



# Generalized Anxiety Disorder: Does the Emotion Dysregulation Model Predict Symptoms Beyond the Metacognitive Model?

Kendall A. Deleurme<sup>1</sup> · Sydney A. Parkinson<sup>1</sup> · Alexander M. Penney<sup>1</sup>

Accepted: 5 September 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022

## Abstract

While the Metacognitive Model (MCM) of generalized anxiety disorder (GAD) is well-established, the Emotion Dysregulation Model (EDM) of GAD has received less attention. This study examined whether the EDM helps explain GAD above and beyond the MCM. The influence of gender was also explored. A non-clinical university sample ( $N=626$ ) completed measures of GAD symptoms, worry severity, the MCM, and the EDM. In support of the EDM, it was found that fear of depression predicted GAD symptoms for men, while fear of anxiety predicted GAD symptoms for women. However, across genders, the strongest predictor of GAD symptoms and worry severity was negative beliefs about worry. While these findings support the MCM view that holding the beliefs that worry is harmful and dangerous is the strongest predictor of GAD overall, incorporating aspects of the EDM into our understanding and treatment of GAD may be beneficial.

**Keywords** Generalized anxiety disorder · Metacognition · Emotion dysregulation · Negative beliefs about worry · Fear of emotion · Gender differences

## Introduction

Generalized anxiety disorder (GAD) consists of excessive anxiety and uncontrollable worry lasting at least six months, with the worry not limited to a single type or context (American Psychiatric Association, 2013). It has been estimated that GAD has a 1–2% past-year and a 3–6% lifetime prevalence rate (Alegria et al., 2010), with women being twice as likely as men to receive a diagnosis (Eaton et al., 2012). There are a number of cognitive-behavioral models of GAD, two of which are the Metacognitive Model (MCM; Wells, 1995) and the Emotional Dysregulation Model

---

✉ Alexander M. Penney  
alexander.penney@macewan.ca

<sup>1</sup> Department of Psychology, MacEwan University, Edmonton, AB, Canada

(EDM; Mennin et al., 2002). Further information regarding the other cognitive-behavioural models of GAD, such as the Cognitive Avoidance Model, the Intolerance of Uncertainty Model, and the Acceptance-Based Model, can be found in Behar et al. (2009) and McCabe-Bennett et al. (2018).

The MCM (Wells, 1995) has extensive empirical support (McCabe-Bennett et al., 2018). This model focuses on how metacognitions, the thoughts that an individual has towards their own thoughts and thought process, play a role in GAD. Within the MCM, both positive beliefs about worry (i.e., believing that worry is beneficial) and negative beliefs about worry (i.e., believing that worry is uncontrollable and dangerous) are believed to contribute to the development and maintenance of GAD. However, it is negative beliefs about worry, and the resulting meta-worry, that are considered the most critical to GAD (Belloch et al., 2007; Davis & Valentiner, 2000; Ruscio & Borkovec, 2004; Wells & Carter, 1999, 2001). Individuals high in negative beliefs about worry think a lot about their worrying thoughts, and believe that they cannot ignore nor control their worrying thoughts. These negative beliefs about one's thinking are key in differentiating between individuals who chronically worry without experiencing significant GAD symptoms from individuals with significant GAD symptoms (Penney et al., 2013; Ruscio & Borkovec, 2004; Wells & Carter, 2001). However, some studies have also found that positive beliefs about worry independently contribute to worry and GAD symptoms even when negative beliefs about worry are accounted for (Khawaja & Chapman, 2007; Koerner et al., 2015). Further, the negative metacognitive belief that one needs to be in control of their thoughts at all times, has also been shown to mediate the relationship between chronic worry and GAD symptoms alongside negative beliefs about worry (Penney et al., 2013). This belief is measured separately from negative beliefs about worry and focuses on the belief that one needs to always control and constantly monitor their thoughts (Wells & Cartwright-Hatton, 2004). The negative belief that one needs to be in control of their thoughts focuses on thoughts more broadly, while the negative beliefs about worry focus more specifically on thoughts about worrying.

The EDM (Mennin et al., 2002) lacks the same degree of empirical support for its utility in explaining GAD compared to other models (McCabe-Bennett et al., 2018). While the MCM focuses on beliefs about worry in maintaining GAD symptoms, the EDM concentrates on beliefs about emotions and emotional dysregulation (Mennin et al., 2002). Specifically, the EDM suggests individuals with GAD experience emotions in higher intensity, are unable to distinguish between their emotions, and lack the strategies to regulate their emotions (Mennin et al., 2002, 2005). It is theorized that this dysregulation leads the individual to develop negative beliefs about their emotions and fear of their emotions, which refers to the apprehension of both losing control over one's emotions and one's reaction to experiencing intense emotions. Fear of emotions encompasses a range of emotions (e.g., anxiety, anger, positive emotions), and the EDM argues that fear of emotions overall contributes to GAD. However, individuals may have one or more specific fears, such as a fear of anxiety or a fear of depression. Due to a fear of emotional experiences, individuals with GAD then attempt to avoid their emotions through worry. However, the negative reinforcement of worry contributes to a continuous cycle of intense emotional experiences, anxiety due to emotions, and ongoing worry to control the anxiety, which

maintains the emotion dysregulation (Mennin et al., 2002). Additionally, previous research has shown that negative beliefs regarding fear, depression, anger, and positive emotions correlate with worry and GAD symptoms (Sugiura, 2017). The relationship between fear of emotions and GAD is consistent in the research and has been previously connected to avoidance of emotional experiences (Buhr & Dugas, 2012; Mennin et al., 2005; Roemer & Orsillo, 2002).

An emotion regulation approach to GAD may offer additional strategies for understanding and conceptualizing GAD beyond the primarily cognitive models, such as the MCM. Though emotions have been included in all major conceptualizations of GAD, the EDM proposes that emotion dysregulation and maladaptive beliefs about emotions are the driving factors in GAD. While the EDM focuses on the beliefs about one's emotions and fear of emotions, the MCM focuses on the beliefs about one's thoughts and worries. Although both models focus on the role of internal experiences and the interpretation of these experiences as the etiological and maintaining factors of GAD, the *type* of internal event that is emphasized by each model substantively differs.

