cooper, 1993). This questionnaire is used to assess the severity of ED psychopathology, higher scores mean higher levels of ED symptomatology. Items are scored using a 7-point Likert scale ranging from 0-6. In the current study, Cronbach's alpha for the EDE-Q is .92, which indicates excellent reliability (George & Mallery, 2003)

**Intolerance of Uncertainty Scale Short Form (IUS-12):** IU was measured using the Intolerance of Uncertainty Scale Short Form (Carleton et al., 2007) which is a shortened version of the original 27-item Intolerance of Uncertainty Scale (Freeston et al., 1994) The IUS-12 is used to assess IU as a trait instead of as a situational response (Mahoney & McEvoy, 2012). It measures

how an individual reacts to uncertainty, the future, and ambiguous situations (Carleton et al., 2016). This scale's items are scored on a ranged 5-point Likert scale going from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). Higher scores indicate higher levels of IU. This instrument was found to have sufficient internal consistency and it is strongly correlated to the original IUS ( $r = .96$ ) (Carleton et al., 2010). In the current study, Cronbach's alpha for the IUS-12 is .92, which indicates excellent reliability (George & Mallery, 2003)

**Depression, Anxiety and Stress Scale (DASS-21):** this scale was created by Lovibond and Lovibond (1995) and as indicated by the authors, it is used as a clinical screening tool for the degree of anxiety, depression and stress symptoms viewed within a dimensional conception, meaning that it does not assign patients to diagnostic categories. The scale consists of 21 questions where items are scored on a 4-point Likert scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). Final scores for the three scales are then understood as *normal*, *mild*, *moderate*, *severe*, or *extremely severe*. Higher scores indicate higher levels of distress. Previous findings reveal that the scale has fair reliability and validity, making it psychometrically accurate (Oei et al., 2013). In the current study, Cronbach's alpha for the DASS21 is .939, which indicates excellent reliability (George & Mallery, 2003)

## **Procedure**

Participants were recruited in international online platforms such as Facebook groups for students and people recovered from EDs, as well as WhatsApp groups. Data collection was performed online through the Qualtrics website. Two Qualtrics survey links (one for the ED-recovered women, and one for the non-ED controls) were provided to facilitate grouping. In both surveys, participants were asked to read and accept an informed consent form. Then, they proceeded to complete the questionnaires, starting with the EDE-Q, followed by the IUS-12 and

the DASS21. After the participants completed the questionnaires they were able to go back to the survey's Facebook/Whatsapp post and provide private feedback about the questionnaires if they desired. No compensation was provided to the participants.

### **Data Analysis**

All analyses were performed using the IBM Statistical Package for the Social Sciences (SPSS) version 25. First, assumptions of normality, homogeneity, and outliers were tested. To evaluate whether ED-recovered women report more IU compared to non-ED controls (H1) a t-test was used. To test whether there is a relationship between IU and anxiety and depression levels in ED-recovered women (H2) a linear regression analysis was used with IU as the independent variable and anxiety as the dependent variable. Finally, to test whether there is a relationship between IU and depression in ED-recovered women (H3) a linear regression analysis was used with IU as the independent variable and depression as the dependent variable.

## **Results**

### **Assumptions of Normality, Homogeneity, and Outliers**

Histograms, box plots, and stem-and-leaf plots showed that the data was normally distributed. In the non-ED controls, one outlier was identified but the participant was not removed because the data didn't present a concern for the analyses, which were run with and without the outlier and the results were highly similar. Furthermore, a scatterplot and a probability-plot showed that assumptions related to homoscedasticity of the residuals, linearity, and normality were not violated. An a priori power analysis was conducted using G\*Power3 (Faul et al., 2007) to test the hypotheses. Results indicated that a minimum sample of 46 ED-recovered women was required to

achieve a power of .95 with an effect size of 0.3. The final sample size including the ED-recovered women and the non-ED control group was  $n=137$ .

