

Article

Intolerance of Uncertainty and Dyadic Adjustment among Individuals with Anxiety

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ABSTRACT

The degree of anxiety exhibited by one or both partners can impair the quality of a romantic relationship. The present study examined the relationship between intolerance of uncertainty (IU), anxiety sensitivity (AS) and dyadic adjustment among adults with anxiety. Additionally, researchers explored whether anxiety correlates (i.e., IU, anxiety severity/sensitivity) were differentially associated with distinct aspects of romantic relationship functioning and specific anxiety disorder. Participants ($N = 185$, 50.8% male, $M_{age} = 35.68$) underwent structured clinical interviews to assess the presence of psychiatric disorders. Subsequently, participants completed self-report measures including the Beck Anxiety Inventory (BAI), Anxiety Sensitivity Index (ASI), Intolerance of Uncertainty Scale (IUS), and the Dyadic Adjustment Scale (DAS). Results indicated that IU was directly associated with dyadic adjustment and did not significantly moderate the link between AS and dyadic adjustment. The association between IU and dyadic adjustment was primarily driven by the satisfaction and consensus subscales. Furthermore, disorder-specific patterns in dyadic adjustment were observed. Results demonstrated IU as a unique contributor to poor intimate interpersonal functioning among individuals with anxiety. Findings suggest that future research must focus on understanding the interplay between internalized

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and social factors in the maintenance of functional impairment among individuals with anxiety.

KEYWORDS: anxiety sensitivity; dyadic adjustment; generalized anxiety disorder; intolerance of uncertainty; social anxiety disorder

INTRODUCTION

Background

Anxiety disorders are among the most common psychiatric disorders in the general population, with global prevalence rates between 28–31% [1–3]. Anxiety disorders are widespread, persistent, and long-term illnesses may result in significant impairment and distress across the lifespan without adequate treatment. The co-occurrence of anxiety disorders with other psychiatric disorders further complicates the diagnostic and treatment processes. For example, individuals with generalized anxiety disorder (GAD) exhibit high rates of comorbidity that are associated with increased symptom severity, disability, and risk for suicidality [4,5]. Most comorbid diagnoses include mood disorders (e.g., major depressive disorder [MDD]) and externalizing disorders (e.g., attention deficit hyperactivity disorder [ADHD]) [6,7]. Beyond the complications of comorbid presentations, anxiety disorders constitute a public health concern [8] and contribute to individual-level impairment across global, physical, occupational, and social domains [9].

Dyadic Adjustment

Dyadic adjustment is a construct that captures an individual's evaluation of their romantic relationship based on their subjective assessment of the relationship quality and functioning. Developed by Spanier [10], he defined this construct:

... as a process, the outcome of which is determined by the degree of: (1) troublesome dyadic differences; (2) interpersonal tensions and personal anxiety; (3) dyadic satisfaction; (4) dyadic cohesion; and (5) consensus on matters of importance to dyadic functioning (p.17).

Using the 7-item Dyadic Adjustment Scale (DAS-7) to measure relationship quality on the basis of the level of agreement and satisfaction within the relationship, Leach et al. [11] suggested that the presence of a romantic relationship with high dyadic adjustment may attenuate mental health symptoms, whereas poor quality relationships tend to exacerbate or maintain anxiety. Furthermore, findings from a genetically informed study aiming to isolate the relationship between dyadic adjustment, anxiety and depression from potential confounds (e.g., genetics and shared environmental factors) revealed that non-shared environmental influences (e.g., partner characteristics) are largely responsible for this

association [12]. These results highlight the importance of addressing dyadic adjustment through the lens of individual-level characteristics [12].

Anxiety and Dyadic Adjustment

The relationship between anxiety disorders and dyadic adjustment has been widely reported within the literature [13–15]. Overall, research has shown a negative association between the presence of anxiety disorders and dyadic adjustment, such that individuals diagnosed with an anxiety disorder were more likely to have poorer relationship quality [12,16–18]. A study on the quality of romantic relationships in individuals suffering from anxiety disorders found that, when at least one partner suffers from an anxiety disorder, the overall quality of the relationship decreases [16]. Thus, anxiety appears to worsen the affected individual's perceptions of their interpersonal relationships and may potentially influence the other partner in the relationship [16,19]. Research performed by Pankiewicz and colleagues [16] indicates that the only determinant of a lower marriage quality using the DAS, a measure used to examine the individual's perception of the quality of their intimate relationship [10], was the presence of anxiety disorders in the respondent of the questionnaire. However, one study using the Marriage Success Scale showed that women with anxiety disorders perceived the quality of their relationships to be worse than non-anxious women and men with anxiety disorders evaluated their relationship quality as lowest when their female partner also had anxiety [16]. This might suggest a tendency that may be rooted in the catastrophic thinking and negative cognitive processing biases inherent in anxiety disorders and might potentially manifest in an increased likelihood for anxious individuals to misattribute their partner's behavior as motivated by ill intent [20]. Concurrently, individuals with poor dyadic adjustment or higher romantic relationship distress are associated with being at higher risk for developing anxiety disorders [12,17,21], suggesting a potential bidirectional relationship potentially at play. Thus, understanding the mechanisms underlying the perpetuation and persistence of both anxiety symptoms and severity, and dyadic adjustment, becomes crucial.

Anxiety Sensitivity

Anxiety Sensitivity (AS) is described as the fear of arousal sensations, rooted in the belief that these sensations precipitate negative outcomes such as social rejection or mortality [22,23]. Derived from the AS theory, differences in AS reflect individual heterogeneity in the capacity to experience somatic symptoms and the risk for future development of anxiety and panic attacks [24]. Research suggests that AS may cause physical, cognitive, and social concerns, which may influence a variety of features in one's life including attachment style [25].

