Evaluation of intolerance of uncertainty: Development and validation of a new self-report measure

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ABSTRACT

Intolerance of uncertainty represents an important risk factor for development of anxiety disorders. However, few measures have been developed in order to evaluate this construct. Four studies were conducted in order to validate a new instrument evaluating intolerance of uncertainty: the Intolerance of Uncertainty Inventory (IUI). The first study described the questionnaire's development and evaluated the psychometric properties of its preliminary version. Study 2 examined the reliability and the factorial validity of the final version of the questionnaire, while Study 3 mainly addressed its convergent validity. Finally, Study 4 examined the questionnaire's temporal stability. Factorial analyses confirmed the IUI's validity. Results also supported the IUI's reliability, convergent validity, and temporal stability. The IUI is the first instrument that offers the possibility of measuring intolerance of uncertainty as a tendency to consider uncertainties to be unacceptable, as well as in terms of cognitive and behavioral manifestations.

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Several studies and etiological models suggest that intolerance of uncertainty is an important risk factor for development of anxiety disorders (e.g., Dugas, Gagnon, Ladouceur, & Freeston, 1998; Holaway, Heimberg, & Coles, 2006; Norton, Sexton, Walker, & Norton, 2005). Dugas, Gosselin, and Ladouceur (2001) define this construct as "an excessive tendency of an individual to consider unacceptable the possibility that a negative event may occur, however small the probability of its occurrence." In other words, several individuals present a weaker tolerance when faced with uncertainty about what will happen in their life. They thus consider a myriad of uncertain situations to be disturbing or unacceptable as compared to more tolerant people, which gives rise to dysfunctional cognitive and behavioral reactions.

For example, findings demonstrate that intolerance of uncertainty is strongly associated with Generalized Anxiety Disorder (GAD) symptoms and worry (Dugas, Gosselin, et al., 2001; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994). More precisely, GAD patients present a higher level of intolerance of uncertainty compared to non-clinical participants or a group of patients with other anxiety disorders (Dugas et al., 1998). Experimental protocols also highlight that an induced increase in intolerance of uncertainty is associated with an increase in worry (Ladouceur, Gosselin, & Dugas, 2000) and that intolerance of uncertainty predicts worry during uncertain tasks (de Bruin, Rassin, & Muris, 2006). Studies also suggest that intolerance of uncertainty is associated with specific symptoms of Obsessive-Compulsive Disorder (OCD), excessive doubt, and checking behaviors (Dugas, Gosselin, et al., 2001; Holaway et al., 2006; Routhier, Hébert, Morin, Baillargeon, & Gosselin, 2007). Steketee, Frost, and Cohen (1998) observed that OCD patients are more intolerant of uncertainty than a control group or a group of patients with another anxiety disorder. Moreover, compulsive

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checkers report a higher level of intolerance of uncertainty compared to patients without checking behaviors and participants from a control group (Tolin, Abramowitz, Brigidi, & Foa, 2003). A higher tendency to consider uncertainty as threatening thus seems to lead some people to worry and doubt more about future negative consequences, which may predispose them to the development of GAD symptoms, OCD symptoms or checking behaviors.

Furthermore, recent studies have attempted to clarify the intolerance of uncertainty construct by differentiating it from other factors associated to anxiety disorders whose manifestations include an intolerant affect to some degree of uncertainty. Carleton, Sharpe, and Asmundson (2007) have demonstrated that intolerance of uncertainty appears to be an independent construct rather than a latent variable of anxiety sensitivity. While both constructs have an element of intolerance of uncertainty, anxiety sensitivity seems to engender an intolerance of uncertainty as it pertains to the uncertain consequences of physical sensations related to a state of arousal specifically, while the intolerance of uncertainty construct entails an intolerance of the uncertain consequences of a myriad of events (physical sensations, social situations, intrusive thoughts). The authors also observed that, similarly to anxiety sensitivity, there was some overlap between the intolerance of uncertainty construct and some fundamental fears, such as the fear of illness, the fear of pain, and the fear of the negative appraisal of others. In conclusion, they suggest that intolerance of uncertainty could be the most fundamental, underlying variable of anxiety disorders. However, further research is required to support this hypothesis (Carleton, Norton, et al., 2007; Carleton, Sharpe, et al., 2007). Grenier, Barrette, and Ladouceur (2005) have, on the other hand, focused on the differences and similarities between intolerance of uncertainty and intolerance of ambiguity, thus clarifying two concepts often used interchangeably in the literature. According to them, the main point of difference between these two constructs would be in the topic causing the discomfort. Intolerance of uncertainty is characterized specifically by a tendency to perceive the future and the possibility of unpredictable events as uncomfortable, while intolerance of ambiguity is characterized by a discomfort in tolerating an ambiguous situation in the "here and now." Berenbaum, Bredemeier, and Thompson (2008) have recently analyzed the relationship between intolerance of uncertainty and the need for cognitive closure, defined as "an individual's desire for a firm answer to a question and an aversion toward ambiguity." Of the different dimensions of intolerance of uncertainty measured, the desire for predictability was most strongly associated with the need for cognitive closure, predictability, ambiguity, and order subscales. The authors thus concluded that this dimension is a core feature of the intolerance of uncertainty construct.

Until now, few instruments have been validated to assess intolerance of uncertainty. The Intolerance of Uncertainty Scale (IUS), developed in French by Freeston et al. (1994) and translated to English by Buhr and Dugas (2002), is the most currently used instrument. This 27-item self-report measure assesses general emotional, cognitive and behavioral reactions to ambiguous and uncertain situations, such as stress and frustration, attempts to control the future and the inability to act (e.g., "Item #24: Uncertainty keeps me from sleeping soundly"; "Item #26: The ambiguities in life stress me"). Results reported by the authors of the French and English versions support some psychometric properties of the IUS. Its internal consistency appears to be excellent (respectively, $\alpha = .91$ and $.94$) and correlations with related constructs, including worries and mood, attest to its convergent validity. The IUS also presents adequate test–retest stability ($r = .78$, French version; $r = .74$, English translation; Dugas, Freeston, & Ladouceur, 1997).

The importance attributed to the construct of intolerance of uncertainty has, however, lead some authors to evaluate and criticize the IUS, notably with regards to its construct and factorial validity (e.g., Carleton, Norton, & Asmundson, 2007; Maack, Deacon, & Abromowitz, 2005; Norton, 2005). Freeston et al. (1994) first suggested that a five-factor structure underlies the IUS items: (1) uncertainty must be avoided, (2) being uncertain negatively influences the person, (3) uncertainties are frustrating, (4) uncertainties are stressful and anxiety provoking, and (5) uncertainty prevents one from acting. As for Buhr and Dugas (2002), they reported a four-factor structure, different than that obtained on the original version: (1) uncertainty leads to an inability to act, (2) uncertainty is stressful and frustrating, (3) unexpected events are negative and should be avoided, and (4) being uncertain about the future is unfair. Despite these attempts to identify a well-defined factorial structure representing the IUS' items, examination of factorial loadings shed a certain amount of doubt on the dimensions actually measured. For example, items like "Uncertainty keeps me from sleeping soundly (#24)" or "Uncertainty makes me vulnerable, unhappy, or sad (#17)" correlate with the factors reported above, yet they represent constructs different than those reported. According to Buhr and Dugas (2002), six items present cross-over factorial loading; the IUS's structure is thus complex and difficult to interpret.

