



Intolerance of uncertainty in pediatric patients: A transdiagnostic pathway to multiple disorders

Robert D Friedberg¹, Callie Goodman¹, Ellison Choate¹, Hannah Zelcer¹, Eunice Mendez¹, Yasaman Movahedi¹, Sandra Trafalis¹, Isabella Xie¹, Megan Neelley¹, Joe Zucker¹

¹Center for the Study and Treatment of Anxious Youth at Palo Alto University, Palo Alto, CA, United States.

*rfriedberg@paloaltou.edu

Published: November 30, 2022

Citation: Friedberg R. D., Goodman C., et al., 2022. Intolerance of uncertainty in pediatric patients: A transdiagnostic pathway to multiple disorders, Medical Research Archives, [online] 10(11).

<https://doi.org/10.18103/mra.v10i11.3314>

Copyright: © 2022 European Society of Medicine. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI:

<https://doi.org/10.18103/mra.v10i11.3314>

ISSN: 2375-1924

ABSTRACT

The search for transdiagnostic pathways and processes to emotional disorders in youth is an emerging and compelling field. In this mini-review, intolerance of uncertainty is posed as a transdiagnostic pathway. The theoretical foundation of intolerance of uncertainty is discussed. Subtypes of intolerance of uncertainty are explained, a behavioral typology is reviewed, neuropsychological correlates are briefly discussed, and age differences are addressed. The role of the Coronavirus-19 pandemic as a critical incident is examined. Subsequently, the research supporting the association between intolerance of uncertainty and anxiety, obsessive-compulsive, depression, autism, as well as eating disorders is reviewed. The findings are then integrated into a parsimonious theoretical synthesis. Limitations of the research are delineated and clinical implications are presented

Key Words: Intolerance of uncertainty, transdiagnostic, anxiety, depression, autism, eating disorders

Introduction

In a world besieged by skyrocketing rates of pediatric behavioral health referrals fomented by the COVID-19 global pandemic, academicians and clinicians alike are hunting for efficient ways to conceptualize and treat various psychiatric disorders. The search for shared pathways to multiple psychiatric disorders is consistent with Research Domain (RDOC) principles.¹ Transdiagnostic processes illuminate a better understanding of genetic heritabilities, underlying latent structures, relative effectiveness of common pharmacological and psychosocial interventions for like disorders, and data indicating that accompanying conditions remit after a primary disorder is mitigated.² Indeed, specifying transdiagnostic trajectories enables earlier identification, prevention, and intervention efforts.³ Moreover, investigating “stable, trait-level characteristics as the field moves away from diagnostic categorizations and towards a more dimensional, systems-level understanding in mental health disorders”^{4, p. 346} is essential. Therefore, understanding and identifying transdiagnostic pathways to emotional/behavioral pathways are particularly salient endeavors. Recognizing and responding to these shared trajectories may facilitate more efficient care of behavioral health concerns.

Intolerance of uncertainty (IU) refers to experiencing heightened distress in response to ambiguous situations.⁵⁻²⁰ More specifically, IU “is the tendency to be bothered or upset by the (as yet) unknown elements of a situation whether the possible outcome is negative or not.”^{8, p.6} IU appears related to

threat appraisals in vague situations.²¹ Simply stated, young patients with high IU experience distress when things are unknown and feel pressure to act in order to resolve ambiguity.²²⁻²³ Excessive IU contributes to the unknown or unknowable being seen as dangerous and unbearable.^{7, 12, 24} These youth find doubt aversive.²² Hence, these young people believe uncertainty must be assiduously avoided.¹¹

Intolerance of uncertainty is a dispositional trait-like construct.^{22, 25-28} Further, IU may serve as a cognitive filter, mindset, and a proposed diathesis or vulnerability factor.^{11, 17, 29} IU has been called a “scar for psychopathology.”^{3, p. 69} Accordingly, IU is increasingly conceptualized as a transdiagnostic route leading to multiple disorders.^{4, 17, 21-22, 24, 25, 27-31} In fact, one report boldly announced, “the jury is in: IU is certainly transdiagnostic.”^{31 p. 9}

This article adopts the perspective that IU is a transdiagnostic pathway to many pediatric psychiatric conditions including anxiety, obsessive-compulsive disorder, autism spectrum, and eating disorders. We selected disorders for inclusion in the review based on their high degree of homotypic comorbidity.³³ The manuscript begins with a theoretical explanation of the IU construct and then proceeds to discuss the relationship between IU and the various disorders. An integrative section follows that synthesizes the information culled from the review. Finally, limitations are presented and clinical implications are suggested.

Theoretical Foundations and Background

Intolerance of uncertainty is composed of two sub-components including prospective and inhibitory IU.^{17,28} Prospective IU forms a future oriented lens associated with predictions of danger, wishes for predictability, harm avoidance, and efforts to reduce ambiguity.^{28,33} On the other hand, inhibitory IU is related to cognitive freezing often and is referred to as uncertainty paralysis.^{17, 28, 33} The freezing may be a function of increased cognitive load reflecting difficulties in allocating attention to available coping resources.³³ Consequently, high IU compromises coping and fosters increased avoidance.

Intolerance of uncertainty is associated with a number of emotional and behavioral symptoms.^{7, 14, 16, 29} For instance, excessive worry^{5, 7, 16, 27} is a common sequela and functions as a problem-solving strategy.²⁹ Further, IU is also connected with rumination, catastrophizing, reassurance-seeking, and avoidance.^{14, 28, 34-35} Coping with IU involves feverish information gathering, distraction, impulsive behavior, and strong urges for advanced planning/organization.²² These symptoms represent partial and ineffective compensation strategies for the sense of lack of control ignited by excessive IU.³ Additionally, multiple safety-behaviors are conceptualized as attempts to over-control events.³¹ Not surprisingly, hypervigilance to physical and psychological threat cues is increased by high IU.^{28,36} IU is also connected to risk-taking.³⁷ Frustration, anger, and rage are also consequences due to perceptions of unfairness and helplessness.⁸ In sum, doubt

equates to a sense of loss of control and helplessness.

Recent work has focused on developing a behavioral typology for IU.²⁴ The research identified five categories (over-engagement, under-engagement, impulsiveness, dither, and flip-flopping) which gained a moderate consensus ($k=.52$). Over-engagement refers to exaggerated approach behaviors such as excessive planning, preparation, and reassurance-seeking as a way to obtain greater certainty. Under-engagement is characterized by avoidance behaviors marked by procrastination and changing topics of discussion. Making snap decisions to preempt uncertainty defines the impulsive dimension. Dither includes inaction, ambivalence, and indecisiveness. The fifth category is termed flip-flopping which pertains to switching between the other four categories.

In addition to psychological correlates, IU is associated with neurobiological markers and indices of physiological arousal.^{17, 31, 37} A recent review¹⁷ noted that IU is associated with neural correlates such as intensified activations in the insula, amygdala, anterior cingulate cortex, orbitofrontal cortex, ventromedial prefrontal cortex, dorsolateral cortex, and posterior frontomedial cortex. Increased striatal volume as well as amplified activation in the insula and the dorsal anterior cingulate cortex were linked to IU.^{4, 37} The hypervigilance accompanying excessive IU amplifies visual attention and recall processing biases.⁴ Inhibitory IU is associated with intrinsic functional connectivity between

the anterior insula and the right frontal areas.³³ On the other hand, prospective IU was correlated with iFC between the anterior insula and the anterior cingulate.³³ Thus, multiple neural biomarkers, physiological signs, and psychological symptoms are influenced by IU.

