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Heightened Fear of Uncertainty in Anorexia and Bulimia Nervosa

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Abstract

Objective—To test whether intolerance of uncertainty (IU) is related to eating disorder (ED) pathology.

Method—Thirty individuals with anorexia nervosa (AN), 19 with bulimia nervosa (BN) and 28 healthy control women (CW) completed the Intolerance of Uncertainty Scale (IUS).

Results—AN and BN groups showed higher IU compared to CW. In AN and BN, Harm Avoidance and Depression scores were positively correlated with IU. In AN but not BN, IU was related positively to Drive for Thinness and Body Dissatisfaction.

Conclusion—Elevated IU is associated with AN and BN. Anxious traits may be inherent in EDs and IU could be a developmental factor contributing to anxiety, mood and ED behavior in AN and BN.

INTRODUCTION

The eating disorders (EDs) anorexia (AN) and bulimia nervosa (BN) are severe psychiatric disorders associated with abnormal food appetite. AN is characterized by severe emaciation, food refusal, and body image disturbance (1), while BN individuals, usually at normal weight, regularly binge on large amounts of food, and use self induced vomiting, laxatives or diuretics to avoid weight gain (1).

The etiology and pathophysiology of EDs are unclear. Behaviorally, clinicians frequently observe a strong need for control in ED populations, while heightened anxious avoidant traits may predispose individuals to develop EDs (2,3). Anxiety disorder research has developed extensive models that connect perceptions of control with fear of uncertainty (4,5). A chronic inability to cope with unpredictable, uncontrollable, negative events, was associated with “negatively valenced emotional responding” (4), and being uncertain about controlling future events leads to anxiety (6). Thus, within the anxiety literature, it is well established that a sense of uncontrollability and unpredictability over certain aspects of one’s environment contributes to the development and maintenance of an anxiety disorder. Those concepts could also have important implications for the development of EDs. ED individuals appear to control their eating, weight and shape as a way to address their perceived lack of control over interpersonal and overall life stressors, and these behaviors

could be an attempt at establishing control and to manage internal uncertainty around life events. If there is in fact intolerance of uncertainty (IU) in various environments in EDs, then focus on the ED could be a means of alternate control and thus alleviating the negative emotion from IU (7).

The Intolerance of Uncertainty scale (IUS) tests IU and has been used in many studies, mostly related to anxiety disorders, and has been found to relate to decision making (8) or emotional ambiguity (9). The IUS has not been studied in EDs before and we hypothesized that AN and BN would have increased scores compared to healthy controls and IUS scores might predict ED behavior. If IU were a substantial factor in ED pathology, then focus on self monitoring and education regarding IU and addressing the cognitive biases around their perceptions of control and their ability to handle uncertain events could be made a specific focus in ED treatment with hopefully improving the overall recovery of the patient.

METHODS

Participants

Seventy seven women, ages 12 to 45 years, completed the study: twenty eight healthy control women (CW; mean age 20.9 ± 6.2 years), 30 women with AN (mean age 20.5 ± 6.7 years) and 19 with BN (mean age 25.2 ± 5.5 years). Participants with AN and BN were recruited through the Eating Disorders Program at The Children's Hospital in Aurora, Colorado, and at the Eating Disorder Center of Denver, which included patients in inpatient and day treatment levels of care. Control participants were recruited through local advertisements in the Denver/Metro area. In general, all study procedures in EDs were completed within the first two weeks after admission. Informed consent was obtained for each individual enrolled, and all research procedures were approved by the Colorado Multiple Institutional Review Board.

To qualify for the study, participants took part in a rigorous, multi-step screening process. Study participants completed a battery of self-report questionnaires, met individually with a doctoral level study investigator to assess medical and psychological history, and also completed a structured diagnostic interview. Healthy CW had a lifetime history of healthy body weight (between 90% and 110% of ideal body weight since menarche), did not endorse lifetime symptomatic eating or weight problems, and were free from any psychiatric or major medical illness. Participants with AN and BN met current DSM-IV-R (1) ED criteria.

Screening

To assess for psychological symptoms in healthy individuals under 18 years ($n=11$), participants were interviewed with the DISC Predictive Scales (DPS), a computerized tool designed to screen minor individuals for psychopathological symptoms quickly and accurately (10). Those who endorsed psychiatric symptoms via DPS, indicating the need for further evaluation and screening, were excluded. AN ($n=8$) and BN minors ($n=1$) completed the Clinical Diagnostic Interview Schedule for Children 4.0 (CDISC-IV), an in-depth computerized diagnostic tool to assess all major psychiatric diagnoses (including eating disorders). Adult CW ($n=17$), AN ($n=22$) and BN ($n=18$) were assessed with the Structured Clinical Interview for DSM-IV-TR Axis I Disorders, which included a module for ED diagnosis (11). Controls were excluded if they endorsed any current or past psychological symptoms. The study, however, did allow co-occurring diagnoses for the ED population, except psychotic and substance use disorders. All study participants also met with the principal investigator (GKWF) for verification of either CW status, that is no psychiatric or eating problem history, or for AN and BN individuals, ED diagnosis and comorbidities.