### **Participants**

A total of 467 responses were initially recorded and divided into two groups. One group (non-ED controls) initially included one-hundred and ninety-one English speaking females above the age of 18 who had never been diagnosed with an ED. First, 96 participants were excluded due to incomplete responses, having a BMI below 18.5 or above 30. From that group, an additional 7 participants were excluded due to having an EDE-Q score above the mean (2.77), narrowing down the total number of participants in the non-ED control group to 88. The other group (ED-recovered) initially consisted of 276 total English speaking females. Two-hundred and nine participants were excluded due to incomplete responses, having a BMI below 18.5 or above 30, absence of previous ED diagnosis, being in treatment at the time of the study, and having an EDE-Q score above the mean, which would indicate a possible ED pathology. This narrowed down the ED-recovered women group to 49 participants, 20 of which were women who recovered from AN, 14 from BN, 2 from BED, 2 from EDNOS-AN, 1 from EDNOS-BN, and the remaining 10 women were recovered from more than one ED including combinations of AB, BN, EDNOS-AN, EDNOS-BN, and BED. Regarding comorbidities, in the group of ED-recovered women and non-ED control group, 25 and 18 women respectively reported having either anxiety, depression, or other disorders.

**Overall Scores**

Table 1. *Descriptive Data for Demographic and Clinical Variables for the ED-Recovered women group and Non-ED Control Group*

<b>Measure</b> (mean, SD, 95% confidence interval)	<b>All Participants</b> <b>n=137</b>	<b>ED-recovered</b> <b>women n=49</b>	<b>non-ED controls</b> <b>n=88</b>
BMI	21.82 (2.48) 21.39-22.24	21.20 (1.97) 20.65-21.77	22.15 (2.67) 21.59-22.73
EDE-Q Score	.86 (.75) .74-.99	0.91 (.73) .71-1.12	.83 (.76) .67-.99
DASS21 (Anxiety subscale)	8.32 (8.5) 6.88-9.76	10.65 (9.54) 7.91-13.40	7.02 (7.61) .54-8.64
DASS21 (Depression subscale)	11.74 (10.84) 9.9-13.57	16.44 (12.45) 12.89-20.02	9.11 (8.87) 7.23-10.99
IUS-12	31.69 (10.49) 29.91-33.46	35.96 (11.18) 32.75-39.17	29.31 (9.33) 27.33-31.28

BMI= Body Mass Index. EDE-Q= Eating Disorder Examination Questionnaire. IUS-12: Intolerance of Uncertainty Scale-12. DASS21 (Anxiety subscale)= Depression and Anxiety Scale-21, Anxiety Subscale. DASS21 (Depression subscale)= Depression and Anxiety Scale-21, Depression Subscale.

**Hypothesis 1: ED-recovered women will report more IU compared to non-ED controls**

An independent samples t-test showed that ED-recovered women scored higher on the IUS-12: ( $M = 35.96$ ,  $SD = 11.18$ ) than the non-ED controls: ( $M = 29.31$ ,  $SD = 9.33$ )  $t(135) = 3.72$ ,  $p = .001$ ,  $f^2 = 0.65$  which is considered a large effect (Cohen, 1988). These results suggest that ED-recovered women report higher levels of IU compared to women who have never had an ED.

**Hypothesis 2: There is a relationship between IU and anxiety levels in ED-recovered women**

Results indicate that there is a positive relationship between IU and anxiety levels in ED-recovered women.  $t(1, 47) = 19.37, p < .001$ , with an  $R^2 = .29$ , *adjusted*  $R^2 = .28$ ,  $\beta = .54$ ,  $f^2 = 0.41$  which is considered a medium effect (Cohen, 1988).

**Hypothesis 3: There is a relationship between IU and depression levels in ED-recovered women**

The regression's results indicate that there is a positive relationship between IU and depression levels in ED-recovered women.  $t(1,47) = 24.01, p < .001$ , with an  $R^2 = .34$ , *adjusted*  $R^2 = .32$ ,  $\beta = .58$ ,  $f^2 = 0.51$  which is considered a large effect (Cohen, 1988)

**Discussion**

The current study aimed to investigate the influence of IU on anxious and depressive symptoms in ED-recovered women. It was found that IU was higher in ED-recovered women compared to non-ED controls. Secondly, it was found that IU is positively related to anxiety and depression. In other words, these findings suggest that IU contributes to higher levels of anxiety and depression in ED-recovered women.

