

Thinking traps: Exploring cognitive distortions and metacognitive beliefs on subclinical anxiety

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Abstract: This correlational study aimed to examine whether metacognitive beliefs (MBs), positive and negative metacognitive beliefs (PMBs and NMBs), predict subclinical anxiety more strongly than cognitive distortions (CDs). A total of 104 subclinical respondents filled in the Cognitive Distortion Scale (CDS), Positive and Negative subscales from the Metacognitions Questionnaire-30, and Anxiety subscale from Depression, Anxiety, and Stress Scale-21 (DASS-21). Hierarchical regression analysis supported the hypotheses that CDs and MBs significantly predicted subclinical anxiety. However, the hypothesis that MBs would explain more of the variance in subclinical anxiety than CDs was partially supported. That is, NMBs accounted for more variance than CDs even after controlling for CDs, whereas PMBs did not. Overall, NMBs were the strongest predictor of subclinical anxiety, followed by CDs and then PMBs. Therefore, neither cognitive nor metacognitive process was stronger than the other; both play a crucial role in anxiety maintenance.

Keywords: Cognitive distortions, metacognitive beliefs, subclinical anxiety

INTRODUCTION, CONTEXT, RESEARCH OBJECTIVES

Cognitive Behavioural Therapy and Metacognitive Therapy

Cognitive Behavioural Therapy (CBT) is known as the gold standard treatment for anxiety, which operates under the principle that negative thoughts cause anxiety. In contrast, Metacognitive therapy (MCT) is an emerging treatment that operates under metacognition—a higher-order cognition that focuses on how individuals think about their thinking (Martinez, 2006). Recent findings suggest MCT may lead to better post-treatment outcomes than CBT (Rawat et al., 2023). The core mechanisms targeted in respective therapies were cognitive distortions (distorted thought content) in CBT, and metacognitive beliefs (dysfunctional beliefs about thinking) in MCT. Hence, this study will compare these core mechanisms to better understand their roles in anxiety.

LITERATURE REVIEW

Cognitive distortions (CDs) are irrational thought patterns that cause individuals to interpret experiences negatively, often affecting their decision-making, interpersonal relationships, and emotional states such as anxiety (Friedman, 2023). These negative thoughts often manifest automatically, also known as negative automatic thoughts (NATs) (Rahnedjat et al., 2017). For instance, individuals would automatically catastrophize a situation by assuming the worst outcome scenarios, even in the absence of factual evidence (Dhanalakshmi, 2015). Their reflexive nature also makes negative thoughts particularly challenging to dismiss (Kocoz, 2017).

However, some researchers challenge the sufficiency of distorted thoughts alone in explaining anxiety. Clark and Beck (2010) and Gentes and Ruscio (2015) found that anxiety may not stem from the mere presence of negative cognitions, but from how such thoughts are evaluated and managed. That is known as metacognition, a higher-order process that influences how thoughts are monitored, interpreted, and controlled (Wells & Matthews, 1994). Thus, a shift in perspective from negative thinking (cognition) to maladaptive beliefs about thinking (metacognition) was observed in recent literature. Unlike the cognitive perspective, which posits that anxiety arises from negative appraisals of thought content, the metacognitive perspective suggests that anxiety is maintained by a perseverative thinking style (e.g., worry or rumination), which is driven by maladaptive beliefs about thinking known as the metacognitive beliefs (MBs) (Spada et al., 2008; Wells, 2009). There are two types of MBs that drive one to engage in a perseverative thinking style, namely positive metacognitive beliefs (PMBs) and negative metacognitive beliefs (NMBs). PMBs refer to beliefs that engaging in worry is useful for coping or problem solving, whereas NMBs refer to beliefs that worry is dangerous and uncontrollable (Wells, 2009; Wells & Matthews, 1996). For example, PMBs include beliefs such as “worrying helps me to cope,” whereas NMBs include beliefs such as “my worrying is dangerous for me.

