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**We know intolerance of uncertainty is a transdiagnostic factor but we don't know what it looks like in everyday life. A systematic review of intolerance of uncertainty behaviours**

By Dr Ravi Sankar, Dr Lucy Robinson, Dr Emma Honey and Professor Mark Freeston.

***Post-referee Author Version***

*This article describes a systematic investigation into intolerance of uncertainty (IU) behaviours. This involved systematic searches of IU behaviours, developing an expert consensus of the different types of IU behaviour, and classifying behaviours into these categories.*

It is estimated that one in six people suffer from a common mental health disorder during their lifetime (National Collaborating Centre for Mental Health, 2011a). Generalized anxiety disorder (GAD) is a chronic condition associated with problems in occupational and social domains and affects 4.4% of the population (MacManus *et al.*, 2009; National Collaborating Centre for Mental Health, 2011b). According to the Laval model of GAD (Dugas *et al.*, 1998) intolerance of uncertainty (IU) is a central feature of GAD and captures the unhelpful cognitive, emotional and behavioural responses to uncertain events and situations (Freeston *et al.*, 1994). For example, an individual high in IU would perceive the chance of a negative event happening as unbearable regardless of its likelihood of occurrence (Carleton *et al.*, 2007). Their appraisal of uncertainty may trigger biological arousal, anxiety, and lead to actions designed to reduce or eliminate uncertainty e.g. escape or seek excessive reassurance (Boswell *et al.*, 2013; Greco & Roger, 2003).

Boswell *et al.* (2013) investigated IU in a transdiagnostic cognitive behavioural therapy (CBT) intervention for emotional disorders. They found that decreases in levels of IU, as measured by the IU scale (Freeston *et al.*, 1994), were associated with post-treatment reductions in symptoms of anxiety and depression. While acknowledging an inability to infer causal relationships, Boswell *et al.* (2013) suggested IU requires further examination to improve the nature of transdiagnostic anxiety treatments. Interventions may include helping individuals manage the psychological effects of uncertainty to increase their tolerance of uncertainty.

Birrell *et al.* (2011) argued that the phenomenology of IU has not been adequately scrutinized. This has important implications for treatment. For example, examination of the features of IU may identify a set of maladaptive behaviours that can be addressed in therapy. Eliciting a description of these behaviours could move clinicians into a position of identifying common IU characteristics.

The aim of this review was to develop a classification system of unhelpful IU behaviours. Part 1 involved a systematic search that drew together studies that presented original versions of an IU scale, as well as books, reviews and papers that included behavioural manifestations of IU. All behavioural representations of IU were extracted and placed into a single list. Part 2 included developing a range of IU behavioural categories based on expert consensus. Part 3 scrutinized a coding system by calculating inter-rater reliability amongst two people who independently coded items from the list into categories.

## **Method**

### **Systematic Searches**

Advanced searches were conducted across four search engines; Scopus, ProQuest, Web of Knowledge, and Ovid. For each database the phrase 'intolerance

of uncertainty' was searched alongside four studies presenting original versions of an IU scale (Dugas *et al.*, 2002; Carleton *et al.*, 2007; Comer *et al.*, 2009; Freeston *et al.*, 1994).

Inclusion criteria comprised:

- 1) Reviews about the IU construct
- 2) Studies with a different IU scale to those used in systematic searches
- 3) Books with an IU chapter

Exclusion criteria included:

- 1) Reviews on anxiety disorders that did not focus on IU
- 2) Studies with no new IU related measure
- 3) Empirical studies with no primary data for IU as these studies focused on psychopathology rather than IU

A total of 885 sources were found and thirteen sources met inclusion criteria and surpassed all exclusion criteria (names of sources available from first author). The authors identified 103 items specific to the IU construct. It was unknown which items reflected intolerance of uncertainty behaviours.

