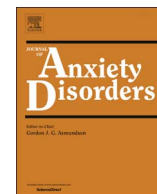




Contents lists available at ScienceDirect

Journal of Anxiety Disorders

journal homepage: www.elsevier.com/locate/janxdis

Factor structure of the intolerance of uncertainty scale for children

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ARTICLE INFO

Keywords:

Intolerance of uncertainty

IU

IUSC

Anxiety

Child

Adolescent

ABSTRACT

Intolerance of uncertainty (IU), a dispositional negative orientation toward uncertainty and its consequences, has been studied in adults, but research has only recently examined IU in youth. Despite some advances, little is known about the factor structure of measures of IU in youth. The present study used confirmatory factor analysis to examine the structure of IU as measured by the Intolerance of Uncertainty Scale for Children (IUSC; Comer et al., 2009) in a sample of youth ($N = 368$) 9–18 years of age ($M_{age} = 12.47$) with and without anxiety disorders and their mothers. Findings demonstrated multiple acceptable factor structures: a correlated factors 2-factor structure and a bifactor model where a general factor underlies all items. While the bifactor model provides better fit and reliability to the data, multivariate analyses indicated that the 2-factor structure distinguishes apprehensive anxiety regarding future events (prospective IU) from present-focused inhibition of behavior due to uncertainty and negative reactions to the presence of uncertainty (inhibitory IU); a total IU score predicted all anxiety domains for self- and parent-reports except for parent-report harm avoidance. Findings are discussed in terms of consistency of IU across adult and youth samples, and how results can inform treatment efforts and etiologic models of IU and anxiety.

1. Introduction

Intolerance of uncertainty (IU) refers to a dispositional negative orientation toward uncertainty and its consequences, and is associated with a tendency to react negatively on emotional, cognitive, and behavioral levels to uncertain and unpredictable situations (Buhr & Dugas, 2002; Dugas, Schwartz, & Francis, 2004). In adults, IU is relatively stable, is associated with a broad range of anxiety and mood problems (Carleton et al., 2012; Carleton, Sharpe, & Asmundson, 2007; Gentes & Ruscio, 2011; Holaway, Heimberg, & Coles, 2006; Yook, Kim, Suh, & Lee, 2010), and has been proposed as a transdiagnostic factor in the development and treatment of emotional disorders (Boswell, Thompson-Hollands, Farchione, & Barlow, 2013; Carleton, 2016; McEvoy & Erceg-Hurn, 2016).

Recent systematic reviews of the IU literature have highlighted the need to more comprehensively study the assessment of IU in children and the association between IU and various forms of psychopathology (e.g., Shihata, McEvoy, Mullan, & Carleton, 2016). Although the

majority of research on IU has been conducted in adult samples, recent years have witnessed considerable advances in the identification, measurement, and understanding of IU in youth samples (i.e. individuals under the age of 19) (Comer et al., 2009; Read, Comer, & Kendall, 2013; Sanchez et al., 2017). Indeed, we now know that IU can be reliably assessed in children and adolescents (Comer et al., 2009), and as with adult IU, child IU is associated with a range of internalizing problems (Boelen, Vrinssen, & van Tulder, 2010; Comer et al., 2009; Dugas, Laugesen, & Bukowski, 2012; Laugesen, Dugas, & Bukowski, 2003; Read et al., 2013; Sanchez et al., 2017). Further, IU aggregates in families, and links between maternal and child IU may mediate the intergenerational transmission of anxiety (Sanchez, Kendall, & Comer, 2016). That is, observed associations between maternal and child anxiety may be explained by the extent to which maternal anxiety predicts maternal IU, which in turn can engender child IU and consequent child anxiety. Despite these advances, however, little is known about the structure of measures of IU in youth.

To date, factor analytic work examining measures of IU has been

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<http://dx.doi.org/10.1016/j.janxdis.2017.07.003>

Received 3 October 2016; Received in revised form 23 July 2017; Accepted 28 July 2017

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confined predominantly to adult samples. Early exploratory factor analytic work evaluating items on the adult 27-item Intolerance of Uncertainty Scale (IUS; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994) initially identified a 5-factor (Freeston et al., 1994) structure and a 4-factor structure (Buhr & Dugas, 2002) on the French and English IUS, respectively. Sexton and Dugas (2009) identified an alternative 2-factor structure. This factor solution—which distinguishes “uncertainty has negative behavioral and self-reference implications” and “uncertainty is unfair and spoils everything”—has demonstrated strong support in both exploratory and confirmatory factor analyses utilizing very large samples (Sexton & Dugas, 2009), with the first factor, relative to the second factor, showing stronger associations with generalized anxiety, somatic anxiety, and depression.

Carleton, Norton, and Asmundson (2007) highlight problems of item redundancy and unrelatedness in the initially identified factor solutions, and confirmatory factor analytic work failed to replicate early results across diverse groups of individuals (Norton, 2005). Moreover, problematic item loadings and poor factor interpretability led some to suggest that removing items from the longer 27-item IUS would improve its factor structure (e.g., Norton, 2005).