Norton (2005) recently evaluated the psychometric properties of the IUS with the objective of verifying if the instrument's structure differed across four cultural groups. The results obtained support the reliability of the IUS. However, the author concluded that the factorial structure of the instrument is weak and instable for each of the cultural groups represented. Factorial analyses revealed five- or six-factor solutions that are extremely divergent and difficult to interpret. Each time, a significant number of items present multiple saturations on several factors. Given these structural problems, many authors stated that the utility of the IUS resides in the use of the total score, which reflects more generally reactions to uncertainties and ambiguity (see Antony, Orsillo, & Roemer, 2001; Freeston et al., 1994; Norton, 2005). Much effort is thus needed to improve the instrument's structure. Carleton, Norton, et al. (2007) and Carleton, Sharpe, et al. (2007) recently proposed an abridged version of the IUS. Despite a clearer factorial structure (component of anxiety and avoidance), this instrument still appears to evaluate general reactions to uncertainty rather than the tendency

to consider uncertainty to be intolerable or unacceptable. In this regard, some authors pointed out that when intolerance of uncertainty is understood only in terms of general reactions to uncertainty, certain biases may arise in studying the link between this construct and anxiety disorders (e.g., Maack et al., 2005; Gosselin, Ladouceur, Evers, & Laverdière, 2005). For example, the IUS is likely to lead to a greater relationship with GAD and OCD, given the constructs assessed by its items (e.g., stress, difficulty sleeping, doubt, disorganization), while several recent studies suggest that intolerance of uncertainty is a construct at the basis of most anxiety disorders (see Holaway et al., 2006; Maack et al., 2005). Moreover, no instrument has yet been developed to specifically evaluate intolerance of uncertainty as defined as an excessive tendency of an individual to consider uncertainty or the possibility that a negative event may occur to be unacceptable. Maack et al. (2005) recently clarified that no IUS items present an apparent satisfactory link to this definition (face validity) and that an instrument evaluating intolerance of uncertainty and not only the general consequences associated with it, remains to be developed. These authors also pointed out that evaluating solely intolerance of uncertainty in terms of manifestations or general consequences (like insomnia or doubt), and not in terms of a specific cognitive tendency, might hinder identification of important differences between these constructs and of associated variables.

In order to rectify these limitations, we recently developed a new instrument evaluating intolerance of uncertainty as defined in the literature: the Intolerance of Uncertainty Inventory (IUI). It has the advantage of evaluating both the excessive tendency of an individual to consider uncertainties in life to be unacceptable, as well as different cognitive and behavioral manifestations or consequences that may result from this excessive tendency. To do so, the IUI includes two distinct parts. Part A groups together items evaluating intolerance of uncertainty as defined specifically by Dugas, Gosselin, et al. (2001), while Part B groups together items evaluating different cognitive and behavioral manifestations or consequences of intolerance of uncertainty like doubt, seeking reassurance or avoidance. An effort was made to avoid including items of an emotional character (anxiety, frustration) that may bias the construct measured and influence studies examining the link between intolerance of uncertainty and emotional problems.

Four studies were conducted among separate samples in order to develop and validate the psychometric properties of the original French version of the IUI. The first study described the questionnaire's development and evaluated the psychometric properties of a preliminary version. The three remaining studies evaluated the psychometric properties of the final version of the questionnaire among adult samples. Study 2 examined the factorial validity and the reliability of the IUI, while Study 3 addressed its convergent validity in relation to other measures as well as its reliability. Finally, Study 4 examined the questionnaire's temporal stability.

1. Study 1

This study presents the steps used in the development of the IUI and evaluates the factorial structure, internal consistency and item quality of a preliminary version. It was hypothesized that the instrument would have excellent internal consistency, as well as a factorial structure reflecting the dimensions agreed upon in its development, namely, one factor representing intolerance of uncertainty for Part A, and six factors representing the six manifestations for Part B.

1.1. Method

1.1.1. Questionnaire development and items selection

Following the steps proposed by DeVellis (2003), a group of clinician-researchers first defined the instrument's structure and generated a pool of items enabling evaluation of the construct. In order to maximize their content validity, these items were then evaluated by two independent experts using a three-point Likert-type scale. The best-rated items were retained and then submitted to a sample of 15 participants in order to confirm their understandability. The remaining items were randomly ordered to create the first version of the questionnaire. A five-point Likert-type scale, similar to that used in the IUS created by Freeston et al. (1994), was selected for item responses (from "not at all characteristic of me" to "entirely characteristic of me"). One hundred and fifty-six items were generated; 25 were retained to create Part A, while 47 items were retained for Part B. Part A measures the excessive tendency of an individual to consider uncertainties in life or the possibility that a negative event may occur to be unacceptable (e.g., "I have difficulty tolerating life's uncertainties"). Part B measures six cognitive and behavioral manifestations/consequences of intolerance of uncertainty: overestimation of the probability that a negative event will occur, avoidance, worry, reassurance seeking, doubt, and control. Overestimation of the probability that a negative event will occur represents the idea that intolerance of uncertainty leads one to overestimate probabilities that negative events will take place (items 4, 11, 24, 25, 31, 33 and 36; e.g., "When a negative event might happen, I often overestimate the likelihood that it will take place"). Avoidance reflects the idea that intolerance of uncertainty incites one to avoid, behaviorally or cognitively, that which is uncertain (items 1, 2, 8, 14, 15, 19, 34 and 38; e.g., "I prefer to avoid uncertain situations"). Worry represents the idea that intolerance of uncertainty leads one to worry (items 5, 6, 10, 30, 27, 32, 45 and 46; e.g., "Uncertain situations worry me"). Reassurance seeking reflects the idea that intolerance of uncertainty leads one to seek out reassurance, through others or through different information sources (items 9, 12, 16, 18, 22, 26, 40 and 44; e.g., "When I am uncertain, I need to be reassured by others"). Doubt reflects the idea that intolerance of uncertainty leads one to doubt oneself and others (items 3, 13, 21, 29, 39, 41, 43 and 47; e.g. "I often have doubts about myself when a situation is uncertain"). Finally, control reflects the idea that intolerance of uncertainty incites one to want to control life

circumstance in an attempt to decrease uncertainties (items 7, 17, 23, 28, 30, 35, 37 and 42; e.g. "When I'm uncertain about what will happen, I try to control everything").

1.1.2. Participants and procedure

A sample of 498 adult French-Canadian participants (368 women and 130 men) participated in the study. The mean age was 22.22 years (S.D. = 3.56). Recruitment was conducted within a university class for students in various disciplines. They completed the preliminary 72-item version of the IUI. Data were double entered in order to limit the risk of data entry errors.

1.2. Results and discussion

1.2.1. Factorial validity

In order to evaluate the factorial structure of the IUI, principal components analyses with Varimax rotation were conducted. An initial analysis conducted on items from Part A revealed four Eigen values superior to 1, representing 61.61% of item variance. However, the Cattell's scree test suggested the presence of only one component. Factorial loadings obtained are presented in Table 1. These suggested four item groupings representing: (1) intolerance of the unexpected, (2) need for certainty, (3) intolerance of the possibility that a negative event may occur, and (4) intolerance of what may happen to others. In order to verify the adequacy of a unique component, a second principal components analysis was conducted while forcing the extraction of a sole factor. The loadings obtained vary between .55 and .84, which supports the adequacy of a unifactorial solution representing 46.43% of item variance (see Table 1).

A principal components analysis conducted on items from Part B of the IUI resulted in nine Eigen values superior to 1, representing 70.84% of item variance. However, the Cattell's scree test suggested the presence of three to four more significant components. Examination of the factorial loadings (see Table 2) suggested nine item groupings representing, according to extraction order, overestimation of the probability that a negative event may occur, avoidance, reassurance, doubt, control, lack of confidence in others, planning, and cognitive avoidance. The first six components reflect the subscales developed for the IUI and few items present cross-over loadings.