Unfortunately, there are few published studies that included factors from both the EDM and MCM models. Recently, researchers have shown that strongly endorsing maladaptive metacognitive beliefs is associated with higher levels of emotional dysregulation (Akbari, 2017; Mazloom et al., 2016; Salguero et al., 2019). This suggests that individuals endorsing dysfunctional beliefs about their worry also hold negative beliefs regarding their emotions. Further, Sugiura (2017) demonstrated that while fear of emotions overall predicted worry severity, and that the more specific fear of anxiety predicted both worry severity and GAD symptoms, negative beliefs about worry had the strongest predictive power for both worry and GAD. These results not only provide support for the MCM, but also lend interest into further exploring the EDM in relation to the MCM. Researchers have also shown that worry severity was associated with an overall fear of emotions and the belief that one lacks control of their emotions, even when controlling for metacognitions (Stapinski et al., 2010). Finally, Salguero et al. (2019) found that while metacognitive beliefs are strongly related to both pathological worry and GAD symptoms, emotional dysregulation was only related to the emotional symptoms of GAD when metacognitive beliefs were controlled. While this literature demonstrates preliminary evidence for the contribution of both metacognitive beliefs and emotional dysregulation to worry and GAD symptoms, researchers have tended to not investigate specific beliefs within the EDM and MCM models. Researchers (e.g., Mennin et al., 2005; Salguero et al., 2019; Stapinski et al., 2010; Sugiura, 2017) have tended to use total/combined scores for EDM-associated measures, and have occasionally done so for MCM-associated measures, rather than examining specific subscale scores (e.g., total scores for fear of emotions have been commonly used rather than investigating the more specific subscales of fear of anxiety, fear of depression, fear of anger, etc.).

Additionally, despite differences in GAD prevalence between genders (Eaton et al., 2012), research examining if the predictors of GAD symptoms and worry severity differ by gender is lacking both in the field broadly, and in the EDM and MCM-related literature specifically (Bottesi et al., 2018). Although Well's (2005) investigation of the relationship between meta-worry and GAD found no

gender differences, others have argued that there is a need for additional investigation (Bottesi et al., 2018). Relevant to the EDM, Mennin and colleagues (2005) briefly mention that gender differences were found with fear of emotion, but specifics were not provided. In other investigations, gender-specific analyses were not reported (Salguero et al., 2019; Stapinski et al., 2010; Sugiura, 2017).

## Aims of the Study

As discussed, while emotions have been included in all major conceptualizations of GAD, the EDM proposes that emotion dysregulation and maladaptive beliefs about emotions are the driving factors in GAD. However, evidence providing support for this claim is lacking (Mennin et al., 2005; Stapinski et al., 2010; Sugiura, 2017). Of the various models of GAD available, the EDM lacks the same degree of empirical support and there is a lack of research comparing the EDM to other more established models of GAD (McCabe-Bennett et al., 2018). In demonstrating the EDM's utility, it is critical to compare it to models that have been established in the literature, such as the MCM. We elected to specifically examine the MCM and EDM models of GAD due to their similarity in focusing on the interpretation of one's internal experiences, yet key differences in which internal experiences are focused on. We also focused on these two specific models of GAD due to the existence of the limited previous research that has demonstrated that factors from the MCM and EDM may independently contribute to GAD symptoms.

The present exploratory study aimed to examine the utility of the EDM as a conceptualization for GAD by investigating whether the EDM was predictive of GAD symptoms and worry above and beyond the MCM. Further, the present study extended current literature by investigating the specific components of both the EDM and MCM (i.e., subscale scores). Given the previous literature, it was hypothesized that fear of emotions would account for unique variance in GAD symptoms and worry severity, though it was also expected that negative beliefs about worry would be the strongest predictor of GAD symptoms and worry severity. Finally, potential gender differences were explored, helping to fill a gap of gender-focused analyses in the GAD field (Bottesi et al., 2018). Given the exploratory nature, no gender-specific hypotheses were formulated.

## Method

### Participants

A non-clinical sample of 626 undergraduates at a Canadian university participated. There were no inclusion or exclusion criteria. The sample was primarily Caucasian (53.7%) and female (71.7%), with a mean age of 22.21 years ( $SD = 6.06$ ).

## Procedure

The institution's Research Ethics Board (REB Reference Number 16-17-079) approved this study on May 29, 2017. Students were recruited through an online portal available to students enrolled in psychology courses at the university. Participants completed the study online to earn up to 2% course credit. Informed consent was obtained from all participants. Consenting participants completed a demographics form, followed by the remaining self-report questionnaires in random order. As part of the first author's undergraduate honours thesis, based on convenience, 384 participants were initially recruited from July 2017 to January 2018. Subsequently, in March 2020, due to the COVID-19 pandemic, there was a need to re-open online research studies so that students in Introductory Psychology courses could earn their required research participation credits. Therefore, this study was re-approved by the institution's Research Ethics Board (REB File Number 100139) on March 20, 2020, and the study was re-opened until June 2020. Data from another 242 participants was collected at this time. Independent samples *t*-tests were conducted, which found no significant differences between the samples on any of the measures discussed below, so the data was combined to yield a total sample of 626 participants.

## Measures

### Generalized Anxiety Disorder 7-Item Scale (GAD-7; Spitzer et al., 2006)

The GAD-7 is a seven-item self-report questionnaire of GAD symptoms. Total scores range from 0 to 21, with higher scores indicating increased GAD symptoms. The GAD-7 displays excellent internal consistency and good convergent validity, as well as strong factorial and construct validity (Mills et al., 2014; Spitzer et al., 2006).

### Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990)

The PSWQ is a 16-item self-report questionnaire that measures one's tendency to engage in worry. Total scores range from 16 to 80, with higher scores suggesting more pathological worry. The PSWQ demonstrates strong internal consistency (Brown et al., 1992; Meyer et al., 1990). Additionally, the PSWQ has high convergent, discriminant, and construct validity (Brown et al., 1992).

### Metacognitions Questionnaire-30 (MCQ-30; Wells & Cartwright-Hatton, 2004)

The MCQ-30 is a 30-item self-report questionnaire measuring various metacognitions. The subscales of the MCQ-30 include: lack of cognitive confidence; cognitive self-consciousness; positive beliefs about worry (MCQ-PB; e.g., I need to worry in order to remain organized); negative beliefs about uncontrollability and danger of worry (MCQ-NB; e.g., My worrying is dangerous for me); and need to control thoughts (MCQ-NC; e.g., I should be in control of my thoughts all of the time).