Age Differences in Intolerance of Uncertainty

Studying IU in child and adolescent populations is an important frontier.^{27, 31, 38-40} Perceptions of uncertainty begin early in development.³⁹ Identifying feelings of uncertainty is considered one of the first signs of introspection and is central in decision-making.⁴⁰ Infants demonstrate they experience, identify, and communicate uncertainty to their caregivers.³⁹ Additionally, an innovative study demonstrated that preschoolers (ages 3-5) were aware of their own sense of uncertainty.⁴⁰

A meta-analysis indicated that the relationship between excessive IU and psychological symptoms endures over time from childhood through adulthood.³¹ In particular, random effects point estimates and bivariate meta-regression results showed a non-significant slope estimate (Fisher's $Z=1.46$).³¹ Another report showed the pathway coefficients between IU and worry for children (.49) and adolescents (.59) were approximate suggesting an enduring link from childhood to adolescence.³⁸ Moreover, in the same study, the pathway coefficient between IU and worry for children (.55) was much stronger than for adolescents (.31). Put simply, other factors such as positive beliefs about worry (PBW)

may attenuate IU's impact on adolescents' worries.

Adolescence is a fertile ground for studying IU.^{33, 41-42} The teenage years represent a time of social, behavioral, and neural maturation.³³ Further, there are increased rates of internalizing psychiatric disorders and risk-taking behaviors in this developmental period.⁴¹⁻⁴² An intriguing finding is that high IU in adolescents was correlated with less risk-taking whereas lower IU prompted more risky behavior.⁴¹ The same study found that adolescents who had greater IU engaged in more information-seeking and deliberate decision-making. In particular, "adolescents may be more vulnerable to developing internalizing problems when faced with chronic stress and uncertainty, common experiences during the COVID-19 pandemic." ^{43, p. 279} Accordingly, practicing clinicians are well-advised to consider the COVID-19 pandemic as a critical incident for accelerating uncertainty.

Coronavirus-19 pandemic as a critical incident

The Coronavirus-19 viral pandemic is igniting uncertainty and various anxieties.^{15, 29, 44-50} Greater IU seems to exacerbate distress amid the viral outbreak.^{15, 44} A new COVID-19 Stress Syndrome is emerging and is marked by symptoms such as fears of contamination, depressed mood, anxiety, repeated checking, excessive reassurance seeking, and storing supplies.⁵⁰ Consequently, the pandemic is viewed as a critical incident inciting surging rates of anxiety⁵¹. Moreover, the virus was described as a "looming vulnerability."^{13, p. 6}

Clearly, COVID-19 itself may be considered an exemplar of uncertainty and logically propel greater levels of IU.^{8,44}

A large global study revealed that 25 percent of youth are showing symptoms of depression and another 20% are demonstrating anxious symptoms amid the pandemic.⁴⁵ For instance, in the United States, 140,000 youth lost a parent and/or grandparent to COVID-19.⁵⁰ Further, 43% of American teens stated they experienced increased stress during the pandemic.⁴⁸ Emergency room visits associated with behavioral health complaints rose 51% for female youth and in 2020, 6,600 individuals ages 10-24 years died via suicide.⁵⁰ In China, incidences of PTSD and Generalized Anxiety in young people soared during the pandemic.⁴⁶ Patients diagnosed with Obsessive-Compulsive, Health Anxiety, and other anxious are particularly vulnerable during the viral outbreak.¹⁹ Clinicians recognize that "learning about threat and safety is central to navigating an uncertain world. Adapting to environmental changes requires learning about when something is dangerous as well as updating those beliefs when cue that were once signaled danger and are now safe."^{52, p. 166} Indeed, anxiety and IU blossom organically during pandemics when relative danger and safety cues are ambiguous.²⁹

Intolerance of uncertainty and various psychiatric disorders in childhood and adolescents

Generalized Anxiety Disorder. Intolerance of uncertainty plays a pivotal role in the development of worry in children.^{18, 53-56} The

connection between elevated IU and worries in pediatric populations is well-documented.^{22,53} The association between IU and childhood worries is found in children as young as 7 year olds.³⁸ In a study that examined IU as a higher order vulnerability factor for cognitive avoidance (CA) and positive beliefs about worry (PBW) in youth, IU emerged as a higher order factor for both variables (26 % of the variance explained in CA; 27% explained in PWB).³⁸

In research employing school age children, IU and worry were significantly correlated ($r=.65-.68$).^{54, 57} Another project found a statistically significant association between IU and worry in children ages 7-13 years ($r=.45$).⁵⁸ A recent investigation involving over 200 5th and 6th grade students found IU to be significantly related to worry (standardized coefficient $=.56$, $t=8.95$, $p,.001$).⁵⁵ Further, the magnitude of the correlation between IU and worry in African-American youth ages 8-13 years was quite large.⁹

A large scale regression analysis involving 521 secondary school students found that IU significantly predicted worries independently of meta-cognitive variables such as positive beliefs and negative beliefs about worry (R^2 change $=.03$).⁴³ Additionally, meta-analytic findings revealed that IU owns a fairly large effect size in predicting worries in youth ($ES=.63$) and accounts for 40% of the variability in worrying behavior.²² Finally, inhibitory IU seems to compromise children's sense of confidence in their own problem solving and contributes to a default coping strategy of over-relying on worrying.⁵⁸

The strong connection between IU and worry contributes to the relationship between IU and GAD. High IU discriminates anxious from non-anxious 7-17 year olds.⁶ Youth diagnosed with GAD reported higher IU than their non-anxious peers.^{11, 53} In a study of 128 youth ages 11-17, there was a strong association between high IU and GAD symptoms ($r=.66$).²⁰ Moreover, IU explained significant unique variance in the physiological symptoms that accompany GAD in Scottish 11-15 year olds ($r=.52$).¹⁸ Results from a logistic regression analysis showed IU predicted the GAD diagnosis in youth ($B=.03$, $SE=.01$, Odds Ratio=1.03).¹⁴ Higher IU was found in patients diagnosed with GAD plus comorbid conditions than in youth with GAD alone or no diagnosis.⁵⁷

Higher intolerance of uncertainty also contributes to Social Anxiety Disorder.^{11, 59} There was a significant correlation between IU and SAD in pre-adolescent and adolescent youth ($r=.61$).²⁰ Children diagnosed with Social Anxiety and GAD did not differ from each other but diverged from non-anxious youth on the basis on their elevated IU scores.¹¹ Thus, IU is a likely common transdiagnostic pathway to both disorders as well as a unique factor differentiating anxious youth from non-anxious counterparts.

Currently, children and adolescents likely face health-related anxieties and distress from uncertainty due to the emergence of the COVID-19 pandemic. Therefore, attending to health anxieties is an increasing concern. Pediatric patients diagnosed with health anxiety demonstrate higher levels of IU.^{20, 60} Health anxiety as measured by scores on a

measure of child illness anxiety were significantly correlated with inflated IU ($r=.80$).²⁰ In particular, a mediational analysis showed that prospective IU exerted a direct effect on health anxiety ($b=.78$).²⁰ Youth were likely to reach the threshold for health anxiety or generalized anxiety if they were previously identified as "vulnerable" for experiencing IU and psychological distress before the onset of the COVID-19 pandemic.¹⁵ A common belief is that youth with pre-existing health anxiety conditions have various concerns about COVID-19.^{15, 19, 49, 61}

Conceptually, "IU often underlies an obsessional thought (e.g. "what if I stab my partner?") and rituals are done to obtain certainty about a feared outcome or event (e.g. reassurance seeking that the harm thought is ego-dystonic—"that my thought is just my OCD)."^{13, p. 2} In study with adults, IU predicted OCD symptoms across all dimensions indicating that it is a critical characteristic to consider.¹³

Intolerance of uncertainty is associated with specific OCD symptoms in youth.^{62, 63} OCD symptoms and elevated IU were significantly correlated in middle and high school students ($r=.63$).²⁰ Most recently, IU was related to anxious symptoms ($r(100) = .69$) in 8-19 year old youth presenting with anxiety disorders and OCD at an Intensive Outpatient Treatment program.⁶⁴ More specifically, IU was particularly linked with ordering/symmetry obsessions and compulsions in young people.⁶² Further, washing, checking reassurance-seeking, and neutralizing symptoms were also correlated with elevated IU.^{10, 63} Perfectionism which is so

central in OCD presentations functions to reduce uncertainty in young patients.⁶²

The literature reviewed in this section clearly indicates that IU is consistently linked with worrying, GAD, HA, Social Anxiety, and OCD. The association may be stronger for adolescents than for younger children. A common function of the search for certainty is the reduction of distress accompanied by lack of predictability/control. Consequently, certainty and predictability equate to safety in these young people. Focusing on these core components may help clinicians and their staff better relate to their anxious patients as well as plan interventions to mitigate the IU amid the peri-pandemic and post-pandemic periods.