**IU In ED-Recovered Women**

Previous studies focused on populations currently suffering from an ED found that IU levels were higher compared to those of non-ED controls (Brown et al., 2017; Frank et al., 2011; Kesby et al., 2017; Sternheim et al., 2011; Sternheim et al., 2015). As expected, the findings in this study act almost as a “following chapter” in the story of women who have suffered from an ED because they confirm previous data indicating that IU is present in the ED-recovered population (Brown et al., 2017). This coincides with Moskovich (2015) where it was found that



IU continues to be an issue for the AN weight-recovered population. On the other hand, McFadden et al. (2014) found AN recovered women's IU scores to be somewhat similar to those of controls, which is contrary to this study's findings. This could be due to the screening for recovery being different given that the authors focused on restrictive-type anorexia and were required to have regular exercise and eating habits for at least a year, factors that were not required in the current study and which could have an impact on symptom severity, thus possibly causing IU scores to be lower. Indeed, participants in the study by Moskovich (2015) only needed to be weight-recovered for a minimum period of 6 months, thus were not fully recovered from the ED. This could explain why their scores are highly similar to ill patients. Given that the inclusion criteria varies significantly in studies with an ED-recovered population, it is not possible to make a clear-cut side-by-side comparison without taking into account factors that could have contributed to important differences among the studies, such as only being recovered for a short period of time, or not requiring absence of certain symptoms that may influence depressive and/or anxious psychopathology. This makes it much more important and necessary for future research to work on unambiguous ED-recovery criteria. Nonetheless, evidence points towards IU being higher in ED-recovered women.

IU seems to be an important component of ED pathology that, if further considered, may steer relapse prevention programs of EDs towards a more effective direction. Indeed, a study by Sternheim and Harrison (2018) where adolescents with AN took part in an intervention that aimed to increase (amongst other aspects) awareness of IU, it was found that IU was significantly reduced, and the reduction was maintained even after a 3-month follow-up. Sternheim and Harrison (2018) study's results demonstrate that the specific addition of IU as a complement of regular ED treatment could be beneficial, but needs further research.

### **IU, Anxiety, and Depression in ED-Recovered Women**

As expected, findings indicate that there is a relationship between IU and anxiety levels in ED-recovered women. This strengthens the theory that IU increases the chances of developing anxiety-related issues (Bosswell et al., 2013) and sheds light on the fact that although anxiety-related processes are taken into account in the treatment for EDs, IU is a factor that should be given much more importance, especially because IU is strongly linked to control (Sternheim et al., 2011) and the way an individual experiences control may significantly influence the emergence or maintenance of anxiety disorders (Frank et al, 2011).

On the other hand, the positive relationship found between intolerance of uncertainty and depression symptoms in ED-recovered women is especially important given that depression is a precursor of EDs and it is also the mental disorder most commonly present in the course of an ED (Fairburn & Brownell, 2005). The presence of these symptoms before, during, and after the disorder could contribute to the maintenance of a pathological cycle that hinders recovery.

Moreover, ED-recovered women's DASS21 anxiety and depression subscales scores in this study correspond to the 'moderate' level (depression: 14-20; anxiety 10-14) of the conventional severity table described by Lovibond and Lovibond (1995). Different authors (Escandón-Nagel et al., 2018; Harrison et al., 2010) have also found moderate levels of anxiety and depression in individuals suffering from obesity-BED and acute AN. This means that ED-recovered women experience anxiety and depression as if they were still ill. Taking that into account, relapse prevention intervention programs for EDs could be improved to target anxiety and depressive pathologies.

### **Strengths, Limitations, and Future Directions**

The current study certainly has strengths, such as the fact that all participants are the same gender and they were also a highly mixed international population which aids in the generalizability of the results. Limitations include the fact that the measures were self-report questionnaires. Also, it would have surely been better to have a clinical face to face interview to diagnose ED-recovery or other pathologies. In addition, the sample was probably not representative of all EDs because not many women who had been previously diagnosed with BED, EDNOS-AN, and EDNOS-BN participated. Furthermore, some women reported via Facebook and Whatsapp private messages that they found it difficult to understand the EDE-Q. Reportedly, the question formulation ‘On how many days of the past 28 days’ seemed “vague”, which made it “difficult to answer”. This could have affected their responses and labeled their ED pathology levels lower or higher than they truly are.

Recommendations for future research are to include more participants with BED, EDNOS-AN, and EDNOS-BN to enhance understanding about the role of IU in these pathologies given that if IU were to be included as an adjunction to ED treatment, adaptations would likely be needed depending on the diagnosis.

