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Cognitive factors predicting checking, procrastination and other maladaptive behaviours: prospective versus Inhibitory Intolerance of Uncertainty

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Intolerance of Uncertainty (IU) is a cognitive construct which is strongly linked to psychopathology, particularly anxiety and obsessive-compulsive symptoms. IU has also been proposed to be linked to maladaptive behaviours such as checking and procrastination in uncertain situations. Additionally, two subfactors of IU have recently been identified, Prospective IU (Desire for Predictability) and Inhibitory IU (Uncertainty Paralysis). These factors may differentially predict approach and avoidance behaviours respectively, however research is lacking. This study investigated associations between IU subfactors and self-reported maladaptive behaviours. University students (n=110; 74.3% female) completed self-report measures of behaviours including checking, procrastination, general avoidance and controlling behaviours. We hypothesised that Prospective IU would be associated with checking behaviours while Inhibitory IU would be associated with procrastination. Procrastination was predicted only by Inhibitory IU, however Checking was predicted equally by Inhibitory IU and Prospective IU. The results provide the first evidence of a differentiation between the two IU subfactors in predicting maladaptive behaviours. Uncertainty Paralysis may be an important cognitive factor reflecting tendencies to freeze during uncertainty, which predicts both checking and procrastination. Checking behaviours may be associated with additional unwillingness to leave outcomes to chance. This research provides new information about specific cognitive factors associated with checking and procrastination and other maladaptive behaviours, which could potentially be targeted in interventions.

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Title: Cognitive Factors Predicting Checking, Procrastination and other Maladaptive Behaviours: Prospective Versus Inhibitory Intolerance of Uncertainty

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**Cognitive Factors predicting Checking, Procrastination and other maladaptive behaviors:
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Abstract

Intolerance of Uncertainty (IU) is a cognitive construct which is strongly linked to psychopathology, particularly anxiety and obsessive-compulsive symptoms. IU has also been proposed to be linked to maladaptive behaviors such as checking and procrastination in uncertain situations. Additionally, two subfactors of IU have recently been identified, *Prospective IU (Desire for Predictability)* and *Inhibitory IU (Uncertainty Paralysis)*. These factors may differentially predict approach and avoidance behaviors respectively, however research is lacking. This study investigated associations between IU subfactors and self-reported maladaptive behaviors. University students ($n=110$; 74.3% female) completed self-report measures of behaviors including checking, procrastination, general avoidance and controlling behaviors. We hypothesised that *Prospective IU* would be associated with checking behaviors while *Inhibitory IU* would be associated with procrastination. Procrastination was predicted only by *Inhibitory IU*, however Checking was predicted equally by *Inhibitory IU and Prospective IU*. The results provide the first evidence of a differentiation between the two IU subfactors in predicting maladaptive behaviors. *Uncertainty Paralysis* may be an important cognitive factor reflecting tendencies to freeze during uncertainty which predicts both checking and procrastination. Checking behaviors may be associated with additional unwillingness to leave outcomes to chance. This research provides new information about specific cognitive factors associated with checking and procrastination and other maladaptive behaviors, which could potentially be targeted in interventions.

Keywords: intolerance of uncertainty, procrastination, checking, prospective, inhibitory anxiety

Highlights:

- *Intolerance of Uncertainty* (IU) is a cognitive construct strongly linked to anxiety.
- We investigated its role in maladaptive behaviors including checking and procrastination.
- Two subcomponents of IU differentially predicted maladaptive behaviors.
- Procrastination was predicted only by *Inhibitory IU*.
- Checking behavior was predicted both by *Inhibitory* and *Prospective IU*.

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Introduction

Intolerance of Uncertainty (IU) has recently received increasing attention as a potentially important trans-diagnostic factor spanning anxiety, obsessive-compulsive and depressive disorders. It is defined as the “tendency of a person to consider the possibility of a negative event occurring as unacceptable and threatening irrespective of the probability of its occurrence” (Carleton, Sharpe & Asmundson, 2007 pg. 1). While numerous studies have investigated links between IU and psychopathology (Birrell, Meares, Wilkinson & Freeston, 2011), its role in contributing to common maladaptive behaviours including checking, procrastination, avoidance and control has received relatively little attention.

IU was originally proposed as a specific vulnerability factor for generalised anxiety disorder (GAD; Dugas, Gosselin & Ladouceur, 2001; Dugas, Schwarz & Francis, 2004). Recent studies, however, have found associations between IU and symptoms of obsessive-compulsive disorder (OCD; Fergus & Wu, 2010), social phobia (Boelen & Reijntjes, 2009; Carleton, Collimore, & Asmundson, 2010), panic disorder (McEvoy & Mahoney, 2012; Sexton and Dugas, 2009; Carleton et al., 2013), post-traumatic stress disorder (PTSD; Fetzner et al., 2013) and depression (Yook, Kim, Suh & Lee, 2010). Despite many studies linking IU to psychopathology, questions remain about the specific nature of the construct and how it may contribute to psychopathological symptoms (Birrell, Meares, Wilkinson & Freeston, 2011). A recent review of factor analysis studies strongly suggested that the IUS is made up of two factors, both in the original 27-item and the 12-item versions (Birrell et al., 2011). Birrell et al. (2011) concludes that ‘*Desire for Predictability*’ and ‘*Uncertainty Paralysis*’ are appropriate labels for these two subfactors. *Desire for Predictability* comprises items that describe an active engagement in seeking certainty. It represents a desire to know what the future holds and may motivate attempts to increase predictability through seeking information and engaging in preparation and planning (Birrell et al., 2011). *Uncertainty Paralysis* represents a sense of being stuck and unable to respond effectively when faced with uncertainty, resulting in a paralysis of cognition and action (Birrell et al., 2011). In the *Intolerance of Uncertainty Scale, Short Form* (IUS-

12; Carleton, Norton, & Admundson, 2007), these two subfactors are referred to as *Prospective* and *Inhibitory IU*, respectively.