When assessing attachment styles in adults, Watt and colleagues [26] have used the Model of Self (i.e., beliefs related to personal worthiness and

potential for rejection in relationships) and the Model of Others (i.e., degree of trust in others and comfort with intimacy) [27]. Their research found a negative Model of Self, characterized by feelings of worthlessness and fear of abandonment, was closely linked to AS and this effect persisted even after controlling for trait anxiety [26]. Moreover, with respect to individuals' internal Model of Others, the authors reported the association between AS and attachment style can vary depending on the type of close relationship (i.e., romantic vs. non-romantic relationships), where intimate relationships were associated with AS-psychological concerns and non-romantic relationships were related to AS-physical concerns [26]. Psychological concerns, such as fears associated with concentration difficulties, may be related to a loss of control, increased conflict, mistrust, and feelings of detachment [26]. These findings, in conjunction with the increased likelihood of those high in AS to exhibit insecure attachment styles (i.e., fearful or preoccupied), underscore the role of AS in relationship dynamics [28]. Therefore, one may hypothesize that AS has unique implications in dyadic adjustment.

Intolerance of Uncertainty

Intolerance of Uncertainty (IU) is defined as the tendency to have maladaptive affective, cognitive, and behavioral responses to uncertain circumstances [29]. The increased difficulty in coping with uncertainty has been linked to the development of worry and the maintenance of anxiety disorders [30–33]. Neurobiologically, studies have shown distinct patterns of regional brain activation among individuals with high IU, including the hyperactivation of the anterior cingulate cortex, insula, and amygdala, as well as the reduced activation of the dorsolateral and ventrolateral prefrontal cortex [34–36], suggesting potential challenges in emotional regulation and executive functioning [34,36]. Additionally, studies examining physiological reactivity to uncertain threat probability have demonstrated higher reactivity (i.e., sweating, frowning, blinking) and reported stress and anxiety in people with higher IU compared to those with lower IU [35,36]. Furthermore, research has indicated that IU is predictive of the severity of various anxiety symptoms, beyond the effects of well-established features (e.g., neuroticism, positive and negative affectivity) [37,38]. Findings demonstrating an association between IU and several mood and anxiety disorders support the role of IU as a transdiagnostic factor [38]. Both IU and AS conceptually show a degree of overlap as they share the core underlying tenet of fear and anxiety of the unknown [39]. However, although interrelated, IU and AS are, nonetheless, distinct constructs [39].

The potential role played by IU is important to consider in the context of dyadic adjustment given that uncertainty can persist beyond the initial stages of a romantic relationship (e.g., uncertainty pertaining to reciprocation of feelings throughout a relationship). Knobloch [40] explored the concept of relational uncertainty, which encompasses: (1) an

individual's personal perception of how certain they are regarding the importance of the relationship (self-uncertainty); (2) uncertainty related to their partner's conception of the relationship (partner uncertainty); (3) and overarching doubts about the relationship (relationship uncertainty). The authors found that relational uncertainty, most notably self-uncertainty, was inversely related to relationship quality [40]. Thus, while there is a paucity of research focused specifically on IU and dyadic adjustment, the evidence of an association between anxiety and romantic relationship quality, the role of IU as a transdiagnostic factor central to various anxiety disorders, and findings pertaining to relational uncertainty provide a basis for the investigation of IU, relationship quality and specifically dyadic adjustment.

Nuances of the Relationship between Anxiety and Dyadic Adjustment

Gender Differences

Studies demonstrated potential gender differences in the features and consequences of anxiety [41], which likely extends to relationship dynamics. For example, Pankiewicz et al. [16] demonstrated the presence of an anxiety disorder among female partners contributed to worsened perceptions of relationship quality on the Marriage Success Scale; however, men with an anxiety disorder only perceived worsened relationship quality when their partner was suffering from an anxiety disorder as well. External stress also tends to be closely linked to dampened relationship satisfaction in women (i.e., stress spillover), potentially due to increased negative perceptions of their partner's behavior [42].

Additionally, depressive symptoms of married women are shown to influence the development of husband's symptoms of depression; however, a married man's symptomatology does not seem to affect his wife's depressive symptoms [43]. South et al. [44] established that the DAS, including the four subscales (see p. 12) exhibited gender-invariance, such that differences observed in DAS scores are not a consequence of interpretation differences between genders but rather are due to true differences in DAS. As such, evaluating the gender differences in anxiety and relationship quality is of interest in the context of IU and dyadic adjustment.

Anxiety Disorder-Specific Differences

Accumulating evidence purports that IU may have significant relevance to certain anxiety disorders and may manifest differently in relation to the core symptomatology of the condition in consideration. For example, worry and rumination central to GAD and the ritualistic and compulsive behaviors endemic to obsessive-compulsive disorder (OCD) may reflect attempts to mitigate the distress associated with the possibility of a negative occurrence while satisfying a desire for predictability [45,46].

However, among individuals with OCD, IU is pertinent for checking compulsions that are thought to stem from pathological doubt [47]. Alternatively, in panic disorder (PD), IU is likely related to not only the catastrophizing of physiological sensations, but also due to the unprovoked nature of panic attacks increasing fear and avoidance [48]. Lastly, IU in social anxiety disorder (SAD) is related to the heightened concern about the potential consequences of social situations [37].

Research has also demonstrated the presence of anxiety disorder-dependent patterns in AS. AS has been widely and consistently reported as a contributor to panic symptomatology. Notably, prospective research has supported the predictive validity of AS in the emergence of PD [49]. However, the dimensions of AS (i.e., AS-Physical, AS-Social, AS-Cognitive) appear to be uniquely associated with different diagnoses [50]. Physical concerns were found to be significantly associated with PD and Agoraphobia, while both social and cognitive concerns were associated with GAD and SAD [50]. Although there seems to be differing patterns of associations between IU and AS based on specific anxiety disorders, the research on anxiety disorder-specific differences and dyadic adjustment remains unclear. Previous literature has shown a significant association linking the presence and increased severity of anxiety symptoms to poorer dyadic adjustment within marital relationships [16,17]. However, the nuances by which different anxiety disorders may impact dyadic adjustment have not yet been sufficiently explored. Therefore, as there seems to be relevant anxiety disorders-specific differences across IU and AS, the potential importance of investigating anxiety correlates and dyadic adjustment by anxiety diagnosis becomes pertinent.

