

# Totally All Alone with My Thoughts: Development, Psychometric Properties and Correlates of the Loneliness Automatic Thoughts Questionnaire

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**Introduction:** The current article introduces the Loneliness Automatic Thoughts Questionnaire (LATQ) and describes research evaluating its psychometric properties and correlates.

**Methods:** Two separate samples of university student participants (Study 1; N = 282, Study 2; N = 289) were administered the LATQ along with a battery of other measures. Whereas Study 1 involved a preliminary investigation of the psychometric properties of the LATQ, Study 2 provided an opportunity to further expand on this aim by assessing the concurrent validity of the measure across studies.

**Results:** Overall, psychometric analyses confirmed that the LATQ items are measured with an adequate degree of internal consistency and confirmatory factor analyses established that the nine items loaded significantly on one replicable factor. Concurrent validity was established in terms of links with other loneliness measures and a measure of persistent and intrusive negative thoughts. Furthermore, LATQ scores were associated with anti-mattering, social hopelessness, anxiety, depression, and unbearable psychache. Moreover, regression analyses established that the LATQ predicted significant unique variance in depression and psychache beyond the variance attributable to measures of loneliness and adaptability to loneliness.

**Discussion:** Collectively, results indicate that loneliness-related automatic thoughts represent a unique and important element of the loneliness construct. Future research applications and additional psychometric issues to address in future research are discussed and a need for a greater focus on the cognitive aspects of loneliness is explored.

**Keywords:** loneliness, automatic thoughts, hopelessness, mattering, anxiety, depression, psychache

Over the past four decades and longer, there have been several important developments in theory and research on the role of automatic thoughts and associated cognitive processes in emotional distress. Initial work evaluated conceptual views outlined in Beck's (1967) cognitive model of depression.<sup>1</sup> The primary focus was on the role of frequent negative automatic thoughts and this culminated in the development of the Automatic Thoughts Questionnaire.<sup>2</sup> Subsequent research and theory examined the vulnerability inherent in a paucity of positive automatic thoughts.<sup>3,4</sup> More recent work has focus on the automatic thoughts associated with other affect states, such as hostile automatic thoughts<sup>5</sup> and automatic thoughts that reflect core personality traits. For instance, one extensive line of investigation examines perfectionism-related automatic thoughts.<sup>6,7</sup> Another focus has been the frequent automatic thoughts experienced by procrastinators about their dilatory behavior.<sup>8–10</sup> Such thoughts are linked with greater distress and lower levels of mindfulness and self-compassion.<sup>8</sup> The general pattern that emerges from this research is that automatic thoughts reflect core vulnerabilities and sensitivities and they are linked consistently with psychological distress.

The current research examines our contention that there are individual differences in the frequency of automatic thoughts about loneliness. That is, we contend that part of what ties loneliness to psychological pain and distress is an internal dialogue that involves frequent thoughts about feeling and being lonely. In the current work, we describe

a relatively new measure that we see as a key supplement to traditional and typical ways of assessing loneliness and ways of conceptualizing and understanding loneliness. This new measure, the Loneliness Automatic Thoughts Questionnaire (LATQ), reflects several interrelated goals. First, we sought to find some unique ways of viewing and understanding the many mental health problems that tend to accompany loneliness.<sup>11</sup> Second, it seems that the cognitive aspects of loneliness have been underemphasized and understudied and this work could represent an illustration of what can be learned by considering loneliness from a cognitive perspective. Third, there is a need for measures with item content that suggests a key target for clinical and counseling interventions.

The need for greater understanding of loneliness is suggested, in part, by indications that there may be an epidemic of loneliness, especially when certain age groups are considered<sup>12</sup> and loneliness seemed to be amplified among young people during the pandemic.<sup>13</sup> Parenthetically, the research described in this article was conducted during the COVID-19 pandemic period and this may have heightened the salience of loneliness and the thoughts related to it. There is also mounting evidence of the costs and consequences of loneliness.<sup>14</sup> Perhaps the most significant costs involve health problems and early mortality.<sup>15,16</sup> Other research on depression and other mental health issues have resulted in strong statements about the clinical significance of loneliness.<sup>17,18</sup> It is now generally accepted that loneliness is transdiagnostic and linked with multiple clinically diagnosed conditions and it can be treated effectively with cognitive behavior therapy and other treatment approaches.<sup>19</sup>