1.2.2. Reliability

Internal consistency and item–total correlations were calculated to evaluate the IUI's reliability. For the items in Part A, the Cronbach α was .96, while item–total correlations varied between .52 and .81. No increases in α were obtained through the withdrawal of items. With regards to Part B, the Cronbach α was .97, while the item–total correlations varied between .03 and .76. Only two items presented a correlation inferior to a criterion score of .35 (i.e., items 12 and 14 of the preliminary version). The α coefficients of the Part B subscales were: .95 for "Overestimation of the probability that a negative event may occur," .82 for "Avoidance," .92 for "Worry," .85 for

"Reassurance," .87 for "Doubt," as well as .89 for "Control." The item–total correlations were all superior to .35, with the exception of item 14 from the "Avoidance" subscale, item 29 of the "Doubt" subscale, and item 12 from the "Reassurance" subscale.

In sum, the findings obtained suggested that Parts A and B of the instrument presented very good validity. The exploratory analyses conducted on the items from Part A revealed four components, although a unifactorial structure appeared to be equally acceptable. As for Part B, the analyses supported well the constructs measured. The six components presenting the highest Eigen values corresponded to the expected subscales. The scale's divisions thus seemed to be appropriate, and the items retained adequately convey each manifestation of intolerance of uncertainty. The other dimensions observed were possibly attributable to the fact that certain subscales contain more than one dimension. For example, the items constructed to represent "Avoidance" were grouped under two components—behavioral avoidance and cognitive avoidance. Moreover, certain items addressing close relations were grouped together. The Cronbach α coefficients obtained for Parts A and B of the IUI also attested to a high-internal consistency. Only three items presented problematic item–total correlations. These could be removed or modified to create a better tool.

Overall, the IUI seemed to effectively evaluate intolerance of uncertainty. Certain indicators showed that the instrument could be improved, notably by decreasing the number of items (e.g., very high-internal consistency). Based on the factorial loadings, reliability analyses (item–total correlations), descriptive statistics for the items (means and standard deviations), as well as face validity, 15 items of the preliminary version were retained for Part A (items 1, 5, 7, 8, 9, 12, 13, 15, 16, 17, 18, 19, 21, 22, and 25). For Part B, five items of the preliminary version were retained for each of the dimensions: "Overestimation of the probability that a negative event may occur" (items 24, 25, 31, 33, and 36), "Avoidance" (items 1, 2, 15, 19, and 34), "Worry" (items 10, 27, 32, 45, and 46), "Reassurance" (items 9, 16, 18, 26, and 40), "Doubt" (items 3, 13, 21, 41, and 47) and "Control" (items 7, 17, 28, 37, and 42). The items comprising the final version of the IUI were then reordered. Only items 22 and 25 from Part A, as well as item 42 from Part B, were mildly modified to simplify them or to eliminate redundancy with other items.

2. Study 2

The goal of Study 2 consisted of verifying the psychometric qualities of the final version of the IUI. More specifically, this study aimed to evaluate the factorial validity and confirm the structure of the inventory's items using exploratory and confirmatory analyses. The instrument's reliability was also examined using Cronbach coefficients and item–total correlations. Based on the results from Study 1, we hypothesized that factorial analysis of Part A would yield a three-factor structure (all items related to the fourth factor were deleted), while

Table 1
Factorial solutions obtained for Part A of the IUI (preliminary version)

Items	Four-factor				One-factor
	1	2	3	4	1
22. J'ai de la difficulté à supporter la possibilité qu'un imprévu puisse survenir (I have difficulty dealing with the possibility that something unexpected may occur)	.76				.77
11. Je trouve inacceptable que la vie soit indéterminée (I find it unacceptable that one cannot know what will happen in life)	.74				.70
6. L'idée qu'un imprévu puisse survenir me paraît inacceptable (The idea that something unexpected might happen seems unacceptable to me)	.70				.69
13. Je trouve intolérable d'avoir à faire face à des situations imprévisibles (I find it intolerable to have to deal with unpredictable situations)	.66				.73
8. Je trouve intolérable que certaines facettes de la vie ne soient pas déterminées à l'avance (I find it intolerable that certain aspects of life are not determined in advance)	.65				.66
16. Le fait de ne pas savoir à l'avance ce qui arrivera est souvent inacceptable pour moi (Not knowing what will happen in advance is often unacceptable for me)	.60				.79
23. Je supporte peu l'idée de ne pas savoir ce qui arrivera dans le futur (I can hardly stand not knowing what will happen in the future)	.58				.78
21. J'aimerais mieux savoir tout et tout de suite plutôt que de rester dans l'incertitude (I would rather know everything right away rather than remain uncertain)	.51				.59
7. Les autres semblent mieux tolérer l'incertitude que moi (Others seem to better tolerate uncertainty than me)	.49	.40			.65
1. J'accepte difficilement que l'avenir soit incertain (I have difficulty accepting that the future is uncertain)		.72			.66
4. Je suis quelqu'un qui a besoin de certitudes dans ce qu'il entreprend (I am someone who needs certainty in what I carry out)		.71			.61
5. Je trouve insupportable de ne pas avoir de garanties dans la vie (I find it unbearable to not have guarantees in life)		.67			.72
14. Je tolère mal d'être incertain-e au sujet de mon avenir (I have difficulty tolerating being uncertain about my future)		.66			.73
25. J'ai besoin de certitudes dans la vie (I need certainty in my life)		.63			.66
2. Je supporte mal d'être incertain-e face aux tâches que je dois accomplir (It is hard for me to endure being uncertain when faced with tasks that I must accomplish)		.58			.56
18. Je tolère difficilement les incertitudes de la vie (I have difficulty tolerating life's uncertainties)	.51	.53			.84
20. Ignorer ce qui m'arrivera dans le futur est intolérable (Not knowing what will happen to me in the future is intolerable for me)	.52	.53			.77
15. Je supporte peu les situations dans lesquelles je ne sais pas ce qui va se passer (I do not really endure situations in which I do not know what is going to happen)	.40	.49			.71
12. Lorsque j'attends une nouvelle importante, je supporte mal de rester dans l'incertitude (When I am waiting for important news, I find it hard to remain in the dark)			.68		.58
19. Lorsque je pense que quelque chose de négatif peut se produire, j'accepte difficilement de demeurer dans l'incertitude (When I think that something negative might happen, I have difficulty remaining uncertain)			.67		.64
17. Les délais d'attente sont insoutenables pour moi quand je ne sais pas ce qui va se passer (Waiting times are unbearable for me when I do not know what is going to happen)			.61		.58
9. Je supporte mal la possibilité qu'il puisse m'arriver un événement négatif (I have difficulty enduring the possibility that a negative event may happen to me)			.60		.59
24. Je tolère difficilement la probabilité que quelque chose de négatif se produise (I have difficulty tolerating the chance that something negative may happen)	.46		.53	.50	.74
10. Je tolère difficilement de ne pas avoir de garanties sur ce qui peut arriver aux gens à qui je tiens (I have difficulty tolerating not having guarantees about what may happen to people I care about)				.77	.62
3. Ignorer ce qui arrivera à mes proches est intolérable (Not knowing what will happen to my loved ones is intolerable)				.76	.55

Note. Only loadings superior to .40 are presented.

Part B would yield a six-factor structure, reflecting the six subscales of the instrument.

2.1. Method

2.1.1. Participants and procedure

A sample of 703 French-Canadian adults (417 women and 282 men) voluntarily participated in the study. The mean age was 23.14 years (S.D. = 5.44). Recruitment was conducted within a university class comprised of students from various disciplines. Participants completed the final 45-item version of the IUI (15 items for Part A and 25 items for Part B), as well as a sociodemographic information questionnaire (administration duration was 15 min). Data were double entered to limit the risk of data entry errors.