Evidence suggests that the two IU subfactors are differentially associated with specific psychopathology. *Uncertainty Paralysis* is more strongly associated with symptoms of social anxiety, panic disorder, agoraphobia, PTSD and depression; while *Desire for Predictability* is more strongly associated with symptoms of OCD and GAD (Boelen, Vrinssen, van Tulder, 2010; Carleton et al. 2012; Carleton et al. 2007; McEvoy and Mahoney 2012; Fetzner et al., 2013; Boelen & Reijntjes, 2009; Gentes & Ruscio, 2011; McEvoy & Mahoney, 2011; Tolin et al., 2003). These studies suggest that while *Uncertainty Paralysis* may be associated more strongly with anxiety and depression symptoms generally, *Desire for Predictability* may be the facet of IU with the greatest specificity to checking, worry and control behaviors, seen particularly in OCD and GAD.

A number of hypotheses have been put forward to explain the differences between the two sub-factors. According to Birrell et al. (2011) these two factors represent different ways of dealing with uncertainty with *Desire for Predictability* reflecting approach responses and *Uncertainty Paralysis* reflecting avoidance responses. Berenbaum et al. (2008) further hypothesized that “*Desire for Predictability* may directly increase worry, while *Uncertainty Paralysis* likely contributes to avoidant behavior that helps maintain a pattern of worrying” (pg. 124).

Although IU is thought to be associated with particular cognitive, affective, and behavioral responses to uncertain situations (Dugas, Schwartz, & Francis, 2004), few studies have explored specific behaviors in relation to IU or its two subfactors (Luhmann, Ishida, Hajcak, 2011; Thibodeau et al., 2013). There is some evidence that IU shapes people’s behavior. In particular, those with high IU may seek more information before making decisions (Ladouceur et al., 1997; Rosen and Knauper, 2009). For example, in a study of information seeking in a health context those higher in IU were more likely to acquire health-related brochures, as a way of reducing their health worries (Rosen and Knauper, 2009). IU may also lead people to behave in ways that reduce the time spent in uncertainty, which they find difficult. Luhmann et al. (2011) found that those with higher IU were

1 more likely to repeatedly choose smaller and fewer probable awards if they were immediately made
2 aware of the outcome, than larger and more probable rewards that would require a longer period of
3 uncertainty before outcomes.
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7 In terms of relationships between the IU subfactors and behavior, Thibodeau et al. (2013)
8 examined this in relation to speed and accuracy of typing performance. Both subfactors were
9 similarly associated with slower typing speed and neither were associated with typing errors. These
10 findings are contrary to the proposal that *Desire for Predictability* is associated with cognitive but not
11 behavioral responses to uncertainty, as both subfactors were associated similarly with typing
12 performance. Other studies have explored associations between the two subfactors and behavioral
13 symptoms of different anxiety disorders. These studies have found *Uncertainty Paralysis* to be
14 associated with avoidance in panic disorder (Carleton et al., 2013), with avoidance, emotional
15 numbness and hyperarousal (but not re-experiencing) in PTSD (Fetzner et al., 2013), and hoarding
16 severity (both buying and keeping) among people with hoarding disorder (Oglesby, 2013). In these
17 studies *Desire for Predictability* was not associated with these symptoms, suggesting that it is more
18 predictive of cognitive rather than behavioral responses.
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35 Checking is a behavioral response associated with psychopathology which may be useful in
36 differentiating the two IU subfactors. Checking is primarily an approach response designed to reduce
37 the uncertainty of possible future threat. If *Desire for Predictability* reflects an approach response to
38 uncertainty and *Uncertainty Paralysis* an avoidance response then it would be expected that
39 checking would be more closely related to *Desire for Predictability* than *Uncertainty Paralysis*. No
40 prior studies have explored this possibility. Checking is common in individuals with OCD (>80%; Lind
41 & Boschen, 2009), and is seen as a type of compulsion performed to reduce the distress and anxiety
42 associated with obsessions. There is also evidence that checking may occur commonly in GAD. Many
43 GAD patients report engaging in repetitive compulsive behaviors at a similar frequency and
44 impairment level to OCD patients, with the most frequent being checking (Schut, Castonguay &
45 Borkovec, 2001; Townsend et al., 1999). The type of checking behavior may differ, however, from
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1 people with OCD. A recent study of undergraduate students found that OCD symptoms were
2 associated with object and interpersonal checking, while GAD symptoms were associated only with
3 checking in an interpersonal context (e.g. reassurance seeking; Coleman, Pieterfesa, Holaway, Coles
4 & Heimberg, 2011). As well as being relevant to both OCD and GAD patients, previous findings
5 support an association between checking and IU (Lind and Boschen, 2009). Using undergraduate
6 students and a clinical OCD sample Lind and Boschen (2009) found that IU mediated the association
7 between beliefs about responsibility to prevent harm and checking behavior. Therefore, exploring
8 the associations of checking with the two IU subfactors will contribute to understanding the possible
9 influence of IU beliefs on checking behavior, and potentially inform treatment approaches. If, for
10 example, checking behaviour is associated with Desire for Predictability, interventions could aim to
11 increase individuals' confidence in their abilities to deal with common events, even though they
12 involve unpredictability. If, however, checking is related to Uncertainty Paralysis, interventions could
13 aim to shape individuals' capacity to continue to perform goal-directed behavior even in the face of
14 uncertainty, through exposure, behavioral experiments and reinforcement.
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32 Procrastination is another type of behavior related to psychopathology which may also be
33 differentially associated with the two IU subfactors. It is a form of avoidance which involves the
34 "voluntarily delay (of) an intended course of action despite expecting to be worse off for the delay"
35 (Steel, 2007 pg.66). Procrastination is highly common and problematic. It can not only cause
36 practical problems but can also prolong anxiety and stress related to the task being avoided (Steel,
37 2007). It is particularly common for students, with up to 50% of university students acknowledging
38 that they engage in consistent and problematic procrastination (Steel, 2007). The items making up
39 the *Uncertainty Paralysis* scale describe a tendency to freeze into inertia in the face of uncertainty
40 and this may reflect a procrastination response to uncertain tasks. Evidence suggests that anxiety
41 and a low sense of self-efficacy are associated with greater procrastination (Haycock et al., 2011),
42 however, no previous studies have investigated the association between IU and student
43 procrastination.
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1 Additional maladaptive behaviors which are prominently associated with psychopathology
2 and uncertainty are avoidance as a general and maladaptive means of attempting to cope with
3 stressors, and excessive attempts to control life circumstances. The recently developed Intolerance
4 of Uncertainty Index (IUI) has subscales assessing both Avoidance and Control (Carleton et al., 2010).
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6 Measurement of these behaviors in relation to IU subfactors may help to determine the extent to
7 which *Prospective* and *Inhibitory IU* relate to approach and avoidance behaviors respectively.
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12 This study aims to investigate the role of cognitive constructs including IU and its subfactors
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14 *Prospective IU* and *Inhibitory IU*, and their individual roles in contributing to problematic behaviors.
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16 Specifically we aim to explore whether IU subfactors are differentially associated with types of self-
17 reported maladaptive behaviors, including interpersonal and object checking, academic
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19 procrastination, more general avoidance, and control. These behaviors are common in student and
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21 clinical populations, and it is hoped that identifying specific cognitive constructs associated with
22
23 specific maladaptive behaviors will inform models and treatment approaches.
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31 We hypothesised that if the IU subfactors represent approach and avoidance responses then
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33 CCS Checking and IUI Control, as approach responses, will be more highly associated with
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35 *Prospective IU*, while Academic Procrastination and IUI Avoidance, both representing avoidance
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37 responses, will be more highly associated with *Inhibitory IU*, after controlling for the other IU
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39 subfactor.
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43 **1. Method**