Depression. Anxiety and depressive disorders are highly correlated in pediatric populations.⁶⁵As the previous section asserts, the extant literature identifies IU as a fundamental pathway to various anxieties. While much research focuses on the impact of IU on anxiety and OCD symptoms, the potential impact of IU on depression should not be disregarded. Therefore, with depression and anxiety being highly comorbid, the role of IU in depressive disorders deserves a closer look.

Intolerance of uncertainty may also underlie depression.⁶⁶ In a very large project involving adults ($n > 1000$) conducted during the COVID-19 outbreak in Wuhan, China, depression and IU were significantly correlated ($r = .43$).⁶⁷ Additionally, a significant association between IU and symptoms of depression was found ($r = .55$) in a school

sample with children ages 8-10 years ($n = 235$).⁶⁸ IU and depressed affect were also related in a large study of 5th and 6th graders (standardized coefficient = .38; $t = 5.81$, $p < .001$).⁵⁵

Moreover, there is some indirect research suggesting that IU is related to depression.^{16, 69} Depression is often marked by low self-efficacy, poor self-concept, helplessness, interpersonal conflict, and perception of rejection.⁷⁰⁻⁷² IU is related to prolonged interpersonal conflict and lower academic achievement in young people.¹⁶ Low self-efficacy as well as elevated perceptions of peer rejection in children and adolescents are linked with excessive IU.⁶⁹

Unfortunately, many pandemic-related circumstances that youths encounter are uncontrollable and the inability prevent every uncertainty ruptures self-efficacy. The virus is dynamic and continuously evolving. When young people experience difficulty tolerating responding to these pandemic-related uncertainties, depressive symptoms become more likely.⁶⁶ Not surprisingly, if young people are gripped by repeated uncertain and uncontrollable circumstances, a sense of helplessness and accompanying depressed mood is quite understandable.^{70, 72-73}

Research continues to identify the significant role IU has as a construct underlying various disorders including depression.^{66, 74} However, there are relatively few studies explicitly focusing on the relationship between IU and depression in youth despite promising early results. Some caution is recommended when

considering IU's contribution to depression in youth. Therefore, more studies exploring this association and its potential impact on learned helplessness are essential.

Autism. Anxiety, depression, and OCD symptoms frequently co-occur with Autism Spectrum Disorders.⁷⁵ While previous research examining IU and internalizing disorders is well-documented, the association between IU and Autism Spectrum Disorders (ASD) is a relatively recent development.²⁶ In a study comparing 57 children diagnosed on the ASD spectrum to 32 neurotypical cohorts (ages 7-16 years), the ASD group was higher in IU ($z = -5.04, p < .001$).²³ Further, levels of IU were rated higher in neuroatypical children than in neurotypical youth by their caregivers ($t = 11.19, p < .001, d = 1.89$).⁷⁶

There is emerging evidence that suggests that IU in children diagnosed with ASD explains various symptoms.^{23, 26, 77} A recent meta-analysis demonstrated a significant relationship between high IU and anxious symptoms in these children (weighted effect size = $r = .62, p < .001$) with IU explaining approximately 38% of the variance in anxiety.²⁶ Pediatric populations diagnosed on the ASD often engage in restricted and repetitive behaviors as well as atypical reactions to sensory stimuli.^{23, 73} Further, there was a higher correlation between IU and sensory sensitivities in the ASD group than in NTs.

Intolerance of uncertainty was also associated with hyper-responsiveness to aversive stimuli ($r = -.36$) and repetitive motor behaviors ($r = .42$).⁷⁸ In a project utilizing reports from

caregivers (N=640), elevated IU was significantly correlated with greater sensory sensitivities ($r = .67$).⁷⁶ Finally, extreme demand avoidance where youth diagnosed on the ASD spectrum feverishly try to escape routine tasks expected of them is another common symptom. IU is a significant predictor of this behavior pattern explaining 15% of the variance in symptom presentation.⁷⁹

In sum, the contribution of IU to specific symptom presentations in ASD is becoming clearer. The link between restricted behavior patterns, sensory sensitivities, and demand avoidance directs a trajectory toward more effective interventions. Additionally, conceptualizing IU as a pivotal ingredient adding to the symptom mix enables a flexible treatment plan which centers on fears of the unknown/uncontrollable stimuli.

Eating Disorders. Similarly to ASD, anxiety, depression, and OCD are highly comorbid with Eating Disorders (EDs).⁸⁰ A variety of recent studies show there is a significant relationship between IU and EDs.⁸¹⁻⁸⁸ The results of a focus group investigation (n=13) yielded qualitative data on patients' experiences with IU and EDs.⁸⁵ Five themes emerged that explained the relationship between IU and restrictive EDs: 1). Uncertainty is dangerous, 2). High anxiety levels and stress are to be avoided (i.e., cognitive biases towards threat stimuli), 3). ED behaviors work to reduce uncertainty, 4). Control (i.e., control of weight, how others perceive them, and need to prevent negative outcomes) is overly valued, and 5). Productive coping strategies are limited. Consequently, disordered eating behaviors are default options.

In a project examining adolescents and transitional age youth, there was a significant association between ED symptoms and IU ($r=.42$).⁸² Moreover, IU likely represents a risk factor for eating disorders (EDs).⁸⁷ IU appears to predict EDs in young people.⁸² Elevated IU was found in a sample of adolescent inpatients diagnosed with Anorexia Nervosa.⁸⁸ In particular, an investigation involving 93 adolescent females diagnosed with Anorexia Nervosa found that inhibitory IU was significantly related ($r=.45$) to shape and weight concerns.⁸¹ Further, preliminary findings suggest that the social and emotional processing deficits found in Anorexia Nervosa could be impacted by IU.⁸⁷ When calorie count is unknown, IU is triggered and the accompanying distress produces various safety behaviors.⁸⁶ It seems reasonable that IU may catalyze restricted eating behaviors and contribute to restrictive EDs by increasing the likelihood of a comorbid anxiety disorder as well as the belief buttressing the urgent need for control.⁸⁵

Diagnostic status and specific eating behaviors are both related to IU. Checking behaviors (e.g. repetitive weigh-ins, obsessive calorie counting, etc.) serve to reduce aversive doubt in clinically diagnosed individuals. Therefore, targeting IU when treating patients with EDs is likely a promising clinical strategy.

Theoretical Synthesis

A diathesis-stress model is recommended to as a way to map the pathways between IU and multiple psychiatric conditions in pediatric populations amid the pandemic.²⁹ As previously noted, elevated IU boosts

catastrophic predictions, ruminations, reassurance-seeking, checking, obsessive pre-planning, hypervigilance to threat cues, avoidance of novel situations, helplessness, procrastination, and indecision. Fear of the unknown may be a causal or maintaining factor in multiple conditions. Yet, the precise nature of the role IU plays in various psychopathologies is currently unclear.⁸⁹

Although the exact mechanism of action is puzzling, several speculations based on cognitive theory are potentially fascinating.⁹⁰⁻⁹³ For instance, if IU is directly linked to a constellation of catastrophizing, reassurance seeking, hypervigilance and avoidance, anxious presentations are more likely. On the other hand, if there is a path from helplessness and indecision to IU, depression is a reasonable consequence. Accordingly, mediational investigations which identify the specific operative mechanisms need to be identified.

