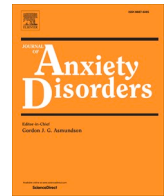




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## Anxiety among older adults during the COVID-19 pandemic

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### ABSTRACT

A growing body of research examines the COVID-19 pandemic's effects on well-being. Only few studies focus on older adults or explore the predictors of COVID-19-related anxiety. Intolerance of uncertainty (IU) and some behaviors (e.g., avoidance, procrastination) are linked to anxiety among older adults and could both be relevant to consider in a pandemic context. This study measured the occurrence and anxiety levels among older adults and verified the possible role of IU and behaviors in predicting anxiety symptoms, impairment and distress related to COVID-19 health standards. It also examined the indirect effect of IU on symptoms, impairment and distress through behaviors. Participants aged 60 and over ( $N = 356$ ) were recruited and administered questionnaires. Anxiety levels and symptom impairment were high and appeared to have increased since the beginning of the pandemic. IU and behavioral manifestations of anxiety were associated with higher anxiety symptoms, impairment and distress related to COVID-19 health standards. The indirect effects of IU on the tendency to worry and COVID-19-related anxiety through behavioral manifestations of anxiety were confirmed. This study provides knowledge on the relationship between COVID-19 and anxiety in older adults and identifies predictors relevant to this population.

### 1. Introduction

Since the first COVID-19 outbreak, several health measures have been implemented to prevent its spread, including disinfection, using facemasks, social distancing, and restricting traveling and non-essential events (Findlay et al., 2020). These measures change based on the pandemic's evolution, advances in researches, and vaccination. This leads to several uncertainties (Behar et al., 2009; Parlapani et al., 2020) and add onto some of the documented perceived risks and consequences of COVID-19 (e.g., pulmonary complications, cardiac arrhythmia, kidney damage, mortality; see Argenziano et al., 2020). Studies also document the presence of long-term difficulties, including muscle weakness, difficulty concentrating and cardiac, digestive and respiratory problems (see Groff et al., 2021; Whitaker et al., 2022).

Although some studies examined the pandemic's effects on mental health, a review by Lebrasseur et al. (2021) concludes that most of them

are limited to global indicators and that a focus on more specific indicators, such as anxiety, and targeting at-risk populations is necessary. Older adults have been disproportionately affected across the various waves (Hadjistavropoulos & Asmundson, 2022) and have been subjected to multiple stressors. They have more chronic diseases and risk factors for complications related to COVID-19 (e.g., hypertension, diabetes; Piras et al., 2022) and it is more difficult for them to access to health services (Lebrasseur et al., 2021). Based on patients' age and their prognostic, triage policies have been developed in various countries (e.g., Italy, USA), to facilitate decision-making in case of lack of resources for critical cares (e.g., use of ventilators; see Antommara et al., 2020; White & Lo, 2020). Non-urgent surgical cases have been postponed, which particularly affects older adults with health needs (Parlapani et al., 2020). Those in long-term care suffered from measures that further isolated them and which, combined with a lack of personnel, had harmful consequences (e.g., limited meals, unsanitary conditions;

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Hadjistavropoulos & Asmundson, 2022).

In Canada, Generalized Anxiety Disorder (GAD) rate, as identified by questionnaires, reached 27.8 % among adults over 18 years old during the COVID-19 pandemic ( $n = 300$ ; Génereux et al., 2021). This rate appears to be significantly lower in Quebec (i.e., 14.2 %;  $n = 300$ ). Older adults had the lowest rate (i.e., 18.3 %), which is consistent with the results of Brazilian and Polish studies (see Ferreira et al., 2020; Gambin et al., 2020). With a smaller sample ( $N = 103$ ), Parlapani et al. (2020) found that 65 % of Greek adults aged 60 and over met the criteria for GAD by questionnaire at the beginning of the pandemic. They concluded that older adults suffer from more anxiety during the COVID-19 pandemic, which is also consistent with Qiu et al.'s (2020) results. García-Fernández et al. (2020) however did not observe any differences in anxiety symptoms between Spaniards aged 60 and over and younger adults ( $N = 1639$ , including 150 older adults). They explain that their anxiety measure was not designed for older adults and that cultural differences, such as higher resilience stemming from difficult experiences (e.g., civil war), could influence anxiety and distress rates. It can be particularly difficult to distinguish anxiety's physiological aspects from the symptoms of physical illnesses in older adults, hence the relevance of targeting various components of anxiety (i.e., cognitive, physiological and behavioral) using validated measures among this population (Grenier et al., 2019). Altogether, these elements demonstrate that further research is needed to examine anxiety in older adults more carefully. Also, further research is needed on explanatory factors of anxiety related to COVID-19 among older adults, to help improve the resources available (Asmundson & Taylor, 2020; Hadjistavropoulos & Asmundson, 2022; Parlapani et al., 2020).

### 1.1. Explanatory factors of anxiety during a pandemic

Gambin et al. (2020) showed that, among different demographic and individual variables, only difficulties in relationships and household duties (e.g., loneliness, fear and uncertainty concerning the pandemic) predicted GAD symptoms during the COVID-19 outbreak among older adults aged between 60 and 85 years old ( $N = 247$ ). Limited interpersonal relationships would lead one to experience loneliness, defined as an experience of distress due to a subjective lack of relationships (De Jong Gierveld & Van Tilburg, 2006). Although these results come from self-created items, with only few items per dimension (1–4), they suggest that interpersonal stressors (e.g., loneliness) and perceived uncertainty, or related factors, should be considered. These factors were proposed in a recent conceptual framework by Hadjistavropoulos and Asmundson (2022) to guide future research on COVID-19 anxiety among older people.