44 45 46 47 **2.1 Participants**

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49 The protocol was approved by the university ethics committee. A total of 110 Participants
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51 (74.3% women) completed self-report measures online. Most participants (80%) were psychology
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53 students who received course credit for participation, while the remainder were university students
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55 of other disciplines. Most participants reported being enrolled in a Bachelor's degree (84.4%) with
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57 the remainder enrolled in a postgraduate degree. The majority of participants (81%) were aged
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1 between 18 to 24 years, 12% were aged 25-30 and 7% over 30. Most participants were born in
2 Australia and came from an English speaking background (91%). Ten (9%) of participants were born
3 elsewhere including Canada, Japan, Romania, Philippines, Germany, South Africa, United States,
4 United Kingdom and two from India. Most participants had either completed high school or
5 equivalent (70.6%) or a Bachelor's degree (16.5%).
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17 The *Intolerance of Uncertainty Scale, Short Form* (IUS-12; Carleton, Norton, & Admundson,
18 2007) is a 12-item version of the original 27-item IUS (IUS-27; Freeston et al., 1994; English
19 translation: Buhr & Dugas, 2002), which strongly correlates with the original scale ($r = 0.96$; Carleton
20 et al., 2007). Factor analysis studies have found that the IUS-12 is made up of two subfactors
21 (reviewed in Birrell et al., 2011). Seven items assess the *Desire for Predictability* factor and five
22 assess the *Uncertainty Paralysis* factor. Previous studies have found the two subscales demonstrate
23 adequate internal consistency (Cronbach's alphas of $>.85$; Carleton et al., 2007; McEvoy & Mahoney,
24 2011). Test-retest reliability over two weeks is considered satisfactory ($r=.77$; Khawaja and Yu, 2010).
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36 The *Intolerance of Uncertainty Index, Part B* (IUI-B; Gosselin et al., 2008; English translation:
37 Carleton et al., 2010) is a 30-item measure that assesses manifestations of uncertainty which are
38 similar to common symptoms of anxiety disorders. It consists of six distinct subscales: Avoidance,
39 Overestimation, Doubt, Reassurance Seeking, Control and Worry. Internal consistency has been
40 found to be adequate for the total score and for each subscale (Carleton, Gosselin & Asmundson,
41 2010). Due to its recent development few other studies have yet explored other aspects of its
42 validity and reliability. In this study we focus on two subscales only: Avoidance and Control which are
43 particularly relevant to the study aims. The Avoidance subscale measures tendencies to avoid,
44 behaviorally or cognitively, things which are uncertain. The control subscale was developed to
45 measure attempts to control life circumstances to decrease uncertainties.
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1 The *Compulsive Checking Scale* (CCS; Holaway, Coles, & Heimberg, 2004, in Coleman et al.,
2 2011) is an 11-item self-report measure developed to assess compulsive checking behaviors,
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4 involving both object and interpersonal checking. The scale was designed by asking experts to rate
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6 items as being more likely to occur in OCD or GAD and retaining those items which were more likely
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8 to discriminate between these conditions. Both factors have been found to have strong internal
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10 consistency (Coleman et al., 2011; Holaway et al., 2004, as cited in Coleman et al., 2011).
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14 The *Procrastination Assessment Scale-Students* (PAS-S; Solomon & Rothblum, 1984) is an 18-
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16 item self-report measure developed to assess levels of academic procrastination among university
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18 students. Test-retest reliability is adequate with correlations of .80 for the total score. Evidence
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20 supports good convergent validity of the PAS-S, with significant correlations between the PAS-S and
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22 the Beck Depression Inventory, Delay Avoidance Scale, Rosenberg Self-Esteem Scale, and students'
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24 grade point averages. Only the first two rating scales concerning frequency and problems with
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26 procrastination were administered.
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33 **2.3. Analyses**