Total scores on each subscale range from 6 to 24, with higher scores indicating increased maladaptive metacognitions. Only the MCQ-PB, MCQ-NB, and MCQ-NC were used in the analyses, as the literature has indicated that only these three subscales are uniquely related to GAD symptoms and worry. The MCQ-30 shows good internal consistency, good convergent validity, and construct validity (Typaldou et al., 2010; Spada et al., 2008; Wells & Cartwright-Hatton, 2004).

### **Berkeley Expressivity Questionnaire (BEQ; Gross & John, 1997)**

The BEQ is a 16-item self-report questionnaire assessing one's emotional expressivity. The BEQ subscales include: positive expressivity (BEQ-POS; e.g., When I'm happy, my feelings show); negative expressivity (BEQ-NEG; e.g., It is difficult for me to hide my fear); and impulse strength (BEQ-IMP; e.g., My body reacts very strongly to emotional situations). Mean item scores were calculated for each subscale, with scores ranging from 1 to 7. Higher scores indicate greater expression of positive feelings (e.g., joy, happiness), negative feelings (e.g., fear, nervousness), and strong emotional reactions to experiences, which the individual finds difficult to control, respectively. The BEQ has good internal consistency, convergent and discriminant validity, and predictive validity (Gross & John, 1997).

### **Affective Control Scale (ACS; Williams et al., 1997)**

The ACS is a 42-item self-report questionnaire measuring fear of experiencing emotions, fear of losing control over emotions, and fear of one's behavioural response to emotion. The ACS includes four subscales: fear of anger (ACS-ANG; e.g., I'm afraid that I will hurt someone if I get really furious); fear of positive affect (ACS-PA; e.g., I can get too carried away when I am really happy); fear of anxiety (ACS-ANX; e.g., I get so rattled when I am nervous that I cannot think clearly); and fear of depression (ACS-DEP; e.g., I am afraid that I could go into a depression that would wipe me out). Subscale scores for the ACS-ANG and ACS-DEP range from 7 to 56 and subscale scores for the ACS-PA and ACS-ANX range from 7 to 91, with higher scores suggesting increased fear of one's emotions. The ACS demonstrates good convergent and discriminant validity (Berg et al., 1998; Williams et al., 1997).

### **Statistical Analyses**

All statistical analyses were conducted using IBM SPSS Statistics version 28. Pearson's  $r$  correlations were computed across all subscales for the full sample. Next, a hierarchical regression analysis was conducted using the full sample to examine which emotional dysregulation and metacognitive beliefs subscales predict worry. PSWQ scores were used as the dependent variable. Scores on the MCQ-PB, MCQ-NB, and MCQ-NC, were entered on the first step. To determine if factors associated with the EDM contributed above and beyond the MCM, the EDM factors of BEQ-POS, BEQ-NEG, BEQ-IMP, ACS-ANG, ACS-PA, ACS-ANX, and ACS-DEP were entered on the second step. Then, using the full sample, a hierarchical regression

was performed to examine which subscales predict GAD symptoms when controlling for worry. For this analysis, the GAD-7 scores were used as the dependent variable, with PSWQ scores entered on the first step. PSWQ scores were included on the first step to identify which MCM and EDM factors correspond to GAD symptoms specifically, rather than which subscales may be related to GAD symptoms only due to an association with non-clinical chronic worry, which was examined in the first regression equation. As with the prior analysis, MCQ-PB, MCQ-NB, and MCQ-NC scores were entered on the next step. Finally, scores from the BEQ-POS, BEQ-NEG, BEQ-IMP, ACS-ANG, ACS-PA, ACS-ANX, and ACS-DEP were entered on the third step. Both regression analyses were then re-conducted using data from either the male ( $n=168$ ) or female ( $n=449$ ) participants. Alpha was set to 0.025 for all analyses.

## Results

The mean scores across most of the scales were comparable to other student samples (see Table 1; Gross & John, 1997; Wells & Cartwright-Hatton, 2004; Williams et al., 1997). However, the mean score on the PSWQ was higher than other student samples (Meyer et al., 1990). Further, the mean score on the GAD-7 was also elevated compared to other student samples, though it was below the established clinical cut off score of 10 (Spitzer et al., 2006; Zhang et al., 2021). Independent samples *t*-tests revealed no significant differences between the full 2017–2018 sample and the full 2020 sample on any measure. However, independent sample *t*-tests revealed that male and female participants significantly differed on almost all of the measures (see Table 1). The female participants

**Table 1** Means and standard deviations for the full sample and male and female participants

Measure	Full Sample ( $N=626$ )		Men ( $n=168$ )		Women ( $n=449$ )		Men vs Women <i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
GAD-7	8.99	5.49	7.36	5.18	9.56	5.48	-4.51**
PSWQ	56.13	13.54	49.53	14.03	58.53	12.51	-7.67**
MCQ-PB	11.97	4.29	11.42	3.97	12.15	4.37	-1.89
MCQ-NB	14.00	4.82	12.69	4.65	14.43	4.77	-4.03**
MCQ-NC	12.61	3.38	13.14	3.45	12.38	3.31	2.50*
BEQ-POS	5.29	1.06	5.03	1.02	5.39	1.06	-3.76**
BEQ-NEG	3.79	1.05	3.42	0.98	3.93	1.03	-5.53**
BEQ-IMP	4.95	1.24	4.31	1.16	5.18	1.20	-8.04**
ACS-ANG	30.37	8.11	30.63	8.48	30.22	7.97	0.54
ACS-PA	41.50	10.72	42.33	10.85	41.00	10.65	1.36
ACS-ANX	49.98	13.22	45.77	13.74	51.34	12.73	-4.69**
ACS-DEP	29.28	10.31	27.20	10.04	29.84	10.23	-2.84**

\* $p < .025$ . \*\* $p < .01$

reported significantly higher scores on the GAD-7, PSWQ, MCQ-NB, BEQ-POS, BEQ-NEG, BEQ-IMP, ACS-ANX, and ACS-DEP, while male participants reported significantly higher scores on the MCQ-NC. All measures demonstrated acceptable to excellent Cronbach's alphas. Significant bivariate correlations were observed between the PSWQ and the GAD-7 scores with the metacognitive and emotional dysregulation subscale scores. See the Supplementary Data for the Cronbach's alphas, some additional psychometric properties, and the Pearson's  $r$  correlations between the measures.