The Present Study

Gaps in the Previous Literature

Clinicians are increasingly utilizing concise self-administered measures to assist in making accurate diagnoses and observing the effect of symptom presentations in various domains of patients' lives. As such, growing bodies of research have examined the role of anxiety constructs as indicators of adjustment within romantic relationships. While the association between anxiety and dyadic adjustment is widely studied, there are key gaps in past literature that warrant further investigation. One such limitation is the scarcity of research on how psychological factors, that are common across various psychiatric conditions (i.e., IU), may alter the quality of romantic relationships. To the best of our knowledge, the literature has not examined the relationship between anxiety and the specific dimensions of dyadic adjustment: satisfaction, cohesion, consensus, and affectional expression. As well, prior research has used definitions of dyadic coupling which tended to exclude populations who are cohabiting, separated, divorced, and widowed, further limiting the applicability of these findings. The DAS takes into

consideration one's history of dyadic adjustment through the examination of at least one past romantic relationship [10]. Thus, it is important to explore single individuals and previous dyadic adjustment as their IU may have been tied to both the ending of previous relationships as well as their current unattached status. Finally, it is important to note the dichotomy of the relative abundance of research on women across multiple life stages (e.g., pregnancy, pre-menopause, chronic illness) [51–53], in contrast to the limited existing research examining the influence of anxiety among men on the quality and functioning of romantic relationships.

Present Study

The present retrospective pilot study aimed to address the gaps in the existing literature using an archival cross-sectional survey-based study design that explored IU, AS, anxiety severity, and dyadic adjustment within a psychiatric outpatient sample of patients diagnosed with an anxiety disorder. The primary objective was to examine whether the relationship between anxiety severity and AS and dyadic adjustment was moderated by IU. Secondary objectives explored differences within the DAS subscales and between genders. In addition, we aimed to determine whether there was disorder-specific variation in the relationship between anxiety correlates and dyadic adjustment.

Consistent with the existing research supporting the association between anxiety and dyadic adjustment, we hypothesized that higher levels of anxiety severity and sensitivity would be associated with lower dyadic adjustment, and that IU would exacerbate this relationship. Further, we anticipated that the model would vary according to diagnosis, in part due to the variability of IU presentations in each anxiety disorder. Specifically, we anticipated that AS would be associated with romantic dyadic adjustment among individuals with PD and that IU would be related to relationship functioning among individuals with GAD. Furthermore, we hypothesized that dyadic adjustment would manifest differently across gender. Lastly, because of the limited literature pertaining to the relationship between the correlates of anxiety and the specific components that comprise dyadic adjustment, we conducted exploratory analyses investigating the influence of the Beck Anxiety Inventory (BAI), Anxiety Sensitivity Index (ASI), and the Intolerance of Uncertainty Scale (IUS) scores on the subscales of the DAS.

MATERIALS AND METHODS

Participants and Procedure

Participants included 185 adult outpatients (94 [50.8%] males, $M_{age} = 35.68$ [$SD = 12.15$]) with ages ranging from 18–72, referred to an outpatient tertiary-care clinic located in Toronto, ON, Canada. All participants met diagnostic criteria for at least one anxiety disorder and were excluded if they met criteria for substance use disorder, alcohol use disorder, an

eating disorder, mania, psychosis, or post-traumatic stress disorder. Diagnoses were established using the Mini-International Neuropsychiatric Interview Plus 5.0.0 (MINI Plus; [54]), which is a structured clinical interview performed by a research coordinator, who was trained by an experienced MINI trainer. All results were verified by a board-certified psychiatrist in a semi-structured clinical interview. Participants also completed a self-report questionnaire package assessing demographic information (i.e., gender, relationship status) and the scales of interest (i.e., IUS, BAI, ASI, DAS). Approximately 44.9% of participants ($n = 83$) were single, 30.3% ($n = 56$) were married, 12.4% ($n = 23$) were cohabitating, 5.4% ($n = 10$) were separated, 2.7% ($n = 5$) were divorced, and 1.1% ($n = 2$) were widowed. Data was collected upon patients' first visit to the clinic between 2011 and 2015, wherein each included patient consented for the use of their data in retrospective studies. All data collection and study procedures were approved by a central ethics board. Additionally, all measures, manipulations and exclusions have been reported below.

Measures

The Mini-International Neuropsychiatric Interview Plus 5.0.0. (MINI)

The MINI is a clinician-administered structured diagnostic interview containing 120 questions and is designed to screen for the presence of current and past psychiatric diagnoses in addition to suicidality, antisocial personality disorder, and ADHD [54]. The MINI assesses for 24 diagnoses including, but not limited to, MDD, dysthymia, mania, PD, and social phobia [55]. The MINI is in accordance with the DSM-IV and ICD-10 diagnostic criteria and has been previously validated, with interrater and test-retest reliability scores indicating excellent agreement ($\kappa = 0.75\text{--}1.00$) [54]. All questions are rated by the clinician as either a YES or NO. At the end of each module, the clinician indicates whether diagnostic criteria are met [54].

Dyadic Adjustment Scale

The DAS measures the degree of adjustment in committed romantic relationships [10]. The questionnaire contains 32 items yielding total adjustment scores and four subscale scores: (i) dyadic satisfaction (i.e., degree of satisfaction with partner [items 16–23, 31–32]), (ii) dyadic cohesion (i.e., degree to which respondent and partner are unified and engage in activities together [items 24–28]), (iii) dyadic consensus (i.e., degree of agreement on matters that are central to the relationship [items 1–3, 5, 7–15]), and (iv) affectional expression (i.e., degree of expression of affection and sexual interest [items 4, 6, 29, 30]) [10]. Higher scores reflect greater dyadic adjustment [10]. Although designed to assess individuals who are currently in a relationship, lasting a minimum of one month, in this study, a slightly adjusted version of the DAS was used to include the option for single, divorced, or widowed individuals to complete the DAS

based on their past, most significant, relationship of at least one month. The DAS has demonstrated good content, criterion, and construct validity in previous studies [10,56]. Moreover, the DAS yielded good overall reliability and internal consistency for this sample ($\alpha = 0.86$).

Anxiety Sensitivity Index

The ASI is a 16-item self-report scale capturing the fear associated with the experience of physiological symptoms (e.g., “it scares me when I feel shaky”) [23]. The ASI measures a unique and stable aspect of fearfulness distinct from other traditional anxiety measures [57]. Responses are measured on a 5-point scale (0 = very little to 4 = very much) such that higher scores indicate more AS. Previous studies have shown test-retest reliability estimates ranging from 0.71–0.75, as well as convergent and discriminant validity [23,57,58]. The ASI has displayed high internal consistency for this sample ($\alpha = 0.91$).