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35 Preliminary analyses involved calculating descriptive statistics and internal consistencies for
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37 each measure. Pearson's correlation coefficients were then calculated to examine relationships
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39 between the study variables. A series of separate regression analyses was performed with each of
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41 the behavioral subscales (interpersonal checking, object checking, academic procrastination, IUI
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43 Avoidance and IUI Control) as dependent variables and *Prospective IU* and *Inhibitory IU* entered as
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45 independent variables, to determine the unique contribution of each variable in predicting the
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47 dependent variable.
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3. Results

3.1. Descriptive Statistics and Correlational Analyses

Descriptive and reliability statistics are presented in Table 1. The results of the correlational analyses are presented in Table 2. *Desire for Predictability* and *Uncertainty Paralysis* were significantly positively correlated with the behavioral variables assessed (CCS, PAS-S, IUI subscales). *Inhibitory IU* was significantly correlated with the PAS-S (Academic Procrastination) while *Prospective IU* was not significantly associated with PAS-S. Both IUS-12 subfactors were equally highly correlated with CCS interpersonal checking and CCS object checking.

3.3. Regression analyses of self-reported behaviors

To assess the unique contributions of each IUS-12 subfactor to self-reported behaviors, a series of hierarchical regression models was constructed with both IU subfactors entered as predictors (IVs) of each self-reported behavior (DVs), including Academic Procrastination, CCS Interpersonal Checking, CCS Object Checking, IUI Avoidance and IUI Control. Collinearity statistics of tolerance and VIF indicated no problems of multicollinearity (Tabachnick et al., 2013). Mahalanobis distance value indicated no indication problematic multivariate outliers. For the majority of regression analyses the assumptions of normality, linearity and homoscedasticity of residuals were considered to be met based on the inspection of plots of standardized residuals and predicted values (Tabachnick et al., 2013). However, for Object Checking there was some indication of non-normal distribution of residuals, and so this analysis was re-run using the bootstrap method and the results were found to be the same.

A summary of the results for the regression analyses can be seen in Table 3. The regression model with both IUS-12 subfactors predicting academic procrastination (PAS-S) was significant ($R^2 = 0.08, f^2 = 0.08, F(2,106) = 4.42, p < 0.014$), with *Inhibitory IU*, but not *Prospective IU*, explaining a unique proportion of variance in procrastination scores.

1 The regression model with both IUS-12 subfactors predicting CCS Interpersonal Checking
2 was statistically significant ($R^2 = 0.29, f^2 = 0.41, F(2,106) = 21.72, p < 0.0001$), explaining 29% of variance in
3 Interpersonal Checking scores. Both *Inhibitory*, and *Prospective, IU* explained a unique proportion of
4 variance in Interpersonal Checking scores, after controlling for the other. The regression model with
5 both IUS-12 subfactors predicting CCS Object Checking was statistically significant ($R^2 = 0.17, f^2 = 0.2,$
6 $F(2,106) = 10.57, p < 0.0001$). When entered into the model together, *Inhibitory*, but not *Prospective, IU*
7 explained a unique proportion of variance in Object Checking scores.
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9 The regression model with both IUS subfactors predicting IUI Control was statistically
10 significant ($R^2 = 0.40, f^2 = 0.68, F(2,106) = 35.70, p < 0.0001$). *Prospective*, but not *Inhibitory, IU* explained a
11 statistically significant unique amount of variance in Control scores. When entered into the
12 regression model *Inhibitory IU* explained 1% of variance and *Prospective IU* 13% of variance in
13 Control scores.
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15 **4. Discussion**

16 We investigated the contribution of specific cognitive constructs (Intolerance of Uncertainty and its
17 subcomponents, *Prospective IU* (corresponding to *Desire for Predictability*) and *Inhibitory IU*
18 (corresponding to *Uncertainty Paralysis*; Birrell et al., 2011) to self-reported problematic behaviors.
19 Maladaptive behaviors including procrastination, checking and avoidance are common in student
20 and clinical populations, and related to psychopathology and impaired functioning. Identification of
21 cognitive constructs associated with these problematic behaviors may present opportunities for
22 improved and tailored interventions. The current study was the first to examine relationships
23 between *Prospective* and *Inhibitory IU* with self-reported maladaptive behaviors (checking,
24 procrastination, avoidance and control). It was predicted that *Inhibitory and Prospective IU* would be
25 associated with avoidance and approach behaviors respectively. Findings were mostly in line with
26 predictions, with *Inhibitory IU* explaining more unique variance in PAS-S academic procrastination
27 and IUI Avoidance scores and *Prospective IU* explaining more unique variance in IUI Control scores.
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However, contrary to hypotheses, *Prospective IU* did not explain more unique variance than *Inhibitory IU* in Object or Interpersonal Checking scores, suggesting that the two IU subfactors are both similarly related to checking behavior.

4.2. Relationships between IUS-12 subfactors and to self-reported interpersonal and object checking

As expected both IUS-12 subfactors were significantly correlated with interpersonal and object checking behaviors, demonstrating similar moderate positive relationships. This is consistent with previous studies reporting associations between measures of IU and OCD symptoms, including checking behavior (Lind & Boschen, 2009; Reuther et al., 2013; Tolin et al., 2003). Contrary to hypotheses, however, the regression analyses did not find *Prospective IU* to be a more important predictor of checking scores after controlling for *Inhibitory IU*. When both IUS-12 subfactors were added into the regression model only *Inhibitory IU* explained a statistically significant amount of variance in object checking scores. Both *Prospective* and *Inhibitory IU* explained a statistically significant amount of unique variance in interpersonal checking scores. This indicates that the variance in checking scores explained by the IU subfactors is largely shared variance, with each subfactor uniquely explaining very little additional variance. The results of this study therefore indicate that both IU subfactors are similarly linked to individuals' self-reported engagement in checking behavior.