The first set of hierarchical regression analyses were performed using the full sample. A hierarchical regression analysis was performed to examine which measures uniquely predict worry, and to determine if the EDM factors contribute above and beyond the MCM factors. Total scores from the PSWQ were entered as the dependent variable. Subscale scores from the MCQ-30 were entered as predictor variables in Step 1 and subscale scores from the BEQ and ACS were entered as predictor variables in Step 2. Step 1 was significant, with MCQ-30 subscales accounting for 53.8% of the variance in PSWQ scores,  $F(3, 582) = 226.35, p < 0.001$  (see Table 2). For ease of presentation, Table 2, and each subsequent regression table, provides the statistical information for each variable that emerged as a significant predictor in each step (i.e., the non-significant predictors are excluded). Step 2 was also significant, and accounted for 8.8% of the variance,  $F_{change}(7, 575) = 19.26, p < 0.001$ . The MCQ-PB, MCQ-NB, BEQ-IMP, ACS-POS, and ACS-ANX were unique predictors of PSWQ scores in Step 2. Unexpectedly, ACS-POS scores were negatively associated with PSWQ scores, while the other factors had the expected positive associations.

A second regression analysis was conducted using the full sample to examine which measures uniquely predict GAD symptoms when controlling for worry. Total scores from the GAD-7 were entered as the dependent variable. PSWQ scores were entered on Step 1 and subscales from the MCQ-30 were entered as predictor variables on Step 2. Again, subscale scores from the BEQ and ACS were entered as predictor variables on Step 3 to determine if the EDM factors account for unique variance in GAD symptoms above and beyond the MCM factors. Step 1 was significant, with PSWQ scores accounting for 44.5% of the variance in GAD-7 scores,  $F(1, 584) = 468.31, p < 0.001$  (see Table 2). Step 2 was also significant, and accounted for 8.5% of the variance,  $F_{change}(3, 581) = 34.97, p < 0.001$ . Finally, Step 3 was significant, accounting for 4.4% of the variance,  $F_{change}(7, 574) = 8.48, p < 0.001$ . Specifically, the PSWQ, MCQ-NB, and ACS-ANX were unique predictors of the variance in GAD-7 scores in Step 3.

Next a series of regression analyses were performed to examine whether measures predicting worry and GAD differed depending on gender. First, hierarchical regressions were performed to determine which measures uniquely predict worry. Total scores from the PSWQ were entered as the dependent variable. Subscale scores from the MCQ-30 were entered as predictor variables in Step 1 and subscale scores from the BEQ and ACS were entered as predictor variables in Step 2.

*Males:* Step 1 was significant, with the MCQ-30 subscales accounting for 59.2% of the variance in PSWQ scores,  $F(3, 151) = 72.94, p < 0.001$  (see Table 3). Step 2 was also significant, accounting for an additional 6.9% of the variance,  $F_{change}(7,$



**Table 2** Summary of hierarchical regression analyses using the full sample

Variable	$R^2$	$R^2$ change	$\beta$	$t$	$pr$
<i>DV: PSWQ</i>					
Step 1	.538	.538**			
MCQ-PB			.105	3.51**	.14
MCQ-NB			.725	22.97**	.69
Step 2	.626	.088**			
MCQ-PB			.130	4.71**	.19
MCQ-NB			.478	12.76**	.47
BEQ-IMP			.182	4.80**	.20
ACS-POS			-.119	-3.72**	-.15
ACS-ANX			.319	7.61**	.30
<i>DV: GAD-7</i>					
Step 1	.445	.445**			
PSWQ			.667	21.64**	.68
Step 2	.530	.085**			
PSWQ			.376	8.99**	.35
MCQ-NB			.368	8.37**	.33
MCQ-NC			.089	2.72*	.11
Step 3	.574	.044**			
PSWQ			.292	6.56**	.26
MCQ-NB			.256	5.66**	.23
ACS-ANX			.141	3.00*	.12

$\beta$  = standardized regression coefficient;  $pr$  = partial correlation; *PSWQ* = Penn state worry questionnaire; *MCQ-NB* = negative beliefs about uncontrollability and danger of worry; *MCQ-PB* = positive beliefs about worry; *BEQ-IMP* = impulse strength; *ACS-POS* = fear of experiencing positive emotions; *ACS-ANX* = fear of experiencing anxiety; *GAD-7* = generalized anxiety disorder 7-item scale; *MCQ-NC* = need to control thoughts

\* $p < .025$ . \*\* $p < .01$

144) = 4.18,  $p < 0.001$ . Specifically, the MCQ-PB, MCQ-NB, and ACS-ANX subscales were found to uniquely predict PSWQ scores in Step 2.

*Females:* Step 1 was significant, with the MCQ-30 subscales accounting for 51.1% of the variance in PSWQ scores,  $F(3, 418) = 145.69, p < 0.001$  (see Table 4). Step 2 was also significant, accounting for an additional 9.7% of the variance,  $F_{change}(7, 411) = 14.60, p < 0.001$ . Specifically, the MCQ-PB, MCQ-NB, BEQ-IMP, ACS-POS, and ACS-ANX subscales were found to uniquely predict PSWQ scores in Step 2. As found in the full sample, ACS-POS unexpectedly emerged as a negative predictor of PSWQ scores.

Finally, separate regression analyses were performed for males and females to determine which measures uniquely predict GAD symptoms when controlling for worry. Total scores from the GAD-7 were entered as the dependent variable, with PSWQ scores entered on Step 1. Subscale scores from the MCQ-30 were entered

**Table 3** Summary of hierarchical regression analyses using the male data

Variable	$R^2$	$R^2$ change	$\beta$	$t$	$pr$
<i>DV: PSWQ</i>					
Step 1	.592	.592**			
MCQ-PB			.160	2.75**	.22
MCQ-NB			.733	12.38**	.71
Step 2	.661	.069**			
MCQ-PB			.165	2.97**	.24
MCQ-NB			.472	6.26**	.46
ACS-ANX			.317	3.26**	.26
<i>DV: GAD-7</i>					
Step 1	.424	.424**			
PSWQ			.651	10.62**	.65
Step 2	.545	.121**			
PSWQ			.274	3.17*	.25
MCQ-NB			.488	5.47**	.41
Step 3	.601	.056**			
MCQ-NB			.381	4.11**	.33
ACS-DEP			.221	2.36*	.19

$\beta$ =standardized regression coefficient;  $pr$ =partial correlation; *PSWQ*=Penn State worry questionnaire; *MCQ-PB*=positive beliefs about worry; *MCQ-NB*=negative beliefs about uncontrollability and danger of worry; *ACS-ANX*=fear of experiencing anxiety; *GAD-7*=generalized anxiety disorder 7-item scale; *ACS-DEP*=fear of experiencing depression

\* $p < .025$ . \*\* $p < .01$

as predictor variables on Step 2 and subscale scores from the BEQ and ACS were entered as predictor variables on Step 3.