To conclude, this study’s findings illustrate the importance of IU by presenting evidence that IU is not only heightened, it is also positively related to both anxiety and depression levels in ED-recovered women. Therefore, it is crucial to continue research in this area because it could have a substantial impact on the care provided to those affected by such serious and complex illnesses.

## References

- Alloy, L., Kelly, K., Mineka, S., & Clements, C. (1990). Comorbidity in anxiety and depressive disorders: A helplessness/hopelessness perspective. In J. D. Maser, & C. R. Cloninger (Eds.), *Comorbidity of anxiety and mood disorders*. Washington, D.C.: American Psychiatric Press.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Araujo, D. M. R., Santos, G. F. da S., & Nardi, A. E. (2010). Binge eating disorder and depression: A systematic review. *The World Journal of Biological Psychiatry, 11*(2-2), 199–207. doi:10.3109/15622970802563171
- Barlow, D. H. (2004). *Anxiety and its disorders: The nature and treatment of anxiety and panic*. Guilford press.
- Boelen, P. A., & Reijntjes, A. (2009). Intolerance of uncertainty and social anxiety. *Journal of Anxiety Disorders, 23*(1), 130–135. doi:10.1016/j.janxdis.2008.04.007
- Boswell, J. F., Thompson-Hollands, J., Farchione, T. J., & Barlow, D. H. (2013). Intolerance of Uncertainty: A Common Factor in the Treatment of Emotional Disorders. *Journal of Clinical Psychology, 69*(6), 630–645. doi:10.1002/jclp.21965
- Brewerton, T. D. (1995). Toward a unified theory of serotonin dysregulation in eating and related disorders. *Psychoneuroendocrinology, 20*(6), 561-590.
- Brown, M., Robinson, L., Campione, G., Wuensch, K., Hildebrandt, T., & Micali, N. (2017). Intolerance of Uncertainty in Eating Disorders: A Systematic Review and Meta-Analysis. *European Eating Disorders Review, 25*(5), 329–343. doi:10.1002/erv.2523

- Brownley, K. A., Berkman, N. D., Peat, C. M., Lohr, K. N., Cullen, K. E., Bann, C. M., & Bulik, C. M. (2016). Binge-Eating Disorder in Adults. *Annals of Internal Medicine*, *165*(6), 409. doi:10.7326/m15-2455
- Carleton, R. N., Collimore, K. C., & Asmundson, G. J. (2010). "It's not just the judgements - It's that I don't know": Intolerance of uncertainty as a predictor of social anxiety. *Journal of Anxiety Disorders*, *24*, 189-195. doi:10.1016/j.janxdis.2009.10.007
- Carleton, R. N., Duranceau, S., Shulman, E. P., Zerff, M., Gonzales, J., & Mishra, S. (2016). Self-reported intolerance of uncertainty and behavioural decisions. *Journal of behavior therapy and experimental psychiatry*, *51*, 58-65. doi: 10.1016/j.jbtep.2015.12.004
- Carleton, R. N., Mulvogue, M. K., Thibodeau, M. A., McCabe, R. E., Antony, M. M., Asmundson, G. J. (2012). Increasingly certain about uncertainty: Intolerance of uncertainty across anxiety and depression. *Journal of Anxiety Disorders*, *26*, 468-479. doi: 10.1016/j.janxdis.2012.01.011
- Carleton, R. N., Norton, M. P. J., & Asmundson, G. J. (2007). Fearing the unknown: A short version of the Intolerance of Uncertainty Scale. *Journal of Anxiety Disorders*, *21*, 105-117. doi:10.1016/j.janxdis.2006.03.014
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, N.J: L. Erlbaum Associates.
- De Jong-Meyer, R., Beck, B., & Riede, K. (2009). Relationships between rumination, worry, intolerance of uncertainty and metacognitive beliefs. *Personality and Individual Differences*, *46*(4), 547-551. doi:10.1016/j.paid.2008.12.010