This is the first study to explore possible differences in association between the two IU subfactors and checking behavior. The finding of similar relationships of the two IU subfactors with checking behavior appears contrary to proposals that *Prospective IU (Desire for Predictability)* reflects approach behavior and *Inhibitory IU (Uncertainty Paralysis)* reflects avoidance behavior (e.g. Birrell et al., 2011; Berenbaum et al., 2008). It may be that the associations of the two IU subfactors with behavior may be more complicated than approach/ avoidance dichotomies. People who rate highly on *Inhibitory IU/Uncertainty Paralysis* may engage in a variety of maladaptive behaviors, which can be classed as both approach and avoidance behaviors. This would be consistent with the

proposal that *Uncertainty Paralysis* represents a greater severity of disorder than *Desire for Predictability* (Mahoney & McEvoy, 2012) and people rating high on *Uncertainty Paralysis* may also tend to rate highly on *Desire for Predictability*. Furthermore, the distinction between approach and avoidance behaviors is not always clear cut. Checking could actually be conceptualised as a type of avoidance behavior, if seen as an avoidance of the uncertainty and discomfort of not knowing.

4.3. Relationships between IUS-12 subfactors and self-reported procrastination

Results of the correlational analyses supported our hypothesis that *Inhibitory IU* would be more highly correlated with procrastination than *Prospective IU*. While *Inhibitory IU* was found to be positively associated with self-reported academic procrastination, *Prospective IU* was not. Furthermore, in the regression analyses *Inhibitory IU* accounted for a significant amount of unique variance in procrastination scores, after controlling for *Prospective IU*. These findings suggest that difficulty acting in the face of uncertainty (i.e. *Uncertainty Paralysis*) is a contributing factor in procrastination behavior among students. Engagement in academic studies such as writing assignments, reading, and studying for exams, usually involves facing new tasks, with inherent uncertainty. Therefore those who have difficulty in tolerating uncertainty may experience high levels of discomfort and anxiety in these situations which may contribute to a tendency to procrastinate to avoid this discomfort. This is consistent with previous research on student procrastination which has identified anxiety as a factor contributing to some students' procrastination behavior (Haycock et al., 2011). It is also in line with previous research on IU and indecisiveness, which can be seen as a tendency to procrastinate in making decisions (Berenbaum et al., 2008).

4.4. Relationships between IUS-12 subfactors and IUI Avoidance and Control

As hypothesised, while both IUS-12 subfactors were highly positively correlated with both IUI Avoidance and Control factors, when entered into the regression analyses *Inhibitory IU* made a greater unique contribution to predicting IUI Avoidance while *Prospective IU*, made a greater unique

1 contribution to predicting IUI Control. This supports the *Prospective IU* factor as reflecting a
2 behavioral tendency to try to actively increase certainty through making plans and organising things
3 in advance, as assessed by IUI Control (eg. *I prefer to control everything in order to decrease*
4 *uncertainties*). It also suggests that the *Inhibitory IU* factor reflects a behavioral tendency to avoid
5 things due to dislike of uncertainty (e.g. *The possibility that a negative event may occur leads me to*
6 *avoid certain activities*). The current results also indicate that a dichotomous conceptualization of
7 *Prospective IU* being associated with cognitive responses and *Inhibitory IU* being associated with
8 behavioral responses is too simplistic, because *Prospective IU* was associated with several self-
9 reported behaviours including checking, general avoidance and control. Further research is needed
10 to refine models of the contribution of IU and its subcomponents to maladaptive behaviors. The IUS-
11 12 subfactors together explained a large amount of variance in IUI Avoidance (47%) and IUI Control
12 (40%) scores. This is probably due to the IUI scales having been developed as a measure of IU, while
13 the other behavioral measures utilised in this study were not.

33 4.5. Implications for interventions

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35 There is existing support for the effectiveness of IU as a treatment target in therapy with
36 GAD patients. Treatment approaches based on the IU model of GAD have been developed to
37 decrease IU among patients with GAD and have been found to be effective in randomised controlled
38 clinical trials in reducing IU and GAD symptoms (e.g. Dugas et al., 2003; Ladouceur et al., 2000;
39 Ladouceur, Le´ger, Dugas, & Freestone, 2004). The current results provide new insights into the
40 potential importance of *Inhibitory IU (Uncertainty Paralysis)* as a key cognitive construct associated
41 both with excessive checking and procrastination. Further research is needed to confirm the role of
42 *Inhibitory IU* in maintaining unhelpful behaviors in clinical conditions, however the current results
43 lead to the tentative suggestion that *Inhibitory IU* could potentially provide a cognitive element
44 which could be targeted in academic counselling, coaching and clinical contexts. Cognitive
45 interventions could seek to reduce high levels of *Inhibitory IU* by helping clients to acquire skills to
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1 act and make decisions more effectively under conditions of uncertainty (e.g., problem-solving
2 skills), to identify and correct cognitive distortions which may contribute to indecision and avoidance
3 and to practice these skills in situations involving uncertainty. Thus effective cognitive-behavioral
4 interventions for procrastination might involve exposure to uncertainty-inducing situations, and the
5 development of skills to take action in uncertain situations (Bredemeier & Berenbaum, 2008),
6 perhaps through behavioral experiments, reinforcement and cognitive strategies. In the current
7 study, excessive checking was associated both with *Inhibitory IU (Uncertainty Paralysis)* and with
8 *Prospective IU (Desire for Predictability)*. Cognitive-behavioral interventions aimed at reducing
9 excessive checking often focus on exposure with response prevention. Further, clinical, research is
10 needed, however if *Uncertainty Paralysis* is also associated with checking in clinical OCD,
11 incorporating additional strategies targeting this tendency to become stuck when uncertain may
12 potentially be beneficial. Such strategies could include shaping individuals' ability to continue taking
13 small steps towards goals even when in uncertain situations, as well as the established approach of
14 aiming to prevent maladaptive checking responses.
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32 33 34 35 4.6. Limitations and directions for future Research 36