Intolerance of Uncertainty Scale

The IUS is a 27-item self-report measure of IU, looking at the tendency to have an aversive response to uncertain situations and to overestimate the possibility of a negative occurrence despite its likelihood [59,60]. For example, sample items include; “unforeseen events upset me greatly” and “it’s unfair not having any guarantees in life” [59]. Previous evaluations of the IUS support the conceptualization of the scale as a unitary model, as compared to different subscales, due to the high internal reliability of the full scale and evidence of item cross-loading across proposed factor solutions [33,59]. Each item is rated on a 5-point scale that ranges from 1 (not at all characteristic of me) to 5 (entirely characteristic of me); higher scores represent greater IU. The IUS has been shown to have good test-retest reliability ($r = 0.74$) [59] and the IUS consisted of excellent internal consistency for this sample ($\alpha = 0.93$).

Beck Anxiety Inventory

The BAI is a 21-item self-report scale evaluating anxious symptom severity through measuring the intensity of physiological symptoms (e.g., “numbness or tingling, unable to relax, difficulty breathing, etc.” [61]. Participant responses are measured on a 4-point scale (0 = not at all to 3 = severe), where higher scores indicate more severe anxiety. The BAI has demonstrated high internal consistency ($\alpha = 0.92$) for this sample and previous studies have demonstrated good test-retest reliability ($r = 0.75$) and convergent validity for this scale [62].

Statistical Analysis

As this was a preliminary, proof of concept study, the archival database used determined the sample size ($n = 185$) of the study. Mean imputation was applied to address the item level missing observed on the DAS, IUS,

BAI, and ASI. Participants with insufficient response completeness (i.e., >75% of items missing per scale) or those with exclusionary conditions were omitted from the analyses. Missing data analyses did not reveal any significant differences between those excluded ($n = 58$) from the analyses relative to those included ($n = 185$). An exception being that patients with missing responses ($M = 71.5$, $SD = 5.45$) on the DAS consensus subscale had significantly lower IUS scores than those without ($M = 80.13$, $SD = 20.67$), $t(5.25) = -2.75$, $p = 0.038$. All continuous predictor variables were centered prior to the creation of interaction terms to reduce multicollinearity.

An independent samples t -test, using Bonferroni corrections, and two one-way ANOVAs were used to examine differences in levels of dyadic adjustment on the basis of gender, relationship status, and age. To explore disorder-specific differences in dyadic adjustment, a factorial analysis of variance (ANOVA) was conducted. Identification of significance between group differences informed the secondary analyses.

In line with the study's main objective and using the full sample ($n = 185$), a moderated regression was performed to assess whether the relationship between anxiety severity and sensitivity and dyadic adjustment was influenced by the degree of IU. The model was conducted using a hierarchical approach (Model 1: effect of covariates [relationship status]; Model 2: predictor variables [ASI, BAI, IUS]; Model 3: inclusion of interaction terms [ASI, BAI, IUS, ASI \times IUS, BAI \times IUS]).

To better elucidate the proposed association between anxiety correlates and dyadic adjustment, moderated regression analyses were performed using the DAS subscale scores as the outcome variable. Subsequently, moderated regressions among individuals separated by anxiety disorder diagnosis (PD [$n = 58$], GAD [$n = 141$], OCD [$n = 39$], SAD [$n = 121$]) were conducted to provide further insight as to whether different anxiety disorders and specific symptoms altered the findings. Of note, a subset analysis could not be completed for specific phobia due to the small sample size ($n = 9$) and the associated statistical power concerns.

RESULTS

Descriptive Statistics

Consistent with previous research in psychiatric outpatient samples, a high degree of comorbidity was present among participants [63]. Of individuals included in this sample, 82.7% had at least one co-occurring condition and 75.1% had a comorbid anxiety disorder. Table 1 summarizes the complete demographic and psychiatric characteristics of the sample.

The independent samples t -test showed that dyadic adjustment scores did not significantly differ between men ($M = 102.59$, $SD = 17.13$) and women ($M = 105.11$, $SD = 18.10$), $t(175) = 0.950$, $p = 0.344$, contrasting the original hypothesis. Additionally, results demonstrated no significant differences in ASI, IUS, and BAI scores between men ($M = 26.06$, $SD = 13.68$,

$M = 79.15$, $SD = 22.11$, and $M = 13.50$, $SD = 10.87$, respectively) and women ($M = 26.52$, $SD = 12.20$, $M = 80.69$, $SD = 18.78$, and $M = 15.15$, $SD = 9.96$, respectively), $t(175) = 0.236$, $p = 0.814$, $t(175) = 0.495$, $p = 0.621$, and $t(175) = 1.05$, $p = 0.296$, respectively. Thus, gender differences were not explored in the succeeding analyses.

Findings from a one-way ANOVA indicated significant differences in dyadic adjustment scores and IUS between those currently in a relationship (i.e., married and cohabitating) ($M = 106.74$, $SD = 17.44$ and $M = 76.91$, $SD = 21.41$, respectively) and those not currently in a relationship (i.e., single, divorced, separated, and widowed) ($M = 99.98$, $SD = 19.41$ and $M = 83.23$, $SD = 20.24$, respectively), $F(177) = 5.86$, $p = 0.017$ and $F(177) = 4.09$, $p = 0.045$, respectively. Thus, relationship status was included as a covariate in the proceeding analyses.

Another one-way ANOVA showed no significant effect of age on DAS ($F(46,130) = 0.546$, $p = 0.990$), IUS ($F(46,130) = 1.12$, $p = 0.301$), and ASI scores ($F(46, 130) = 1.15$, $p = 0.266$). Furthermore, results from the factorial ANOVA indicated the presence of a main effect for SAD, such that there was significantly lower dyadic adjustment among individuals with SAD ($M = 98.82$, $SE = 3.617$) compared to those without ($M = 105.289$, $SE = 4.332$), $F(1, 171) = 5.128$, $p = 0.025$, $\eta_p^2 = 0.029$.