*Males:* Step 1 was significant, with the PSWQ accounting for 42.4% of the variance in GAD-7 scores,  $F(1, 153) = 112.70$ ,  $p < 0.001$  (see Table 3). Step 2 was also significant, with the MCQ-30 subscales accounting for an additional 12.1% of the variance in GAD-7 scores,  $F_{change}(3, 150) = 13.24$ ,  $p < 0.001$ . Finally, Step 3 significantly accounted for an additional 5.6% of the variance,  $F_{change}(7, 143) = 2.86$ ,  $p < 0.008$ . Specifically, the MCQ-NB and ACS-DEP were found to uniquely predict GAD-7 scores in Step 3. PSWQ scores did not account for significant variance in GAD-7 scores in Step 3.

*Females:* Step 1 was significant with the PSWQ accounting for 42.9% of the variance in GAD-7 scores,  $F(1, 420) = 315.51$ ,  $p < 0.001$  (see Table 4). Step 2 was also significant, with the MCQ-30 subscales accounting for an additional 7.5% of the variance in GAD-7 scores,  $F_{change}(3, 417) = 21.06$ ,  $p < 0.001$ . Finally, Step 3 significantly accounted for an additional 5.0% of the variance,  $F_{change}(7, 410) = 6.58$ ,  $p < 0.001$ . Specifically, the PSWQ, MCQ-NB, and ACS-ANX were found to uniquely predict GAD-7 scores in Step 3.

**Table 4** Summary of hierarchical regression analyses using the female data

Variable	$R^2$	$R^2$ change	$\beta$	$t$	$pr$
<i>DV: PSWQ</i>					
Step 1	.511	.511**			
MCQ-NB			.695	17.96**	.66
Step 2	.608	.097**			
MCQ-PB			.117	3.53**	.17
MCQ-NB			.497	3.63**	.25
BEQ-IMP			.221	4.73**	.28
ACS-POS			-.141	-3.70**	-.18
ACS-ANX			.283	5.99**	.28
<i>DV: GAD-7</i>					
Step 1	.429	.429**			
PSWQ			.655	17.76**	.66
Step 2	.504	.075**			
PSWQ			.389	7.88**	.36
MCQ-NB			.332	6.39**	.30
MCQ-NC			.093	2.34*	.11
Step 3	.554	.050**			
PSWQ			.330	6.25**	.30
MCQ-NB			.214	3.99**	.19
ACS-ANX			.158	3.01**	.15

$\beta$  = standardized regression coefficient;  $pr$  = partial correlation; *PSWQ* = Penn state worry questionnaire; *MCQ-NB* = negative beliefs about uncontrollability and danger of worry; *MCQ-PB* = positive beliefs about worry; *BEQ-IMP* = impulse strength; *ACS-POS* = fear of experiencing positive emotions; *ACS-ANX* = fear of experiencing anxiety; *GAD-7* = generalized anxiety disorder 7-item scale; *MCQ-NC* = need to control thoughts

\* $p < .025$ . \*\* $p < .01$

## Discussion

The available evidence supporting the EDM, which proposes that emotion dysregulation and maladaptive beliefs about emotions cause and maintain GAD symptoms, is limited (Mennin et al., 2005; Stapinski et al., 2017; Sugiura, 2017). Alternatively, the MCM, which emphasizes negative beliefs about worry as the driving force in GAD, is well supported (Belloch et al., 2007; Davis & Valentiner, 2000; Penney et al., 2013; Ruscio & Borkovec, 2004; Wells & Carter, 2001; Wells, 1995). Empirically supported measures aligning with each model were included in the present study to investigate if components of the EDM predict worry and GAD symptoms, even when the MCM is accounted for. To the authors' knowledge, the present study is the first to focus on subscale scores of both MCM and EDM measures. Further, potential gender differences were examined to help address the lack of research in this area (Bottesi et al., 2018).

It was found that fear of anxiety and fear of depression significantly contributed to GAD even when metacognitive beliefs were accounted for, which aligns with previous findings suggesting that fear of emotions and perceived uncontrollability of emotions play a role in GAD symptoms and worry (Mennin et al., 2005; Stapinski et al., 2010; Sugiura, 2017). In particular, fear of anxiety emerged as a unique predictor of worry severity in both the full sample and across genders. This aligns with previous research connecting anxiety sensitivity (i.e., a fear of the potential consequences of anxiety to one's physiological, cognitive, and social functioning) to GAD and worry (Boswell et al., 2013; Intrieri & Newell, 2020; Naragon-Gainey, 2010). However, gender influenced the remaining relationships with emotion dysregulation. In the male subsample, while the fear of anxiety predicted worry, it was fear of depression that uniquely predicted GAD symptoms. This suggests that men with GAD symptoms fear that feelings of depression may overwhelm them and leave them unable to function. Amongst the female subsample, however, fear of anxiety uniquely predicted both GAD symptoms and worry severity. This suggests that women with GAD symptoms fear a loss of control over their mind and body due to their anxiety. The findings in the female subsample parallel the findings from the full sample, likely due to the greater proportion of females who participated in the study.

Additionally, impulse strength was also found to uniquely predict worry severity in the female subsample and full sample, further suggesting that women who chronically worry may believe that they have difficulty controlling their emotional reactions to events. Finally, a negative relationship was found between a fear of positive emotions and worry severity in the full sample, and amongst female participants specifically. It is unclear why such a relationship was found. One possibility is that women who are chronic worriers may report that they do not fear positive emotions because they would prefer to feel positive emotions over the negative affect that often accompanies their worrying. Alternatively, it may be that women who chronically worry rarely experience moments of high positive affect, and therefore do not feel the need to fear such emotional experiences. However, this negative association might instead be due to a statistical suppression effect (Thompson & Levine, 1997), rather than showing a true relationship between fear of positive emotions and worry severity. Further research will be needed to explore this potential relationship. Overall, while the specific emotion differed by gender, it appears that fear of emotions contributes to worry severity and GAD symptoms, even when maladaptive metacognitions are accounted for.