- Dugas, M. J., Buhr, K., & Ladouceur, R. (2004). The Role of Intolerance of Uncertainty in Etiology and Maintenance. In R. G. Heimberg, C. L. Turk, & D. S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice* (p. 143–163). Guilford Press.
- Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: a preliminary test of a conceptual model. *Behaviour Research and Therapy*, *36*(2), 215–226. doi:10.1016/s0005-7967(97)00070-3
- Escandón-Nagel, N., Peró, M., Grau, A., Soriano, J., & Feixas, G. (2018). Emotional eating and cognitive conflicts as predictors of binge eating disorder in patients with obesity. *International Journal of Clinical and Health Psychology*, *18*(1), 52–59. doi:10.1016/j.ijchp.2017.09.003
- Fairburn C.G., Beglin S. (2008) Eating disorder examination questionnaire. In: Fairburn CG, editor. *Cognitive behavior therapy and eating disorders*. New York, NY: Guilford Press. pp. 309–313.
- Fairburn C.G., Cooper Z. (1993) The eating disorder examination. In: Fairburn C, Wilson GT, editors. *Binge eating: nature assessment and treatment*. 12. New York, NY: Guilford Press. pp. 317–360.
- Fairburn, C., Brownell, K. (2005) *Eating Disorders and Obesity: A comprehensive Handbook*. Guilford Press.
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175-191. doi: 10.3758/bf03193146
- Fichter, M. M., & Quadflieg, N. (2004). Twelve-year course and outcome of bulimia nervosa. *Psychological Medicine*, *34*(08), 1395. doi:10.1017/s0033291704002673

- Frank, G. K. W., Roblek, T., Shott, M. E., Jappe, L. M., Rollin, M. D. H., Hagman, J. O., & Pryor, T. (2011). Heightened fear of uncertainty in anorexia and bulimia nervosa. *International Journal of Eating Disorders, 45*(2), 227–232. doi:10.1002/eat.20929
- Freeston, M., Rhéaume, J., Letarte, H., Dugas, M., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*(6), 791-802. doi:10.1016/0191-8869(94)90048-5
- George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference 11.0 update (4<sup>th</sup> ed.)*. Boston: Allyn & Bacon
- Godart, N. T., Flament, M. F., Curt, F., Perdereau, F., Lang, F., Venisse, J. L., Halfon, O., Bizouard, P., Loas, G., Corcos, M., Jeammet., Fermanian, J. (2003). Anxiety disorders in subjects seeking treatment for eating disorders: a DSM-IV controlled study. *Psychiatry Research, 117*(3), 245–258. doi:10.1016/s0165-1781(03)00038-6
- Godart, N. T., Perdereau, F., Rein, Z., Berthoz, S., Wallier, J., Jeammet, P., & Flament, M. F. (2007). Comorbidity studies of eating disorders and mood disorders. Critical review of the literature. *Journal of affective disorders, 97*(1-3), 37-49. doi: 10.1016/j.jad.2006.06.023
- Godart, N., Radon, L., Curt, F., Duclos, J., Perdereau, F., Lang, F., Venisse, J.L., Halfon, O., Bizouard, P., Loas, G., Corcos, M., Jeammet, Ph., Flament, M. F. (2015). Mood disorders in eating disorder patients: Prevalence and chronology of ONSET. *Journal of Affective Disorders, 185*, 115–122. doi:10.1016/j.jad.2015.06.039
- Gosselin, P., Ladouceur, R., Evers, A., Laverdière, A., Routhier, S., & Tremblay-Picard, M. (2008). Evaluation of intolerance of uncertainty: Development and validation of a new self-report measure. *Journal of Anxiety Disorders, 22*(8), 1427–1439. doi:10.1016/j.janxdis.2008.02.005