Table 2
Structure for Part B of the IUI (preliminary version)

Items	Factor solution								
	1	2	3	4	5	6	7	8	9
36. Lorsque je suis incertain-e, j'ai tendance à surestimer les chances que les événements tournent mal (When I'm uncertain, I tend to overestimate the odds that events will turn out badly)	.82								
25. En situation d'incertitude, j'ai tendance à exagérer les chances que les choses se déroulent mal (In an uncertain situation, I tend to exaggerate the odds that things will go badly)	.82								
24. Lorsqu'un événement négatif est possible, je surestime souvent les probabilités qu'il se produise (When a negative event might happen, I often overestimate the likelihood that it will take place)	.79								
31. J'ai tendance à surestimer la probabilité qu'un malheur arrive lorsque je ne sais pas ce qui va se passer (I tend to overestimate the probability that something bad will occur when I don't know what will happen)	.79								
33. J'exagère souvent les chances que le pire arrive lorsqu'un imprévu se présente (I often exaggerate the odds that the worst will happen when something unexpected occurs)	.79								
11. Lorsque je suis incertain-e, j'ai tendance à surestimer les probabilités que des événements négatifs se produisent (When I am uncertain, I tend to overestimate the chances that a negative even will happen)	.78								
6. Lorsque j'attends des nouvelles à propos de quelque chose d'incertain, je me construis plusieurs scénarios négatifs (When I am waiting for news concerning something I am uncertain about, I imagine many negative scenarios)	.73								
4. Lorsque je pense à l'avenir, j'ai tendance à exagérer la probabilité qu'il m'arrive quelque chose de fâcheux (When I think about the future, I tend to exaggerate the probability that something bad may happen to me)	.70								
5. Je m'inquiète à l'idée qu'un événement négatif puisse se produire (I worry at the thought that a negative event may occur)	.54		.48						
15. La possibilité qu'un événement négatif survienne m'amène à éviter certaines activités (The possibility that a negative event may occur leads me to avoid certain activities)		.75							
19. J'évite les situations qui sont susceptibles de présenter des imprévus (I avoid situations in which something unanticipated is likely to occur)		.75							
8. J'évite certains endroits lorsque je ne sais pas ce qui va se passer (I avoid certain places when I do not know what will happen)		.73							
34. J'ai tendance à ne pas m'engager dans les activités qui comportent une part d'incertitude (I tend not to engage in activities involving some uncertainty)		.72							
2. Je préfère laisser tomber un projet plutôt que d'avoir à vivre dans l'incertitude (I prefer to drop a project rather than have to live with uncertainty)		.66							
1. Je préfère éviter les situations incertaines (I prefer to avoid uncertain situations)		.58							
45. Ne pas savoir ce que l'avenir me réserve m'amène à m'inquiéter (Not knowing what the future holds for me worries me)			.70						
10. Je m'en fais beaucoup pour les incertitudes de la vie (I worry a lot about life's uncertainties)			.66						
27. Les situations incertaines m'inquiètent (Uncertain situations worry me)			.65						
46. J'ai tendance à m'inquiéter lorsque je ne suis pas certain-e de ce qui va se passer (I tend to worry when I am uncertain about what will happen)			.63						
20. Les situations imprévisibles m'inquiètent (Unforseeable situations worry me)			.62						
32. Penser que quelque chose d'inattendu puisse survenir m'inquiète (Thinking that something unexpected might happen worries me)			.60						
16. Lorsque je suis incertain-e, j'ai besoin d'être rassuré-e par les autres (When I am uncertain, I need to be reassured by others)				.77					
9. J'ai souvent recours aux autres pour me rassurer lorsque je ne sais pas ce qui va se passer (I often resort to others to reassure me when I do not know what will happen)				.77					
18. J'ai tendance à demander l'opinion des autres lorsque je suis incertain-e de ce qui va se passer (I tend to ask for the opinion of others when I am unsure about what will happen)				.75					
26. Je demande souvent la même information à plusieurs personnes pour me rassurer face à ce qui va se passer (I often ask for the same information from several people to reassure myself about what will happen)				.61					
22. J'ai tendance à demander énormément d'informations pour être certain que tout se passera bien (I tend to ask for an enormous amount of information to be sure that everything will go well)				.52				.45	
40. Même s'il y a peu de chances qu'un événement négatif survienne, on doit souvent me répéter que tout ira bien (Even if there is unlikely that a negative event may occur, I need to be told repeatedly that everything will go well)	.45			.47					
13. Je doute souvent de moi lorsque la situation est incertaine (I often have doubts about myself when a situation is uncertain)	.41				.71				

Table 2 (*Continued*)

Items	Factor solution								
	1	2	3	4	5	6	7	8	9
41. Lorsque je me retrouve dans une situation incertaine, j'ai tendance à douter de ce que je fais (When I find myself in an uncertain situation, I tend to have doubts about what I'm doing)					.66				
3. Lorsque je suis incertain-e, j'ai tendance à douter de mes capacités (When I am uncertain, I tend to doubt my capabilities)					.66				
43. Je me questionne sur ma capacité à résoudre un problème quand l'issue est incertaine (I question my ability to solve a problem when the outcome is uncertain)					.60				
21. Lorsque l'issue d'un événement est incertaine, je doute souvent d'avoir fait tout ce qu'il fallait (When the outcome of an event is uncertain, I often doubt having done all that was necessary)					.56				
47. J'ai souvent tendance à remettre mes choix en question lorsque je suis incertain-e de ce qui va se passer (I often tend to question my choices when I am uncertain about what will happen)					.55				
7. J'ai tendance à vouloir diriger les autres pour ne pas qu'un imprévu leur arrive (I tend to want to boss others around so that nothing unexpected will happen to them)						.85			
37. J'ai tendance à vouloir contrôler les activités de mes proches afin de diminuer les chances qu'il leur arrive quelque chose (I tend to want to control my loved one's activities in order to decrease the chances that something will happen to them)						.76			
17. Je dois tout contrôler pour essayer d'empêcher les conséquences négatives de survenir (I must control everything in order to prevent negative consequences from happening)						.63			
28. Lorsque je suis incertain-e de ce qui va se passer, j'essaie de tout contrôler (When I am uncertain about what will happen, I try to control everything)						.62			
30. J'ai de la difficulté à déléguer certaines tâches parce que j'ai moins de contrôle sur ce qui peut arriver (I have difficulty delegating certain tasks because then I would have less control over what could happen)							.80		
39. J'ai tendance à douter des autres dans des situations incertaines (I tend to doubt others in uncertain situations)							.74		
29. J'ai tendance à douter des habiletés des autres à faire face aux imprévus (I tend to doubt the skills others have to deal with the unexpected)							.67		
42. Je préfère tout prendre en charge afin de diminuer les incertitudes (I prefer to take on everything in order to decrease uncertainties)							.59	.42	
23. J'essaie de planifier à l'avance toutes mes activités afin de diminuer la possibilité qu'une conséquence négative se produise (I try to plan all my activities in advance to reduce the chances that a negative consequence may occur)								.80	
35. J'ai tendance à vouloir tout planifier à l'avance pour éviter les situations incertaines (I tend to want to plan everything in advance to avoid uncertain situations)								.71	
12. En situation d'incertitude, j'ai tendance à me calmer en me répétant que tout va bien aller (In uncertain situations, I tend to calm myself by repeating to myself that everything will be O.K.)									.73
14. J'essaie de ne pas penser aux incertitudes de la vie (I try not to think about things that are uncertain in life)									.69
44. Lorsqu'un imprévu se présente, j'essaie souvent de me convaincre que rien de négatif ne pourra se produire (When something unexpected happens, I often try to convince myself that nothing negative will happen)									.68
38. J'essaie de me distraire pour ne pas penser aux choses incertaines qui pourraient se produire (I try to distract myself from thinking about uncertain things that could happen)									.51

Note. Only loadings superior to .40 are presented.