PMBs are believed to play a larger role in the *initial* stages of anxiety by encouraging repeated engagement in worry (Pretorius et al., 2015; Wells, 2009). Although their predictive power for clinical psychopathologies has yielded inconsistent findings, they are commonly observed in the general population or non-clinical sample (Sun et al., 2017). In contrast, NMBs are considered a robust predictor of anxiety symptoms, particularly in clinical samples (Sun et al., 2017). This difference in observed predictiveness between the MBs was mainly due to NMBs promoting heightened internal monitoring and emotional arousal (Clauss et al., 2020; Bardeen & Fergus, 2018; Gorday & Bardeen, 2022). NMBs exacerbate anxiety by increasingly allocating attention to internal cues (e.g., catastrophizing thoughts, fast heartbeat), thereby intensifying anxious arousal and encouraging avoidant behaviour. Consequently, the constant attention towards threatening cues and avoidance coping makes it harder for individuals to learn that their feared outcomes are unlikely to occur, thus maintaining their anxiety (Gorday & Bardeen, 2022). Hence, both MBs on worry are believed to make negative thoughts more accessible and persistent, ultimately contributing to anxiety.

Interestingly, some researchers found that even in the absence of negative thoughts, the mere presence of MBs may still predict anxiety by influencing how individuals regulate their internal experiences (Ryum et al., 2017). In a moderation study by Bailey and Wells (2015), it was found that catastrophic interpretations (akin to CDs) alone did not strongly predict health anxiety in cancer patients; instead, their effect was dependent on individuals' MBs. That is, catastrophic interpretation only predicted health anxiety when individuals endorsed high NMBs. Hence, negative thoughts like CDs

themselves may not always predict anxiety. Furthermore, some studies also suggested that even in the absence of worry, MBs can still predict anxiety. Supporting this, Ryum et al. (2017) found that MBs predicted anxiety symptoms before and after controlling for worry, suggesting that MBs exert direct (absence of worry) and indirect (through worry) influence on anxiety. Combining both studies, this suggests that even among individuals who experience little to no negative thoughts or worry, MBs may still sustain anxiety by influencing how people are persistently interpreting and responding to their internal experiences (e.g., excessive monitoring of bodily or emotional cues), which leads to heightened self-focus, and cause one to prolong their engagement with anxiety (Wells, 2019). Hence, negative cognitions and worry by themselves may not be inherently maladaptive, as all of us may experience them occasionally. Drawing from this direction, a new question arises: then what makes them dysfunctional? Accordingly, it was proposed that they only become problematic when individuals hold rigid MBs about those negative thoughts, thereby sustaining their negative cognitive processing and reinforcing maladaptive thinking patterns (Wells & Matthews, 1994). In other words, MBs determine how one interprets their thoughts or worries, thereby shaping their responses by *persistently* attending to their thinking process, which then predicts anxiety.

THEORETICAL FRAMEWORK

Cognitive Distortions and Anxiety

Beck's Cognitive Theory (Beck, 1979) posits that emotional disorders, such as anxiety, arise from dysfunctional cognitive schemas—mental structures formed through early life experiences. These schemas influence how individuals process and interpret information (Mammad et al., 2017). When schemas are activated in response to threat, these distortions often manifest through *negative automatic thoughts* (NATs; Beck & Clark, 1997) and *negative attentional biases* (NABs) toward negative interpretations (Zou et al., 2024). Together, these systematic errors in cognitive processing contributed significantly to the onset and maintenance of anxiety (Hallard et al., 2024).

Metacognitive Beliefs and Anxiety

The Self-Regulatory Executive Function (S-REF) model, developed by Wells and Matthews (1994) proposed that anxiety is maintained through MBs. These beliefs shape how individuals respond to their own thoughts by *activating* the Cognitive Attentional Syndrome (CAS)—a perseverative thinking style characterised by worry, rumination, threat monitoring, and ineffective coping strategies, such as thought suppression and avoidance (Hallard et al., 2021; Ryum et al., 2017). According to the model, CAS prolongs and intensifies negative emotional experiences, including anxiety, by sustaining dysfunctional cognitive processes (Hallard et al., 2021). Within this framework, pathological worrying sustained by CAS is coined as Type 1 worry and Type 2 worry (Wells, 2006).