During the H1N1 pandemic, Wheaton et al. (2012) observed that three factors were related to cognitive and behavioral aspects of anxiety toward influenza. Among them, health anxiety was defined as a tendency to fear illness and its consequences; fear of contamination, as an excessive preoccupation with contamination in one's life; and disgust, as an aversion to aspects harmful to the body. Health anxiety and fear of contamination are influenced by how individuals perceive diseases (Asmundson & Taylor, 2020; Wheaton et al., 2012). If perceived as dangerous, as it is the case for a pandemic, the diseases will cause them more anxiety. However, their sample, comprised of psychology students ( $N = 315$ ), mainly women reporting low levels of anxiety related to the H1N1, limits the generalizability of these results to older adults.

### 1.2. Intolerance of uncertainty, behavioral manifestations, and the Covid-19

People face many uncertainties during a pandemic (e.g., whether a loved one is infected, whether vaccination is efficient). Those who find it more difficult to tolerate unexpected events, unknown situations and changes are at risk for anxiety. Intolerance of uncertainty (IU) is the excessive tendency to consider unacceptable the possibility of a negative

event occurring, regardless of the probability of it may occur (Dugas, Gosselin, et al., 2001). It is indeed an important risk factor for anxiety disorders (Carleton et al., 2007) in various populations, including older adults (see Nuevo et al., 2009), and is linked to health anxiety (Langlois et al., 2007).

According to Carleton et al. (2007) prospective IU reflects a desire for events' predictability and includes certainty-seeking strategies (e.g., organizing everything in advance), while inhibitory IU reflects inhibition to avoid uncertainty (e.g., getting away from situations). Gosselin et al. (2008) also point out that IU leads to distinct manifestations that must be distinguished from the tendency to consider uncertainties unacceptable. Behavioral manifestations include control, reassurance-seeking and avoidance of uncertainty. By doing these, one can perceive that uncertainty is reduced and therefore the negative emotions associated with IU will decrease temporarily. They also increase one's feeling of control over possible consequences, such as getting infected with a virus (Langlois et al., 2007). During a pandemic, these manifestations make people more likely of noticing contradictory information (Taylor, 2019) or conforming to their fears since their attention is focused on possible consequences.

Ferreira et al. (2020) observed that the inhibitory component of IU is linked to emotional anxiety, while its prospective component is related to stress (e.g., difficulty relaxing, being nervous or irritable) in Brazilian adults aged 18–72 ( $N = 924$ ). Satici et al. (2020) also noted, among Turkish adults aged 18–73 ( $N = 1772$ ), that IU is moderately linked to COVID-19 fear, as well as weakly linked with psychological well-being in general. They observed an indirect effect of IU on well-being through rumination and COVID-19 fear. Hence, IU could be associated with more repetitive thoughts about the causes and consequences of one's own mental condition and fear, which would negatively affect psychological well-being.

Jiwani et al. (2021) also noted, among 99 adults aged 18–75, that COVID-19 fear mediated the relationships between prospective IU and GAD symptoms, and between prospective IU and internet searching. Despite its limited sample size and the use of self-created items, this study suggest that desire for predictability is associated to greater COVID-19 fear, which in turn, would be associated with more anxiety and behaviors, like internet searching, as a response to reduce that fear.

Other cross-sectional studies using questionnaires provide support for the link between IU, information-seeking behaviors and perceived distress or anxiety in the context of COVID-19. Riehm et al. (2020) found that the number of traditional media consulted to obtain COVID-19 information was associated with more psychological distress. The study was carried out on a large random and representative sample of 6329 American adults aged 18 and over, with 11.3 % of them presenting with moderate to severe distress. Baerg and Bruchmann (2022) also confirmed, with 317 undergraduate university students, that frequency of internet searches, measured using a single question, and IU were associated with more health anxiety and fear of COVID-19. Moreover, a higher level of IU was associated with a stronger link between information seeking and fear of COVID-19, but not between information seeking and health anxiety. Finally, more fear of COVID-19 was associated with more social distancing, with a moderating effect of IU. Another study by Curtis et al. (2022), among 281 middle-aged and older adults aged 50 and over, provides some support among older adults. A higher perceived level of COVID-19 media exposure and, interestingly, a higher COVID-19 media dependency for health information, were linked to more physiological symptoms of anxiety, perceived risk and concern about COVID-19 consequences. Although it is likely that participants reporting more COVID-19 media exposure are more proactive in information-seeking as an anxiety management strategy, it has not been studied directly. However, results confirming the predictive role of COVID-19 media dependency support the idea that people aged 50 and over need information, which could be linked to IU and anxious behaviors (e.g., reassurance) during a pandemic. The effect of gender on this relationship was non-significant.

Overall, the COVID-19 pandemic appears to be associated with higher rates of anxiety and appears to affect older adults (Parlapani et al., 2020), although there are some conflicting results. A few studies support the associations between IU, anxiety symptoms (e.g., rumination, concerns about COVID-19) and behaviors that aim to reduce anxiety and uncertainty, such as internet searching. It is possible that behaviors, such as information-seeking to feel reassured, increase concerns about COVID-19, or that more anxious people limit their time consulting the media to reduce their fear of COVID-19 (Riehm et al., 2020). As discussed by Asmundson and Taylor (2020), pandemic anxiety may be linked to several other maladaptive behavioral manifestations. Some avoid health services to escape the risk of contamination, while others overuse them to obtain confirmation that their health changes are not due to infection. Some avoid social relations more, while others do not respect distancing measures. Finally, some over-plan or prepare more by hoarding supplies preventing them from functioning normally. It is important to further study individual factors that may be associated with anxiety and specific behaviors observed in the context of a pandemic such as COVID-19 (Asmundson & Taylor, 2020). The role of the IU appears important to consider (Baerg & Bruchmann, 2022) and could differ depending on the type of anxiety symptoms. Other predictors (e.g., loneliness and feelings of vulnerability about illness) also seem worth considering. The cultural and age differences observed, the lack of studies in older adults and the fact that they are particularly at risk of COVID-19 anxiety, emphasize the need for further research in this population. Differences in the manifestations of anxiety also support this position. Altunoz et al. (2018) observed that excessive reassurance seeking due to worries was not commonly found in older adults. Other behaviors, such as avoidance and procrastination (i.e., putting off things or decisions), were more related to their symptoms and may be relevant to consider.