Limitations

While literature base documents IU's transdiagnostic nature, a number of methodological limitations and theoretical gaps remain. First, most studies are cross-sectional so the data accounts for only one point in time. More longitudinal studies are necessary. Second, the majority of studies are correlational and thus, no causal inferences are enabled. Additionally, moderation and mediational studies are necessary to more fully explore IU's mechanisms of actions as well as direct and indirect effects.^{17, 75, 94} An over-reliance on questionnaire data pervades the research. Accordingly, investigations

including behavioral measures may improve the science.⁹⁵

Although some studies focus on pre-pubertal youth, most previous work incorporates middle school age or adolescent youth.^{17, 94} The data base investigating the relationship between IU and anxiety spectrum disorder is well-developed. While the initial findings on the connections between IU and depression, autism, and eating disorders are promising, more studies examining IU in these conditions is necessary. The literature includes data on young people across the globe but of course, expanding the scope of the research to understand IU in diverse populations is a worthy endeavor. In particular, investigating the way marginalization, prejudice, and oppression impacts IU in traditionally under-served youth is imperative.⁹

Clinical Implications

Methodological and theoretical limitations notwithstanding, the current knowledge pertaining to IU as a transdiagnostic pathway proffers several clinical implications for behavioral health professionals. "Repeatedly assessing for IU and designing interventions that address the management of IU may be indicated to better support children and their families to make sure that clinicians are targeting the construct sufficiently."^{64 p.8} Consequently, the Intolerance of Uncertainty Index-A for Children (IUI-A-C)¹⁶ is a new generation tool that improves upon various assessment instruments and helps clinicians better locate elements of IU. Providing an estimate of IU independently of anxiety is a

major advantage of the IUI-A-C. The measure enjoys very favorable psychometric properties including solid convergent, divergent, and concurrent validity as well as strong internal reliability.¹⁶ Thus, the IUI-A-C equips both clinicians and researchers with another means to tap IU.⁹⁶

We recommend that pediatricians and other behavioral health professionals consider adding a measure that assesses young patients' IU when they conduct routine psychosocial screening. For instance, if a patient screens positive for generalized anxiety, social anxiety, separation anxiety, health anxiety or OCD, staff could be directed to follow up with the IUI-A-C. Identifying the level of IU in these young people would add greater specificity to the screening regimen and give providers a clearer route to treatment.

A treatment goal for IU is to "engage a sense of curiosity in patients about whether uncertainty is in fact tolerable and often benign, and to help them discover that uncertain situations often provide important opportunities for new information and personal growth."^{2, p. 105} Applying modular CBT (mCBT) to cases where young patients are highly intolerant of uncertainty is a propitious approach.^{52, 97-99} mCBT involves delivering psychoeducation (PE), Basic Behavioral Tasks (BBT), Cognitive Restructuring (CR), and Exposure/Experiments (E/E) to young patients.¹⁰⁰⁻¹⁰²

Providing information about IU and its treatment embodies PE. In PE, clinicians

increase young patients' expertise in IU and mCBT treatment. The rationale for CBT is explained and the role of IU in patients' symptoms are explained. An innovative metaphor such as seeing the world through "uncertainty glasses"¹⁰³ may be quite useful in making this information more meaningful. For younger children, making a pair of these spectacles in session with their clinicians is potentially engaging.

Ingredients in the BBT module include contingency management, behavioral activation, and relaxation techniques. Self-instructional procedures, problem-solving, and rational analysis epitomize CR. Modifying maladaptive catastrophic predictions when encountering novel and ambiguous situations represents CR's lodestar. Finally, manifold structured exercises for re-engineering young patients' inaccurate cognitions are readily available.^{99, 102, 104-106}

Intolerance of uncertainty is key target in potential exposures.^{52, 59, 86, 98, 107} Similar to treating other anxiety spectrum disorders, exposure is an indispensable component.¹⁰⁸⁻¹¹² Exposures and experiments invite young patients to face what they heretofore avoided. Imaginal worry exposures should be aimed at specific catastrophic beliefs. Additionally, experiential procedures might center on preventing various safety behaviors in unknown situations (e.g. picking an unknown activity to do, ordering a new food at a restaurant, only checking answers on a test twice, engaging in an improvisational theatre exercise).

Conceptual understanding of IU as well as its assessment and treatment is

evolving. New generation measures such as the IUI-A-C and flexible application of mCBT supply clinicians with promising choices. Consequently, clinicians are encouraged to be proactive when adapting evidence-based treatments during the COVID-19 pandemic and beyond in providing dynamic, practical, and beneficial treatments for youth experiencing excessive IU.⁵⁹

Conclusion

The COVID-19 pandemic fundamentally unsettled the world and propelled various uncertainties as well as accompanying emotional difficulties. Tolerating multiple uncertainty becomes a pressing a challenge. Not surprisingly, skills for tolerating uncertainty emerges as an urgent need. Fortunately, mCBT represents a salutary treatment option.

Corresponding author

Robert D Friedberg

Center for the Study and Treatment of
Anxious Youth at Palo Alto University
Palo Alto, CA, United States.

Email: rfriedberg@paloalto.edu

Funding Statement

None

Acknowledgments:

None

Conflict of Interest Statement

Dr. Friedberg receives book royalties from Springer, Guilford, John Wiley, Routledge, and Professional Resource Press. He is on the speaking faculty of the Beck Institute of Cognitive Behavioral Therapy and is a consultant to Kinark Child and Family Services and Psychological Assessment Resources. Ms. Goodman, Choate, Xie, Zelcer, Movahedi, Neelly, Zucker and Dr. Trafalis have nothing to disclose.

References

1. Insel T, Cuthbert B, Garvey M, Heinssen R, Pine DS, Quinn K, Sanislow C, Wang P. Research domain criteria (RDoC): Toward a new classification framework for research on mental disorders. *Am J Psychiatr.* 2010; 167: 748-751. [PMID: 20595427
DOI: 10.1176/appi.ajp.2010.09091379}
2. McEvoy PM, Erceg-Hurn DM. The search for universal transdiagnostic and trans-therapy change processes: Evidence for intolerance of uncertainty. *J Anxiety Disord.* 2016; 41: 96-107. [PMID: 26898177
DOI: 10.1016/j.janxdis.2016.02.002]
3. Correa KA, Liu H, Shankman SA. The role of intolerance of uncertainty in current and remitted internalizing and externalizing psychopathology. *J Anxiety Disord.* 2019; 62: 68-76. [PMID: 30639836
DOI: 10.1016/j.janxdis.2019.01.001]
4. DeSerisy M, Hirsch E, Stratterman J, Silverman M, Roy A. Intolerance of uncertainty and risk for anxiety: Neural mechanisms and cross-cultural implications. *Behav Therapist.* 2021; 44, 346-356.
5. Carleton RN. Into the unknown: A review and synthesis of contemporary models involving uncertainty. *J Anxiety Disord.* 2016; 39: 30-43.
[PMID: 26945765
DOI: 10.1016/j.janxdis.2016.02.007]
6. Comer JS, Roy AK, Furr JM, Gotimer K, Beidas RS, Dugas MJ, Kendall PC. The Intolerance of Uncertainty Scale for Children: A psychometric evaluation. *Psychol Assess.* 2009; 21: 402-411. [PMID: 19719351
PMCID: PMC2952545
DOI: 10.1037/a0016719]
7. Dugas MJ, Hedayati M, Karavidas A, Buhr K, Francis K, Phillips NA. Intolerance of uncertainty and information processing: Evidence of biased recall and Interpretations. *Cogn Behav Ther.* 2005; 29: 57-70. [DOI: 10.1007/s10608-005-1648-9]
8. Freeston M, Tiplady A, Mawn L, Bottesi G, Thwaites S. Towards a model of uncertainty distress in the context of coronavirus (COVID-19). *Cogn Behav Ther.* 2020; 13:e 31 .[PMID: 34191941
PMCID: PMC7426588
DOI: 10.1017/S1754470X2000029X]
9. Geronimi EMC, Richards A, Gramszlo C, Woodruff-Borden J. A preliminary investigation of cognitive features associated with worry among Africa American youth. *J Black Psychol.* 2019; 45: 518-539. [DOI: 10.1177/0095798419870076]
10. Gillette CB, Bilek EL, Hanna GL, Fitzgerald KD. Intolerance of uncertainty in youth with obsessive-compulsive disorder and generalized anxiety disorder: A transdiagnostic construct with implications for phenomenology and treatment. *Clin Psychol Rev.* 2018; 60: 100-108[PMID:29426573
DOI: 10.1016/j.cpr.2018.01.007]
11. Hearn CS, Donovan CL, Spence SH, March S, Holmes MC. What's the worry with social anxiety? Comparing cognitive processes in children with generalized anxiety disorder and social anxiety disorder. *Child Psychiatry Hum Dev.* 2017; 48: 786-795. [PMID:

27917455 DOI: 10.1007/s10578-016-0703-y]

12. Kendall, PC, Norris, LA., Rabner, JC, Crane, ME, Rifkin, LS. (2020). Intolerance of uncertainty and parental accommodation: Promising targets for personalized intervention for youth anxiety. *Curr Psychiatr Rep.* 2020; 22: 1-8.[DOI: [10.1007/s11920-020-01170-3](https://doi.org/10.1007/s11920-020-01170-3)]

13. Pinciotti CM, Riemann BC, Abramowitz JS. Intolerance of uncertainty and obsessive-compulsive disorder dimensions. *J Anxiety Disord.* 2021; 81: 102417. [PMID: 33991818 DOI: 10.1016/j.janxdis.2021.102417]

14. Read KL, Comer JS, Kendall PC. The Intolerance of Uncertainty Scale for Children (IUSC): Discriminating principal anxiety diagnoses and severity. *Psychol Assess.* 2013; 25: 722-729.

[PMID: 23647032 DOI: 10.1037/a0032392]

15. Rettie H, Daniels J. Coping and tolerance of uncertainty: Predictors and mediators of mental health during the COVID-19 pandemic. *Am Psychol.* 2020; 76: 427-437. [PMID: 32744841 DOI: 10.1037/amp0000710]

16, Rifkin LS, Kendall PC. Intolerance of uncertainty in youth: Psychometrics of the Intolerance of Uncertainty Index-A for Children. *J Anxiety Disord.* 2020; 71: 102197. [PMID: 32126335 DOI: 10.1016/j.janxdis.2020.102197]

17. Shihata S, McEvoy PM, Mullan BA, Carleton RN. Intolerance of uncertainty in emotional disorders: What uncertainties remain? *J Anxiety Disord.* 2016; 41: 115-124. [PMID: 27212227

DOI: 10.1016/j.janxdis.2016.05.001]

18. Watts R, Cossar J, Ferreira N. Applicability of the intolerance of uncertainty model to generalized anxiety disorder symptoms in young people. *Mediterr J Clin Psychol.* 2021; 9: 1-20. [DOI: 10.13129/2282-1619/mjcp-2978]

19. Wheaton MG, Messner GR, Marks JB. Intolerance of uncertainty as a factor

linking obsessive-compulsive symptoms, health anxiety and concerns about the spread of

the novel coronavirus (COVID-19) in the United States. *J Obsessive Compuls Relat Disord.* 2021; 28: 100605. [PMID: 33251098 PMCID: PMC7681070 DOI: 10.1016/j.jocrd.2020.100605]

20. Wright KD, Adams Lebell MAN, Carleton RN. Intolerance of uncertainty, anxiety sensitivity, health anxiety, and anxiety disorder symptoms in youth. *J Anxiety Disord.* 2016; 41: 35-42. [PMID: 27302203 DOI: 10.1016/j.janxdis.2016.04.011]

21. Milne S, Lomax C, Freeston MH. A review of the relationship between intolerance of uncertainty and threat appraisal in anxiety. *Cogn Behav Ther.* 2019; 12: 1-18. [DOI: 10.1017/S1754470X19000230]

22. Bottesi G, Marchetti I, Sica C, Ghisi M. What is the internal structure of intolerance of uncertainty? A network analysis approach. *J Anxiety Disord.* 2020; 75: 102293. [PMID: 32827868 DOI: 10.1016/j.janxdis.2020.102293]

23. Vasa, RA, Kreiserm NL, Keefer,A, Singh, V, Mostofsky, SH. Relationships between Autism Spectrum Disorder and intolerance of uncertainty. *Autism Re.s* 2018; 11: 636-644. [PMCID PMC: 5903967 DOI: 10.1002/aur1916]
24. Sankar R, Robinson L, Freeston M. '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. *Clin Psychol Forum*. 2017; 296: 10-15.
25. Hawes MT, Farrell MR, Cannone JL, Finsaas MC, Olino TM, Klein DN. Early childhood temperament predicts intolerance of uncertainty in adolescence. *J Anxiety Disord*. 2021; 80: 102390. [PMID: 33857835 DOI: 10.1016/j.janxdis.2021.102390]
26. Jenkinson, R, Milne, E, Thompson, A. The relationship between the intolerance of uncertainty and anxiety in autism: A systematic literature review and meta-analysis. *Autism*. 2020; 24: 1933-1944. [PMCID 7539603 doi:10.1177/136236320932437]
- 27 Osmanağaoğlu N, Creswell C, Dodd HF. Intolerance of uncertainty, anxiety, and worry in children and adolescents: A meta-analysis. *J Affect Disord*. 2018; 225: 80-90. [PMID: 28802117 DOI: 10.1016/j.jad.2017.07.035]
28. Stevens K, Rogers T, Campbell M, Björgvinsson T, Kertz S. A transdiagnostic examination of decreased intolerance of uncertainty and treatment outcome. *Cog Behav Ther*. 2018; 47: 19-33. [PMID: 28650777 DOI: 10.1080/16506073.2017.1338311]
29. Korte C, Friedberg RD, Wilgenbusch T, Paternostro JK, Brown K, Kakolu A, et al. Intolerance of uncertainty and health-related anxiety in youth amid the COVID-19 pandemic: Understanding and weathering the continuing storm. *J Clin Psychol Med Settings*. 2022; 29:645 653. [PMID: 34478037 PMCID: PMC8414950 DOI: 10.1007/s10880-021-09816-x]
- 30, Geok ET, Lee KYC, Sündermann O. An experimental investigation of intolerance of uncertainty and its impact on sub-clinical psychopathology. *J Behav Ther Exp Psychiatry*. 2022;75: 101718. [PMID: 35081482 DOI: 10.1016/j.jbtep.2021.101718]
31. McEvoy PM, Hyett MP, Shihata S, Price JE, Strachan L. The impact of methodological and measurement factors on transdiagnostic associations with intolerance of uncertainty: A meta-analysis. *Clin Psychol Rev*. 2019; 73: 101778. [PMID: 31678816 DOI: 10.1016/j.cpr.2019.101778]
32. Beauchaine TP, Gatzke-Kopp LM. Genetic and environmental influences on behavior. In: Beauchaine, TP, Hinshaw, SP eds. *Child and adolescent psychopathology*. 2nd ed.. New York: John Wiley; 2013: 111-142.
33. DeSerisy M, Musial A, Comer JS, Roy AK. Functional connectivity of the anterior insula associated with intolerance of uncertainty in youth. *Cogn Affect Behav Neurosci*. 2020; 20: 493-502.