To illustrate, during the activation of CAS, individuals with PMBs will engage in Type 1 worry (Wells, 2006). Driven by the belief that worrying is beneficial, this form of worry is where individuals engage in chains of catastrophic questions (what ifs?) about negative outcomes, followed by attempts to generate responses to cope with and prepare for the perceived threat. Once they succeed in dealing with the threat, PMBs are reinforced as an effective coping mechanism. As a result, worry is actively sustained without the individual looking for ways to cease it (ineffective coping). In contrast, individuals who endorse NMBs engage in Type 2 worry, also known as meta-worry, which involves worry about the worrying process itself (Wells, 2006). This form of worry stems from NMBs, where they interpret the act of worrying to be dangerous or uncontrollable. They would constantly scan for potential threats and attempt to suppress their negative thinking or worry. Consequently, this makes one more hypervigilant and the suppressed thinking to rebound (Clauss et al., 2020; Yapan et al., 2022; Hoffart et al., 2018). This sustained negative thinking or worry thereby maintains and intensifies one's anxiety. Hence, even if negative thoughts were not present, MBs would still activate CAS and reinforce individuals to engage in these persistent cognitive processes (e.g., worry, thought control, suppression) and predict anxiety.

Furthermore, because CAS activation encourages individuals to maintain their worries, individuals are trapped in *object mode*, where they become entangled in their worrying and perceive

their thoughts as facts. This prevents them from detaching themselves from their thinking process for a more objective evaluation, which is known as the *metacognitive mode* (Wells, 2009). Consequently, when MBs are not challenged, this hinders their ability to view things objectively. For example, individuals with negative thoughts often struggle to fully believe that their distortions are not factual, despite being made aware that it's a distorted thought (Taylor-Bennett et al., 2024). These top-down processes suggest that MBs may contribute to anxiety more than CDs alone by shaping how individuals' dysfunctional beliefs maintain these negative thoughts, potentially sustaining anxiety.

RESEARCH GAP

To the best of my knowledge, while many studies examined CDs–anxiety and MBs–anxiety separately, few directly compared the predictive strength of PMBs, NMBs, and CDs. Existing comparisons mostly focus on depression (e.g., Özgüç & Tanrıverdi, 2023; Kürümlüoğlulil & Tanrıverdi, 2022; Tanrıverdi & Özgüç, 2023). In addition, MBs in subclinical adults remain underexplored (Romtveit & Tanas, 2020). Most metacognitive studies target clinical populations (e.g., GAD, SAD, PTSD) or youth samples (e.g., Esbjorn et al., 2015). Yet, subclinical anxiety increases the risk of developing clinical disorders. Hence, studying subclinical adults may clarify key risk factors and provide insights into early identification and prevention.

Therefore, the aim of the current study was to investigate whether MBs, specifically positive metacognitive beliefs (PMBs) and negative metacognitive beliefs (NMBs)— higher-order thinking processes, predict subclinical anxiety more strongly than cognitive distortions (CDs)— lower-level thinking.

Hence, the research question is: Do positive and negative metacognitive beliefs predict subclinical anxiety symptoms beyond the effects of cognitive distortions in adults with subclinical symptoms? To answer the research question, there were three hypotheses. First, it was hypothesised that cognitive distortion would significantly predict subclinical anxiety. Second, metacognitive beliefs (PMBs and NMBs) would significantly predict subclinical anxiety. Third, it was hypothesised that metacognitive beliefs (PMBs and NMBs) would explain more variance in subclinical anxiety beyond that explained by cognitive distortions.

METHOD

Design

This study employed a non-experimental correlational design to examine two predictors— cognitive distortions (CDs) and metacognitive beliefs (MBs) on subclinical anxiety. Hierarchical multiple linear regression was used to run the analysis.

Participants

A total of 185 participants were recruited through convenience and snowball sampling via social media platforms (e.g., Instagram, Facebook, RedNote). Eligible participants were 18 to 25 years old (inclusion criteria). Participants who scored lower than 10 on the DASS-21 Anxiety subscale were excluded from the study (exclusion criteria). The final sample comprised 104 participants (15 males, 89 females). This fulfilled G*Power's minimum requirement of 89 participants for analysis (Faul et al., 2007).