### 1.3. Current study

This study measured the current and retrospective severity of anxiety and impairment in Quebec older adults in the context of the COVID-19 pandemic. It also verified the relationships between IU, different behavioral manifestations, anxiety symptoms and impairment, while controlling for loneliness and feelings of vulnerability about illness. Furthermore, it verified the indirect effect of IU on anxiety symptoms and impairment through behavioral manifestations of anxiety. We predicted that anxiety levels reported during the current pandemic would be greater than anxiety levels reported in previous studies, conducted in non-pandemic contexts. We also predicted that more IU and behavioral manifestations of anxiety would be associated with more anxiety symptoms and impairment. Finally, we postulated that behavioral manifestations of anxiety would mediate the relationship between IU and anxiety symptoms, impairment and distress related to COVID-19 health standards.

## 2. Method

### 2.1. Participants and procedure

Following institutional ethics approval, 356 Quebec adults participated in this cross-sectional study. To be included, they needed to be 60 or over, live in Quebec and be able to read without difficulty. Considering planned analyses, expected effect sizes (moderate and above) and some recommendations (i.e., Fritz & Mackinnon, 2007; Tabachnick & Fidell, 2018), a size of around 360 participants was identified as adequate. Quebec's population represents almost a quarter of Canada's total population and is the province with the highest COVID-19 death rate (Institut national de santé publique, 2021a). Participants were recruited during February and March 2021, which corresponds to the end of the second wave and the beginning of the third wave of COVID-19. At that point, Quebec had reached 10,000 deaths due to

COVID-19, with more than 287,000 positive cases (Institut national de santé publique du Québec, 2021b). Non-essential activities and trips were allowed, but not recommended to limit virus transmission. Most areas were on alert levels prohibiting gatherings or limiting them to people living at the same address. COVID-19 vaccination began on December 14, 2020. The study's participants were recruited using advertisement in public places (e.g., grocery stores) across Quebec and online (e.g., Facebook). Participants were asked to complete the consent form and the questionnaires on Simple Survey, an online software; 84 % of the participants fully completed them. As compensation, they were eligible to win a draw for a 100\$ prepaid card. The sample included 258 females, 97 males and one participant that identifies as non-binary, aged between 60 and 90 years old ( $M = 63.13$ ,  $SD = 6.01$ ). The majority (92.69 %) had received their first COVID-19 vaccine shot. Almost half of the participants had a university degree and most of them were retired and lived in their own homes (see Table 1). Just over half of them had a 50,000\$ or more annual income. Just under half of the participants reported having health problems requiring medical attention (44.10 %) and almost a quarter (23.88 %) took medication for anxiety. In terms of the pandemic's impacts, 16.38 % of participants attributed a loss of income to COVID-19; 3.93 %, lost their job; 19.02 %, changed their anxiety medication; 1.40 %, were infected; and 5.62 %, lost a loved one to COVID-19.

### 2.2. Measures

The survey included measures regarding demographics, health issues and COVID-19-related questions (e.g., positive cases, financial losses). An item assessed the extent to which the implemented COVID-19 health standards generated psychological distress on a 10-point Likert scale (0 = not at all to 10 = extremely). It was inspired by an item from the *Worry and Anxiety Questionnaire* (WAQ; Dugas & Gosselin, 2001) assessing distress, while the measurement scale was the same as the one used in the *Sheehan Disability Scale* (SDS; Sheehan, 1983).

#### 2.2.1. Anxiety symptoms and impairment

The WAQ (Dugas, Freeston, et al., 2001) assesses the severity of GAD symptoms. Two version assessed the current (since the past 6 months) and the retrospective (pre-pandemic) severity of symptoms. Each

**Table 1**  
Demographic and COVID-19 related variables.

	<i>f</i>	%
Level of education		
Primary and secondary	72	20.22
Collegial/Post-secondary education	109	30.62
University degree	175	49.16
Occupation		
Retired	298	83.71
Full- or part-time employed	41	11.52
Unemployed or receiving social assistance	13	3.65
Sick leave	2	0.56
Long term or permanent disability leave	2	0.56
Residential		
Owner households	261	73.33
Renter households	74	20.79
Residential care homes	9	2.53
Other	12	3.37
Income		
9999 \$ or less	1	0.29
10,000 \$ to 19,999 \$	18	5.17
20,000 \$ to 29,999 \$	40	11.49
30,000 \$ to 39,999 \$	49	14.08
40,000 \$ to 499,999 \$	61	17.53
50,000 \$ or more plus	179	51.44
Marital status		
Married or non-marriage relationship	223	62.64
Single	93	26.12
Widowed	40	11.24



version had six items rated on a nine-point Likert scale (e.g., 0 = not at all to 8 = very severely). Four items were added to assess if the participants felt that the pandemic had an impact on their worries, that their worries or anxiety had increased or diminished with the pandemic and if they had sought professional help. To meet the GAD criteria, participants have to score four or higher on the items (at least three of the six somatic items). Higher scores indicate more severe symptoms. The WAQ has demonstrated good convergent and discriminant validity as well as good sensitivity and stability (Dugas, Freeston et al., 2001).