- [PMID: 32124254 PMCID: PMC7272284 DOI: 10.3758/s13415-020-00780-x]
34. Beesdo-Baum K, Jenjahn E, Höfler M, Lueken U, Becker ES, Hoyer J. Avoidance, safety behavior, and reassurance seeking in generalized anxiety disorder. *Depress Anxiety*. 2012; 29:948-957. [PMID: 22581482 DOI: 10.1002/da.21955]
35. Satici B, Saricali M, Satici SA, Griffiths MD. Intolerance of uncertainty and mental wellbeing: Serial mediation by rumination and fear of COVID-19. *Int J Ment Health Addict*. 2020; 1-12. [PMID: 32427165 PMCID: PMC7228430 DOI: 10.1007/s11469-020-00305-0]
36. Petrongolo JL, Zelikovsky N, Keegan RM, Furth SL, Knight A. Examining uncertainty in illness in parents and children with chronic kidney disease and systemic lupus erythematosus: A mediational model of internalizing symptoms and health-related quality of life. *J Clin Psychol Med Settings*. 2020; 27: 31-40. [PMID: 30989366 DOI: 10.1007/s10880-019-09617-3]
37. Baker AE, Galván A. Threat or thrill? The neural mechanisms underlying the development of anxiety and risk taking in adolescence. *Dev Cogn Neurosci*. 2020; 45: 100841. [PMID: 32829216 PMCID: PMC7451699 DOI: 10.1016/j.dcn.2020.100841]
38. Fialko L, Bolton D, Perrin S. Applicability of a cognitive model of worry to children and adolescents. *Behav Res Ther*. 2012; 50: 341-349. [PMID: 22459733 DOI: 10.1016/j.brat.2012.02.003].
39. Goupil L, Romand-Monnier M, Kouider S. Infants ask for help when they know they don't know. *Proc Natl Acad Sci USA* 2016; 113: 3492-3496. [PMID: 26951655 PMCID: PMC4822620 DOI: 10.1073/pnas.1515129113].
40. Lyons KE, Ghetti S. I don't want to pick! Introspection on uncertainty supports early strategic behavior. *Child Dev*. 2013; 84: 726-736. [PMID: 23278486 DOI: 10.1111/cdev.12004]
41. Dekkers LMS, Jansen BRJ, Salemink E, Huizenga HM. Intolerance of Uncertainty Scale: Measurement invariance among adolescent boys and girls and relationships with anxiety and risk taking. *J Behav Ther Exp Psychiatry*. 2017; 55: 57-65. [PMID: 27914319 DOI: 10.1016/j.jbtep.2016.11.009]
42. Thielsch C, Andor T, Ehring T. Metacognitions, intolerance of uncertainty, and worry: An investigation in adolescents. *Pers Individ Dif*. 2015; 74: 94-99. [DOI: 10.1016/j.paid.2014.10.004]
43. Weissman DG, Rodman AM, Rosen ML, Kasperek S, Mayes M, Sheridan MA, Lengua MA, et al. Contributions of emotional regulation and brain structure to adolescent internalizing problems and stress vulnerability during the COVID-19 pandemic: A longitudinal study. *Bio Psychiatr*. 2021; 1: 272-282 [DOI: 10.1016/j.bpsgps.2021.06.001]
44. Reizer A, Geffen L, Koslowski M. Life under the COVID-19 lockdown: On the relationship between intolerance of uncertainty and psychological distress. *Psychol Trauma*. 2021; 13: 432-437, [PMID: 33539162 DOI: 10.1037/tra0001012]

45. Racine N, McArthur BA, Cooke JE, Eirich R., Zhu J, Madigan S. Global Prevalence of Depressive and Anxiety Symptoms in Children and Adolescents During COVID-19: A meta-analysis. *JAMA Pediatr.* 2021; 175: 1142–1150. [doi: 10.1001/jamapediatrics.2021.2482]
46. Liu JJ, Bao Y, Huang X, Shi J, Lu L. Mental health considerations for children quarantined because of COVID-19. *Lancet Child Adolesc Health.* 2020; 4: 347-349. [PMID: 32224303 PMCID: PMC7118598 DOI: 10.1016/S2352-4642(20)30096-1]
47. Paluszek MM, Asmundson AJN., Landry CA, McKay D, Taylor S, Asmundson GJG. Effects of anxiety sensitivity, disgust, intolerance of uncertainty on the COVID stress syndrome: a longitudinal assessment of the transdiagnostic constructs and the behavioral immune system. *Cogn Behav Ther., 2021; 3,* [10.1080/16506073.2021.1877339]
48. American Psychological Association. Stress in America™ 2020: A national mental crisis. Washington, DC: American Psychological Association 2020.
49. Taylor S, Landry CA, Paluszek MM, Fergus TA, McKay D, Asmundson GJG. COVID stress syndrome: Concept, structure, and correlates. *Depress Anxiety.* 2020; 37: 706-714. [PMID: 32627255 PMCID: PMC7362150 DOI: 10.1002/da.23071]
50. Office of the Surgeon General (OSG). Protecting youth mental health: The U.S. Surgeon General's advisory. Washington, DC: US Department of Health and Human Services 2021. [PMID: 34982518]
51. Haig-Ferguson A, Cooper K, Cartwright E, Loades ME, Daniels J. Practitioner review: Health anxiety in children and young people in the context of the COVID-19 pandemic. *Behav Cogn Psychother.* 2021; 49: 129-143. [PMID: 32829718 PMCID: PMC7503041 DOI: 10.1017/S1352465820000636]
52. Gee DG, Odriozola P. When uncertainty is a certainty: Optimizing exposure-based therapies. *Biol Psychiatry.* 2021 1:166-167. [DOI: 10.1016/j.bpsgos.2021.08.001]
53. Donovan CL, Holmes MC, Farrell LJ. Investigation of the cognitive variables associated with worry in children with generalised anxiety disorder and their parents. *J Affect Disord.* 2016; 192: 1-7. [PMID: 26702733 DOI: 10.1016/j.jad.2015.12.003]
54. Donovan CL, Holmes MC, Farrell LJ, Hearn CS. Thinking about worry: Investigation of the cognitive components of worry in children. *J Affect Disord* 2017; 208: 230-237. [PMID: 27792968 DOI: 10.1016/j.jad.2016.09.061]
55. Panarello B, Bukowski WM. Young adolescent experiences with the intolerance of uncertainty, worry, and anxious arousal across contexts. *Can J Behav Sci.* 2021; 53: 514-521. [DOI: 10.1037/cbs0000262]
56. Songco A, Hudson JL, Fox E. A cognitive model of pathological worry in children and adolescents: A systematic review. *Clin Child Fam Psychol Rev.* 2020; 23: 229-249. [PMID: 31989444 PMCID: PMC7192867 DOI: 10.1007/s10567-020-00311-7]