Materials

Cognitive Distortions Scale (CDS)

The CDS (Covin et al., 2011) 20-item scale is rated on a 7-point Likert scale ranging from 1 (*Never*) to 7 (*All the time*), assessing 10 cognitive distortion patterns. Scores range from 20–140, with higher scores indicating greater distortions. As the scale was also validated in Malaysia (Xiong et al., 2020), the internal consistency for this study was also strong ($\alpha = .90$).

Metacognitions Questionnaire-30 (MCQ-30)

Positive (MCQ-POS) and Negative (MCQ-NEG) subscales from the MCQ-30 (Wells & Cartwright-Hatton, 2004) were used to assess positive and negative metacognitive beliefs, respectively. Each subscale consisted of six items rated on a 4-point Likert scale ranging from 1 (*Do not agree*) to 4 (*Agree very much*). The scores range from 6 to 24 per subscale. The scales demonstrated good internal consistency in this study (MCQ-30 $\alpha = .81$, MCQ-POS $\alpha = .88$, MCQ-NEG $\alpha = .81$). Previous research has demonstrated that the MCQ-30 possesses good internal consistency, as well as concurrent and convergent validity (Spada et al., 2008).

Depression Anxiety Stress Scale-21 (DASS-21)

Only the anxiety subscale from the DASS-21 (Lovibond & Lovibond, 1995) was used to assess anxiety symptoms over the past week. The subscale was comprised of 7 items rated on a 4-point Likert scale ranging from 0 (*Did not apply to me at all*) to 3 (*Applied to me very much or most of the time*). Scores range from 0–21, with higher scores reflecting greater anxiety. Although DASS-21 has been validated in Malaysia (Yusoff, 2013; Ahmad et al., 2018; Khaiyom et al., 2019), the internal consistency in this study was low ($\alpha = .62$).

Informed consent and demographic forms were administered to participants, in which they provided their age, gender, ethnicity, nationality, and current employment status.

Procedure

The study was fully conducted online. After providing informed consent, participants completed demographic questions and the three self-report measures (CDS, MCQ-POS/NEG, and DASS-21 anxiety subscale). Participation was voluntary, anonymous, and required less than 20 minutes.

RESULTS

Assumption Testing

Linearity

The plots revealed a clear positive linear pattern for CDs and MBs, supporting the assumption of linearity was met.

Normality

The Shapiro-Wilk test indicated a deviation from normality, Shapiro-Wilk(104) = .96, $p = .003$. Therefore, the assumption of normality was not met.

Homoscedasticity

The standardised residuals appeared to be approximately equally spread out across the range of predicted values, with no clear pattern observed. Therefore, the assumption of homoscedasticity was met.

Absence of Multicollinearity

CDs and MBs were not highly correlated, with a Variance Inflation Factor (VIF) of 1.14 and a tolerance value of 0.88. Therefore, this supports the absence of multicollinearity.

Descriptive Statistics

Descriptive statistics showed that participants were aged 18 to 25 ($M = 21.91$, $SD = 1.29$). The sample was skewed toward females ($n = 89$, 85.6%) compared to males ($n = 15$, 14.4%). Most were Malaysians ($n = 103$, 99%), with one from Mainland China. In terms of ethnicity, the majority were Chinese ($n = 97$, 93.3%), followed by Malay ($n = 4$, 3.8%) and Indian ($n = 3$, 2.9%). Most participants were students ($n = 102$, 98.1%), with two reporting full- or part-time employment.

On average, participants reported a moderate level of cognitive distortions ($M = 99.19$, $SD = 18.05$, Range = 84) on the Cognitive Distortions Scale (CDS), which has a total score range of 20 to 120. On the other hand, the average participants reported a moderately high level of metacognitive beliefs ($M = 35.89$, $SD = 6.26$, Range = 48) on the Metacognitions Questionnaire-30 (MCQ-30), which has a total score range of 12 to 48.

Specifically, average participants reported a level of moderate positive metacognitive beliefs ($M = 16.87$, $SD = 4.57$, Range = 17), and a high level of negative metacognitive beliefs ($M = 19.03$, $SD = 3.75$, Range = 17). These results indicate that, on average, participants endorsed slightly higher levels of NMBs than PMBs.