The 8-item short form of the *Penn State Worry Questionnaire* (PSWQ; Hopko et al., 2003) assesses severity of worries on a five-point Likert scale (1 = not at all typical of me to 5 = very typical of me). A high score indicates greater worries. The PSWQ has demonstrated excellent internal consistency ( $\alpha = 0.92$ ; Knight et al., 2008) and adequate convergent and divergent validity (Hopko et al., 2003) among older adults. A score of 23 and above suggests the presence of GAD (Stanley et al., 2011).

The *Generalized Anxiety Disorder 7- items scale* (GAD-7; Spitzer et al., 2006) assesses the frequency of GAD symptoms on a four-point Likert scale (0 = not at all to 3 = nearly every day). Scores of eight or greater indicate possible anxiety disorders (Kroenke et al., 2007; Plummer et al., 2016). Two studies suggest that a lower cutoff score (e.g., 5) may be more appropriate for older adults (see Wild et al., 2014; Vasiliadis et al., 2015). Scores of five, ten and 15 have also been suggested by the authors indicating mild, moderate and severe anxiety, respectively. The GAD-7 shows good convergent validity and internal consistency ( $\alpha = 0.82$ ; Wild et al., 2014).

The CSS (Taylor et al., 2020) assesses COVID-19 fear and anxiety-related distress responses in 36 items on a five-point Likert scale (fear-related items: 0 = not at all to 4 = extremely; checking and traumatic stress items: 0 = never to 4 = almost always). Higher scores on the CSS indicate more anxiety. The French-Canadian version has excellent factorial validity and internal consistency ( $\alpha = 0.96$ ; Brisson, Kowalczyk, Castonguay, Goyette et al., 2021).

The SDS (Sheehan, 1983) assesses functional impairment in three items on an 11-point Likert scale (0 = not at all to 10 = extremely). High scores are associated with high functional impairment, five or greater being associated with significant functional impairment. The SDS has demonstrated acceptable validity and good internal consistency ( $\alpha = 0.89$ ; Leon et al., 1997).

### 2.2.2. Psychological factors

The *Intolerance of Uncertainty Inventory* – Part A (IUI-a; Gosselin et al., 2008) assesses IU in eight items on a five-point Likert scale (1 = not at all typical of me to 5 = entirely typical of me). A high score indicates greater IU. The IUI-a has excellent factorial validity and internal consistency in older adults ( $\alpha = 0.94$ ; Brisson et al., 2020).

The *Behavioral Manifestations Questionnaire* (BMQ; Brisson, Kowalczyk, Castonguay, Lambert et al., 2021) assesses the behavioral manifestations of anxiety in 21 items on a five-point Likert scale (1 = not at all typical of me to 5 = entirely typical of me). Five subscales are identified: (1) overplanning and checking, (2) avoidance, (3) control, (4) reassurance-seeking and (5) procrastination. A high score indicates engaging in more behavioral manifestations. The BMQ has excellent factorial validity and internal consistency in older adults ( $\alpha = 0.95$ ; Brisson, Kowalczyk, Castonguay, Lambert et al., 2021).

The *Illness Worry Scale* (IWS; Robbins & Kirmayer, 1996) assesses feelings of vulnerability about illness on nine yes/no items. High scores indicate greater feelings of vulnerability. The IWS has demonstrated good internal consistency ( $\alpha = 0.83$ ) and convergent validity among adults (Langlois et al., 2007).

The 6-item *de Jong-Gierveld Loneliness Scale* (DJLS; De Jong Gierveld & Van Tilburg, 2006) assesses overall, emotional and social loneliness on a three-point Likert scale (yes, more or less and no). A high score indicates greater loneliness. The reliability is satisfactory ( $\alpha = 0.71$ ) and the convergent validity is excellent among older adults (De Jong Gierveld & Van Tilburg, 2006).

### 2.3. Data analytic strategy

Descriptive statistics (e.g., means, standard deviations, skewness, frequencies) and internal consistency indices (Cronbach’s alpha) were computed to describe the measures, verify assumptions and verify if older adults had anxiety levels that were equal to or greater than the cutoff scores of the anxiety and impairment measures (see Table 2). To test the first hypothesis, comparison tests (chi-squares, repeated measures ANOVA) compared the current and retrospective WAQ scores, while Welch Z-tests compared this study’s GAD-7 and PSWQ scores to those of previous studies, conducted in non-pandemic contexts, among adults of similar age ranges and origins. To test the second and third hypotheses, preliminary analyses (i.e., correlations and ANOVA) first identified demographic and psychological variables that had at least moderate significant associations with measures of anxiety, impairment and distress related to COVID-19 health standards (Cohen, 1988;  $d \geq 0.60$  and  $r \geq 0.30$ ). Those variables were controlled for in subsequent models. Mediation analyses were carried out using the PROCESS macro for SPSS (with 5000 bootstrapped resamples; Hayes, 2013) to test the direct effects of IU and behavioral manifestations on the measures of anxiety, impairment and distress as well as the possible indirect effect of IU on these latter measures through behavioral manifestations of anxiety. Statistical significance was assessed at  $p < 0.05$  level.

**Table 2**

Descriptive statistics and internal consistency of instruments and frequencies with anxiety levels equal to or greater than the cutoff scores on the anxiety and impairment measures.