57. Cowie J, Clementi MA, Alfano CA. Examination of the intolerance of uncertainty construct in youth with generalized anxiety disorder. *J Clin Child Adolesc Psychol.* 2018; 47: 1014-1022. [PMID: 27654145 PMID: PMC7364664 DOI: 10.1080/15374416.2016.1212358]
58. Lee AH, Woodruff-Borden J. Roles of emotional reactivity, intolerance of uncertainty, and negative problem orientation on developing childhood worry. *Pers Individ Dif.* 2018; 135: 25-30. [DOI: 10.1016/j.paid.2018.06.048]
59. Khan AN, Bilek E, Tomlinson RC, Becker-Haimes EM. Treating social anxiety in an era of social distancing: Adapting exposure therapy for youth during COVID-19. *Cogn Behav Pract.* 2021; 28: 669-678. [PMID: 33564222 PMID: PMC7862041 DOI: 10.1016/j.cbpra.2020.12.002]
60. Oliver AM, Wright KD, Kakadekar A, Pharis S, Pockett C, Bradley TJ, Tomczak CR, Erlandson MC. Health anxiety and associated constructs in children and adolescents with congenital heart disease: A CHAMPS cohort study. *J Health Psychol.* 2020; 25: 1355-1365. [PMID: 29402140 DOI: 10.1177/1359105318755263]
61. Sauer KS, Jungmann, SM, Witthoft, M. Emotional and behavioral consequences of the COVID-19 pandemic: The role of health anxiety, intolerance of uncertainty, and distress (in) tolerance. *Intl J Environ Res Public Health.* 2020; 17:7241. [doi:10.3390/ijerph 17197241]
62. Cervin, M, Perrin, S, Olsson E, Aspvall K, Geller, DA, Wilhem S, et al. The centrality of doubting and checking in the network structure of obsessive-compulsive symptoms in youth. *J Am Acad Child Adolesc Psychiatr.* 2020; 95: 880-887. [doi; 10.1016/j.aac.2019.06.018 PMID: 7219532]
63. Pozza A, Albert U, Dèttore U. Perfectionism and intolerance of uncertainty are predictors of OCD symptoms in children and early adolescents: A prospective, cohort, one-year, follow-up study. *Clin Neuropsychiatry.* 2019; 16: 53-61. [PMID: 34908939 PMID: PMC8650182]
64. Sperling J. The role of intolerance of uncertainty in treatment for pediatric anxiety disorders and obsessive-compulsive disorder. *Evid Based Pract Child Adol Ment Hlth.* 2022. [DOI: 10.1080/23794925.2022.2051215]
65. Cummings CM, Caporino NE, Kendall PC. Comorbidity of anxiety and depression in children and adolescents: 20 years after. *Psychol Bull.* 2014; 140: 816-845. [PMID: 24219155 PMID: PMC4006306 DOI: 10.1037/a0034733]
66. Yao N, Qian M, Jiang Y, Elhai JD. The influence of intolerance of uncertainty on anxiety and depression symptoms in Chinese-speaking samples: Structure and validity of the Chinese translation of the Intolerance of Uncertainty Scale. *J Per Assess.* 2021: 103:406-415. [doi:10.1080/0022.3891.2020.1739058 PMID: 32216599]
67. Zhuo L, Wu, Q, Le H, Li, H, Zheng L, Ma G, Tao H. COVID-19 related intolerance of uncertainty and mental health among back-

- to-school students in Wuhan: The moderation effect of social support. *Intl J Environ Res Public Health*. 2021; 18: 981. [doi: 10/3390/ijerpn18030981]
68. Evans SC, Blossom JB, Fite PJ. Exploring longitudinal mechanisms of irritability in children: Implications for cognitive-behavioral intervention. *Behav Ther*. 2020; 51: 238-252. [PMID: 32138935 DOI: 10.1016/j.beth.2019.05.006]
69. Li Q, Luo R, Zhang X, Meng G, Dai B, Liu X. Intolerance of uncertainty and negative emotions among Chinese adolescents: A moderated mediation model of risk perception, social exclusion, and perceived efficacy. *Intl J Environ Public Health*. 2021; 18:2864. [doi:10.3390/ijerph18062894]
70. Fassett-Carman A, Hankin BL, Snyder HR. Appraisals of dependent stressor controllability and severity are associated with depression and anxiety symptoms in youth. *Anxiety Stress Coping*. 2019; 32: 32-49. [PMID: 30303017 PMCID: PMC6709974 DOI: 10.1080/10615806.2018.1532504]
71. Kovacs M. *Children's Depression Inventory-2*. North Tonawanda, NY: Multi-Health Systems, 2010.
72. Rodriguez CM, Pu DF, Foiles AR. Cognitive-affective pathways to child depressive and anxious symptoms: Role of children's discipline attributions. *Child Psychiatry Hum Dev*. 2019; 50: 163-171. [PMID: 30019223 DOI: 10.1007/s10578-018-0831-7]
73. Gladstone TR, Kaslow NJ, Seeley JR, Lewinsohn PM. Sex differences, attributional style, and depressive symptoms among adolescents. *J Abnorm Child Psychol*. 1997; 25: 297-306. [PMID: 9304446 DOI: 10.1023/a:1025712419436]
74. Hayward L, Vartanian LR, Kwick C, Newby JM. How might child adversity predict adult psychological distress? Applying the Identity Disruption Model to understanding depression and anxiety disorders. *J Aff Disord*. 2020; 765:112-119. [doi:10.10167/jad.2020.01.036]
75. Cai RY, Richdale AL, Dissanayake C, Uljarević M. Brief report: Inter-relationship between emotion regulation, intolerance of uncertainty, anxiety, and depression in youth with autism spectrum disorder. *J Autism Dev Disord*. 2018; 48: 316-325. [PMID: 28980172 DOI: 10.1007/s10803-017-3318-7]
76. Neil L, Olsson NC, Pellicano E. The relationship between intolerance of uncertainty, sensory sensitivities, and anxiety in autistic and typically developing children. *J Autism Dev Disord*. 2016; 46: 1962-1973. [PMID: 26864157 PMCID: PMC4860201 DOI: 10.1007/s10803-016-2721-9]
77. Hodgson AR, Freeston MH, Honey E, Rodgers J. Facing the unknown: Intolerance of uncertainty in children with autism spectrum disorders. *J App Res Intell Disab*. 2016; 1-9 [doi:10.1111/12245]
78. Wigham S, Rodgers J, South M, McConachie H, Freeston M. The interplay between sensory processing abnormalities, intolerance of uncertainty, anxiety and restricted and repetitive behaviours in autism spectrum disorder. *J Autism Dev Disord*.

- 2015; 45: 943-952 [PMID: 25261248 DOI: 10.1007/s10803-014-2248-x]
79. Stuart L, Grahame V, Honey E, Freeston M. Intolerance of uncertainty and anxiety as explanatory frameworks for extreme demand avoidance in children and adolescents. *Child Adolesc Ment Health*. 2020; 25: 59-67. [PMID: 32307839 DOI: 10.1111/camh.12336]
80. Stice E, Bohan C. Eating disorders. In: Beauchaine, TP, Hinshaw, SP, eds. *Child and adolescent psychopathology*, 2nd ed. New York: John Wiley, 2013: 715-738.
81. Bijsterbosch JM, Keizer A, Boelen PA, Van den Brink F, Danner UN, Sternheim LC. How deep is your thought? The relations between intolerance of uncertainty, worry and weight and shape concerns in adolescent girls with anorexia nervosa. *J Eat Disord*. 2021; 9: 164. [PMID: 34930469 PMCID: PMC8686596 DOI: 10.1186/s40337-021-00523-4]
82. Brosf LC, Egbert AH, Reilly EE, Wonderlich JA, Karam A, Vanzhula I, et al. Intolerance of uncertainty moderates the relationship between high personal standards but not evaluative concerns perfectionism and eating disorder symptoms cross-sectionally and prospectively. *Eat Behav*. 2019; 35: 101340. [PMID: 31731235 DOI: 10.1016/j.eatbeh.2019.101340]
83. Giles S, Toohey M, Hughes EK, Fuller-Tyszkiewicz M, Krug I. Do orthorexia and intolerance of uncertainty mediate the relationship between autism spectrum traits and disordered eating symptoms? *Eat Weight Disord*. 2021; 26: 2309-2316. [PMID: 33389701 DOI: 10.1007/s40519-020-01094-0]
84. Reilly EE, Perry TR, Brown TA, Wierenga CE, Kaye WH. Intolerance of uncertainty and eating disorder symptoms over the course of intensive treatment. *Behav Ther*. 2021; 52: 698-708. [PMID: 33990243 DOI: 10.1016/j.beth.2020.09.002]
85. Konstantellou A, Hale L, Sternheim L, Simic M, Eisler I. The experience of intolerance of uncertainty for young people with a restrictive eating disorder: A pilot study. *Eat Weight Disord*. 2019; 24: 533-540. [PMID: 30778868 DOI: 10.1007/s40519-019-00652-5]
86. Schaumberg K, Reilly EE, Gorrell S, Levinson CA, Farrell NR, Brown TA, Smith KM, Schaefer LM, Essayli JH, Haynos AF, Anderson LM. Conceptualizing eating disorder psychopathology using an anxiety disorders framework: Evidence and implications for exposure-based clinical research. *Clin Psychol Rev*. 2021; 83: 101952 [PMID: 33221621 PMCID: PMC7868093 DOI: 10.1016/j.cpr.2020.101952]
87. Kesby A, Maguire S, Brownlow R, Grisham JR. Intolerance of uncertainty in eating disorders: An update on the field. *Clin Psychol Rev*. 2017; 56: 94-105 [PMID: 28710918 DOI: 10.1016/j.cpr.2017.07.002]
88. Sternheim L, Harrison A. The acceptability, feasibility and possible benefits of a group-based intervention targeting intolerance of uncertainty in adolescent inpatients with anorexia nervosa. *Cogent Psychol*. 2018; 5: 1441594. [DOI: 10.1080/23311908.2018.1441594]
89. Palitz SA, Rifkin LS, Norris LA, Knepley M, Fleischer NJ, Steinberg L, Kendall PC. But