2.2. Results and discussion

2.2.1. Descriptive statistics

Table 3 presents the means and standard deviations obtained by participants on the two parts of the IUI, as well as on each of the instrument's subscales. Women presented higher mean scores than men on Part A ($t(697)$ = 2.17; p = .03). They also had higher mean scores on the following subscales: "Reassurance" ($t(694)$ = 4.57; $p < .001$), "Worries" ($t(696)$ = 3.28; p = .001) and "Doubt" ($t(693)$ = 3.21; p = .001). Moreover, men presented higher mean scores on the following subscales "Avoidance" ($t(694)$ = −2.78; p = .006) and "Control" ($t(558.36)$ = −2.13; p = .03). How-ever, after having applied a Bonferroni correction for multiple testing (α = .05/8 = .006), the only remaining significant differences observed were for "Reassurance," "Worries," and "Doubts." The subsequent validation analyses were conducted separately for men and women. Given the similarity of the results obtained, the results for the overall sample are presented here.

2.2.2. Exploratory factor analyses

A principal components analysis with Varimax rotation conducted on Part A items of the IUI identified two Eigen values superior to 1, representing 58.74% of item variance. The factorial loadings presented in Table 4 suggested two

Table 3
Descriptive statistics for Study 2

Measures	Women		Men		Total sample	
	M	S.D.	M	S.D.	M	S.D.
IUI—Part A	33.59	10.66	31.77	11.16	32.85	10.88
IUI—Part B	66.87	21.31	64.88	21.95	66.06	21.56
Avoidance	9.00	3.69	9.79	3.67	9.32	3.69
Doubt	12.47	4.34	11.38	4.54	12.02	4.44
Overestimation	11.24	4.95	11.34	4.99	11.29	4.97
Worry	11.24	4.11	10.18	4.29	10.81	4.20
Control	9.28	4.53	10.66	5.02	10.19	4.75
Reassurance	13.13	4.54	11.54	4.51	12.48	4.59

Note. IUI, Intolerance of Uncertainty Inventory (final version).

item groupings representing (1) intolerance of the unexpected and difficulty tolerating waiting periods in uncertain situations, and (2) intolerance of uncertainty and not being able to plan everything in advance. A second principal components analysis forcing the extraction of a sole component has also suggested the feasibility of a unifactorial solution representing 51.8% of item variance. The loadings obtained for each of the items on this component vary between .61 and .84 (see Table 4).

A principal components analysis conducted on Part B items resulted in four Eigen values superior to 1, representing 67.35% of item variance. Examination of the factorial loadings showed that the last two components represented the "Overestimation of the probability that a negative event will occur" and "Control" subscales. Component 1 grouped together items evaluating "Reas-

surance", as well as certain items from the "Worry" and "Doubt" subscales. Finally, component 2 grouped together items conveying "Avoidance," "Worry," and "Doubt" in uncertain situations. A final principal components analysis forcing the extraction of 6 dimensions provided a structure that perfectly conveys the six expected dimensions: (1) "Overestimation of the probability that an negative even will occur," (2) "Control," (3) "Reassurance," (4) "Avoidance," (5) "Worry," and (6) "Doubt." One item presented cross-over loadings (i.e., item 1; see Table 5).

2.2.3. Confirmatory factor analyses

In order to complete the analysis of the IUI's factorial structure, confirmatory factorial analyses were conducted using Mplus software. Three models were tested to represent the items of Part A of the IUI. The first model aimed to confirm a one-factor structure representing all of the 15 items. The second model aimed to confirm a two-factor structure conveying (a) intolerance of uncertainty and of uncertain situations (items 1, 2, 3, 4, 5, 8, 9, 11, 15) and (b) intolerance of the unexpected and difficulty waiting in an uncertain situation (items 6, 7, 10, 12, 13, 14). Finally, the third model aimed to test a three-factor solution similar to the latter model: (a) intolerance of uncertainty and of uncertain situations (items 1, 2, 3, 4, 5, 8, 9, 11, 15), (b) intolerance of the unexpected (items 7 and 14) and (c) difficulty waiting in an uncertain situation (items 6, 10, 12, 13). Fit indices included the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual

Table 4
Factorial solutions for Part A of the IUI (final version)

Items	Two-factor		One-factor
	1	2	1
10. Les délais d'attente sont insoutenables pour moi quand je ne sais pas ce qui va se passer (Waiting periods are unbearable for me when I do not know what is going to happen)	.78		.73
6. Lorsque j'attends une nouvelle importante, je supporte mal de rester dans l'incertitude (When I am waiting for important news, I find it hard to remain in the dark)	.75		.66
8. Je supporte peu les situations dans lesquelles je ne sais pas ce qui va se passer (I do not really tolerate situations in which I do not know what is going to happen)	.69		.77
12. Lorsque je pense que quelque chose de négatif peut se produire, j'accepte difficilement de demeurer dans l'incertitude (When I think that something negative might happen, I have difficulty remaining in uncertainty)	.69		.68
14. J'ai de la difficulté à supporter la possibilité qu'un imprévu puisse survenir (I have difficulty dealing with the possibility that something unexpected may occur)	.68	.43	.79
7. Je trouve intolérable d'avoir à faire face à des situations imprévisibles (I find it intolerable to have to deal with unpredictable situations)	.64	.48	.80
13. J'aimerais mieux savoir tout et tout de suite plutôt que de rester dans l'incertitude (I would rather know everything right away rather than remain uncertain)	.63		.65
9. Le fait de ne pas savoir à l'avance ce qui arrivera est souvent inacceptable pour moi (Not knowing what will happen in advance is often unacceptable for me)	.59	.55	.81
15. J'ai besoin de certitudes dans ce que j'entreprends (I need to be sure of what I take on)	.52		.65
5. Je supporte mal la possibilité qu'il puisse m'arriver un événement négatif (I have difficulty tolerating the possibility that a negative event may happen to me)	.49	.47	.67
2. Je trouve insupportable de ne pas avoir de garanties dans la vie (I find it unbearable to not have guarantees in life)		.77	.70
1. J'accepte difficilement que l'avenir soit incertain (I have difficulty accepting that the future is uncertain)		.76	.69
3. Les autres semblent mieux tolérer l'incertitude que moi (Others seem to better tolerate uncertainty than me)		.74	.61
4. Je trouve intolérable que certaines facettes de la vie ne soient pas déterminées à l'avance (I find it intolerable that certain aspects of life are not determined in advance)		.65	.69
11. Je tolère difficilement les incertitudes de la vie (I have difficulty tolerating life's uncertainties)	.58	.61	.84

Note. Only loadings superior to .40 are presented.

Table 5
Six-factor factorial solution for Part B of the IUI (final version)

