



Review article

Intolerance of Uncertainty, anxiety, and worry in children and adolescents: A meta-analysis



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ABSTRACT

Background: Intolerance of uncertainty (IU) has been implicated in the development and maintenance of worry and anxiety in adults and there is an increasing interest in the role that IU may play in anxiety and worry in children and adolescents.

Method: We conducted a systematic review and meta-analysis to summarize existing research on IU with regard to anxiety and worry in young people, and to provide a context for considering future directions in this area of research. The systematic review yielded 31 studies that investigated the association of IU with either anxiety or worry in children and adolescents.

Results: The meta-analysis showed that IU accounted for 36.00% of the variance in anxiety and 39.69% in worry. Due to the low number of studies and methodological factors, examination of potential moderators was limited; and of those we were able to examine, none were significant moderators of either association. Most studies relied on questionnaire measures of IU, anxiety, and worry; all studies except one were cross-sectional and the majority of the studies were with community samples.

Limitations: The inclusion of eligible studies was limited to studies published in English that focus on typically developing children.

Conclusions: There is a strong association between IU and both anxiety and worry in young people therefore IU may be a relevant construct to target in treatment. To extend the existing literature, future research should incorporate longitudinal and experimental designs, and include samples of young people who have a range of anxiety disorders.

1. Introduction

Anxiety disorders are among the most common mental health problems; the lifetime prevalence of anxiety disorders is estimated as 28.8% with onset usually in childhood and adolescence (Kessler et al., 2005). Anxiety disorders follow a chronic course (Costello et al., 2003), affect daily life (Jarrett et al., 2015; Paulus et al., 2015), and are associated with significant global burden (Whiteford et al., 2013). Cognitive Behaviour Therapy (CBT) for anxiety disorders in young people is effective, with recent data showing 58.9% of the children and adolescents were free from any anxiety diagnosis following CBT (James et al., 2015). However, this leaves a substantial proportion of young people who continue to have an anxiety diagnosis after completing CBT. As such, there is significant scope to improve treatments. To inform the advancement of treatment, we require a better understanding of the factors that underpin the development and maintenance of anxiety disorders in children and adolescents.

Intolerance of Uncertainty (IU) has been defined in a number of

ways. Most recently as “an individual's dispositional incapacity to endure an aversive response triggered by the perceived absence of salient, key, or sufficient information, and sustained by the associated perception of uncertainty” (Carleton, 2016b). At the core of IU is fear of the unknown (Carleton, 2016a). IU based models of worry hypothesize that individuals with high IU will be more prone to engage in worry as IU sets off a chain of worrying, negative problem orientation and cognitive avoidance as well as directly affecting problem orientation and cognitive avoidance (Dugas and Koerner, 2005). These models have received empirical support and there is evidence that IU has an important role in the maintenance of anxiety disorders in adults.

Although early work on IU focused on the association with generalized anxiety disorder (GAD), there is now evidence that IU might be a transdiagnostic risk factor for the development and maintenance of clinically significant anxiety more broadly as well as for depression (Carleton et al., 2010; Holaway et al., 2006; McEvoy and Mahoney, 2011; Norr et al., 2013; Tolin et al., 2003). Indeed, a meta-analysis of the association between IU and GAD, obsessive-compulsive disorder

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(OCD), and major depressive disorder (MDD) revealed IU as a shared factor in all three syndromes in adults (Gentes and Ruscio, 2011). Further, a recent meta-analysis revealed that six cognitive vulnerability factors associated with anxiety and depression (pessimistic inferential style, dysfunctional attitudes, rumination, anxiety sensitivity, IU, and fear of negative evaluation) loaded onto a single factor. Of these, IU had the strongest factor loading, further indicating that IU may be linked to both anxiety and depression (Hong and Cheung, 2015).

Treatment research in adults has highlighted the potential benefit of focusing on IU; treatments that target tolerating uncertainty have been found to reduce symptoms of GAD (Dugas and Ladouceur, 2000; Dugas et al., 2003; van der Heiden et al., 2012), and social phobia (Mahoney and McEvoy, 2012). Furthermore, in transdiagnostic CBT for adults with heterogeneous anxiety and depressive disorders, changes in IU across treatment significantly predicted changes in anxiety and depressive symptoms (Boswell et al., 2013). Examination of the factors underlying IU sets the stage for more specific targeted interventions. For example, prospective IU, which is characterized by the desire for predictability, is associated with worry and anticipatory apprehension, while inhibitory IU, which is a more immediate behaviourally focused facet of IU, is linked with social anxiety and depression (Hong, 2015).