For anxiety, participants reported moderate subclinical levels ($M = 14.83$, $SD = 3.30$, Range = 11) on the DASS-21 anxiety subscale (Lovibond & Lovibond, 1995). However, the subscale showed poor internal consistency (Cronbach's $\alpha = .62$), so results should be interpreted with caution. Finally, no extreme outliers were identified for any study variables, as confirmed by boxplots.

Inferential Statistics

In Model 1, CDs were entered into the regression model. The first model indicated that CDs significantly predicted subclinical anxiety, $b = 0.06$ ($sr = .32$), BCa CI [0.03, 0.09], $t(102) = 3.39$, $p < .001$. Therefore, the first hypothesis that CDs will significantly predict participants' subclinical anxiety was supported (see Table 1).

In Model 2, MBs were added to the regression model alongside CDs. The model explained a total of 27.4% variance in subclinical anxiety, of variance, $R^2 = .27$, $F(2,101) = 19.11$, $p < .001$. The inclusion of MBs in the model significantly increased the proportion of variance explained by 17.3%, R^2 -change = .17, F -change (1, 101) = 24.10, $p < .001$.

Additionally, the subcomponents of MBs (PMBs and NMBs) were further extracted and measured independently on subclinical anxiety. In each analysis, CDs were entered in Model 1, followed by either PMBs or NMBs in Model 2. The inclusion of PMBs significantly increased in proportion of variance explained by 7.8%, R^2 -change = .08, $F(1,101) = 9.54$, $p = .003$; whereas the inclusion of NMBs also significantly increased in proportion of variance explained by 11.8%, R^2 -change = .12, $F(1,101) = 15.26$, $p < .001$. Therefore, the second hypothesis that MBs will significantly predict subclinical anxiety was also supported.

Further examination revealed that overall MBs continued to be a significant predictor of subclinical anxiety while controlling for CDs, $b = 0.23$ ($sr = .42$), BCa CI [0.14, 0.34], $t(101) = 4.91$, $p < .001$. Specifically, PMBs was a significant predictor while controlling for CDs ($b = 0.20$ ($sr = .28$), BCa CI [0.06, 0.36], $t(101) = 3.09$, $p = .003$), as well as NMBs was a significant predictor while controlling for CDs ($b = 0.33$ ($sr = .34$), BCa CI [0.17, 0.51], $t(101) = 3.91$, $p < .001$).

Conversely, CDs only remained as a significant predictor while controlling for PMBs ($b = 0.03$ ($sr = .17$), BCa CI [0.02, 0.08], $t(101) = 3.02$, $p = .003$), but not while controlling for NMBs ($b = 0.03$ ($sr = .28$), BCa CI [-0.00, 0.07], $t(101) = 1.77$, $p = .079$).

Taken together, even after controlling for each other, NMBs continued to predict higher subclinical anxiety with a predictive variance of 11.8% while controlling for CDs. Although PMBs explained a unique variance of 7.8% when controlling for CDs, CDs accounted for a slightly higher proportion of 10.1% when controlling for PMBs. Therefore, the third hypothesis that MBs (PMBs and NMBs) would significantly explain more variance in subclinical anxiety beyond that explained by CDs was partially supported.

Table 1
Hierarchical Regression Coefficients in Predicting Subclinical Anxiety from Cognitive Distortions and Metacognitive Beliefs

Model		<i>B</i>	<i>SE</i>	<i>Beta</i> (β)	<i>t</i>	<i>Sig.</i>	<i>Part (sr)</i>
1	CDs	.058	.017	.319	3.394	<.001	.319
2	CDs	.030	.017	.163	1.804	.074	.153
	MBs	.234	.048	.444	4.909	<.001	.416

Note. Outcome variable = subclinical anxiety; CDs = cognitive distortions; MBs = metacognitive beliefs.