Measures

Once enrolled, study participants completed the following series of self-assessment questionnaires:

Cloninger's Temperament and Character Inventory, a 240-item self-assessment questionnaire that examines personality based on 7 different dimensions. For this study, we examined harm avoidance and novelty seeking; Beck's Depression Inventory, a 21-item multiple choice questionnaire that examines depression symptoms (12); the Eating Disorder Inventory-3, an expanded version of Garner's Eating Disorder Inventory-2 (13,14). This 91-item questionnaire assesses psychological and behavioral traits related eating disorder development and maintenance; Spielberger's State-Trait Anxiety Inventory (STAI) (15), an instrument that consists of separate self-report scales for measuring State and Trait Anxiety.

The Intolerance of Uncertainty scale (IUS), originally developed in French but translated into English, is a 27 item instrument with good internal consistency, test-retest reliability and validity (16) and has recently been validated in a new large sample (17). It has a four factor structure (uncertainty is stressful and upsetting, uncertainty leads to inability to act, uncertain events are negative and should be avoided, and being uncertain is unfair), but it is recommended to use the overall IUS score. Both Buhr and Sexton (16,17) found in a nonclinical sample of adult college and university students mean values of 55 and 56 total score. Those individuals were not screened for psychiatric diagnoses and most likely included some individuals with anxiety and depressive disorders.

Statistical Analysis

Pearson correlation analyses were conducted to examine relations between IUS, demographic and behavioral data. A three-group one way analysis of variance and Tukey post hoc tests were employed to examine IUS, demographic and other behavioral data between CW, AN and BN. In addition, a one way analysis of variance was conducted to explore IUS differences in AN and BN individuals with and without anxiety disorder or major depressive disorder against CW. False Discovery Rate procedures were used to correct p-values (18). Exploratory analyses using linear regression were conducted to further examine IUS and its relation to eating pathology.

RESULTS

Demographic data

The ANOVA showed a significant group difference for age ($p < 0.04$) and BMI ($p < 0.001$). Post hoc analysis indicated that AN and BN individuals were not significantly different in age compared to CW, but BN individuals were significantly older compared to the AN group ($p < 0.05$), and AN individuals were significantly lower in BMI compared to CW and BN individuals ($p < 0.001$). Within the AN group, 9 individuals had either social phobia ($n = 3$), obsessive compulsive disorder ($n = 4$), generalized anxiety disorder ($n = 4$), posttraumatic stress disorder ($n = 1$), or a combination (one individual had both threshold PTSD and Social Phobia, one individual had Social Phobia and OCD, one individual had Social Phobia and Panic Disorder), 21 individuals did not have a current threshold anxiety disorder. Nine AN individuals had a current depressive disorder. Eight BN individuals had a current anxiety disorder (social phobia $n = 5$, PTSD $n = 2$, GAD $n = 6$) and six BN individuals had current depression. Thirteen of the AN, and 3 of the BN individuals had neither current anxiety nor depressive disorder.

Correlation analyses (Table 1)

Harm Avoidance and Depression scores were significantly related to IUS in AN and BN but not CW. Trait Anxiety scores were significantly related to IUS scores in AN and CW and near significant in BN. Drive for Thinness was significantly related to IUS in AN and CW but not BN. Body Dissatisfaction scores were significantly related to IUS scores in AN but not BN or CW. State Anxiety scores were significantly related to IUS scores in CW but not in AN or BN. In AN but not BN without current depressive or anxiety disorder, IUS scores were significantly related to Harm Avoidance ($R=0.8$, $p=0.002$) and Depression ($R=0.8$, $p=0.004$). IUS was not related to age or BMI in any group.

Analyses of variance (Table 2)

Harm Avoidance, Depression, Drive for Thinness, State and Trait anxiety were all significantly higher in the AN and BN individuals compared to CW, but similar between the ED groups. Novelty Seeking was significantly higher in CW compared to AN, but lower compared to BN. Bulimia symptoms were significantly higher in BN compared to CW. Body Dissatisfaction was significantly higher in AN and BN compared to CW and significantly higher in BN than AN. IU was significantly greater in AN and BN compared to CW, but similar between the ED groups. An ANCOVA using age and BMI as covariates also showed a significant group difference ($p<0.001$) between the EDs and CW group. A separate analysis found no difference in IUS scores between youth (<18) and adults (>18) within the CW ($df=26$, $p<0.5$), AN ($df=28$, $p<0.4$) and BN ($df=17$, $p<0.7$) study groups.