However, it is important to note that negative beliefs about worry emerged as a strong predictor of both GAD symptoms and worry severity in the full sample and in each gender subsample. Therefore, the present study adds support to the MCM conceptualization of GAD. Negative beliefs about worry have been consistently associated with GAD and worry (Penney et al., 2020) and must be considered a primary factor in the development and maintenance of GAD. Positive beliefs about worry also emerged as a predictor of worry, but not GAD symptoms, across genders. This aligns with the MCM (Wells, 2005) argument that positive beliefs about worry contribute to chronic worry without making a substantial contribution to GAD symptoms specifically. The findings for the metacognitive subscales used in the present study also support the position that gender does not influence the relationships

between metacognitions and GAD symptoms or worry (Spada et al., 2008; Wells, 2005).

The present results support a continued focus on metacognitions in treating GAD (Wells & Carter, 2001). Treatments emphasizing metacognitions have been demonstrated to be more effective than alternatives, including intolerance-of-uncertainty therapy (van der Heiden et al., 2012), cognitive behavioral therapy (Nordahl et al., 2018), and applied relaxation (Wells et al., 2010). However, the literature also suggests that emotion regulation therapy (Fresco et al., 2013), which incorporates concepts from cognitive behavioral therapy (Mennin et al., 2013), may also be effective. While research comparing emotion regulation therapy to other treatments is limited, what is available suggests that emotion regulation therapy is more effective than an attention control condition in improving GAD symptoms and worry (Mennin et al., 2018). Findings of the present study provide support for further exploring emotion regulation therapy, particularly in comparing it with alternative therapies, such as those focusing on metacognitions.

A comprehensive model and treatment approach that emphasizes the MCM, while including components of the EDM, may provide a more complete understanding of how GAD develops, is maintained, and best treated (Salguero et al., 2019). Given the present findings and existing literature, it appears that negative beliefs about worry and fear of emotions independently contribute to GAD symptoms and worry, and the theoretical accounts of GAD should incorporate both factors. Further, current treatment conceptualizations, which tend to be focused on problematic cognitions in GAD (McCabe-Bennett et al., 2018), may benefit from including additional psychoeducation regarding emotions, as well as the inclusion of strategies to decrease the fear of experiencing emotions. Indeed, when working with clients who have GAD, it may be helpful to include interventions that focus on the fear of depression for male clients versus the fear of anxiety for female clients. For example, interoceptive exposure with female clients may help reduce the fear of anxiety, particularly the fear of the physical sensations and expected loss of control due to anxiety. For male clients, on the other hand, cognitive restructuring may be useful to help these clients challenge their fear of depression and feelings of sadness. In addition, when working with chronic worriers who do not have GAD, targeting the fear of anxiety may be beneficial regardless of the client's gender.

A limitation of the present study was the sample obtained, which consisted of a non-clinical university population. However, researchers have argued that large undergraduate student samples are appropriate for understanding emotional disorders (Tull et al., 2008). Future researchers may wish to consider including data from community-based non-clinical populations, as well as clinical populations. Further, the sample was 71.1% female, which represents a limitation given that the study assessed differences between genders. Future researchers who wish to explore gender differences in GAD should aim to actively recruit male participants and should design their study with a goal of using moderation analyses, where gender is examined as a moderator between dysfunctional beliefs and GAD symptoms. Another limitation is that an a priori power analysis was not conducted, which would have helped clarify the appropriate sample size needed for the present study. The use of online self-report questionnaires is also a limitation.

## Conclusion

Overall, both negative metacognitions and fear of emotions appear to independently contribute to GAD symptoms and worry. Regarding the utility of the EDM in explaining what causes and maintains GAD symptoms, fear of emotions (a fear of depression for men, and a fear of anxiety for women) appears to be associated with GAD symptoms. However, while fears of anxiety and depression may contribute to GAD, negative beliefs about worry appear to be the driving factor. In addition to current CBT treatments for GAD targeting metacognitions, treatment outcomes may be improved by including interventions designed to decrease a fear of emotional experiences.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s10942-022-00479-7>.

**Author's Contribution** This manuscript is based on KAD's undergraduate honours thesis, which was supervised by AMP within the Department of Psychology at MacEwan University. KAD and AMP designed the study, collected the data, and assisted with data cleaning, data analysis, and manuscript preparation. SAP assisted with data cleaning, data analysis, and manuscript preparation. All authors contributed to and approved the final draft.

**Funding** No funding was received for the completion of this study.

**Data Availability** The datasets and/or analyses used during this study are available from the corresponding author upon reasonable request.

## Declarations

**Conflict of interest** The authors declare no competing interests.

**Ethical Approval and Informed Consent** The study was approved by the MacEwan University Research Ethics Board. All participants were shown an online consent form detailing the nature of the study prior to the completion of the questionnaires.

## References

- Akbari, M. (2017). Metacognitions or distress intolerance: The mediating role in the relationship between emotion dysregulation and problematic internet use. *Addictive Behavior Reports*, *6*, 128–133. <https://doi.org/10.1016/j.abrep.2017.10.004>
- Alegria, A. A., Hasin, D. S., Nunes, E. V., Liu, S., Davies, C., Grant, B. F., & Blanco, C. (2010). Comorbidity of generalized anxiety disorder and substance use disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry*, *71*(9), 1187–1195. <https://doi.org/10.4088/JCP.09m05328gry>
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th edition). <https://doi.org/10.1176/appi.books.9780890425596>.
- Behar, E., DiMarco, I. D., Hekler, E. B., Mohlan, J., & Staples, A. M. (2009). Current theoretical models of generalized anxiety disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders*, *23*(8), 1011–1023. <https://doi.org/10.1016/j.janxdis.2009.07.006>