Despite the extensive body of research examining IU in adults and the clinical promise of this work, relatively little research has examined the association of IU with anxiety and worry in children and adolescents. The significant association of IU with anxiety and worry found in adults may not translate directly into a similar association for young people because the ability to detect and reason about uncertainty develops across childhood and adolescence. The basic cognitive skills necessary for detecting and responding to uncertainty are present from a very young age (Lyons and Ghetti, 2011, 2013; Roebers et al., 2007). For example infants as young as 20 months old show evidence of introspective awareness which is a necessary skill to detect knowledge gaps and to experience uncertainty (Goupil et al., 2016); children as young as 4 years old implicitly demonstrate that they are able to identify multiple possibilities when uncertainty exists both in their mind and in the physical world (Robinson et al., 2006), and children as young as 4.5 years old are able to monitor their perceived uncertainty and ask for help under uncertain circumstances (Beran et al., 2012).

Although children may be aware of uncertainty and able to respond to uncertainty from a young age, many cognitive processes related to uncertainty continue to develop through middle childhood and adolescence. For example introspective awareness continues to improve through to the elementary school years (Roebers and Howie, 2003; Roebers et al., 2007). Similarly, meta-cognitive skills such as holding possible predicted outcomes in mind, delaying making an interpretation until further information is received or making a tentative interpretation whilst being open to adjusting this interpretation in light of new information, and asking for help in response to uncertainty develop gradually (Moshman, 2004; Weil et al., 2013). As the cognitive skills necessary for reasoning about uncertainty develop, it seems likely that the nature of IU and the association between IU and anxiety and worry may change. Despite this, to our knowledge there is no data that indicates whether IU develops linearly with age or waxes and wanes throughout development and there has been little consideration of how age might affect the association between IU and anxiety and worry.

An emerging body of research has begun to examine IU in the context of anxiety and worry in young people, with studies including children (e.g. Kertz and Woodruff-Borden, 2013) and adolescents (e.g. Laugesen et al., 2003). Age and gender vary widely across studies and most of the studies include children and young people from broad age ranges such as age 4–18 years. In general, there appears to be a lack of consideration of the effects of age and gender on the associations between IU and both anxiety and worry. Where they have been examined, results appear to be inconsistent. For example, while the link between IU and worry was not moderated by gender in one study (Boelen et al., 2010); in another study IU was found to be associated with worry in

females only (Barahmand, 2008). As such, it is not clear what effect age and gender have on the strength of the association of IU with anxiety and worry in young people.

In making sense of divergent findings, it is important to note that methods vary considerably across studies including the study population (clinical vs community), method of anxiety assessment (questionnaire vs diagnostic interview), the measure used to assess IU, the person who reports on the child's anxiety and IU, and study design (cross-sectional or longitudinal). Variation in each of these factors may also influence the magnitude of the associations between IU and both anxiety and worry.

Considering the promise of IU based psychological therapies with adults, it is timely to examine what we know about IU in young people in the context of anxiety and worry and to consider directions for future work in this field. To date there has been no systematic review of IU in relation to child and adolescent anxiety or worry. The aims of this review are therefore 1) to examine the existing evidence for an association between IU and both anxiety and worry in children and adolescents by conducting a meta-analysis; 2) to provide a summary of the critical gaps in the existing literature and the priorities for future work in this area. More specifically, the meta-analysis has 3 objectives: 1) to estimate the mean association between IU and anxiety in children and adolescents, 2) to estimate the mean association between IU and worry in children and adolescents, 3) to test whether these associations are moderated by age, gender, sample type, study design, method of anxiety assessment, IU questionnaire used, and informant of anxiety, worry, and IU. The focus in this work is on worry and anxiety; to our knowledge only one study examined IU and depression in young people (Boelen et al., 2010); therefore, a meta-analysis of an association of IU and depression in young people would be premature.

2. Method

2.1. Eligibility criteria

Studies were included in the meta-analysis if they met each of the following eligibility criteria:

1. The study must be based upon empirical research. Only research that offers extractable quantitative data is included. Reviews, presentations, and posters are not included due to the potential for overlap with published data.
2. The sample consists of child and adolescent participants, defined as all participants in the study must be under the age of 21 years with a mean age < 18 years.
3. Participants are children and adolescents without a diagnosed developmental disorder.
4. Studies include at least one standardized measure of child/adolescent anxiety (state or trait) or worry, completed by either the child/adolescent or parents. Questionnaires must show internal consistency of at least .7 and evidence of construct validity. If a standardized semi-structured diagnostic interview is used, there is evidence of inter-rater reliability of at least .7 and evidence construct validity. Interviews can be completed either with child, parent, or both.
5. Studies include at least one measure of IU, completed by either the child or parent. The measure is described in the study as a measure of IU by the authors.
6. The association of IU with anxiety or worry is available (reported or provided by the authors).
7. Studies are written in English. Non-English papers are not included due to lack of resources and facilities for translation.

2.2. Preliminary search strategy

The literature search was conducted in May 2017 using Web of

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