37 Although the current study provided further evidence of the relationship between IU with
38 self-reported maladaptive behavior, it has a number of limitations. The study involved a relatively
39 small sample comprising university students. Future research would therefore be of interest,
40 involving large clinical samples. Additionally, future studies could utilise behavioral and experimental
41 measures to provide further cross-validation of the link between IU and behaviors. The cross-
42 sectional nature of the current study also precludes making causal interpretations. Longitudinal
43 research is therefore required to explore the temporal ordering of the variables, as while IU beliefs
44 may influence behavior, behavior is also likely to influence how people rate themselves on the IU. A
45 mediational model could also be explored using longitudinal data where behavioral variables are
46 considered as potential mediators of the association between IU and psychopathological symptoms.
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4.7. Conclusions

The results of the current study extend prior research on relations between IU and maladaptive behavior. The results provide the first evidence of an association between the IU subfactors and self-reported behaviors of procrastination and checking. Furthermore, the findings provide some evidence of differentiation between the two IU subfactors, with only *Inhibitory IU (Uncertainty Paralysis)* predicting academic procrastination. This provides support for proposals that *Uncertainty Paralysis* reflects a tendency to freeze into inertia in some situations, whereas *Desire for Predictability* does not. While further research is needed, these results provide new information which may potentially inform interventions targeting *Uncertainty Paralysis* with the aim of reducing procrastination, a pervasive problem in clinical and student populations. Additionally, they suggest the potential importance of targeting both *Uncertainty Paralysis* and *Desire for Predictability* in treatments for excessive checking.

REFERENCES

- Berenbaum, H., Bredemeier, K., & Thompson, R. J. (2008). Intolerance of Uncertainty: Exploring its dimensionality and associations with need for cognitive closure, psychopathology, and personality. *Journal of Anxiety Disorders, 22*, 117-125.
- Birrell, J., Meares, K., Wilkinson, A., & Freeston, M. (2011). Toward a definition of intolerance of uncertainty: A review of factor analytical studies of the Intolerance of Uncertainty Scale. *Clinical Psychology Review, 31*, 1198-1208.
- Boelen, P. A., & Reijntjes, A. (2009). Intolerance of uncertainty and social anxiety. *Journal of Anxiety Disorders, 23*, 130-135.
- Boelen, P. A., Vrinssen, I., & van Tulder, F. (2010). Intolerance of uncertainty in adolescents correlations with worry, social anxiety, and depression. *The Journal of Nervous and Mental Disease, 198*, 194-200.
- Bredemeier, K., & Berenbaum, H. (2008). Intolerance of uncertainty and perceived threat. *Behavior Research and Therapy, 46*, 28-38.
- Buhr, K., & Dugas, M. (2000). Validation of the English version of the Intolerance of Uncertainty Scale. In *annual meeting of the Association for Advancement of Behavior Therapy, New Orleans*.
- Carleton, R. N., Collimore, K. C., Asmundson, G. J. G. (2010). "It's not just the judgements—It's that I don't know": Intolerance of uncertainty as a predictor of social anxiety. *Journal of Anxiety Disorders, 24*, 189-195.
- Carleton, R. N., Fetzna, M. G., Hackl, J. L., & McEvoy, P. (2013). Intolerance of uncertainty as contributor to fear and avoidance symptoms of panic attacks. *Cognitive Behavior Therapy, 42*, 328-341.
- Carleton, R. N., Gosselin, P., & Asmundson, G. J. G. (2010). The Intolerance of Uncertainty Index: Replication and extension with an English sample. *Psychological Assessment, 22*, 396-406.