- Harrison, A., Sullivan, S., Tchanturia, K., & Treasure, J. (2010). Emotional functioning in eating disorders: attentional bias, emotion recognition and emotion regulation. *Psychological Medicine*, *40*(11), 1887–1897. doi:10.1017/s0033291710000036
- van der Heiden, C., Melchior, K., Muris, P., Bouwmeester, S., Bos, A. E. R., & van der Molen, H. T. (2010). A hierarchical model for the relationships between general and specific vulnerability factors and symptom levels of generalized anxiety disorder. *Journal of Anxiety Disorders*, *24*(2), 284- 289. doi:10.1016/j.janxdis.2009.12.005
- Herpertz-Dahlmann, B. (2015). Adolescent Eating Disorders. *Child and Adolescent Psychiatric Clinics of North America*, *24*(1), 177–196. doi:10.1016/j.chc.2014.08.003
- Herpertz-Dahlmann, B. M., Wewetzer, C., Schulz, E., & Remschmidt, H. (1996). Course and outcome in adolescent anorexia nervosa. *International Journal of Eating Disorders*, *19*(4), 335–345. doi:10.1002/(sici)1098-108x(199605)19:4<335::aid-eat2>3.0.co;2-m
- Herpertz-Dahlmann, B., & Remschmidt, H. (1993). Depression and psychosocial adjustment in adolescent anorexia nervosa. A controlled 3-year follow-up study. *European Child & Adolescent Psychiatry*, *2*(3), 146-154. doi: 10.1007/BF02125569
- Herpertz-Dahlmann, B., & Remschmidt, H. (1993). Depression in anorexia nervosa at follow-up. *International Journal of Eating Disorders*, *14*(2), 163–169. doi:10.1002/1098-108x(199309)14:2<163::aid-eat2260140206>3.0.co;2-y
- Herzog, D. B., Dorer, D. J., Keel, P. K., Selwyn, S. E., Ekeblad, E. R., Flores, A. T., Greenwood, D. N., Burwell, R.A. & Keller, M. B. (1999). Recovery and relapse in anorexia and bulimia nervosa: a 7.5-year follow-up study. *Journal of the American Academy of Child & Adolescent Psychiatry*, *38*(7), 829-837. doi: 10.1097/00004583-199907000-00012



- Herzog, D. B., Keller, M. B., Sacks, N. R., Yeh, C. J., & Lavori, P. W. (1992). Psychiatric Comorbidity in Treatment-Seeking Anorexics and Bulimics. *Journal of the American Academy of Child & Adolescent Psychiatry, 31*(5), 810–818. doi:10.1097/00004583-199209000-00006
- Herzog, D. B., Nussbaum, K. M., & Marmor, A. K. (1996). Comorbidity and outcome in eating disorders. *Psychiatric Clinics of North America, 19*(4), 843–859. doi:10.1016/s0193-953x(05)70385-3
- Hoek, H. W. (2016). Review of the worldwide epidemiology of eating disorders. *Current Opinion in Psychiatry, 29*(6), 336–339. doi:10.1097/ycp.0000000000000282
- Holaway, R. M., Heimberg, R. G., & Coles, M. E. (2006). A comparison of intolerance of uncertainty in analogue obsessive-compulsive disorder and generalized anxiety disorder. *Journal of Anxiety Disorders, 20*(2), 158–174. doi:10.1016/j.janxdis.2005.01.002
- Holtkamp, K., Müller, B., Heussen, N., Remschmidt, H., & Herpertz-Dahlmann, B. (2005). Depression, anxiety, and obsessionality in long-term recovered patients with adolescent-onset anorexia nervosa. *European Child & Adolescent Psychiatry, 14*(2), 106–110. doi:10.1007/s00787-005-0431-5
- Hsu, L. K. G., Crisp, A. H., & Callender, J. S. (1992). Psychiatric diagnoses in recovered and unrecovered anorectics 22 years after onset of illness: A pilot study. *Comprehensive Psychiatry, 33*(2), 123–127. doi:10.1016/0010-440x(92)90009-f
- Hudson, J. I., Pope Jr, H. G., & Yurgelun-Todd, D. (1988). Bulimia and major affective disorder: experience with 105 patients. *Psychiatrie & psychobiologie, 3*(1), 37-47.
- Hudson, J. I., Pope, J. H., Yurgelun-Todd, D., Jonas, J. M., & Frankenburg, F. R. (1987). A controlled study of lifetime prevalence of affective and other psychiatric disorders in