- Belloch, A., Morillo, C., & Garcia-Soriano, G. (2007). Are the dysfunctional beliefs that predict worry different from those that predict obsessions? *Clinical Psychology and Psychotherapy*, *14*(6), 438–448. <https://doi.org/10.1002/cpp.551>
- Berg, C. Z., Shapiro, N., Chambless, D. L., & Ahrens, A. H. (1998). Are emotions frightening? II: An analogue study of fear of emotions, interpersonal conflict, and panic onset. *Behavior Research and Therapy*, *36*(1), 3–15. [https://doi.org/10.1016/s0005-7967\(97\)10027-4](https://doi.org/10.1016/s0005-7967(97)10027-4)
- Boswell, J. F., Farchione, T. J., Sauer-Zavala, S., Murray, H. W., Fortune, M. R., & Barlow, D. H. (2013). Anxiety sensitivity and interoceptive exposure: A transdiagnostic construct and change strategy. *Behaviour Therapy*, *44*(3), 417–431. <https://doi.org/10.1016/j.beth.2013.03.006>
- Bottesi, G., Martignon, A., Cerea, S., & Ghisi, M. (2018). Worry and associated cognitive features in Italian university students: Does gender make a difference? *Personality and Individual Differences*, *126*(1), 38–43. <https://doi.org/10.1016/j.paid.2018.01.016>
- Brown, T. A., Antony, M. M., & Barlow, D. H. (1992). Psychometric properties of the Penn State Worry Questionnaire in a clinical anxiety disorders sample. *Behavior Research and Therapy*, *30*(1), 33–37. [https://doi.org/10.1016/0005-7967\(92\)90093-v](https://doi.org/10.1016/0005-7967(92)90093-v)
- Buhr, K., & Dugas, M. J. (2012). Fear of emotions, experiential avoidance, and intolerance of uncertainty in worry and generalized anxiety disorder. *International Journal of Cognitive Therapy*, *5*(1), 1–17. <https://doi.org/10.1521/ijct.2012.5.1.1>
- Davis, R. N., & Valentiner, D. P. (2000). Does meta-cognitive theory enhance our understanding of pathological worry and anxiety? *Personality and Individual Differences*, *29*(3), 513–526. [https://doi.org/10.1016/S0191-8869\(99\)00211-1](https://doi.org/10.1016/S0191-8869(99)00211-1)
- Eaton, N. R., Keyes, K. M., Krueger, R. F., Balsis, S., Skodol, A. E., Markon, K. E., Grant, B. F., & Hasin, D. E. (2012). An invariant dimensional liability model of gender differences in mental disorder prevalence: Evidence from a national sample. *Journal of Abnormal Psychology*, *121*(1), 282–288. <https://doi.org/10.1037/a0024780>
- Fresco, D. M., Mennin, D. S., Heimberg, R. G., & Ritter, M. (2013). Emotion regulation therapy for generalized anxiety disorder. *Cognitive and Behavioral Practice*, *20*(3), 282–300. <https://doi.org/10.1016/j.cbpra.2013.02.001>
- Gross, J. J., & John, O. P. (1997). Revealing feelings: Facets of emotional expressivity in self-reports, peer ratings, and behavior. *Journal of Personality and Social Psychology*, *72*(2), 435–448. <https://doi.org/10.1037/0022-3514.72.2.435>
- Intrieri, R. C., & Newell, C. B. (2020). Anxiety sensitivity not distress tolerance as a predictor of generalized anxiety symptoms and worry. *Current Psychology*. <https://doi.org/10.1007/s12144-020-00636-0>
- Khawaja, N. G., & Chapman, D. (2007). Cognitive predictors of worry in a non-clinical population. *Clinical Psychologist*, *11*(1), 24–32. <https://doi.org/10.1080/13284200601151778>
- Koerner, N., Tallon, K., & Kusec, A. (2015). Maladaptive core beliefs and their relation to generalized anxiety disorder. *Cognitive Behavior Therapy*, *44*(6), 441–445. <https://doi.org/10.1080/16506073.2015.1042989>
- Mazloom, M., Yaghubi, H., & Mohammadkhani, S. (2016). Post-traumatic stress, symptoms, meta-cognitions, emotional schema, and emotion regulation: A structural equation model. *Personality and Individual Differences*, *88*, 94–98. <https://doi.org/10.1016/j.paid.2015.08.053>
- McCabe-Bennett, H., Fracalanza, K., & Antony, M. M. (2018). The psychological treatment of generalized anxiety disorder. In D. David, S. J. Lynn, & G. H. Montgomery (Eds.), *Evidence-based psychotherapy: The state of the science and practice* (1st ed., pp. 95–122). Wiley-Blackwell.
- Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behavior Research and Therapy*, *28*(6), 487–495. [https://doi.org/10.1016/0005-7967\(90\)90135-6](https://doi.org/10.1016/0005-7967(90)90135-6)
- Mennin, D. S., Ellard, K. K., Fresco, D. M., & Gross, J. J. (2013). United we stand: Emphasizing commonalities across cognitive-behavioral therapies. *Behavior Therapy*, *44*(2), 234–248. <https://doi.org/10.1016/j.beth.2013.02.004>
- Mennin, D. S., Fresco, D. M., & O'Toole, M. S. (2018). A randomized controlled trial of emotion regulation therapy for generalized anxiety disorder with and without co-occurring depression. *Journal of Consulting and Clinical Psychology*, *86*(3), 268–281. <https://doi.org/10.1037/ccp0000289>
- Mennin, D. S., Heimberg, R. G., Turk, C. L., & Fresco, D. M. (2002). Applying an emotion regulation framework to integrative approaches to generalized anxiety disorder. *Clinical Psychology: Science and Practice*, *9*(1), 85–90. <https://doi.org/10.1093/clipsy.9.1.85>