### **Development of behavioural categories**

The first author had several discussions with an IU expert researcher (Professor Mark Freeston) to construct a grid that classified types of IU behaviours. This grid was emailed to 7 other IU expert researchers (contact first author for details). They were asked to rate the clarity, distinctiveness and clinical relevance of each category on a five-point Likert scale and to provide descriptive feedback.

A median score of four or five on the Likert scale was taken to indicate very distinct, clear or clinically relevant categories. A median score of 3 or below indicated a need for improvement of that category, which was then modified using descriptive

feedback. Categories with a semi-interquartile range score of 1 or more were considered to show excessive variation in scores and were also altered using descriptive feedback.

### **Procedure**

Eight steps were taken to measure face validity of the IU behavioural categories: discussions with supervisor; definitions of categories; collating feedback from experts and setting criteria to judge ratings; identifying further modifications of categories; incorporating feedback to change definitions; determining if issues raised by experts had been addressed; having two independent coders use expert reviewed IU behavioural categories to classify items from the IU item list; measuring inter-rater reliability. Four behavioural categories were initially defined in the grid: Under engagement, Over engagement, Impulsive, Dither/Flip-Flop. Final definitions of these categories are shown in table 1.

### **Results**

Expert ratings and changes to categories based on descriptive feedback are presented. Then the classification of items into IU behavioural categories by two independent coders is summarised.

#### **Expert Consensus Summary**

All classes of behavior were judged to be clinically salient based on median scores of 4 or higher. Over-engagement and under-engagement required further distinction and clarity of definition based on median scores of 3 or lower. Descriptive feedback was consistent with these ratings e.g. “the distinction between over- and under-engagement needs to be made more clear...it’s not clear what the difference is between avoiding uncertainty and seeking certainty”.

Despite high median and low semi-interquartile ranges for Dither/Flip-Flop, one consistently raised issue involved separating Dither and Flip-Flop into two categories. Five categories of IU behaviours were constructed after expert feedback (see table 1).

<insert table 1 here>

### **Classification of items**

Two independent coders were trained to use the IU behavioural categories to classify pilot items. Once good inter-rater reliability was achieved they then classified the 103 items. Items were sorted into IU or non-IU behaviours. Inter-rater reliability was determined by Kappa coefficient scores. Both coders agreed that 42 items were IU behaviours and 38 items were non-IU behaviours.

<insert table 2 here>

Of 42 observations, there were 27 (64.29%) observed agreements. Number of observed agreements expected by chance was 10.60 (25.34%). A Kappa coefficient indicated that the strength of agreement across categories was considered to be moderate,  $k(42) = 0.52$ .

All categories of IU behaviour had observed agreements of 83.33% or higher. Strength of agreement by two coders was considered to be good for under- and over-engagement, moderate for dither, fair for flip-flop, and worse than expected by chance for impulsive. Fewest items were categorised into impulsive and flip-flop, whilst under and over-engagement had the most items.

### **Discussion**

The aim of this review was to develop categories of IU behaviours. Feedback from 7 experts in this field contributed to the development of 5 categories of IU behaviours: under-engagement, over-engagement, impulsive, dither and flip-flop. A

moderate level of agreement ( $Kappa = 0.52$ ) was found between two coders in classifying items into these categories.

The most plausible reason for a lack of strong agreement may involve the item pool. Some categories had very few items allocated to them. Although poor agreement was found for impulsive IU behaviour, expert consensus supported the utility of this category. Therefore, all categories should be retained for further exploration.

Items were extracted from well validated IU scales and other IU sources. One interpretation is that the literature adds little to our understanding of behavioural manifestations of IU. More work is required to validate these behaviours in analogue and clinical populations. It would be interesting to explore the prevalence of all five categories in populations with GAD, social anxiety and depression.

This review is the first to use a categorical approach to describe common IU behaviours; however the item pool was limited. Other methods may be used to identify more IU behaviours e.g. card sorting tasks (McEachan *et al.*, 2010). Semi-structured interviews may help discriminate IU from anxiety related behaviours by addressing the functional aspects.