Table 1. Demographic and psychiatric characteristics of the sample ($N = 185$).

| | <i>N</i> (%) |
|------------------------------|--------------|
| Relationship Status | - |
| Single | 83 (44.9%) |
| Married | 56 (30.3%) |
| Cohabiting | 23 (12.4%) |
| Separated | 10 (5.4%) |
| Divorced | 5 (2.7%) |
| Widowed | 2 (1.1%) |
| Psychiatric Diagnoses | - |
| MDD | 25 (13.5%) |
| PD | 58 (31.4%) |
| Agoraphobia | 25 (13.5%) |
| SAD | 121 (65.4%) |
| OCD | 39 (21.1%) |
| GAD | 141 (76.2%) |
| Specific Phobia | 9 (4.9%) |
| ADHD | 37 (20.0%) |

Note. MDD, Major Depressive Disorder; PD, Panic Disorder; SAD, Social Anxiety Disorder; OCD, Obsessive Compulsive Disorder; GAD, Generalized Anxiety Disorder; ADHD, Attention-Deficit Hyperactivity Disorder.

Primary Analysis

A partial correlation was performed, with Bonferroni corrections, to examine the relationship between DAS, ASI, IUS, and BAI, while controlling for relationship status. The correlations between DAS and ASI, $r(173) = -0.018$, $p = 0.818$, and DAS and BAI, $r(173) = -0.014$, $p = 0.850$, were not found to be statistically significant. The correlation between DAS and IUS, $r(173) = -0.248$, $p < 0.001$, ASI and IUS, $r(173) = 0.351$, $p < 0.001$, ASI and BAI, $r(173) = 0.527$, $p < 0.001$, and IUS and BAI, $r(173) = 0.329$, $p < 0.001$,

were found to be statistically significant (Table 2). Condition indices (condition index < 20) and tolerance values (tolerance > 0.6) were within the acceptable range for each model.

The results from the moderated regression (Table 3) revealed Model 1 was not significant and accounted for 2.2% of the variance in dyadic adjustment. Therefore, no significant effect of relationship status on dyadic adjustment was found. Model 2 was significant and accounted for 6.9% of the variance in dyadic adjustment. IUS was significantly linked to the degree of dyadic adjustment such that higher IUS was associated with lower DAS; however, ASI and BAI were both insignificantly associated with dyadic adjustment. Model 3 was not significant and accounted for an additional 1.6% of the variance. Therefore, IUS does not significantly moderate the relationship between ASI and BAI and dyadic adjustment, rejecting the initial hypothesis. To achieve a more parsimonious model, subsequent analyses were run without the interaction term.

Table 2. Bivariate pearson correlations between variables of interest.

| Variable | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------|----------|-----------|------|--------|------------|-----------|--------|-----------|
| 1. DAS | 103.89 | 17.57 | 1.00 | -0.023 | -0.253 *** | -0.013 | -0.066 | 0.050 |
| 2. ASI | 26.34 | 12.97 | - | 1.00 | 0.351 *** | 0.538 *** | 0.028 | -0.007 |
| 3. IUS | 79.92 | 20.62 | - | - | 1.00 | 0.317 *** | 0.013 | 0.008 |
| 4. BAI | 14.28 | 10.49 | - | - | - | 1.00 | 0.088 | 0.081 |
| 5. ASI × IUS | 94.94 | 255.09 | - | - | - | - | 1.00 | 0.568 *** |
| 6. BAI × IUS | 70.25 | 234.65 | - | - | - | - | - | 1.00 |

*** $p < 0.001$; Note. ASI, Anxiety Sensitivity Index; IUS, Intolerance of Uncertainty Scale; BAI, Beck Anxiety Inventory.

Table 3. Moderated regression analyses: IUS as a moderator between anxiety dimensions and dyadic adjustment.

| - | <i>b</i> | <i>SE</i> | β | <i>t</i> | ΔF | ΔR^2 | R^2 |
|---------------------|----------|-----------|------------|----------|------------|--------------|----------|
| Model 1 | - | - | - | - | 3.845 | 0.022 | 0.022 |
| Relationship Status | 5.178 | 2.641 | 0.147 | 1.961 | - | - | - |
| Model 2 | - | - | - | - | 4.356 | 0.069 | 0.091 ** |
| ASI | 0.068 | 0.120 | 0.051 | 0.569 | - | - | - |
| IUS | -0.244 | 0.068 | -0.289 *** | -3.602 | - | - | - |
| BAI | 0.084 | 0.147 | 0.050 | 0.570 | - | - | - |
| Model 3 | - | - | - | - | 1.476 | 0.016 | 0.107 |
| ASI | 0.076 | 0.120 | 0.056 | 0.631 | - | - | - |
| IUS | -0.245 | 0.068 | -0.288 *** | -3.622 | - | - | - |
| BAI | 0.082 | 0.147 | 0.049 | 0.560 | - | - | - |
| ASI × IUS | -0.011 | 0.007 | -0.141 | -1.585 | - | - | - |
| BAI × IUS | 0.009 | 0.006 | 0.129 | 1.443 | - | - | - |

*** $p < 0.001$, ** $p < 0.01$; Note. ASI, Anxiety Sensitivity Index; IUS, Intolerance of Uncertainty Scale; BAI, Beck Anxiety Inventory.

Dyadic Adjustment Subscales: Satisfaction, Cohesion, Consensus, and Affectional Expression

A series of multiple regressions were performed to determine whether the relationship between the IUS, ASI, BAI, and dyadic adjustment varies based on the domain of the DAS. The overall models (Table 4) for the DAS consensus and satisfaction subscales were significant and accounted for

7.3% and 9.9% of the variance respectively. Across both significant models, higher IUS was associated with lower DAS.