Comorbid Diagnoses and IU

An overall analysis of variance found a significant difference between subgroups of AN and BN with and without a comorbid anxiety disorder, comorbid depressive disorder and CW ($p<0.0001$). Post hoc analyses revealed that AN with and without anxiety and depressive disorder and BN without depressive disorder as well as with and without anxiety disorder had significantly greater IUS scores compared to CW ($p<0.05$), but not BN with a comorbid depressive disorder. AN with comorbid anxiety and depression had significantly greater IUS scores compared to BN with comorbid depression only ($p<0.05$). BN with only comorbid anxiety disorder showed significantly higher IUS scores compared to BN with comorbid depressive disorder only ($p<0.05$).

Secondary Analyses

Regression analyses were conducted to begin to examine the role IU may play as a predictor of eating pathology. The control group was removed for these analyses as the model being investigated pertains to eating pathology of AN and BN. In AN but not in BN, IUS scores significantly accounted for 16% and 26% of the variance in Drive for Thinness and Body Dissatisfaction, respectively.

DISCUSSION

This study is unique in the application of analysis of IU in Eating Disorders. The results indicate that both AN and BN are associated with heightened IU and this was associated with Harm Avoidance and Depression scores in AN and BN. In the AN group, IU was associated with Drive for Thinness and Body Dissatisfaction. In all three groups IU was associated with Trait Anxiety, and in CW, IU was associated with Drive for Thinness and also State Anxiety.

IU has received substantial attention in the anxiety literature but not yet in EDs. Studies support the notion that IU plays a role in adolescent (19) and adult (20) worry, and is thought to be related primarily to GAD, OCD and social anxiety (21–23) as well as

depression (24). We did not find IU differences between youth and adult study participants, which supports previous research of the importance of IU elevations in both youth and adult samples (19,20,25).

Both ED groups had significantly higher IU compared to CW, and ED individuals without current anxiety or depressive disorder demonstrate elevated IU compared to CW nonetheless. Furthermore, both AN and BN individuals' IU scores correlated with Harm Avoidance and Depression scores. ED populations are consistently found to have elevated negative affect such as anxiety and depression and it is possible Harm Avoidance or depression drive IU in the ED population, in light of a lack of such a relationship in the CW. However, EDs could also be associated with primarily higher IU which could drive Harm Avoidance and depression (26), or ED individuals might be particularly sensitive to perceptions of uncontrollability over the environment which could drive both IU and Harm Avoidance and depressive symptoms. This will need to be explored further. Norton and Mehta extended a model of vulnerabilities for emotional disorders (27), that built on work from Clark and Watson (28,29) and Taylor (30). In that hierarchical model negative and positive affectivity influences anxiety and depressive disorder development, while anxiety sensitivity and IU are important mediators in this hierarchy.

Anxiety has been suggested to be a key vulnerability factor for the development of AN (31), and both AN and BN have been found to have emotion regulation difficulties (32,33). Thus, we believe that the development of a hierarchical model in the processing of negative and positive emotions and their impact on anxiety, mood and eating pathology would be very helpful in the conceptualization and treatment of EDs.

For the CW, IU was related to Drive for Thinness, and State and Trait Anxiety. The relationship with the anxiety measures would be consistent with the Norton model (27), while a relationship with Drive for Thinness has not been reported before. It could be conceivable that IU is a vulnerability factor that drives even healthy females to control their body weight, maybe through the sense of heightened control. AN and BN groups showed different relationships between IU and ED related behavior. AN showed positive relationships between IU and Body Dissatisfaction as well as Drive for Thinness, but this was not the case for the BN individuals. This is consistent with our exploratory analysis indicating that IU does account for Drive for Thinness and Body Dissatisfaction to a significant degree in AN but not BN, thus demonstrating a different process occurring between eating pathology and the different EDs. Given that the model we are investigating is based on anxiety disorder research it is not surprising that the relationship between IU and eating pathology in AN would mirror the process seen in the development of anxiety disorders. Specifically, in AN, IU is associated with negative affect which may lead to the development of eating pathology. Further studies are needed to clarify this model within AN. The model however did not apply to the BN group which might be surprising. BN in contrast to AN individuals are higher in novelty seeking and may have less difficulty expressing their feelings, which could change how ED symptoms are driven by emotional states in BN. A detailed model based analysis for both AN and BN groups would go beyond the scope of this manuscript and will be developed in a subsequent article.