- 1 Carleton, R. N., Norton, P. J., & Asmundson, G. J. G. (2007). Fearing the unknown: A short version of the
2 Intolerance of Uncertainty Scale. *Journal of Anxiety Disorders, 21*, 105–117.
- 3 Carleton, R. N., Sharpe, D., & Asmundson, G. J. G. (2007). Anxiety sensitivity and intolerance of uncertainty:
4 Requisites of the fundamental fears? *Behavior Research and Therapy, 45*, 2307–2316.
- 5 Carleton, R. N., Mulvogue, M. K., Thibodeau, McCabe, R. E., Antony, M. M., & Asmundson, G. J. G. (2012)
6 Increasingly certain about uncertainty: Intolerance of uncertainty across anxiety and depression.
7 *Journal of Anxiety Disorders, 26*, 468– 479.
- 8 Coleman, S. L., Pietrefesa, A. S., Holaway, R. M., Coles, M. E., & Heimberg, R. G. (2011). Content and
9 correlates of checking related to symptoms of obsessive compulsive disorder and generalized
10 anxiety disorder. *Journal of Anxiety Disorders, 25*, 293-301.
- 11 Craske, M. G., & Hazlett-Stevens, H. (2002). Facilitating symptom reduction and behavior change in GAD: The
12 issue of control. *Clinical Psychology: Science and Practice, 9*, 69-75.
- 13 Dugas, M. J., Gosselin, P., & Ladouceur, R. (2001). Intolerance of uncertainty and worry: Investigating
14 specificity in a nonclinical sample. *Cognitive Therapy and Research, 25*, 551-558.
- 15 Dugas, M. J., & Ladouceur, R. (2000). Treatment of GAD: Targeting intolerance of uncertainty in two types of
16 worry. *Behavior Modification, 24*, 635-657.
- 17 Dugas, M. J., Laugesen, N., & Bukowski, W. M. (2012). Intolerance of uncertainty, fear of anxiety, and
18 adolescent worry. *Journal of Abnormal Child Psychology, 40*, 863-879.
- 19 Dugas, M. J., Schwarz, A., & Francis, K. (2004). Intolerance of Uncertainty, Worry, and Depression. *Cognitive*
20 *Therapy and Research, 28*, 835-842.
- 21 Dugas, M. J., Savard, P., Gaudet, A., Turcotte, J., Laugesen, N., Robichaud, M., Francis, K., & Koerner, N.
22 (2007). Can the components of a cognitive model predict the severity of generalized anxiety
23 disorder? *Behavior Therapy, 28*, 169-178.
- 24 Dugas, M. J., Schwarz, A. & Francis, K. (2004). Intolerance of uncertainty, worry and depression. *Cognitive*
25 *Therapy and Research, 28*, 835-842.
- 26 Fergus, T. A., & Wu, K. D. (2010). Do symptoms of Generalized Anxiety and Obsessive-Compulsive Disorder
27 share cognitive processes? *Cognitive Therapy and Research, 34*, 68–176.
- 28 Fergus, T. A., Bardeen, J. R., & Wu, K. D. (2013). Intolerance of uncertainty and uncertainty-related
29 attentional biases: Evidence of facilitated engagement or disengagement difficulty? *Cognitive*
30 *Therapy and Research, 37*, 735-741.
- 31 Fetzner, M. G., Horswill, S. C., Boelen, P. A., & Carleton, R. N. (2013). Intolerance of uncertainty and PTSD
32 symptoms: Exploring the construct relationship in a community sample with a heterogeneous
33 trauma history. *Cognitive Therapy and Research, 37*, 725-734.
- 34 Freeston, M. H., Rheaume, J., Letarte, H., Dugas, M. J. & Ladouceur, R. (1994). Why do people worry?
35 *Personality and Individual Differences, 17*, 791-802.
- 36 Gentes, E. L., & Ruscio, A. M. (2011). A meta-analysis of the relation of intolerance of uncertainty to
37 symptoms of generalized anxiety disorder, major depressive disorder, and obsessive-compulsive
38 disorder. *Clinical Psychology Review, 31*, 923-933.
- 39 Gosselin, P., Ladouceur, R., Evers, A., Laverdiere, A., Routhier, S., & Tremblay-Picard, M. (2008). Evaluation of
40 intolerance of uncertainty: Development and validation of a new self-report measure. *Journal of*
41 *Anxiety Disorders, 22*, 1427–1439.
- 42 Haycock, L. A., McCarthy, P., & Skay, C. L. (1998). Procrastination in college students: The role of self-efficacy
43 and anxiety. *Journal of Counseling & Development, 76*, 317-324.
- 44 Holaway, R. M., Heimberg, R. G., & Coles, M. E. (2006). A comparison of intolerance of uncertainty in
45 analogue obsessive-compulsive disorder and generalized anxiety disorder. *Anxiety Disorders, 20*,
46 158-174.
- 47 Hoyer, J. & Gloster, A. T. (2009). Psychotherapy for Generalized Anxiety Disorder: Don't worry, it works!
48 *Psychiatric Clinics of North America, 32*, 629–640.
- 49 Khawaja, N. G., & Yu, L. N. H. (2010). A comparison of the 27-item and 12-item intolerance of uncertainty
50 scales. *Clinical psychologist, 14*, 97-106.

- 1 Ladouceur, R., Talbot, F., & Dugas, M. J. (1997). Behavioral expressions of intolerance of uncertainty in
2 worry: Experimental findings. *Behavior Modification*, *21*, 355-371.
- 3 Ladouceur, R., Gosselin P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: A
4 study of a theoretical Model. *Behavior Research and Therapy*, *38*, 933-941.
- 5 Lind, C., & Boschen, M. J. (2009). Intolerance of uncertainty mediates the relationship between responsibility
6 beliefs and compulsive checking. *Journal of anxiety disorders*, *23*, 1047-1052.
- 7 Luhmann, C. C., Ishida, K., Hajcak, G. (2011). Intolerance of uncertainty and decisions about delayed,
8 probabilistic rewards. *Behavior Therapy*, *42*, 378–386.
- 9 Mahoney, A. E. J., & McEvoy, P. M. (2012). A transdiagnostic examination of Intolerance of Uncertainty
10 across anxiety and depressive disorders. *Cognitive Behavior Therapy*, *41*, 212–222.
- 11 McEvoy, P. M., & Mahoney, A. E. J. (2011). Achieving certainty about the structure of intolerance of
12 uncertainty in a treatment-seeking sample with anxiety and depression. *Journal of Anxiety Disorders*,
13 *25*, 112–122.
- 14 McEvoy, P. M., & Mahoney, A. E. J. (2012). To be sure, to be sure: Intolerance of uncertainty mediates
15 symptoms of various anxiety disorders and depression. *Behavior Therapy*, *43*, 533–545.
- 16 Oglesby, M. E., Medley, A. N., Norr, A. M., Capron, D. W., Korte, K. J., & Schmidt, N. B. (2013). Intolerance of
17 uncertainty as a vulnerability factor for hoarding behaviors. *Journal of Affective Disorders*, *145*, 227–
18 231.
- 19 Rosen, N. O., & Knauper, B. (2009). A little uncertainty goes a long way: State and trait differences in
20 uncertainty interact to increase information seeking but also increase worry. *Health Communication*,
21 *24*, 228–238.
- 22 Schut, A. J., Castonguay, L. G., & Borkovec, T.D. (2001). Compulsive checking behaviors in generalized anxiety
23 disorder. *Journal of Clinical Psychology*, *57*, 705–715.
- 24 Sexton, K. A., & Dugas, M. J. (2009). Defining distinct negative beliefs about uncertainty: Validating the factor
25 structure of the Intolerance of Uncertainty Scale. *Psychological Assessment*, *21*, 176–186.
- 26 Solomon, L. J., & Rothblum, E. D. (1984). Academic procrastination: Frequency and cognitive-behavioral
27 correlates. *Journal of Counseling Psychology*, *31*, 503-509.
- 28 Steel, P. (2007). The nature of procrastination: a meta-analytic and theoretical review of quintessential self-
29 regulatory failure. *Psychological bulletin*, *133*, 65-94.
- 30 Tabachnick, B.G.; Fidell, L.S.; Osterlind, S.J. Using multivariate statistics. Boston: Pearson Education. 2013.
- 31 Thibodeau, M. A., Carleton, R. N., Gomez-Perez, L., & Asmundson, G. J. G. (2013). “What if I make a
32 mistake?” Intolerance of uncertainty is associated with poor behavioral performance. *The Journal of*
33 *Nervous and Mental Disease*, *201*, 760-766.
- 34 Tolin, D. F., Abramowitz, J. S., Brigidi, B. D., & Foa, E. B. (2003). Intolerance of uncertainty in obsessive-
35 compulsive disorder. *Anxiety Disorders*, *17*, 233-242.
- 36 Townsend, M. H., Weissbecker, K. A., & Barbee, J. G. (1999). Compulsive behavior in generalized anxiety and
37 obsessive compulsive disorder. *Journal of Nervous and Mental Disease*, *187*, 697–699.
- 38 Yook, K., Kim, K., Suh, S., Y., Lee, K. S. (2010). Intolerance of uncertainty, worry, and rumination in major
39 depressive disorder and generalized anxiety disorder. *Journal of Anxiety Disorders*, *24*, 623–628.
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Table 1