- bulimic outpatients. *The American journal of psychiatry*, *144*(10), 1283-1287. doi: 10.1176/ajp.144.10.1283
- Iwasaki, Y., Matsunaga, H., Kiriike, N., Tanaka, H., & Matsui, T. (2000). Comorbidity of axis I disorders among eating-disordered subjects in Japan. *Comprehensive Psychiatry*, *41*(6), 454-460. doi: 10.1053/comp.2000.16561
- Jensen, D., Cohen, J., Mennin, D., Fresco, D., & Heimberg, R. (2016). Clarifying the unique associations among intolerance of uncertainty, anxiety, and depression. *Cognitive Behaviour Therapy*, *45*(6), 431–444. doi:10.1080/16506073.2016.1197308
- Kaye, W. H., Bulik, C. M., Plotnicov, K., Thornton, L., Devlin, B., Fichter, M. M., Treasure, J., Kaplan, A., Woodside, D.B., Johnson, C.L., Halmi, K., Brandt, H.A., Crawford, S., Mitchell, J.E., Strober, M., Berrettini, W., Jones, I. (2008). The genetics of anorexia nervosa collaborative study: Methods and sample description. *International Journal of Eating Disorders*, *41*(4), 289–300. doi:10.1002/eat.20509
- Kesby, A., Maguire, S., Brownlow, R., & Grisham, J. R. (2017). Intolerance of Uncertainty in eating disorders: An update on the field. *Clinical Psychology Review*, *56*, 94–105. doi:10.1016/j.cpr.2017.07.002
- Keski-Rahkonen, A., & Mustelin, L. (2016). Epidemiology of eating disorders in Europe. *Current Opinion in Psychiatry*, *29*(6), 340–345. doi:10.1097/ycp.0000000000000278
- Konstantellou, A., Campbell, M., Eisler, I., Simic, M., & Treasure, J. (2011). Testing a cognitive model of generalized anxiety disorder in the eating disorders. *Journal of anxiety disorders*, *25*(7), 864-869. doi: 10.1016/j.janxdis.2011.04.005
- Levinson, C., Zerwas, S., Calebs, B., Forbush, K., Kordy, H., Watson, H., Hofmeier, S., Levine, M., Crosby, RD., Peat, C., Runfola, CD., Zimmer, B., Moesner, M., Marcus, MD., Bulik,

- C. M. (2017). The core symptoms of bulimia nervosa, anxiety, and depression: A network analysis. *Journal of Abnormal Psychology, 126*(3), 340–354. doi:10.1037/abn0000254
- Linde, J. A., Jeffery, R. W., Levy, R. L., Sherwood, N. E., Utter, J., Pronk, N. P., & Boyle, R. G. (2004). Binge eating disorder, weight control self-efficacy and depression in overweight men and women. *International Journal of Obesity, 28*(3), 418–425. doi:10.1038/sj.ijo.0802570
- Lovibond, S.H. & Lovibond, P.F. (1995). Manual for the Depression Anxiety & Stress Scales. (2nd Ed.) Sydney: Psychology Foundation.
- Mahoney, A. E. J., & McEvoy, P. M. (2012b). A Transdiagnostic Examination of Intolerance of Uncertainty Across Anxiety and Depressive Disorders. *Cognitive Behaviour Therapy, 41*(3), 212–222. doi:10.1080/16506073.2011.622130
- Mahoney, A. E. J., & McEvoy, P. M.. (2012). Trait versus situation-specific intolerance of uncertainty in a clinical sample with anxiety and depressive disorders. *Cognitive Behaviour Therapy, 41*, 26-39. doi:10.1080/16506073.2011.622131
- McEvoy, P. M., & Mahoney, A. E. (2012). To be sure, to be sure: Intolerance of uncertainty mediates symptoms of various anxiety disorders and depression. *Behavior Therapy, 43*(3), 533-545. doi: 10.1016/j.beth.2011.02.007
- McFadden, K., Tregellas, J., Shott, M., & Frank, G. (2014). Reduced salience and default mode network activity in women with anorexia nervosa. *Journal of Psychiatry & Neuroscience, 39*(3), 178–188. doi:10.1503/jpn.130046
- Morris, L. S., Baek, K., Kundu, P., Harrison, N. A., Frank, M. J., & Voon, V. (2015). Biases in the Explore–Exploit Tradeoff in Addictions: The Role of Avoidance of Uncertainty. *Neuropsychopharmacology, 41*(4), 940–948. doi:10.1038/npp.2015.208