DISCUSSION

Summary of Findings

The present study examined whether higher-order thinking processes—metacognitive beliefs (MBs), specifically the positive (PMBs) and negative (NMBs) beliefs—predict subclinical anxiety more strongly than lower-level cognitive distortions, particularly the cognitive distortions (CDs). Findings revealed that both CDs and MBs were significant predictors of subclinical anxiety, supporting the first two hypotheses. When the subcomponents of MBs were compared with CDs, CDs remained predictive of anxiety when controlling for PMBs, but not when NMBs were controlled for. Thus, the third hypothesis was only partially supported. Overall, NMBs emerged as the strongest predictor, followed by CDs, while PMBs were the least predictive.

Interpretation

In line with the Self-Regulatory Executive Function (S-REF) model, MBs contributed meaningfully to subclinical anxiety. PMBs reflect the perceived usefulness of worry, such as believing it helps judgment and motivation (Kolubinski et al., 2016). Although PMBs show inconsistent predictive power in clinical populations (Sun et al., 2017), the present findings suggest that in subclinical anxiety, they may still function as a maintaining risk factor by activating worry.

Firstly, NMBs were the stronger predictor. Unlike PMBs, which justify engagement with worry, NMBs reflect beliefs that worry is dangerous or uncontrollable (Wells, 2019). These beliefs may encourage maladaptive coping, such as thought suppression and hypervigilant monitoring, which can intensify worry. Over time, this cycle could shift individuals into object mode, where thoughts are treated as factual, potentially reinforcing the CAS and prolonging anxiety (Kolubinski et al., 2016; Su & Shum, 2019). While the present study cannot determine whether PMBs or NMBs initiate or maintain worry, the findings are consistent with the model's proposition that NMBs may be more strongly associated with subclinical anxiety than PMBs.

Although MBs were overall strong predictors, PMBs were not stronger than CDs. One explanation is that PMBs (e.g., “worrying helps me prepare”) may be perceived as functional, particularly in collectivistic cultures that value coping strategies maintaining group harmony (Luong et al., 2020). In the current Malaysian Chinese-dominated sample, PMBs may help individuals anticipate threats and avoid burdening others. Collectivistic values also promote self-critical reflection and relational thinking, which encourage metacognitive self-awareness (Brycz et al., 2015). This may buffer some negative effects of worry, explaining why PMBs predicted anxiety but not more than CDs.

CDs, by contrast, reflect distorted thought content that directly amplifies threat (e.g., catastrophizing). These distortions provoke greater emotional arousal (Deperrois & Combalbert, 2022) because of their intrusive nature. Attempts to suppress them often increase their frequency and emotional impact (Cowan et al., 2017). CDs exaggerate threat appraisals (Beck & Clark, 1997) and increase intolerance of uncertainty (IU; Robichaud et al., 2019). Thus, their threat-oriented content plays a direct role in anxiety. Supporting this, Pretorius et al. (2015) found PMBs predicted worry intensity but not anxiety itself, while CDs are more closely tied to emotional arousal.

The finding that CDs and NMBs predicted anxiety more strongly than PMBs may reflect shared mechanisms. Both involve avoidance-related responses and heightened threat appraisals. For CDs, distorted content fosters exaggerated threat perceptions (Beck & Clark, 1997). For NMBs, worry itself is perceived as uncontrollable or harmful (Wells, 2009). Both increase emotional arousal and reinforce

beliefs that thoughts must be controlled, perpetuating anxiety. PMBs, in contrast, normalise worry without directly escalating threat, unless worry becomes chronic. This supports the CAS framework, where worry, threat monitoring, and avoidant coping maintain anxiety (Wells, 2019).

When comparing CDs and NMBs, CDs were no longer significant after controlling for NMBs. This suggests anxiety persists less because of distorted thoughts themselves, and more because of meta-worry. In other words, it is not always the presence of negative thoughts that predicts anxiety, but how they are interpreted and regulated. This is consistent with the S-REF model (Wells, 2009) and prior findings (Clark & Beck, 2010; Gentes & Ruscio, 2015) that dysfunctional beliefs and strategies, rather than cognitions alone, sustain anxiety.