The correlation of IU with Trait Anxiety is consistent with the idea that IU is a trait based construct developed early in life (25). IU does not appear to fluctuate depending on situations but rather remains stable and enduring and thus potentially contributing to a psychological vulnerability as discussed earlier in the development of anxiety (27) and possibly EDs. State Anxiety did however relate to IU in the CW and it is possible that while State Anxiety is more environment determined as opposed to the more genetically driven

Trait Anxiety (34), during psychological wellness State and Trait Anxiety correlate well and thus both relate to IU.

Limitations

The sample size was not large, and it is our plan to provide replication in an expanded sample. With the assessment of ED groups with and without comorbid conditions the subgroups were reduced substantially which could have affected the results. Still, the 95% confidence intervals for the mean IUS scores in CW (44–53) were well separated from AN (68–89) and BN (59–115) without comorbid depression or anxiety disorder. The behavioral data rely on self report which could be inflated. The causal relationships between the observed behavioral variables examined in this study, if any, are not known. These aspects will need to be addressed with specific tasks that test those contingencies and in relation to brain imaging techniques. Our mean values for the IUS score in the CW was lower compared to the IUS validation studies, however those studies included individuals with higher depression and anxiety ratings most likely accounting for higher IU. This brings up a further limitation that is that we cannot distinguish illness effects on IU versus IU as a possible vulnerability for developing an ED. EDs are associated with high premorbid anxiety disorders though (2,3), and with the concept that IU fuels anxiety (27) and subsequently ED behavior, it is quite likely that IU has an important role in driving ED behavior. This will need to be addressed in longitudinal studies.

In conclusion, IU is elevated in AN and BN in this sample and may be a factor in the expression of negative affect, particularly anxiety, in these individuals and perhaps eating pathology. IU seems to be involved in ED pathology, and the perception of control should be considered in the work with the ED population since anxious individuals are characterized by their own perceptions of not being able to handle situations that are uncertain. We propose to develop models that incorporate IU, positive and negative affectivity and anxiety sensitivity in order to improve conceptualization of ED development, pathophysiology and treatment.

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Table 1

Significant correlation coefficient results between Intolerance of Uncertainty scale (IUS) and behavioral variables; p-values are False Discovery Rate corrected; Pearson Correlation Coefficient, R, Control Women, CW; Anorexia Nervosa Women, AN; Bulimia Nervosa Women, BN; Temperament and Character Inventory, TCI; Beck Depression Inventory, BDI; Eating Disorders Inventory 3, EDI-3; Spielberger State and Trait Anxiety Inventory, STAI.

Intolerance of Uncertainty	Harm Avoidance (TCI)	Depression (BDI)	Drive for Thinness (EDI-3)	Body Dissatisfaction (EDI-3)	State Anxiety (STAI)	Trait Anxiety (STAI)
CW	0.10	0.31	0.63	0.18	0.52	0.53
	0.60	0.13	0.009	0.46	0.008	0.006
AN	0.69	0.77	0.39	0.50	0.14	0.40
	<0.001	<0.001	0.04	0.007	0.54	0.04
BN	0.52	0.64	0.32	0.20	0.18	0.46
	0.04	0.006	0.25	0.46	0.54	0.06

Table 2

Behavioral data of the study groups; p-values are False Discovery Rate corrected; df 2, 74 for all comparisons. Temperament and Character Inventory, TCI; Eating Disorders Inventory 3, EDI-3; Beck Depression Inventory, BDI; Tukey's post hoc test indicated for Intolerance of Uncertainty, Harm Avoidance, Depression, Drive for Thinness, State and Trait Anxiety AN, BN > CW p < 0.001; Novelty Seeking AN < CW, BN p < 0.005; Bulimia BN > CW p < 0.001; Body Dissatisfaction AN, BN > CW p < 0.001 and BN > AN p < 0.003.

	CW (n=28)		AN (n=30)		BN (n=19)		F	P
	Mean	SD	Mean	SD	Mean	SD		
Novelty Seeking (TCI)	20.6	5.6	14.9	6.1	22.7	6.3	11.6	<0.001
Harm Avoidance (TCI)	9.0	3.3	21.7	7.8	22.9	5.9	42.7	<0.001
Depression (BDI)	1.6	1.8	23.0	10.2	23.5	10.9	59.1	<0.001
Drive for Thinness (EDI-3)	1.0	2.0	12.9	6.8	16.1	4.2	67.2	<0.001
Bulimia (EDI-3)	0.1	0.5	2.3	4.3	12.4	4.6	74.1	<0.001
Body Dissatisfaction (EDI-3)	1.8	2.4	12.2	8.8	19.1	6.5	42.6	<0.001
State Anxiety	28.1	6.8	54.8	12.2	47.9	13.1	46.5	<0.001
Trait Anxiety	29.5	7.0	55.9	9.6	56.5	1.9	76.3	<0.001
Intolerance of Uncertainty	48.3	11.3	82.4	19.4	85.2	19.5	38.7	<0.001