- Moskovich, A. A. (2015). *Maladaptive Rule-Governed Behavior in Anorexia Nervosa: The Need for Certainty and Control* (Doctoral dissertation, Duke University).
- O'Brien, K. M., & Vincent, N. K. (2003). Psychiatric comorbidity in anorexia and bulimia nervosa: Nature, prevalence, and causal relationships. *Clinical Psychology Review, 23*, 57-74. doi: 10.1016/s0272-7358(02)00201-5
- O'Dwyer, A. M., Lucey, J., & Russell, G. (1996). Serotonin activity in anorexia nervosa after long-term weight restoration: response to D-fenfluramine challenge. *Psychological Medicine, 26*(02), 353. doi:10.1017/s0033291700034747
- Oei, T. P. S., Sawang, S., Goh, Y. W., & Mukhtar, F. (2013). Using the Depression Anxiety Stress Scale 21 (DASS-21) across cultures. *International Journal of Psychology, 48*(6), 1018–1029. doi:10.1080/00207594.2012.755535
- Pollice, C., Kaye, W., Greeno, C., & Weltzin, T. (1997). Relationship of depression, anxiety, and obsessionality to state of illness in anorexia nervosa. *International Journal of Eating Disorders, 21*(4), 367–376. doi:10.1002/(sici)1098-108x(1997)21:4<367::aid-eat10>3.0.co;2-w
- Renjan, V., McEvoy, P. M., Handley, A. K., & Fursland, A. (2016). Stomaching uncertainty: Relationships among intolerance of uncertainty, eating disorder pathology, and comorbid emotional symptoms. *Journal of Anxiety Disorders, 41*, 88–95. doi:10.1016/j.janxdis.2016.03.008
- Rosenbaum, D. L., & White, K. S. (2015). The relation of anxiety, depression, and stress to binge eating behavior. *Journal of Health Psychology, 20*(6), 887–898. doi:10.1177/1359105315580212

- Salbach-Andrae, H., Lenz, K., Simmendinger, N., Klinkowski, N., Lehmkuhl, U., & Pfeiffer, E. (2008). Psychiatric Comorbidities among Female Adolescents with Anorexia Nervosa. *Child Psychiatry and Human Development, 39*(3), 261–272. doi:10.1007/s10578-007-0086-1
- Schmidt, U., Adan, R., Böhm, I., Campbell, I. C., Dingemans, A., Ehrlich, S., Elzackers, I., Favaro, A., Giel, K., Harrison, A., Himmerich, H., Hoek, H., Herpertz-Dahlmann, B., Kas, M., Seitz, J., Smeets, P., Sternheim, L., Tenconi, E., van Elburg, A., van Furth, E., Zipfel, S. (2016). Eating disorders: the big issue. *The Lancet Psychiatry, 3*(4), 313–315. doi:10.1016/s2215-0366(16)00081-x
- Smink, F., 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
- Sternheim, L., Fisher, M., Harrison, A., & Watling, R. (2017). Predicting intolerance of uncertainty in individuals with eating disorder symptoms. *Journal of Eating Disorders, 5*(1). doi:10.1186/s40337-017-0152-4
- Sternheim, L., & Harrison, A. (2018). The acceptability, feasibility and possible benefits of a group-based intervention targeting intolerance of uncertainty in adolescent inpatients with anorexia nervosa. *Cogent Psychology, 5*(1).doi:10.1080/23311908.2018.1441594
- Sternheim, L., Konstantellou, A., Startup, H., & Schmidt, U. (2011). What does uncertainty mean to women with anorexia nervosa? An interpretative phenomenological analysis. *European Eating Disorders Review, 19* (1), 12–24. doi: 10.1002/erv.1029
- Sternheim, L., Startup, H. & Schmidt, U. (2015) Anxiety-related processes in anorexia nervosa and their relation to eating disorder pathology, depression and anxiety. *Advances in Eating*

*Disorders: Theory, Research and Practice*, 3:1, 13-19. doi:  
10.1080/21662630.2014.948469

Sternheim, L., Startup, H., & Schmidt, U. (2011b). An experimental exploration of behavioral and cognitive–emotional aspects of intolerance of uncertainty in eating disorder patients. *Journal Of Anxiety Disorders*, 25(6), 806-812. doi: 10.1016/j.janxdis.2011.03.020

Sternheim, L., Startup, H., & Schmidt, U. (2014). Anxiety-related processes in anorexia nervosa and their relation to eating disorder pathology, depression and anxiety. *Advances in Eating Disorders*, 3(1), 13–19. doi:10.1080/21662630.2014.948469

Stewart, M. C. (2009). *Relationships Between Intolerance of Uncertainty and Eating Disorder Symptomatology in a Mixed Non-clinical, Sub-clinical, and Clinical Eating Disordered Population* (Doctoral dissertation, University of Hawaii at Manoa).

Voon, V. (2015). Cognitive biases in binge eating disorder: the hijacking of decision making. *CNS Spectrums*, 20(06), 566–573. doi:10.1017/s1092852915000681

World Medical Association Declaration of Helsinki. (2013). *JAMA*, 310(20), 2191. doi:10.1001/jama.2013.281053