Table 1. Descriptive statistics for study variables (N=109)

	α	Possible Range	Range	Mean	SD	Skewness (S.E.)	Kurtosis (S.E.)
<i>IUS-12</i>							
<i>Uncertainty Paralysis</i>	0.90	5-25	5-23	11.19	4.80	0.64 (0.23)	-0.59 (0.46)
<i>Desire for Predictability</i>	0.89	7-35	7-31	18.53	5.79	-0.04 (0.23)	-0.46
<i>Behavioural measures</i>							
Procrastination (PASS)	0.89	12-60	17-60	36.43	9.25	0.09 (0.23)	-0.21
CCS Interpersonal checking	0.89	0-54	2-54	23.21	12.99	0.30 (0.23)	-0.94
CCS Object checking	0.93	0-45	0-39	9.72	11.31	1.02(0.23)	-0.19
IUI Avoidance	0.82	5-25	4-19	9.90	5.81	0.45(0.23)	-1.03
IUI Control	0.91	5-25	5-25	12.36	5.81	0.31 (0.23)	-1.04
IUI Reassurance seeking	0.89	5-25	5-25	14.88	5.41	-0.32 (0.23)	-0.83
IUI Overestimation	0.95	5-25	5-25	14.63	5.83	-0.36 (0.23)	-0.93
IUI Doubt	0.89	5-25	5-24	15.17	5.11	-0.31 (0.23)	-0.70
IUI Worry	0.92	5-25	5-25	14.38	5.26	-0.18 (0.23)	-0.83

Note: IUS-12: Intolerance of Uncertainty Scale-12; PASS: Procrastination Assessment Scale for Students; CCS: Compulsive Checking Scale; IUI: Intolerance of Uncertainty Index; SD: Standard Deviation; S.E.: Standard Error.

Table 2. Pearson's r correlation coefficients between study variables ($N=99$)

	1	2	3	4	5	6
<i>IUS-12 subscales</i>						
1. Prospective IU						
2. Inhibitory IU	.76**					
<i>Behavioral measures</i>						
3. Academic Procrastination (PAS-S)	.13	.26**				
4. Interpersonal checking	.49**	.52**	.38**			
5. Object checking	.36**	.40**	.17	.48**		
6. IUI Avoidance	.62**	.65**	.40**	.51**	.41**	
7. IUI Control	.52**	.63**	.23*	.57**	.40**	.60**

*. Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

Table 3

Table 3. Summary of regression analyses with IUS-12 *Prospective* and *Inhibitory IU* subfactors as independent variables and behavioural measures as dependent variables

<i>Dependent Variable</i>	<i>Independent variables</i>	<i>β</i>	<i>SE</i>	<i>t</i>	<i>p-Value</i>
<i>PAS-S Procrastination</i>	<i>Prospective IU</i>	-0.15	.23	.70	.49
	<i>Inhibitory IU</i>	0.37	.28	3.4	.001
<i>CCS Interpersonal Checking</i>	<i>Prospective IU</i>	0.24	.27	2.3	.023
	<i>Inhibitory IU</i>	0.33	.34	2.6	.011
<i>CCS Object Checking</i>	<i>Prospective IU</i>	0.14	.26	1.2	.24
	<i>Inhibitory IU</i>	0.29	.32	2.1	.039
<i>IUI Avoidance</i>	<i>Prospective IU</i>	0.30	.10	4.1	<.001
	<i>Inhibitory IU</i>	0.43	.08	4.0	<.001
<i>IUI Control</i>	<i>Prospective IU</i>	0.55	.11	5.0	<.001
	<i>Inhibitory IU</i>	0.11	.44	.97	.33

Abbreviations: Intolerance of Uncertainty Index; IUS-12; CCS: Compulsive Checking Scale; PASS: Procrastination Assessment Scale for Students; IUI: Intolerance of Uncertainty Scale-12.