Items	Factor solution					
	1	2	3	4	5	6
29. En situation d'incertitude, j'ai tendance à exagérer les chances que les choses se déroulent mal (In an uncertain situation, I tend to exaggerate the chances that things may go badly)	.79					
14. Lorsqu'un événement négatif est possible, je surestime souvent les probabilités qu'il se produise (When a negative event might happen, I often overestimate the likelihood that it will take place)	.79					
23. Lorsque je suis incertain-e, j'ai tendance à surestimer les chances que les événements tournent mal (When I am uncertain, I tend to overestimate the odds that the events will turn out badly)	.78					
19. J'ai tendance à surestimer la probabilité qu'un malheur arrive lorsque je ne sais pas ce qui va se passer (I tend to overestimate the probability that something bad will occur when I do not know what will happen)	.78					
3. J'exagère souvent les chances que le pire arrive lorsqu'un imprévu se présente (I often exaggerate the odds that the worst will happen when something unexpected occurs)	.76					
27. Je préfère tout contrôler afin de diminuer les incertitudes (I prefer to control everything in order to decrease uncertainties)		.83				
24. J'ai tendance à vouloir contrôler les activités de mes proches afin de diminuer les chances qu'il leur arrive quelque chose (I tend to want to control my loved one's activities in order to decrease the chances that something will happen to them)		.81				
4. J'ai tendance à vouloir diriger les autres pour ne pas qu'un imprévu leur arrive (I tend to want to boss others around so that nothing unexpected will happen to them)		.81				
18. Lorsque je suis incertain-e de ce qui va se passer, j'essaie de tout contrôler (When I am uncertain about what will happen, I try to control everything)		.80				
10. Je dois tout contrôler pour essayer d'empêcher les conséquences négatives de survenir (I must control everything in order to prevent negative consequences from happening)		.77				
9. Lorsque je suis incertain-e, j'ai besoin d'être rassuré-e par les autres (When I am uncertain, I need to be reassured by others)			.82			
5. J'ai souvent recours aux autres pour me rassurer lorsque je ne sais pas ce qui va se passer (I often rely on others to reassure me when I do not know what will happen)			.80			
11. J'ai tendance à demander l'opinion des autres lorsque je suis incertain-e de ce qui va se passer (I tend to ask for the opinion of others when I am unsure about what will happen)			.78			
16. Je demande souvent la même information à plusieurs personnes pour me rassurer face à ce qui va se passer (I often ask for the same information from several people to reassure myself about what will happen)			.65			
25. Même s'il y a peu de chances qu'un événement négatif survienne, on doit souvent me répéter que tout ira bien (Even if it is unlikely that a negative event may occur, I need to be told repeatedly that everything will go well)			.45			
8. La possibilité qu'un événement négatif survienne m'amène à éviter certaines activités (The possibility that a negative event may occur leads me to avoid certain activities)				.76		
22. J'ai tendance à ne pas m'engager dans les activités qui comportent une part d'incertitude (I tend not to engage in activities involving some uncertainty)				.75		
12. J'évite les situations qui sont susceptibles de présenter des imprévus (I avoid situations that in which something unanticipated is likely to occur)				.68		
26. Je préfère laisser tomber un projet plutôt que d'avoir à vivre dans l'incertitude (I prefer to drop a project rather than have to live with uncertainty)				.66		
28. Ne pas savoir ce que l'avenir me réserve m'amène à m'inquiéter (Not knowing what the future holds for me worries me)					.67	
17. Les situations incertaines m'inquiètent (Uncertain situations worry me)					.67	
6. Je m'en fais beaucoup pour les incertitudes de la vie (I worry a lot about life's uncertainties)					.62	
15. J'ai tendance à m'inquiéter lorsque je suis incertain-e de ce qui va se passer (I tend to worry when I am uncertain about what will happen)					.59	
20. Penser que quelque chose d'inattendu puisse survenir m'inquiète (Thinking that something unexpected might happen worries me)					.58	
1. Je préfère éviter les situations incertaines (I prefer to avoid uncertain situations)				.46	.51	
2. Lorsque je me retrouve dans une situation incertaine, j'ai tendance à douter de ce que je fais (When I find myself in an uncertain situation, I tend to have doubts about what I am doing)						.71
7. Je doute souvent de moi lorsque la situation est incertaine (I often have doubts about myself when a situation is uncertain)						.69
21. Lorsque je suis incertain-e, j'ai tendance à douter de mes capacités (When I am uncertain, I tend to doubt my capabilities)						.66
13. Lorsque l'issue d'un événement est incertaine, je doute souvent d'avoir fait tout ce qu'il fallait (When the outcome of an event is uncertain, I often doubt having done all that was necessary)						.62
30. J'ai souvent tendance à remettre mes choix en question lorsque je suis incertain-e de ce qui va se passer (I often tend to question my choices when I am uncertain about what will happen)						.58

Note. Only loadings superior to .40 are presented.

Table 6
Fit indices for the confirmatory factor analytic models

Models	χ^{2a}	d.f.	CFI	RMSEA	SRMR	AIC
IUI—Part A						
One-factor	681.72	90	.90	.09	.05	24908.66
Two-factor	649.11	89	.90	.09	.05	24878.05
Three-factor	551.48	87	.92	.08	.04	24784.41
IUI—Part B						
Six-factor	1452.15	390	.93	.06	.05	52320.38

Note. CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; AIC, Akaike's information criterion.

[a] All $p < .0001$.

(SRMR). For the CFI, scores of .90 and above represent a good model fit, with values of .95 or higher representing a better fit (Brown, 2006). Browne and Cudek (1993) suggested that RMSEA values equal or below .08 represent an acceptable fit, and that models with a value superior to .10 should be rejected. Lower values of the SRMR reflect a better fit, with values of .05 or lower representing an excellent fit. Table 6 presents the Fit indices obtained. Chi-square tests of model fit completed the results. Examination of the different indices revealed that the one- and two-factor structures were similar; most reflected feasible factorial models, although the RMSEA was less appropriate when compared to the three-factor solution. The SRMR for the three-factor model suggested an excellent fit for the data.

The factorial analysis aiming to confirm the six-factor structure of Part B obtained indices suggesting a feasible, even excellent structure (see Table 6). Part B of the IUI thus seemed to present a factorial structure conveying the six expected item groupings that are presented in the inventory's description.

2.2.4. Reliability

The Cronbach α coefficient obtained for all items in Part A was .93, while the item–total correlations varied between .56 and .80. With regards to Part B, the α was .96, and the item–total correlations varied between .46 and .77. The α obtained did not increase with the withdrawal of items. With regards to the instrument subscales, the α were .94 for "Overestimation of the probability that a negative event will occur," .85 for "Avoidance," .91 for "Worry," .88 for "Reassurance," .90 for "Doubt," as well as .91 for "Control." The item–total correlations were all superior to the criterion threshold of .35.

In sum, this second study supported the factorial validity and reliability of the IUI. A one-factor structure appeared to be adequate to convey Part A of the inventory, although three factors appeared to be better for representing the 15 items. Analyses confirmed the six-factor structure created for Part B. The coefficients presented by each of the instrument's items suggested that they are valid and reliable for evaluating uncertainty.

3. Study 3

This third study evaluated the validity and reliability of the final version of the IUI. To do so, participants completed

the IUI, as well as other instruments evaluating intolerance of uncertainty and associated constructs. We hypothesized that the total scores on Parts A and B, and on the six IUI subscales would show high correlations with the IUS (Freeston et al., 1994). We also hypothesized that the IUI scores (Part A, Part B, and subscales) would present moderate to high correlations with validated measures of GAD and OCD symptoms, given that intolerance of uncertainty have been shown to be associated with those disorders, especially worry and checking behaviors (e.g., Dugas, Gosselin, et al., 2001; Holaway et al., 2006). Finally, we hypothesized that participants meeting the GAD diagnostic criteria as assessed via a questionnaire (WAQ: Dugas, Freeston, et al., 2001) would present a higher degree of intolerance of uncertainty than participants who do not present those criteria.

3.1. Method

3.1.1. Participants and procedure

A sample of 308 adult French-speaking participants (230 women and 78 men) voluntarily participated in the study. The mean age was 22.62 years (S.D. = 5.67). Recruitment was conducted in a similar manner as in the previous studies. Data was double entered to limit data entry errors.

3.1.2. Measures

In addition to the 45-item final version of the IUI, the following questionnaires were administered. The IUS (Freeston et al., 1994) was used to measure general reactions to uncertain situations (see description in Section 1). Three questionnaires were used to evaluate constructs associated with intolerance of uncertainty and thus could provide support for the convergent validity of the IUI. The Penn State Worry Questionnaire (PSWQ: Meyer, Miller, Metzger, & Borkovec, 1990; French translation: Gosselin, Dugas, Ladouceur, & Freeston, 2001) was used to evaluate the tendency to worry. It has 16 items evaluating one's general tendency to worry. A five-point Likert-type scale is used to score this questionnaire. The French translation showed excellent test–retest reliability (4 weeks; $r = .86$), very good internal consistency ($\alpha = .92$) and excellent convergent validity (Gosselin et al., 2001). The Worry and Anxiety Questionnaire (Dugas, Freeston, et al., 2001) was used to evaluate the GAD criteria (see description in Section 1). Finally, the Padua Inventory (PI: Sanavio, 1988; French version: Freeston, Ladouceur, Thibodeau, & Gagnon, 1991) evaluated OCD symptoms. This instrument has 60 items, of which 43 make up four subscales: (1) mental control, (2) contamination, (3) checking and (4) impulsiveness and loss of control. A five-point Likert-type scale is used to score each item. The PI has excellent internal consistency ($\alpha = .90$–.94) as well as good 1-month test–retest reliability ($r = .78$–.83) (Freeston et al., 1991). Finally, the Beck Depression Inventory II (BDI-II: Beck, Steer, & Brown, 1996) was used to evaluate depression symptoms (see description in Section 2). These symptoms are generally less associated with intolerance of uncertainty as compared to anxiety symptoms. The order of questionnaire completion was counterbalanced to limit administration biases.