Table 4. Multiple regression analyses: anxiety correlates and DAS subscales.

| | <i>b</i> | <i>SE</i> | β | <i>t</i> | <i>p</i> -Value | <i>F</i> | <i>R</i> ² | <i>p</i> -Value |
|--|----------|-----------|---------|----------|-----------------|----------|-----------------------|-----------------|
| Satisfaction (<i>n</i> = 179) | - | - | - | - | - | 4.588 | 0.073 | 0.004 ** |
| ASI | 0.046 | 0.051 | 0.079 | 0.902 | 0.368 | - | - | - |
| IUS | -0.106 | 0.029 | -0.293 | -3.705 | <0.001 *** | - | - | - |
| BAI | 0.047 | 0.062 | 0.066 | 0.753 | 0.452 | - | - | - |
| Cohesion (<i>n</i> = 182) | - | - | - | - | - | 1.375 | 0.023 | 0.252 |
| Consensus (<i>n</i> = 176) | - | - | - | - | - | 6.291 | 0.099 | <0.001 *** |
| ASI | -0.014 | 0.050 | -0.024 | -0.278 | 0.782 | - | - | - |
| IUS | -0.116 | 0.028 | -0.326 | -4.135 | <0.001 *** | - | - | - |
| BAI | 0.095 | 0.061 | 0.135 | 1.555 | 0.122 | - | - | - |
| Affectional Expression (<i>n</i> = 173) | - | - | - | - | - | 0.017 | 0.000 | 0.997 |

*** $p < 0.001$, ** $p < 0.01$; Note. ASI, Anxiety Sensitivity Index; IUS, Intolerance of Uncertainty Scale; BAI, Beck Anxiety Inventory.

Anxiety Disorder-Specific Patterns in Dyadic Adjustment

We performed a final series of multiple regressions to assess anxiety disorder-specific patterns in dyadic adjustment. The overall models (Table 5) were significant for GAD, Agoraphobia, and PD subgroups (9.7%, 31.3%, 19.4% of the variance, respectively) and approached statistical significance for SAD (accounted for 6.4% of the variance). Diverging findings were evident such that lower IUS was significantly associated with higher dyadic adjustment among individuals with GAD and Agoraphobia, aligning with what was hypothesized. However, this was also accompanied by ASI in PD, indicating that IUS and ASI are significantly associated with dyadic adjustment among individuals with PD, supporting our hypothesis. More, specifically, lower IUS and higher ASI were associated with greater dyadic adjustment among individuals with PD.

Table 5. Multiple regression analyses: indicators of dyadic adjustment across anxiety disorders.

| | <i>b</i> | <i>SE</i> | β | <i>t</i> | <i>p</i> -Value | <i>F</i> | <i>R</i> ² | <i>p</i> -Value |
|------------------------------------|----------|-----------|---------|----------|-----------------|----------|-----------------------|-----------------|
| GAD (<i>n</i> = 141) | - | - | - | - | - | 4.881 | 0.097 | 0.003 ** |
| ASI | 0.167 | 0.147 | 0.111 | 1.138 | 0.257 | - | - | - |
| IUS | -0.293 | 0.087 | -0.302 | -3.349 | 0.001 *** | - | - | - |
| BAI | -0.156 | 0.176 | -0.088 | -0.887 | 0.377 | - | - | - |
| OCD (<i>n</i> = 39) | - | - | - | - | - | 2.419 | 0.172 | 0.083 |
| ASI | 0.666 | 0.270 | 0.507 | 2.468 | 0.019 * | - | - | - |
| IUS | -0.224 | 0.161 | -0.254 | -1.387 | 0.174 | - | - | - |
| BAI | -0.511 | 0.335 | -0.313 | -1.528 | 0.136 | - | - | - |
| SAD (<i>n</i> = 121) | - | - | - | - | - | 2.665 | 0.064 | 0.051 |
| ASI | 0.150 | 0.153 | 0.105 | 0.984 | 0.327 | - | - | - |
| IUS | -0.235 | 0.091 | -0.258 | -2.592 | 0.011 * | - | - | - |
| BAI | -0.080 | 0.199 | -0.043 | -0.403 | 0.688 | - | - | - |
| Agoraphobia (<i>n</i> = 25) | - | - | - | - | - | 3.192 | 0.313 | 0.045 * |
| ASI | 0.607 | 0.314 | 0.405 | 1.933 | 0.067 | - | - | - |
| IUS | -0.661 | 0.235 | -0.707 | -2.812 | 0.010 ** | - | - | - |
| BAI | 0.315 | 0.482 | 0.156 | 0.654 | 0.520 | - | - | - |
| PD (<i>n</i> = 58) | - | - | - | - | - | 4.339 | 0.194 | 0.008 ** |
| ASI | 0.416 | 0.202 | 0.316 | 2.057 | 0.045 * | - | - | - |
| IUS | -0.395 | 0.119 | -0.454 | -3.329 | 0.002 ** | - | - | - |
| BAI | -0.056 | 0.262 | -0.033 | -0.212 | 0.833 | - | - | - |

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$; Note. GAD, Generalized Anxiety Disorder; OCD, Obsessive Compulsive Disorder; SAD, Social Anxiety Disorder; PD, Panic Disorder; ASI, Anxiety Sensitivity Index; IUS, Intolerance of Uncertainty Scale; BAI, Beck Anxiety Inventory.

DISCUSSION

Several key findings were derived from the study. Firstly, IU was significantly associated with dyadic adjustment beyond an individual's anxiety severity and sensitivity. The relational uncertainty theory postulates an increased risk for negative evaluations of relationship quality when several components of a relationship are perceived as less certain [40]. Moreover, in a nonclinical population, Knobloch et al. [64] found that when an individual was experiencing relational uncertainty, they interpreted their partner's behavior as less fond and more hostile. This negative perception may lead to misinterpretation and skewed views about the partner as a contributor to dysfunction perpetuating disagreement and resentment.