Research with adults has supported more parsimonious 2-factor IU solutions, often in shortened versions of the IUS. Carleton, Norton et al. (2007) identified a 2-factor IU structure in a 12-item version of the IUS (i.e., IUS-12) that broadly distinguished “prospective” and “inhibitory” IU. *Prospective IU*—referring to apprehensive anxiety, fear regarding future events, and a desire for predictability—is inherently future-oriented and has been linked to worry, generalized anxiety disorder (GAD), and obsessive-compulsive disorder (OCD) (e.g., Hong & Lee, 2015; McEvoy & Mahoney, 2011). In contrast, *Inhibitory IU*—referring to inhibition of behavior due to uncertainty, uncertainty paralysis, and negative reactions in the presence of uncertainty—is more present-focused and has been linked to social anxiety disorder (Carleton, Collimore, & Asmundson, 2010), panic disorder (Carleton, Sharpe et al., 2007), and depression (McEvoy & Mahoney, 2012). Given the favorable psychometric properties of the shortened IUS-12 (Carleton, Norton et al., 2007), the IUS-12 and the prospective/inhibitory 2-factor model have been increasingly incorporated into adult studies examining IU.

Other recent factor analytic work in adult samples has considered whether a general factor of IU might underlie all items of the IUS-12. Hale et al. (2016), using bifactor confirmatory factor analysis, found better support for a model examining a general factor of IU than a model examining the two factors of prospective and inhibitory IU. This work suggests that the IUS-12 for adults may be better scored with a unidimensional total score rather than with separate prospective/inhibitory subscale scores. Specifically, this work found poor model fit in a correlated 2-factor confirmatory factor analysis, which is contrary to other work that has found acceptable model fit in similar models. However, this research, along with much of the other prominent factor analytic research on IU (e.g., Carleton, Norton et al., 2007), examined the IUS in a non-clinical sample of undergraduates. Factor analytic investigations of IU in clinical samples is critical.

Although anxiety disorders tend to first onset in childhood (Comer & Olfson, 2010; Merikangas et al., 2010), and emerging longitudinal work suggests that IU may play an etiologic role in the development of worry and related anxiety symptoms (Dugas et al., 2012), much remains to be learned about the structure of IU measures in youth. Boelen et al. (2010) conducted the only study to use factor analysis to consider the structure of IU in individuals below the age of 19, and found preliminary support for the Carleton, Norton et al. (2007) 2-factor prospective/inhibitory structure of IU in adolescents. However, their study was restricted to adolescents over the age of 14, they only considered the Carleton, Norton et al. (2007) 2-factor prospective/inhibitory model of IU, and they did not consider alternative factor structures that have also been identified in the adult literature. Further, they had youth complete the adult IUS rather than a measure specifically created for children.

The Intolerance of Uncertainty Scale for Children (IUSC; Comer et al., 2009) was developed specifically for youth; IUSC items map directly onto the items of the adult IUS but the language was changed for developmental compatibility. For example, metacognitive content was removed (e.g., “my mind can’t be relaxed when...” became “I can’t relax when...”), figurative and complex language was removed as were idioms whose meanings children may not easily deduce from literal definitions of the words (e.g., “sleeping soundly” became “sleeping well”), and the number of polysyllabic (i.e., > 3 syllable) words was reduced (e.g., “the ambiguities of life” became “things that are unclear”). The IUSC has shown strong validity and reliability in youth samples (Comer et al., 2009), but its factor structure has yet to be evaluated.

To date, no study has (a) comparatively evaluated multiple potential factor structures of measures of IU in a youth sample, (b) examined the structure of an IU measure in youth below the age of 14, or (c) factor analyzed the structure of IU in children or adolescents using IU items developed specifically for and supported in youth populations. Informed by the factor analytic examinations of IU in adult samples, the present study applied confirmatory factor analysis to examine the structure of IU in a large sample of youth with and without anxiety disorders using the IUSC. After identifying a preferred IUSC factor structure in youth, subsequent analyses examined differential associations between the identified factors and anxiety symptom domains.

2. Method

2.1. Participants

Participants ($N = 368$) were youth ages 9–18 years ($M = 12.47$, $SD = 2.4$) with and without anxiety disorders, and their mothers. Roughly half (49.1%) of participating youth were female, 68.2% identified as non-Hispanic/White, 16.6% identified as Black or African American, 4.3% identified as Hispanic/Latino, 3.0% identified as Asian, 0.3% identified as American Indian or Alaskan Native, and 2.4% identified as other. Participants were recruited for various psychopathology and treatment outcome studies from three metropolitan sites in the Northeast region of the United States: the Temple University Child and Adolescent Anxiety Disorders Clinic (CAADC; $n = 155$), the Boston University Center for Anxiety and Related Disorders (CARD; $n = 132$), and the New York University Child Study Center ($n = 81$). Anxious youth ($n = 221$) and their mothers were recruited from the flow of families seeking treatment for child anxiety problems at these centers. These anxious youth and their mothers completed study measures on paper as part of a pre-treatment battery of questionnaires. Non-referred community participants ($n = 147$) were also recruited at these same centers for various psychopathology and treatment outcome studies from similar communities as families seeking anxiety services; these community participants also filled out measures on paper as part of a larger battery of questionnaires for the respective study in which they were recruited to participate.

Of the subsample of anxious participants, youth met criteria for the following DSM-IV disorders as assessed by doctoral or masters-level clinicians using the Anxiety Disorders Interview Schedule for Children (ADIS; Silverman & Albano, 1996): GAD (53.8%), social anxiety disorder (27.6%), specific phobia (18.1%), separation anxiety disorder (10.0%), OCD (9.0%), depressive disorder (including major depressive disorder or dysthymic disorder) (7.7%), anxiety disorder not otherwise specified (1.8%), trichotillomania (1.8%), selective mutism (1.4%), panic disorder without agoraphobia (1.4%), panic disorder with agoraphobia (0.9%), posttraumatic stress disorder (0.9%), and agoraphobia (0.5%).

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