Table 7
Correlations between the different measures used in Study 3

Measures	IUI-A	IUI-B	Avoidance	Doubt	Overestimation	Worry	Control	Reassurance	IUS	PSWQ	PI	BDI-II
IUI—Part A	–	.82*	.67*	.71*	.65*	.82*	.55*	.64*	.68*	.58*	.43*	.41*
IUI—Part B		–	.77*	.87*	.84*	.89*	.69*	.80*	.72*	.67*	.47*	.42*
Avoidance			–	.64*	.51*	.66*	.47*	.50*	.58*	.42*	.39*	.30*
Doubt				–	.74*	.78*	.42*	.70*	.66*	.61*	.38*	.39*
Overestimation					–	.70*	.50*	.58*	.59*	.57*	.42*	.33*
Worry						–	.53*	.68*	.68*	.71*	.41*	.43*
Control							–	.43*	.46*	.38*	.37*	.28*
Reassurance								–	.57*	.57*	.35*	.34*
IUS									–	.67*	.52*	.56*
PSWQ										–	.40	.54*
PI											–	.48*
BDI-II												–

Note. IUI, Intolerance of Uncertainty Inventory (final version); IUS, Intolerance of Uncertainty Scale; PSWQ, Penn State Worry Questionnaire; IP, Padua Inventory; BDI-II, Beck Depression Inventory-II; *p < .001.

3.2. Results and discussion

3.2.1. Convergent validity

Pearson correlations were calculated between the total scores on Parts A and B and on the IUI subscales, the total IUS and PSWQ scores, as well as the total score and subscales scores of the PI. According to the literature, moderately strong correlations were expected between the dimensions measured by the IUI, intolerance of uncertainty reactions (IUS), tendency to worry (PSWQ) and OCD symptoms, notably checking (PI). These correlations are presented in Table 7. The results showed that Parts A and B of the IUI correlate strongly with the measure of intolerance of uncertainty developed by Freeston et al. (1994). The correlations between the IUI subscales and this measure also appeared to be very satisfactory. In regards to the correlations calculated between the two parts and the IUI subscales, the PSWQ and the IP, significant moderate to high correlations were obtained, which confirms that the IUI adequately correlates with constructs associated with intolerance of uncertainty. It should be pointed out that the results on the IUI seem to correlate as strongly with the IP control scale (Part A: $r = .46$; Part B: $r = .53$) as with the checking scale (Part A: $r = .36$; Part B: $r = .39$), which suggests that studies aiming to better understand the links between OCD and intolerance of uncertainty should be pursued. Moreover, the correlations calculated between Parts A and B of the IUI and the BDI-II were moderate.

Two between-group *t*-tests were conducted to verify presence of significant differences between people with and without GAD, as assessed through a questionnaire, in regard to Parts A and B of the IUI. Significant differences between the two groups were obtained. As expected, people with a GAD, according to the WAQ, present a significantly different result on Part A ($t(287) = -7.68$; $p < .001$) and Part B ($t(285) = -7.42$; $p < .001$) of the IUI, when compared to people without GAD. People with GAD obtain higher scores (IUI-A: $M = 43.09$, S.D. = 11.06; IUI-B: $M = 88.00$, S.D. = 22.37) than those who do not meet the GAD criteria (IUI-A: $M = 31.05$, S.D. = 9.28; IUI-B: $M = 63.59$, S.D. = 19.44). Along the same lines, significant differences were also observed between the groups in regards to each subscale of the inventory's Part B (all $p < .001$).

3.2.2. Reliability

For the items of Part A, the Cronbach α was .92 and the item–total correlations varied between .50 and .78. For Part B of the IUI, the Cronbach α was .96 and the item–total correlations fell between .43 and .77. As for the IUI subscales in Part B, the α were .94 for "Overestimating the probability that a negative event will occur," .86 for "Avoidance," .90 for "Worry," .89 for "Reassurance," .91 for "Doubt," as well as .91 for "Control." The withdrawal items did not increase the α coefficients obtained. No item presented an item–total correlation inferior to the criterion threshold of .35.

The findings revealed that Parts A and B of the IUI possess very satisfactory validity. The high correlations obtained between the IUI and the measure developed by Freeston et al. (1994), as well as between the IUI and the measures of the associated constructs suggested that the instrument adequately evaluates intolerance of uncertainty. The internal consistency and the item–total correlations of both of the questionnaire's parts, as well as Part B's subscales were excellent, thus attesting to its reliability. Although the sample was comprised mainly of women, the similarity of the results obtained with those of the previous study, as well as analyses conducted with the study sample support the results and suggest that they represent well both sexes.

4. Study 4

This final study aimed to evaluate the temporal stability of the final IUI version among an adult sample. The participants completed the IUI twice at the beginning of a course, with an interval of 5 weeks between administrations. Given that this was an exploratory study, no hypotheses were put forward for this aim.

4.1. Method

4.1.1. Participants and procedure

Fifty-six women and 57 men voluntarily completed the questionnaire. The mean age was 23.45 years (S.D. = 3.86). The data were double entered to limit the risk of data entry errors.

4.2. Results and discussion

The mean obtained for Part A of the IUI was 33.78 (S.D. = 10.33) for the first assessment time and 32.69 (S.D. = 10.98) for the second assessment time. For Part B, the means were 67.35 (S.D. = 20.25) for the first assessment and 67.82 (S.D. = 21.84) for the second assessment. Dependant t-tests conducted on these scores did not detect any significant difference or change over time for Part A ($t(112) = 1.57$; $p = .12$), and Part B ($t(111) = .16$; $p = .87$) of the IUI. Similarly, no significant difference was observed with respect to the means on the Part B subscales (all $p > .12$). Test–retest correlations of .76 and .75 were obtained between scores on Part A and Part B respectively. The test–retest correlations calculated for the subscales were .73 for "Overestimation of the probability that a negative event will occur," .66 for "Avoidance," .71 for "Worry," .70 for "Reassurance," .76 for "Doubt," and .66 for "Control."

Overall, these results supported the temporal stability of the IUI after a 5-week interval. It is possible that some manifestations, like control or avoidance, are less stable or more associated with circumstantial elements. Other studies could evaluate the stability of the IUI over longer periods and thus verify if intolerance of uncertainty presents qualities similar to personality traits.

5. Conclusion

These studies aimed to develop a new instrument evaluating intolerance of uncertainty, the Intolerance of Uncertainty Inventory, and to evaluate its psychometric properties through four different samples from an adult non-clinical French-speaking population. The results obtained showed that the inventory possesses excellent psychometric qualities.