Instruments	n	M	SD	$\alpha$	f	%
Anxiety, impairment and distress measures						
WAQ (retrospective)	356	17.36	12.23	0.94		
GAD					47	13.20
Non-GAD					309	86.80
WAQ (current)	356	21.71	14.09	0.95		
Presence of an anxiety disorder					80	22.53
Non-GAD					275	77.47
PSWQ	343	17.49	6.57	0.92		
$\geq$ cutoff score					69	20.12
$<$ cutoff score					274	79.88
GAD-7	337	5.03	4.78	0.95		
Presence of an anxiety disorder					78	23.15
Absence of an anxiety disorder					259	76.85
Little anxiety					184	54.60
Mild anxiety					100	29.67
Moderate anxiety					36	10.68
Severe anxiety					17	5.04
CSS <sup>a</sup>	332	30.41	23.09	0.93		
$\geq 2$ SD from the mean					21	6.33
$< 2$ SD from the mean					311	93.67
SDS	327	6.86	7.12	0.96		
$\geq$ cutoff score					55	16.82
$<$ cutoff score					272	83.18
Distress-health standards	356	4.12	2.90	–		
Measures of psychological factors						
IUI-a	320	18.53	7.37	0.95		
BMQ	304	49.23	16.42	0.83		
IWS	300	13.57	5.57	0.72		
DJGLS	300	2.89	1.89	0.88		

Note. WAQ (retrospective) = retrospective Worry and Anxiety Questionnaire; WAQ (current) = current Worry and Anxiety Questionnaire; PSWQ = short form of the Penn State Worry Questionnaire; GAD-7 = Generalized Anxiety Disorder 7- items scale; CSS = COVID Stress Scales; SDS = Sheehan Disability Scale; IUI-a = short form of the Intolerance of Uncertainty Scale-Part A; BMQ = Behavioral Manifestations Questionnaire; IWS = Illness Worry Scale; DJGLS = de Jong-Gierveld Loneliness Scale; Distress-health standards = Item measuring distress related to COVID-19 health standards. <sup>a</sup> Since there is no cutoff score on the CSS, results were compared to a score that was 2 SD away from the mean.

### 3. Results

The measures yielded good internal reliability estimates (see Table 2). A few variables showed a slight deviation from normality. Considering the sample size and the lack of differences in the results when using transformed variables, the original data were kept.

#### 3.1. Occurrence and change of anxiety symptoms in the pandemic

Between 20.12 % and 23.15 % of participants had anxiety levels greater than cutoff scores on the anxiety measures, which compares to anxiety levels of older adults with GAD or another anxiety disorder (see Table 2). More than six percent (6.33 %) had a score greater than two standard deviations away from the mean on the CSS, which reflects a high level of COVID-19-related anxiety. Almost 17 % showed high impairment levels on the SDS. In addition, 68.45 % of older adults reported that the pandemic influenced their worries and anxiety. Specifically, 64.23 % said that their worries and anxiety's severity had increased, while 10.73 % said it had decreased. Many participants (14.41 %) reported seeking professional help for those symptoms during the pandemic. According to the current and retrospective WAQ scores, more older adults would currently meet the GAD criteria, identified by questionnaire ( $\chi^2 = 47.61, p < 0.001$ ). The WAQ's current mean score was also higher than the WAQ's retrospective mean score (prior to the COVID-19 pandemic;  $F(1, 353) = 73.85, p < 0.001, \eta^2 = 0.17$ ; see Table 2). The time by sex interaction was non-significant ( $F(1, 353) = 0.25, p < 0.619$ ). The GAD-7 mean score obtained in this study was significantly higher than the ones reported in Wild et al. (2014) and Vasiliadis et al. (2015). The mean PSWQ score was also significantly higher than the ones reported in Crittendon and Hopko (2006), and Knight et al. (2008).

#### 3.2. Relation between individual variables and anxiety, impairment and distress measures

Having health problems was moderately correlated with more worries, measured by the PSWQ ( $F(1, 341) = 24.26, p < 0.001, \eta^2 = 0.07$ ). The feelings of vulnerability about illness, measured by the IWS, was strongly correlated with the PSWQ scores ( $r = 0.52, p < 0.001$ ), the GAD-7 scores ( $r = 0.50, p < 0.001$ ) and the CSS scores ( $r = 0.53, p < 0.001$ ). The IWS scores were also moderately correlated with the WAQ scores ( $r = 0.46, p < 0.001$ ), the SDS scores ( $r = 0.36, p < 0.001$ ) and distress related to COVID-19 health standards ( $r = 0.38, p < 0.001$ ). In addition, loneliness, measured by the DJLS, was moderately correlated with the WAQ scores ( $r = 0.40, p < 0.001$ ), the PSWQ scores ( $r = 0.39, p < 0.001$ ), the GAD-7 scores ( $r = 0.42, p < 0.001$ ), the SDS scores ( $r = 0.39, p < 0.001$ ) and distress related to COVID-19 health standards ( $r = 0.40, p < 0.001$ ). Finally, of all measures, results for women ( $M = 22.96, SD = 13.76$ ) and men ( $M = 18.19, SD = 14.41$ ) only differed on the WAQ, with a small effect size ( $F(1, 353) = 8.27, p = 0.004, \eta^2 = 0.02$ ).

#### 3.3. Direct and indirect effects of IU and behavioral manifestations of anxiety

Six models tested the direct effects of IU and behavioral manifestations of anxiety and the indirect effects of IU (through behavioral manifestations) on the measures of anxiety and impairment (i.e., WAQ, PSWQ, GAD-7, CSS, SDS scores) and distress related to COVID-19 health standards (outcome variables) through the five BMQ subscales (mediator variable). All six models were significant ( $ps < 0.001; R^2 = 0.35$  to  $0.61$ ).