- what will the results be?: Learning to tolerate uncertainty is associated with treatment-produced gains. *J Anxiety Disord.* 2019; 68: 102146. [PMID: 31669785 DOI: 10.1016/j.janxdis.2019.102146]
90. Beck AT. *Cognitive therapy and the emotional disorders.* 2nd ed. New York: International University Press; 1976
91. Beck AT, Clark DA. Anxiety and depression: An information processing perspective. *Anxiety Stress Coping.* 1998; 1: 23-36.[DOI: 10.1080/10615808808248218]
92. Ghahramanlou-Holloway M, Wenzel A, Lou K, Beck AT. Differentiating cognitive content between depressed and anxious outpatients. *Cogn Behav Ther.* 2007; 36: 170-178. [PMID: 17852174 DOI: 10.1080/16506070701374256]
93. Ingram RE, Kendall PC. Cognitive clinical psychology: Implications of an information processing perspective. In: Ingram, RE, ed. *Information processing approaches to clinical psychology.* Orlando, FL: Academic Press, 1986: 3-21.
94. Sanchez AL, Cornacchio D, Chou T, Leyfer O, Coxe S, Pincus D, et al. Development of a scale to evaluate young children's responses to uncertainty and low environmental structure. *J Anxiety Disord.* 2017; 45: 17-23. [PMID: 27907833 DOI: 10.1016/j.janxdis.2016.11.006]
95. Osmanağaoğlu N, Creswell C, Snuggs S, Stuijzand S, Dodd HF. Evaluating the psychometric properties of the intolerance of uncertainty scale for children in a preadolescent sample. *J Anxiety Disord.* 2021; 77: 102343. [PMID: 33310446 DOI: 10.1016/j.janxdis.2020.102343]
96. Tiller-Ormord J, Korte C, Friedberg RD. Helping pediatric patients tolerate uncertainty during unprecedented times: Translating findings from new research on developmental psychopathology and two promising measures. *J Trans Sci.* 2021; 7: 1-5. [DOI: 10.15761]
97. Einstein DA. Extension of the transdiagnostic model to focus on intolerance of uncertainty: A review of the literature and implications for treatment. *Clin Psychol.* 2014; 21: 280-300. [PMID: 25400336 PMCID: PMC4204511 DOI: 10.1111/cpsp.12077].
98. Wahlund T, Andersson E, Jolstedt M, Perrin S, Vigerland S, Serlachius E. Intolerance of uncertainty-focused treatment for adolescents with excessive worry: A pilot feasibility study. *Cogn Behav Pract.* 2020; 27: 215-230. [DOI: 10.1016/j.cbpra.2019.06.002]
99. Chorpita BF, Weisz JR. *MATCH-ADTC: Modular approach to therapy for children with anxiety, depression, trauma, or conduct problems.* Satellite Beach, FL: PracticeWise; 2009
100. Friedberg RD, Paternostro JK. Cognitive behavioral therapy with youth: Essential foundations and elementary practices. In: Friedberg RD, Paternostro JK, eds. *Handbook of cognitive behavioral therapy for pediatric medical conditions* New York; Springer Nature, 2019:87-102.
101. Friedberg RD, Thordarson MA. Cognitive behavioral therapy. In: Matson J. ed. *Handbook of child psychopathology and*

developmental disabilities treatment. New York: Springer, 2018: 43-62.

102. McClure JM, Friedberg RD, Thordarson MA, Keller M. *CBT express: Effective 15-minute techniques for treating children and adolescents*. New York: Guilford Press, 2019.

103. Hebert EA, Dugas MJ. Behavioral experiments for intolerance of uncertainty: Challenging the unknown in the treatment of generalized anxiety disorder. *Cogn Behav Pract*. 2019; 26:421-436. [DOI: 10.1016/j.cbpra.2018.07.007]

104. Kendall PC, Hedtke KA. *Coping cat workbook*. Ardmore, PA: Workbook Publishing, 2006.

105. Stallard P. *Think good, feel good. A cognitive behavioural therapy workbook for children and young people*. New York: John Wiley, 2002.

106. Friedberg RD, McClure JM. *Clinical practice of cognitive therapy with children and adolescents: The nuts and bolts*. 2nd ed. New York: Guilford, 2015.

107. McGuire JF, Storch EA. An inhibitory learning approach to cognitive-behavioral therapy for children and adolescents. *Cogn Behav Pract*. 2019; 26: 214-224. [PMID: 31205406 PMID: PMC6570488 DOI: 10.1016/j.cbpra.2017.12.003]

108. Ale, CM, McCarthy, DM, Rothchild, LM, Whiteside, SPH. Components of cognitive behavioral therapy related to outcome in childhood anxiety disorders. *Clin Child Family Rev*. 2015; 18: 240-251. [PMID: 26001645 DOI: 10.1007/s10567-015-0184-8]

109. Banneyer, KN, Bonin, L, Price, K, Goodman, WK, Storch, EA. Cognitive behavioral therapy for childhood anxiety disorders: a review of recent advances. *Curr Psychiatr Rep*. 2018; 20: 65. [PMID: 30056623 DOI: 10.1007/s11920-018-0924-9]

110. Silk, JS, Tan, PZ, Ladoucuer, CD, Meller, S, Siegle, CJ, McMakin, DL, Forbes, EE, Dahl RE, Kendall PC Mannarino, A, Ryan, ND. A randomized clinical trial comparing individual CBT and child-centered therapy for child anxiety disorders. *J Clin Child Adolesc Psychol*. 2018; 47:542-554 [PMID: 26983904 DOI: 10.1080/15374416.2016.1138408]

111. Bergez, KC, Ramirez, AC, Grebe, SC, Perez, MI, Viana, AG, Storch, EA, et al. Efficacy of exposure-based therapy for youth anxiety and obsessive compulsive disorder. In *Exposure therapy for children with anxiety*. Peris, TS, Storch, EA, McGuire, JF eds. New York: Academic Press, 2020.

112. Higa-McMillan, CK, Francis, SE, Rith-Najarian, L, Chorpita, BF. Evidence-based update: 50 years of research on treatment for child and adolescent anxiety, *J Clin Child Adolesc Psychol*. 2015; 45:91-113 [PMID: 26087438 DOI: 10.1080/15374416.2015.1046177]