### **Limitations**

There are several flaws in this review that limit the conclusions which can be drawn. The validity of categories was not reevaluated by experts after five categories were constructed. Given that Flip-Flop and Dither were separated into two categories, a second round of feedback with median ratings of 4 or 5 would have indicated high utility. This may then increase confidence in researchers and clinicians who wish to use this classification system.

The classification system was developed in this review and needs to be validated in future studies. It could also have been helpful to ask the experts to classify the final 103 items to provide a robust evaluation of the IU behavioural categories.

### **Clinical Implications**

Noticing behavioural manifestations of IU in clinical practice could be worthwhile given that it is a transdiagnostic factor (Mahoney & McEvoy, 2012). Targeting this construct may enhance a person's ability to tolerate the uncertainty inherent in exposure treatments and standardized CBT packages. For example, a patient who has social anxiety might avoid exposure-based tasks. While a clinician may view their behaviour as disengagement, the patient may instead be struggling with the uncertainty of trying something new. The patient may benefit from strategies to manage under-engagement. An IU-specific behavioural experiment may best target behaviours driven by a fear of uncertainty.

In summary, this review extracted items from the literature to identify behavioural expressions of IU. Most of these expressions reflected two types of IU behaviour: over- and under-engage. Eliciting behavioural descriptions from people with high levels of intolerance of uncertainty could be the next step to determine the clinical relevance of these behaviours.

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Table 1: IU behavioural categories post expert review

<p><b>Under-engagement</b></p> <p>Avoidant behaviours motivated by attempts to disengage or keep away from future situations with uncertain outcomes, feelings or thoughts. Presentation includes 'doing any activity to prevent engaging with uncertainty'. For example, a person procrastinates, escapes from uncertain social situations, and changes the topic of conversation away from that which creates uncertainty.</p>
<p><b>Over-engagement</b></p> <p>Approach behaviours driven by attempts to attain specific and certain/known outcomes in future situations. Presentation includes 'grinding away, going beyond lengths to find certainty'. For example, a person excessively prepares for talks, excessively seeks reassurance while choosing a dish from the menu, and plans unnecessarily when travelling to a familiar place.</p>
<p><b>Impulsive</b></p> <p>Behaviours that immediately eliminate uncertainty about outcomes in situations or the distress caused by uncertainty in situations. Presentation includes 'doing without considering the consequences or prior planning'. For example, a person chooses the first dish they see on the menu, buys the first car they see, and makes snap decisions.</p>
<p><b>Dither</b></p> <p>Behaviours that result in inaction due to hesitancy in choosing between at least two out of three courses of action, namely under-engagement (avoiding future uncertain situations), over-engagement (seeking future certainty), and impulsive (immediately reducing feelings of uncertainty), without really pursuing any of them. Presentation involves 'rapid deployment or lack of deployment of these IU behaviours, which can lead to an end state of behavioural paralysis'. For example, a person alternates between moving forward slightly and suddenly braking while driving onto a roundabout, flips between planning to go for a walk and watching television, and fails to progress on an assignment.</p>
<p><b>Flip-Flop</b></p> <p>Behaviours that involve switching between at least two out of three courses of action, namely under- and over-engagement and impulsive behaviours over a longer time scale than dithering. Presentation involves 'partial deployment of these IU behaviours'. For example, a person spends months reading reviews and visiting many houses before putting off buying a house for the next few months, spends years training in a particular career and suddenly changes to another career, and excessively prepares for an assignment but does not meet the deadline.</p>

Table 2: Number of items categorized into each IU category (matched items are in *bold*).

	<b>Coder Two</b>					Total
	Under-engagement	Over-engagement	Impulsive	Dither	Flip Flop	
Under-engagement	<b>9</b>	1	4	1	0	15
Over-engagement	0	<b>12</b>	1	0	0	13
Impulsive	0	0	<b>0</b>	0	1	1
Dither	0	4	1	<b>5</b>	1	11
Flip Flop	0	1	0	0	<b>1</b>	2
Total	9	18	6	6	3	42