The rigor employed in the development of the IUI confers it very good face validity. The items included were coherent with the definitions of the construct of intolerance of uncertainty presented in the recent literature. They are also exempt from complex dimensions evaluating different constructs, such as insomnia or frustration, which could falsify examination of the links between intolerance of uncertainty and different psychological difficulties. The factorial analyses, both exploratory and confirmatory, supported the IUI's factorial validity. Part A of the inventory, which evaluates the tendency to consider life's uncertainties to be unacceptable, seemed to best be represented by a three dimension structure, although a unifactorial structure appeared to be acceptable. With regards to Part B, the analyses supported the structure established during the questionnaire's development. Accordingly, the instrument also evaluates six manifestations of intolerance of uncertainty, such as avoidance and reassurance seeking. The range of manifestations of intolerance of uncertainty that are measured by the instrument are diverse and the equivalent number of items measuring each of these dimensions (five items) is another appreciable quality of the IUI. Other subscales could eventually be added to broaden the range of manifestations measured. The results also supported the

IUI's reliability, convergent validity, temporal stability and the quality of each of its items. It correlated adequately with the intolerance of uncertainty measure developed by Freeston et al. (1994), as well as with measures of associated constructs such as GAD and OCD symptoms. The internal consistency of the questionnaire and subscales were excellent and its temporal stability was adequate.

Now that the IUI has demonstrated that it possesses excellent psychometric properties among French-speaking participants from a non-clinical population, it will be important to validate the instrument among clinical populations (e.g., GAD, OCD). Moreover, validation of the English translation is necessary to confirm that the psychometric properties of this version are comparable to those of the original French version used in the studies presented. Other studies are also necessary to mitigate limitations regarding the generalizability of the findings due to the age of the studies' participants. Preliminary data demonstrates however that the instrument is valid and reliable among children and adolescents (see Blouin, Tremblay-Picard, Bouchard, Thériault, & Gosselin, 2007). Along the same lines, each and every one of the studies reported were conducted using Canadian population samples. It is therefore possible that certain items would warrant linguistic and cultural modifications so that the psychometric properties of the instrument are maintained when used with diverse populations. The validation process of the IUI would therefore benefit from a cross-cultural examination of its items and psychometric characteristics. Also, the use of a multi-method approach in order to measure its construct validity and to confirm its convergent and divergent validity would also be an important step for further validating the measure.

In sum, the IUI makes it possible to effectively and rapidly evaluate intolerance of uncertainty. As emphasized by Maack et al. (2005), evaluation of intolerance of uncertainty using general manifestations alone casts doubt on the usefulness of the instruments currently available. For example, in order to verify whether an intervention effectively decreases intolerance of uncertainty, it is important to evaluate change in the negative manifestations/consequences of the construct, such as doubt, reassurance seeking and avoidance (Part B), but it is equally important to specifically evaluate the tolerance or acceptance of uncertainties (Part A). The IUI is the first instrument that offers the possibility to measure intolerance of uncertainty as not only a tendency to consider uncertainties to be unacceptable, but also in terms of specific cognitive and behavioral manifestations. In this regard, the instrument could prove to be of great value in research and clinical practice.

References

Antony, M. M., Orsillo, S. M., & Roemer, L. (2001). *Practitioner's guide to empirically based measures of anxiety. AABT clinical assessment series*. New York: Kluwer Academic.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck depression inventory manual* (2nd ed.). San Antonio, TX: Psychological Corporation.

Berenbaum, H., Bredemeier, K., & Thompson, R. J. (2008). Intolerance of uncertainty: exploring its dimensionality and associations with need for cognitive closure, psychopathology, and personality. *Journal of Anxiety Disorders, 22,* 117–125.

Blouin, S., Tremblay-Picard, M., Bouchard, J., Thériault, J., & Gosselin, P. (2007, April). Validation de l'Inventaire d'Intolérance à l'Incertitude auprès d'adolescents. *Poster presented at the SQRP convention.*

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford Press.

Browne, M. W., & Cudek, R. (1993). Alternate ways of assessing model fit. In: K. A. Bollen & J. S. Long (Eds.), *Testing structural equation model* (pp. 136–162). Newbury Park, CA: Sage.

Buhr, K., & Dugas, M. J. (2002). The intolerance of uncertainty scale: psychometric properties of the English version. *Behaviour Research and Therapy, 40,* 931–945.

Carleton, R. N., Norton, P. J., & Asmundson, G. J. G. (2007a). Fearing the unknown: a short version of the intolerance of uncertainty scale. *Journal of Anxiety Disorders, 21,* 105–117.

Carleton, R. N., Sharpe, D., & Asmundson, G. J. G. (2007b). Anxiety sensitivity and intolerance of uncertainty: requisites of the fundamental fears? *Behaviour Research and Therapy, 45,* 2307–2316.

de Bruin, G. O., Rassin, E., & Muris, P. (2006). Worrying in the lab: does intolerance of uncertainty have predictive value? *Behaviour Change, 23,* 138–147.

DeVellis, R. F. (2003). *Scale development: theory and applications*. Newbury Park, California: Sage Publications Inc.

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 6,* 593–606.

Dugas, M. J., Freeston, M. H., Provencher, M., Lachance, S., Ladouceur, R., & Gosselin, P. (2001a). The worry and anxiety questionnaire: validation among nonclinical and clinical participants. *Journal de Thérapie Comportementale et Cognitive, 11,* 31–36.

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: a preliminary test of a conceptual model. *Behaviour Research and Therapy, 36,* 215–226.

Dugas, M. J., Gosselin, P., & Ladouceur, R. (2001b). Intolerance of uncertainty and worry: investigating specificity in a nonclinical sample. *Cognitive Therapy and Research, 25,* 551–558.

Freeston, M. H., Ladouceur, R., Thibodeau, N., & Gagnon, F. (1991). La mesure des symptômes obsessifs—compulsifs. *Journal de Thérapie Comportementale et Cognitive, 4,* 22–28.

Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17,* 791–802.

Gosselin, P., Dugas, M. J., Ladouceur, R., & Freeston, M. H. (2001). Évaluation des Inquiétudes: validation d'une traduction française du PSWQ. *L'Encéphale, 27,* 475–484.

Gosselin, P., Ladouceur, R., Evers, A., & Laverdière, A. (2005, June). Evaluation of intolerance of uncertainty: development of a new measure. *Poster presented at the annual convention of the Canadian Psychological Association.*

Grenier, S., Barrette, A. M., & Ladouceur, R. (2005). Intolerance of uncertainty and intolerance of ambiguity: similarities and differences. *Personality and Individual Differences, 39,* 593–600.

Holaway, R. M., Heimberg, R. G., & Coles, M. E. (2006). A comparison of intolerance of uncertainty in analogue obsessive-compulsive disorder and generalized anxiety disorder. *Journal of Anxiety Disorders, 20,* 158–174.

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: a study of a theoritical model of worry. *Behaviour Therapy, 30,* 933–941.

Maack, D. J., Deacon, B. J., & Abromowitz, J. S. (2005). Intolerance of uncertainty and the anxiety disorders: questioning the construct validity of the intolerance of uncertainty scale. *Poster presented at the ABCT convention.*

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State worry questionnaire. *Behaviour Research and Therapy, 28,* 487–495.

Norton, P. J. (2005). A psychometric analysis of the intolerance of uncertainty scale among four racial groups. *Journal of Anxiety Disorders, 19*(5), 699–707.

Norton, P. J., Sexton, K. A., Walker, J. R., & Norton, G. R. (2005). Hierarchical model of vulnerabilities for anxiety: replication and extension with clinical sample. *Cognitive Behaviour Therapy, 34*(1), 50–63.

Routhier, S., Hébert, R., Morin, K., Baillargeon, A., & Gosselin, P. (2007, April). Intolérance à l'incertitude et symptômes obsessionnels-compulsifs. *Poster presented at the SQRP convention.*

Sanavio, E. (1988). Obsessions and compulsions: the Padua inventory. *Behaviour Research and Therapy, 26,* 169–177.

Steketee, G., Frost, R. O., & Cohen, I. (1998). Beliefs in obsessive-compulsive disorder. *Journal of Anxiety Disorders, 12,* 525–537.

Tolin, D. F., Abramowitz, J. S., Brigidi, B. D., & Foa, E. B. (2003). Intolerance of uncertainty in obsessive-compulsive disorder. *Journal of Anxiety Disorders, 17,* 233–242.