Overall, both CDs and MBs contributed meaningfully to anxiety. NMBs were the strongest predictor, but CDs still explained unique variance, especially when PMBs were controlled. This suggests cognitive and metacognitive processes can operate in parallel, with their influence depending on the type of MBs endorsed. For example, with PMBs but not NMBs, CDs may contribute through threat-laden content. With NMBs but not PMBs, focus may shift to meta-worry, prompting maladaptive regulation such as suppression. Hence, metacognitive processes are not inherently superior to cognitive processes. Rather, anxiety appears shaped by both thought content (cognition) and thought regulation (metacognition).

Limitations and Recommendations

Several limitations should be noted when interpreting these results. First, the DASS-21 anxiety subscale has low internal reliability, which may have affected the data distribution. This could be influenced by the online data collection, especially via RedNote, where language or regional differences may have led to varying interpretations of items. As Thiyagarajan et al. (2022) noted, DASS-21 scores are highly sample-dependent; regional or dialect variations within Malaysia can influence how certain items are interpreted. Second, the sample mainly included university students, limiting generalizability. The motivational role of worry observed here may be specific to academic demands and may not apply to other life stages or contexts. Third, the correlational design does not mean causal conclusions or directionality. Other factors, such as current stress levels, may have influenced the observed relationships. As supported, a study found that NMBs did not independently predict anxiety; however, they predicted anxiety when individuals were stressed (Ramos-Cejudo & Salguero, 2017).

Considering these limitations, several improvements for future research are warranted. Studies could explore other metacognitive subcomponents (e.g., cognitive confidence, self-consciousness) alongside cognitive features like IU to assess their predictive contribution to anxiety. Moreover, expanding to non-student adult populations and using more robust designs, such as longitudinal or moderation studies, could further provide evidence on how MBs interact with CDs in anxiety.

Implications

The findings suggested that neither cognitive processes (CDs) nor metacognitive processes (MBs) were clearly stronger in predicting subclinical anxiety. Even after controlling for each other, NMBs emerged as the strongest predictor, followed by CDs, and then PMBs. This adds evidence that MBs operate independently from cognition (Wells, 2019).

When comparing NMBs and CDs to PMBs, the role of threat appraisals and avoidance responses may be key risk components in determining which processes are more maladaptive for anxiety. Since NMBs and CDs were stronger predictors than PMBs, it is likely that features promoting avoidant responses, such as suppression and threat scanning, further intensify perceived threats and sustain anxiety. Arguably, the need to control thoughts (metacognitive) may be a stronger predictor of anxiety than intolerance of uncertainty (IU; cognitive), given its direct link to persistent cognitive avoidance, whereas IU resembles the mechanism of PMBs of fuelling worry to reduce uncertainty (Boswell et al., 2013).

Finally, since CDs remained significant after controlling for PMBs but not NMBs, suggesting that cognitive and metacognitive processes also interact rather than functioning independently. Adopting an integrated framework, such as the Behavioural-Cognitive-Metacognitive Model (Rahnedjat et al., 2017), may provide a more complete understanding of subclinical anxiety.

For practical implications, screening for NMBs and CDs may help identify at-risk individuals before symptoms become clinically impairing. While PMBs were weaker predictors, they still contribute to anxiety, particularly in collectivistic cultures that promote worrying. Clinically, more focus on NMBs may enhance interventions, as addressing them also targets maladaptive strategies (e.g., suppression, rumination, threat monitoring) and distorted cognitions (CDs). This may explain why Metacognitive Therapy (MCT) has been found to address patients' thoughts more comprehensively than Cognitive Behavioural Therapy (CBT) (Taylor-Bennett et al., 2024), leading to greater long-term efficacy (Rawat et al., 2023).

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STATEMENT OF ETHICAL CLEARANCE

The study was cleared for data collection by the Ethics Review Board (ERB), Department of Psychology, HELP University. Ethical clearance granted 18th March 2025.

DATA AVAILABILITY STATEMENT

Data is available upon request from the authors.

DECLARATION OF ORIGINALITY

We declare that the current submission is our work and is not being considered for publication elsewhere. We certify that referenced work used in this submission has been properly acknowledged in text and in the reference list.

CONFLICT OF INTEREST STATEMENT

The authors report no conflicts of interest.

PUBLISHER'S NOTE

The views and claims expressed in this article do not represent the Board of Editors and the Reviewers.

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