Additionally, researchers have begun to explore the neural mechanisms underlying attachment bonds, specifically those between romantic partners. Findings presented by Eisenberger and colleagues [65], demonstrated that the presence of an attachment figure during a threatening experience, in this case physical pain caused by a heat stimuli, triggered increased neural activity in the ventromedial prefrontal cortex (VMPFC), a region associated with safety signaling [65]. These findings are supported by data presented by Morriss et al. [66] showing that being with a romantic partner during a task with the potential to receive a shock led to less activation of the amygdala and greater activity in the subgenual anterior cingulate cortex and the VMPFC compared to being with a friend [66]. Thus, these studies highlight that an attachment figure may trigger the recruitment of neural circuits responsible for pain reduction, leading to a greater sense of safety and security. However, the degree to which an attachment figure, particularly a romantic partner, can evoke a sense of safety in their partner may be impacted by the quality of the partner relationship. Coan et al. [67] demonstrated an increased perception of and response to threatening circumstances among individuals with poorer dyadic adjustment compared to individuals with increased dyadic adjustment, as seen through increased activation of the right anterior insula, superior frontal gyrus, and hypothalamus under instances of threat. Thus, it could be suggested that individuals with lower dyadic adjustment would struggle more with self-regulation or require additional support in threatening or uncertain situations even in the presence of a romantic partner. This becomes important given the mechanism by which IU may affect romantic relationship quality is its influence on excessive reassurance-seeking [68,69]. Specifically, individuals high in IU typically engage in maladaptive strategies (e.g., excessive reassurance-seeking) to mitigate uncertainty and temporarily reduce distress. Clark and colleagues [68] demonstrated that IU mediated the relationship between

attachment anxiety and threat-related reassurance-seeking, suggesting that reassurance-seeking may reflect “hyperactivating attachment behavior.” Thus, patients who are intolerant of uncertainty may require excessive and frequent assurance from their partners, for a variety of issues including their worthiness or “lovableness”, ultimately to combat their abandonment-related fears. However, this behavioral pattern can be conceptualized as eventually having more difficulty in effectively diminishing IU and reducing attachment anxiety, resulting in poor relationship quality and persistence of anxiety symptoms.

Secondly, our results indicated that IU is associated with dyadic adjustment in several anxiety disorders. This finding aligns with previous work suggesting IU is not limited to worry-predominant disorders (e.g., GAD) but rather reflects a general vulnerability that cuts across diagnostic boundaries [70]. Aligning with our hypothesis, higher IU was associated with greater dyadic adjustment among individuals with GAD, PD, and Agoraphobia. In GAD, this relationship may result from the experiential avoidance in response to the internal experience evoked by uncertainty [71]. In turn, due to the previously identified “emotion-amplifying” effects of experiential avoidance [72], an individual who engages in avoidance may experience a heightened affective response to a provocation that subsequently increases conflict. Furthermore, across GAD, PD, and Agoraphobia, IU may be related to a preference of avoiding negative relationship outcomes including disputes and separation. The approach-avoidance motivational perspective differentiates between avoidance and approach relationship goals [73]. Individuals who are predominately avoidance oriented, and thus less focused on fostering positive experiences, are likely to have a relationship with decreased satisfaction over time [74].

Simultaneously, there may be subtleties in the relationship between IU and dyadic adjustment in GAD, PD, and Agoraphobia that were not captured by this study. Previous research has indicated prospective IU, or the desire for predictability, is a mechanism by which neuroticism is related to GAD, and inhibitory IU, or the hindered capacity of acting when faced with uncertainty, is linked to PD and Agoraphobia [38]. Moreover, situation-based IU or IU concerning a particularly aversive circumstance (e.g., social gathering for SAD) appears to be an important factor in individuals with Agoraphobia and PD [75]. This demonstrated that situation-specific IU did not predict worry above and beyond the contributions of trait IU [75]. Therefore, the anticipatory response to general ambiguity might drive dyadic adjustment in individuals with GAD and the avoidance or inaction confined to certain contexts may be related to poor adjustment in those with Agoraphobia and PD.

Examining the association between anxiety correlates and dyadic adjustment also revealed differences between anxiety disorders. For individuals with PD, AS was significantly related to dyadic adjustment, supporting our hypothesis. However, an unforeseen finding was that

higher AS was associated with better dyadic adjustment. One possible explanation for the positive relationship between AS and dyadic adjustment is rooted in the stress generation hypothesis [76]. The stress generation hypothesis states that individuals with depression are prone to dependent (i.e., partially due to the individual) life stress because of their beliefs, expectations, and biases [76]. Despite its origins in explaining depression recurrence, the stress generation hypothesis has been extended to encompass a broader range of externalizing and internalizing psychopathology [77]. Conway and colleagues [77] linked PD to a stress inhibition effect, whereby the presence of the condition reduces interpersonal conflict as opposed to the increased stressful life events thought to arise from depression. Furthermore, the symptoms of PD, including heightened AS, are often isolated and intensifies rapidly. As a result, those with PD possibly only seek infrequent and momentary support from their partners. In contrast to the partner burnout that may result from the more enduring comfort required in other anxiety disorders, this brief support might function to enhance perceived dyadic adjustment.

The overall model for OCD was not significant, which may be explained by the limited relationship between OCD and IU. In a study conducted using a non-clinical sample, Dugas et al. [60] found only a moderate association between IU and OCD symptoms. Another study conducted with a clinical population found that IU predicted worry and GAD symptoms but did not predict OCD symptoms [78].

As for SAD, the overall model approached statistical significance. This may be resultant from the exclusion of other psychological factors that are salient to SAD. For example, previous research utilizing similar constructs demonstrated that fear of negative and positive evaluation accounted for greater variance in SAD symptoms than AS and IU [79], perhaps in part explaining our results.

While past literature emphasized gender differences in both anxiety and evaluations of relationship quality, comparable levels of dyadic adjustment, IU, ASI, and BAI were found for men and women. Whisman et al. [80] noted similar results wherein husbands and wives with either depression or anxiety shared equivalent levels of relationship satisfaction. Therefore, although specific genders may exhibit different anxiety symptomatology, it appears that the presence of psychopathology, irrespective of gender, is a prominent component contributing to changes in dyadic adjustment. Additionally, previous studies have highlighted the differences in the perceptive and evaluative nature of dyadic adjustment across gender, such that women's dyadic adjustment can be largely predicted through the evaluation of the self and their own wellbeing, while dyadic adjustment in men is largely informed by their evaluation or perception of their partner's wellbeing and capabilities within the relationship [16,81]. Thus, it may be that gender differences are not displayed through distinct levels of dyadic adjustment but rather in the

perceptive nature of dyadic adjustment and relationship quality [42,44,81]. Although we found no relationship in gender across the variables in question, it may be prudent for future studies to investigate and replicate such findings. Additionally, it is important to acknowledge the limitation in the current literature gathered on dyadic adjustment, such that a majority pertain mostly to heterosexual, monogamous, long-term relationships. Thus, the increased exploration of various relationship orientations, inclusive of homosexual, non-monogamous, and short-term relationships, should be considered in future studies examining dyadic adjustment.