The direct effects of IU on the five BMQ subscales and the measures of anxiety, impairment and distress were significant when controlling for the partial effects of loneliness and feelings of vulnerability about illness (see Table 3). Higher levels of IU were associated with more behavioral manifestations of anxiety and more anxiety symptoms,

**Table 3**  
Direct effects of the mediation models.

DV model	Direct effects	b	SE	p
WAQ (current)	IU on mediators <sup>a</sup>			
	Over-planning and verification	0.43	0.042	0.000
	Avoidance	0.30	0.022	0.000
	Control	0.21	0.028	0.000
	Reassurance-seeking	0.16	0.020	0.000
	Procrastination	0.07	0.021	0.001
	IU, mediators and covariates on DV			
	IUI-a <sup>b</sup>	0.97	0.128	0.000
	Over-planning and verification <sup>c</sup>	0.20	0.174	0.239
	Avoidance <sup>c</sup>	-0.76	0.286	0.008
	Control <sup>c</sup>	0.16	0.247	0.521
	Reassurance-seeking <sup>c</sup>	0.09	0.317	0.768
	Procrastination <sup>c</sup>	0.66	0.282	0.019
	IWS <sup>d</sup>	0.38	0.130	0.004
DJGLS <sup>d</sup>	1.28	0.358	0.000	
PSWQ	IU on mediators <sup>a</sup>			
	Over-planning and verification	0.43	0.042	0.000
	Avoidance	0.30	0.022	0.000
	Control	0.21	0.028	0.000
	Reassurance-seeking	0.16	0.020	0.000
	Procrastination	0.07	0.021	0.001
	IU, mediators and covariates on DV			
	IUI-a <sup>b</sup>	0.47	0.052	0.000
	Over-planning and verification <sup>c</sup>	0.21	0.071	0.004
	Avoidance <sup>c</sup>	-0.23	0.118	0.054
	Control <sup>c</sup>	-0.16	0.101	0.115
	Reassurance-seeking <sup>c</sup>	0.20	0.130	0.129
	Procrastination <sup>c</sup>	0.35	0.115	0.003
	Health problems <sup>d</sup>	0.59	0.529	0.270
IWS <sup>d</sup>	0.16	0.055	0.005	
DJGLS <sup>d</sup>	0.40	0.147	0.007	
GAD-7	IU on mediators <sup>a</sup>			
	Over-planning and verification	0.43	0.042	0.000
	Avoidance	0.30	0.022	0.000
	Control	0.21	0.028	0.000
	Reassurance-seeking	0.16	0.012	0.000
	Procrastination	0.07	0.021	0.001
	IU, mediators and covariates on DV			
	IUI-a <sup>b</sup>	0.30	0.042	0.000
	Over-planning and verification <sup>c</sup>	0.10	0.058	0.093
	Avoidance <sup>c</sup>	-0.03	0.095	0.787
	Control <sup>c</sup>	-0.04	0.082	0.664
	Reassurance-seeking <sup>c</sup>	-0.10	0.106	0.343
	Procrastination <sup>c</sup>	0.17	0.094	0.073
	IWS <sup>d</sup>	0.16	0.043	0.000
DJGLS <sup>d</sup>	0.44	0.119	0.000	
CSS	IU on mediators <sup>a</sup>			
	Over-planning and verification	0.42	0.041	0.000
	Avoidance	0.31	0.021	0.000
	Control	0.20	0.027	0.000
	Reassurance-seeking	0.15	0.019	0.000
	Procrastination	0.09	0.020	0.000
	IU, mediators and covariates on DV			
	IUI-a <sup>b</sup>	0.83	0.205	0.000
	Over-planning and verification <sup>c</sup>	0.95	0.283	0.001
	Avoidance <sup>c</sup>	0.86	0.464	0.065
	Control <sup>c</sup>	-0.35	0.403	0.393
	Reassurance-seeking <sup>c</sup>	0.03	0.510	0.959
	Procrastination <sup>c</sup>	0.43	0.451	0.346
	IWS <sup>d</sup>	0.97	0.211	0.000
SDS	IU on mediators <sup>a</sup>			
		0.43	0.042	0.000

(continued on next page)

Table 3 (continued)

DV model	Direct effects	b	SE	p
	Over-planning and verification			
	Avoidance	0.30	0.022	0.000
	Control	0.21	0.028	0.000
	Reassurance-seeking	0.16	0.020	0.000
	Procrastination	0.07	0.021	0.001
	IU, mediators and covariates on DV			
	IUI-a <sup>b</sup>	0.44	0.073	0.000
	Over-planning and verification <sup>c</sup>	-0.05	0.099	0.623
	Avoidance <sup>c</sup>	0.01	0.163	0.964
	Control <sup>c</sup>	-0.09	0.140	0.526
	Reassurance-seeking <sup>c</sup>	-0.18	0.180	0.308
	Procrastination <sup>c</sup>	0.26	0.160	0.107
	IWS <sup>d</sup>	0.14	0.074	0.055
	DJGLS <sup>d</sup>	0.69	0.204	0.001
Distress-health standards	IU on mediators <sup>a</sup>			
	Over-planning and verification	0.43	0.042	0.000
	Avoidance	0.43	0.022	0.000
	Control	0.21	0.028	0.000
	Reassurance-seeking	0.16	0.020	0.000
	Procrastination	0.07	0.021	0.001
	IU, mediators and covariates on DV			
	IUI-a <sup>b</sup>	0.20	0.029	0.000
	Over-planning and verification <sup>c</sup>	0.01	0.040	0.769
	Avoidance <sup>c</sup>	-0.23	0.065	0.000
	Control <sup>c</sup>	-0.06	0.056	0.272
	Reassurance-seeking <sup>c</sup>	0.10	0.072	0.176
	Procrastination <sup>c</sup>	0.15	0.064	0.022
	IWS <sup>d</sup>	0.06	0.030	0.053
	DJGLS <sup>d</sup>	0.35	0.082	0.000