- Mennin, D. S., Heimberg, R. G., Turk, C. L., & Fresco, D. M. (2005). Preliminary evidence for an emotion dysregulation model of generalized anxiety disorder. *Behavior Research and Therapy*, *43*(10), 1281–1310. <https://doi.org/10.1016/j.brat.2004.08.008>
- Mills, S. D., Fox, R. S., Malcarne, V. L., Roesch, S. C., Champagne, B. R., & Sadler, G. R. (2014). The psychometric properties of the generalized anxiety disorder-7 scale in Hispanic Americans with English or Spanish language preference. *Culture Diversity & Ethnic Minority Psychology*, *20*(3), 463–468. <https://doi.org/10.1037/a0036523>
- Nordahl, H. M., Borkovec, T. D., Hagen, R., Kennair, L. E. O., Hjemdal, O., Solem, S., Hanse, B., Haseth, S., & Wells, A. (2018). Metacognitive therapy versus cognitive-behavioral therapy in adults with generalised anxiety disorder. *Bjpsyc Open*, *4*(5), 393–400. <https://doi.org/10.1192/bjo.2018.54>
- Naragon-Gainey, K. (2010). Meta-analysis of the relations of anxiety sensitivity to the depressive and anxiety disorders. *Psychological Bulletin*, *136*(1), 128–150. <https://doi.org/10.1037/a0018055>
- Penney, A. M., Mazmanian, D., & Rudanycz, C. (2013). Comparing positive and negative beliefs about worry in predicting generalized anxiety disorder symptoms. *Canadian Journal of Behavioral Science*, *45*(1), 34–41. <https://doi.org/10.1037/a0027623>
- Penney, A. M., Rachor, G. S., & Deleurne, K. A. (2020). Differentiating the roles of intolerance of uncertainty and negative beliefs about worry across emotional disorders. *Journal of Experimental Psychopathology*, *11*(4), 1–22. <https://doi.org/10.1177/2043808720970072>
- Roemer, L., & Orsillo, S. M. (2002). Expanding our conceptualization of and treatment for generalized anxiety disorder: Integrating mindfulness/acceptance-based approaches with existing cognitive-behavioral models. *Clinical Psychology: Science and Practice*, *9*(1), 54–68. <https://doi.org/10.1093/clipsy.9.1.54>
- Ruscio, A. M., & Borkovec, T. D. (2004). Experience and appraisal of worry among high worriers with and without generalized anxiety disorder. *Behavior Research and Therapy*, *42*(12), 1469–1482. <https://doi.org/10.1016/j.brat.2003.10.007>
- Salguero, J. M., Ramos-Cejudo, J., & Garcia-Sancho, E. (2019). Metacognitive beliefs and emotional dysregulation have a specific contribution on worry and the emotional symptoms of generalized anxiety disorder. *International Journal of Cognitive Therapy*, *12*(3), 179–190. <https://doi.org/10.1007/s41811-019-00048-4>
- Spada, M. M., Mohiyeddini, C., & Wells, A. (2008). Measuring metacognitions associated with emotional distress: Factor structure and predictive validity of the Metacognitions Questionnaire 30. *Personality and Individual Differences*, *45*(3), 238–242. <https://doi.org/10.1016/j.paid.2008.04.005>
- Spitzer, R. L., Kroenke, K., Williams, J. B., & Lowe, B. (2006). A brief measure for assessing generalized anxiety disorder. *Archives of Internal Medicine*, *166*(10), 1092–1097. <https://doi.org/10.1001/archinte.166.10.1092>
- Stapinski, L. A., Abbott, M. J., & Rapee, R. M. (2010). Fear and perceived uncontrollability of emotion: Evaluating the unique contribution of emotional appraisal variables to prediction of worry and generalized anxiety disorder. *Behavior Research and Therapy*, *48*(11), 1097–1104. <https://doi.org/10.1016/j.brat.2010.07.012>
- Sugiura, Y. (2017). Metacognitive, emotional, and avoidance predictors of generalized anxiety disorder. *Psychology*, *8*(4), 636–653. <https://doi.org/10.4236/psych.2017.84041>
- Tull, M. T., Bornovalova, M. A., Patterson, R., Hopko, D. R., & Lejuez, C. W. (2008). Analogue research. In D. McKay (Ed.), *Handbook of research methods in abnormal and clinical psychology* (pp. 61–74). Sage.
- Typaldou, M., Nidos, A., Roxanis, I., Dokianaki, F., Vaidakis, N., & Papadimitriou, G. (2010). Psychometric properties of the Metacognitions Questionnaire-30 (MCQ-30) in a Greek sample. *Annals of General Psychiatry*, *9*, S103. <https://doi.org/10.1186/1744-859X-9-S1-S103>
- Thompson, F., & Levine, D. U. (1997). Examples of easily explainable suppressor variables in multiple regression research. *Multiple Linear Regression Viewpoints*, *24*, 11–13.
- van der Heiden, C., Muris, P., & van der Molen, H. T. (2012). Randomized controlled trial on the effectiveness of metacognitive therapy and intolerance-of-uncertainty therapy for generalized anxiety disorder. *Behavior Research and Therapy*, *50*(2), 100–109. <https://doi.org/10.1016/j.brat.2011.12.005>
- Wells, A. (1995). Metacognition and worry: A cognitive model of generalized anxiety disorder. *Behavioral and Cognitive Psychotherapy*, *23*(3), 301–320. <https://doi.org/10.1017/S1352465800015897>
- Wells, A. (2005). The metacognitive model of GAD: Assessment of meta-worry and relationship with DSM-IV generalized anxiety disorder. *Cognitive Therapy and Research*, *29*, 107–121. <https://doi.org/10.1007/s10608-005-1652-0>



- Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behavioral Research and Therapy*, 37(6), 585–594. [https://doi.org/10.1016/S0005-7967\(98\)00156-9](https://doi.org/10.1016/S0005-7967(98)00156-9)
- Wells, A., & Carter, K. (2001). Further tests of a cognitive model of generalized anxiety disorder: Metacognitions and worry in GAD, panic disorder, social phobia, depression, and nonpatients. *Behavior Therapy*, 32(1), 85–102. [https://doi.org/10.1016/S0005-7894\(01\)80045-9](https://doi.org/10.1016/S0005-7894(01)80045-9)
- Wells, A., & Hatton-Cartwright, S. (2004). A short form of the metacognitions questionnaire: Properties of the MCQ-30. *Behavior Research and Therapy*, 42(4), 385–396. [https://doi.org/10.1016/S0005-7967\(03\)00147-5](https://doi.org/10.1016/S0005-7967(03)00147-5)
- Wells, A., Welford, M., King, P., Papageorgiou, C., Wisely, J., & Mendel, E. (2010). A pilot randomized trial of metacognitive therapy vs applied relaxation in the treatment of adults with generalized anxiety disorder. *Behaviour Research and Therapy*, 48(5), 429–434. <https://doi.org/10.1016/j.brat.2009.11.013>
- Williams, K. E., Chambless, D. L., & Ahrens, A. (1997). Are emotions frightening? An extension of the fear of fear construct. *Behavior Research and Therapy*, 35(3), 239–248. [https://doi.org/10.1016/S0005-7967\(96\)00098-8](https://doi.org/10.1016/S0005-7967(96)00098-8)
- Zhang, C., Wang, T., Zeng, P., Zhao, M., Zhang, G., Zhai, S., Meng, L., Wang, Y., & Liu, D. (2021). Reliability, validity, and measurement invariance of the general anxiety disorder scale among Chinese medical university students. *Frontiers in Psychiatry*, 12, 648755. <https://doi.org/10.3389/fpsy.2021.648755>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.