Another key finding from this study is the relationship between IU and dyadic adjustment appearing to be driven by the satisfaction and consensus subscales. Arguably, a factor underlying both the satisfaction and consensus subscales is effective communication between partners. As previously discussed, Knobloch et al. [64] demonstrated that when faced with relational uncertainty, individuals tend to perceive their partner as less attentive throughout conversations, ultimately impeding on the ability to engage in healthy dialect and reducing satisfaction [82]. Moreover, Cramer [83] found that relationship satisfaction was correlated with partner consensus and together they produced lower levels of conflict. Due to the intertwined nature of relationship satisfaction and consensus, and their connection to communication, it is not surprising that we observed a significant relationship between IU and the satisfaction and consensus subscales.

CONCLUSIONS

Study Limitations

This study contained several limitations that should be considered for meaningful interpretation of the results. Firstly, only the perspective of one individual within a couple was assessed, as opposed to both partners, resulting in the inability to incorporate the partner's viewpoint. This information may supplement our findings by allowing for control of other potential contributors to dyadic adjustment. Additionally, the study does not include a healthy control group, and the patient cohort selected for this study made it difficult to disentangle the influence of specific anxiety disorders since there was a high level of comorbidity within the sample. While not unexpected in real-world psychiatric outpatient samples, narrowing the selection criteria to patients with one anxiety disorder at the time of data collection could possibly mitigate this issue. Furthermore, as data for this study was collected from an established archival dataset, demographic information was limited and did not include information on race, ethnicity, sexual orientation, income, and socioeconomic status. Demographic information, including duration of relationship or relationship orientation, may provide important insight into marital satisfaction; thus, it is an important limitation to consider. Finally, as this

sample is derived from a real-world, community situated, outpatient clinic population, a sizable limitation is the inability to discern anxiety disorder specific patterns relating to dyadic adjustment. However, as much of the psychiatric population endures multiple comorbid disorders, our findings serve as real-world data which further informs clinicians of more specified psychotherapeutic approaches relevant to their patients.

Future Directions

Future research might consider additional factors central to romantic relationships, such as temperament, attachment styles, and comorbid psychiatric disorders. It is also important to assess anxiety and dyadic adjustment in a more diverse sample (e.g., individuals from the LGBTQ2+ community), as our findings do not necessarily translate uniformly across populations. Relatedly, replication of this study using a larger sample size with the ability to create more distinctive anxiety-disorder specific groups is required to validate findings. Due to this study's support for IU in romantic relationship contexts, it is of interest to consider how different components of IU (i.e., inhibitory IU) may influence the relationship. Finally, further longitudinal and prospective work is needed to provide a more refined representation of how IU and relationship quality interacts over time. For example, the relationship between anxiety disorders and dyadic adjustment may be better characterized as bidirectional such that the quality of the romantic relationships could also influence one's mental health stability.

Implications and Applications

Our findings contribute to the evolving knowledge base of the factors related to interpersonal functioning among individuals with anxiety. We demonstrated that IU was consistently associated with worsened relationship quality across the entire sample. IU in those with anxiety was closely linked to poor perceptions of the degree to which an individual feels content in the relationship and the extent to which they agree with their partner on important matters. While IU was associated with heightened dyadic adjustment in those with GAD and Agoraphobia, AS was related to improved perceived relationship quality in those with PD. Collectively, this study emphasizes the need to consider IU as a potential mechanism underlying the co-occurrence of anxiety and dysfunctional romantic relationships. Ultimately, these results help guide effective treatment approaches and facilitate the prevention of persistent anxious symptoms resulting from the reciprocal interaction between anxiety and interpersonal stress. Moreover, careful reflection of the nuanced patterns in dyadic adjustment rooted in unique anxiety disorder symptomatology is required to inform individualized treatment and identify subgroups at heightened risk for poor romantic outcomes.

ETHICAL STATEMENT

Ethics Approval

The study was approved by Optimum Clinical Research Inc. Ethics Review Board (File NO. 575, date of approval: March 22, 2007). Additionally, regarding the Informed Consent Statement, informed consent was obtained from all subjects involved in the study. All new patients referred between 2011 and 2015 were eligible for participation. Patients were informed that participation was voluntary and that access to treatment was not dependent on providing data for future analyses. All participants met the age of consent in Canada (i.e., 16 years) and provided written consent to agree for their data to be anonymized and added to a database for future research purposes.

Declaration of Helsinki STROBE Reporting Guideline

This study adhered to the Helsinki Declaration. The Strengthening the Reporting of Observational studies in Epidemiology (STROBE) reporting guideline was followed.

DATA AVAILABILITY

The dataset of the study is available from the authors upon reasonable request due to privacy.

AUTHOR CONTRIBUTIONS

Conceptualization, MAK, TS, IE, SL; Methodology, ET, AG, GM, TS, MAK; Software, OR; Validation, KF (Kathryn Fotinos), SL, TS, IE, and MAK; Formal Analysis, ET and AG; Data Curation, GM, OR, and KF (Kaitlyn Ferreira); Writing—Original Draft Preparation, ET, AG, and GM; Writing—Review & Editing, ET, AG, SL, KF (Kathryn Fotinos), TS, IE, and MAK; Visualization, ET; Supervision, TS, IE, and MAK; Project Administration, ET, AG, and GM.

CONFLICTS OF INTEREST

Martin Katzman reports a relationship of employment and non-financial support with S.T.A.R.T Clinic for Mood and Anxiety Disorders. Martin Katzman reports a relationship of employment with Adler Graduate Professional School, NOSM University, and Lakehead University. Martin Katzman reports a relationship of consulting or advisory and funding grants with AbbVie Inc, Eisai Co Ltd, Canopy, Janssen Pharmaceuticals Inc, Idorsia, and Lundbeck. Martin Katzman reports a relationship of consulting or advisory and travel reimbursement with Otsuka Pharmaceutical Co Ltd, Pfizer Inc, Elvium/Purdue Pharma LP, Takeda Pharmaceutical Company Limited, Eli Lilly, Knightsbridge, Merck, Tilray Inc, Taro Pharma, Boehringer Ingelheim, and Bristol-Myers Squibb. Martin Katzman reports a relationship of funding grants with Genuine

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