Note. WAQ (retrospective) = retrospective Worry and Anxiety Questionnaire; WAQ (current) = current Worry and Anxiety Questionnaire; PSWQ = short form of the Penn State Worry Questionnaire; GAD-7 = Generalized Anxiety Disorder 7- items scale; CSS = COVID Stress Scales; SDS = Sheehan Disability Scale; IUI-a = short form of the Intolerance of Uncertainty Scale-Part A; BMQ = Behavioral Manifestations Questionnaire; IWS = Illness Worry Scale; DJGLS = de Jong-Gierveld Loneliness Scale; Distress-health standards = Item measuring distress related to COVID-19 health standards. SE = Standard Error

- <sup>a</sup> a path.
- <sup>b</sup> c' path.
- <sup>c</sup> b path.
- <sup>d</sup> Control variable.

interference, and distress related to COVID-19 health standards. As for the direct effects of BMQ subscales, more procrastination was associated with more anxiety symptoms and worries on the WAQ and PSWQ and with more distress related to COVID-19 health standards, whereas over-planning and checking were associated with more worries on the PSWQ and COVID-19-related anxiety on the CSS. Direct effects of avoidance were also noted. More avoidance was associated with less anxiety on the WAQ and less distress about COVID-19 health standards. Two similar marginal effects were also observed on the PSWQ ( $p = 0.054$ ) and CSS ( $p = 0.065$ ) scores.

Indirect effects of IU on anxiety symptoms and distress related to COVID-19 health standards were observed. IU was associated with more anxiety symptoms and worries on the WAQ ( $b = 0.05$ ,  $SE = 0.027$ ; 95 % CI [0.009, 0.116]), the PSWQ ( $b = 0.03$ ,  $SE = 0.014$ ; 95 % CI [0.005, 0.057]) and more distress related to COVID-19 health standards ( $b = 0.01$ ,  $SE = 0.007$ ; 95 % CI [0.001, 0.028]) through more procrastination. IU was also associated to more worries on the PSWQ ( $b = 0.09$ ,  $SE = 0.035$ ; 95 % CI [0.027, 0.165]) and more COVID-19-related anxiety on the CSS ( $b = 0.40$ ,  $SE = 0.161$ ; 95 % CI [0.149, 0.737]) through more overplanning and verification. Finally, IU was associated to less distress related to COVID-19 health standards ( $b = -0.07$ ,  $SE = 0.023$ ; 95 % CI

[-0.117, -0.026]) through more avoidance.

#### 4. Discussion

This study measured the intensity and occurrence of anxiety symptoms, impairment and distress related to health standards among Quebec older adults during the COVID-19 pandemic. It also verified the direct effects of IU and behavioral manifestations of anxiety and the indirect effects of IU on symptoms, impairment and distress through behavioral manifestations.

As hypothesized, there seems to be an increase in anxiety scores and in the proportion of participants showing anxiety levels equal to or greater than the cutoff scores of anxiety and impairment measures during the pandemic. Almost a quarter of the sample reported anxiety levels like those of GAD or other anxiety disorders patients. These results are consistent with results observed in other countries (Parlapani et al., 2020; Qiu et al., 2020), reflecting high rates of anxiety among older adults during the pandemic. Based on participants' recollection, their current GAD symptoms were more severe during the pandemic compared to their pre-pandemic GAD symptoms, with a large effect size. Moreover, GAD symptoms were more severe compared to those reported by older adults in other studies that took place in pre-pandemic contexts. The comparisons with studies that had similar samples (i.e., older adults, community-based; Crittendon & Hopko, 2006; Wild et al., 2014) yielded differences with the largest effect sizes. Vasiliadis et al.'s (2015) sample consisted of older adults recruited from clinical waiting rooms and who were seeking care, which could explain the smaller yet still significant effect.

A high proportion of Quebec older adults (68.45 %) reported that the COVID-19 pandemic affected their worries and anxiety. Nearly 65 % of them perceived an increase in their anxiety and 14.41 % have sought professional help for these symptoms. This perceived increase in anxiety could reflect anxiety and worries that are specifically related to the COVID-19 context and the multiple situations requiring constant adaptation (e.g., changes in health measures, vaccination requirements). Unlike the general tendency, some participants (10.73 %) indicated that they felt their anxiety had decreased during the pandemic. This could be explained by participants having more time to take care of themselves and their relationship, slowing down at work, being able to make retirement decisions and feeling relieved about not having to leave the house. Other studies showed that some anxiety disorders appear to be worsened and others, alleviated by the lockdown measures. Patients with GAD and panic symptoms showed more fear related to COVID-19 compared to those with social anxiety disorder and a specific phobia (Ardestani et al., 2021). Being under lockdown and having limited social interactions may have allowed older adults to avoid the sources of their usual fears and anxiety (e.g., fear of falling). It is also possible that some people felt less anxious since the lockdown allowed them to think about aging and identify what they wanted to do next with their life. Being more aware about aging, even if fostered by such an imposed situation, can normalize changes and allow better anxiety management among older adults (Nuevo et al., 2009).

Overall, the results confirmed the relationships between older adults' sense of loneliness, anxiety, perceived impairment and distress toward health standards. Feelings of vulnerability about illness were also found to be related to anxiety in the tested models, which is consistent with the results of previous studies (Gambin et al., 2020; Wheaton et al., 2012). The lockdown and health restrictions reduce social contact that may already be limited for some. This could lead to more distress and anxiety. For instance, grandparents who usually took care of their family had to restrict this type of activity given the risks involved. In addition, anxious people are often less active and limit their activities, which can also demoralize them (Gosselin et al., 2008). For people who perceive themselves as being more vulnerable to illness, the severity and risk of illness conveyed in the context of a pandemic reduce their perception of control, which increases anxiety and their perception



of risk (Langlois et al., 2007).

Even while controlling for the previous variables, older adults' IU was found to be strongly and directly related to the intensity of their anxiety, COVID-19-related fears, impairment and distress related to COVID-19 health measures, which supports the second hypothesis. Specific behavioral manifestations, such as procrastination, overplanning, and checking, were also directly related to more anxiety. Procrastination was associated to more GAD symptoms and worries as well as more distress toward health standards. Consistent with the third hypothesis, procrastination explained part of the relationship between the IU and these three variables. Several studies argue that people with higher IU view everyday problems (e.g., routine tasks, decisions) as overwhelming and doubt their problem-solving skills (e.g., Dugas et al., 1998). This promotes putting off things or decisions and maintains worries, problems or decisions that remain. New daily challenges and choices presented themselves since the pandemic (e.g., finding good masks, shopping with restrictions), which can be worrisome for people. Overplanning and checking were associated to more specific worries and fears about COVID-19 and explained part of the relationship between IU and COVID-related anxiety. These behaviors may stem from older adults' desire to leave nothing to chance and to reduce their feelings of IU and anxiety, which is consistent with results obtained with young adults (Fourtounas & Thomas, 2016). Overplanning and checking could also result from a desire for predictability and to be prepared for anything. Worry or fears related to COVID-19 could function as cognitive avoidance strategies or an unproductive way of planning further, which is consistent with Borkovec et al. (2004) avoidance theory of worry. Contrary to our hypothesis, avoidance was negatively associated with GAD symptoms, COVID-19-related anxiety and distress about health standards. Avoidance still explained some of the relationship between IU and distress. During a pandemic, avoidance can be a way for older adults who are intolerant of uncertainty to feel relieved as their anxiety diminish, while also following health policies and avoiding risk of contamination. Being cautious by avoiding contamination situations is mostly desirable and encouraged, which could explain why avoidance is associated with less distress and less anxiety. Avoidance becomes an issue when it is done excessively and depending on its associated impairment which, in the context of a pandemic, is more difficult to identify and must be evaluated according to the real potential risks.

To our knowledge, our study is the first to specifically examine anxiety in Quebec older adults during a pandemic. Some limitations should be noted and considered in future researches. First, the study had a single measurement time, which prohibits from drawing causal conclusions. The sample size and the convenience sampling do not make it possible to assume the results' representativeness for all older adults in Quebec. Also, 51 % of the participants had a university degree, while in Quebec and Canada, university graduation rates are 19.7 % and 21.3 % respectively (Statistics Canada, 2016). The most reported income bracket appears to be compatible with the median income of \$62,900 for Canadian senior households (Statistics Canada, 2021). Higher levels of pandemic anxiety may be present among older adults living below the poverty line or with less education (Nuevo et al., 2009; Richardson et al., 2011). The majority of our sample were women, which could limit the generalizability to men. The results are based on self-report questionnaires and not on in-depth clinical assessments. Even if the measures used are well validated and widely used, this may have influenced the incidence rates of GAD and impairment. Participants' psychiatric history, cognitive limitations, and comorbid conditions were not controlled for, which may have influenced the results. However, Riehm et al. (2020) showed that the links between information-seeking behaviors and distress in the context of COVID-19 remained after controlling for psychiatric history. Although over 65 % of older adults have access to internet and use it proficiently (Davidson & Schimmele, 2019), online recruitment may have targeted more functional participants. Finally, the retrospective assessment on the WAQ may have been influenced by people's difficulty to recall accurately their experience or may have been

influenced by their current anxiety levels.

## 5. Conclusions

Anxiety rates were relatively high among older adults and were higher than those observed in studies conducted in non-pandemic contexts. Future studies should document the evolution of older adults' anxiety during the COVID-19 pandemic. This study provides evidence for the role of IU and behavioral manifestations of anxiety as explanatory factors for their pandemic anxiety. It would be relevant to verify if these variables are associated with a stronger maintain or chronicity of anxiety. Del-Valle et al. (2022) recently showed that anxiety and depressive symptoms of Argentinian adults ( $n = 1230$ ) increased during the pandemic and that IU predicted symptom variability. Research among other populations also has shown that anxiety symptoms, including those of GAD, predict the subsequent onset of depression (e.g., Prenoveau et al., 2013). This type of relationship could be relevant to examine in older adults, especially given the association of loneliness and isolation with COVID-19.

Interventions that target IU and behavioral manifestations, including self-help treatment (see Landreville et al., 2016), are effective in helping older adults manage their anxiety. Targeting IU could impact different manifestations of anxiety and distress during the pandemic. These manifestations could either be behavioral (e.g., excessive visits to one's family doctor or emergency rooms, procrastination of care or actions to limit contagion), cognitive (e.g., worries) or physiological (tension, fatigue). Improving one's awareness of their excessive manifestations of anxiety and targeting them (e.g., using exposure with response prevention), could make it possible to work indirectly on IU's effects on anxiety and fear of COVID-19. It could also indirectly affect loneliness (e.g., by reducing excessive isolation using context-appropriate measures). This line of research could be relevant to study the relationship between IU and pandemic anxiety or to consider methods that effectively target this type of anxiety.

## Conflict of interest

We have no known conflict of interest to disclose.

## Data Availability

Data will be made available on request.

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