People with elevated loneliness tend to endorse various types of irrational beliefs.<sup>20</sup> Regarding the specific relevance of automatic thoughts about loneliness, our current research can be viewed as an extension of related lines of investigation that focus on thoughts and ruminative tendencies. Research has established links between loneliness and negative automatic thoughts in general.<sup>21,22</sup> Similarly, investigators have also documented links between loneliness and ruminative brooding<sup>23</sup> and Nolen-Hoeksema and Larson<sup>24</sup> have discussed how ruminative brooding, depression, and loneliness are often experienced after significant loss. Most notably, other research has established the presence of individual differences in rumination about loneliness.<sup>25</sup> This research was conducted with university students. There were clear individual differences in the tendency to brood about being lonely. This loneliness-related rumination was linked with peer-related loneliness and depression, but not with parent-related loneliness. Recent qualitative research also yielded evidence pointing to the existence of loneliness-related rumination.<sup>26</sup>

Our new measure of automatic thoughts about loneliness is described below. We wrote items that comprise the Loneliness Automatic Thoughts Questionnaire with the expectation that we were tapping one dimension comprised of extreme and intense automatic thoughts about loneliness. Our goal was to try to capture themes that seemingly reflect the internal dialogue of people prone to experiencing unbearable loneliness. The descriptive statistics (mean, standard deviation, and alpha coefficient) for the new measure is outlined in Table 1 below, followed by the scale item content shown in Table 2. As can be seen from the scale content in Table 2, people experiencing loneliness-related automatic thoughts are keenly aware of a discrepancy between how their life is going and they would like it to be going in an ideal sense. This fits with cognitive discrepancy conceptualizations of loneliness that emphasizes a discrepancy between the ideal and the actual circumstances.<sup>27</sup>

Parenthetically, it should be noted that themes reflected in our measure of loneliness-related automatic thoughts were informed by case accounts of people experiencing profound loneliness who were also characterized by ruminative thoughts and tendencies.<sup>28,29</sup> This work also follows from previous research and theory from Horowitz and associates.<sup>30</sup> They described a loneliness-related “fuzzy set prototype” that pointed to close links between loneliness and depression and associated negative judgments of the self. Relevant themes include isolation in terms of feeling and being different

**Table 1** Means, Standard Deviations, and Alphas for All Measures – Study 1

Variables	<i>M</i>	<i>SD</i>	<i>Alphas</i>
Loneliness Automatic Thoughts	19.54	9.92	0.95
UCLA Loneliness	46.97	14.62	0.96
PINTS	18.20	4.87	0.90
Social Desirability	5.91	2.10	0.50

**Note:** N = 282.

**Abbreviation:** PINTS, Persistent and Intrusive Negative Thoughts Scale.

**Table 2** Factor Loadings for the Items of the Loneliness Automatic Thoughts Questionnaire – Studies 1 and 2

Items		Factor Loadings
Why am I so lonely?	Study 1	0.86
	Study 2	0.76
I cannot stand to feel this alone	Study 1	0.88
	Study 2	0.88
It's weak to be this lonely	Study 1	0.79
	Study 2	0.74
I feel helpless being by myself for too long	Study 1	0.79
	Study 2	0.77
Will this loneliness ever end?	Study 1	0.84
	Study 2	0.86
I cannot escape this loneliness	Study 1	0.88
	Study 2	0.84
Something must be wrong with me to feel this alone	Study 1	0.84
	Study 2	0.81
I cannot handle feeling alone	Study 1	0.84
	Study 2	0.76
Other people are not this alone	Study 1	0.75
	Study 2	0.64

Notes: N = 282 for Study 1 and N = 289 for Study 2.

from others, loneliness reflecting something wrong with the self, and a sense of inefficacy in terms of feeling helpless to alleviate loneliness.

It should also be noted that this measure was first included as part of a broader investigation described in a recent article by Besser that included a focus on the loneliness experienced during the COVID-19 pandemic.<sup>31</sup> However, key psychometric issues and broader applications remain to be studied. Besser and colleagues<sup>31</sup> found in this initial study with a sample of 462 college students from Israel that the Loneliness Automatic Thoughts Questionnaire had adequate internal consistency and consisted of one factor according to a principal components analysis. Moreover, elevated scores were associated in the expected direction with measures of negative automatic thoughts and positive automatic thoughts and a general measure of loneliness. A regression analysis reported in the Besser study<sup>31</sup> showed that elevated levels of loneliness-related automatic thoughts were predicted uniquely by measures of self-criticism, dependency, anti-mattering, and mattering.

The current research examined the characteristics and the correlates when the Loneliness Automatic Thoughts Questionnaire was worded in English and completed by students from Toronto, Canada. Psychometric tests were more stringent than those previously conducted. For instance, in the current research, we evaluated the scale item responses in both samples via confirmatory factor analyses. Regarding the correlates, the measures that were included were designed to evaluate concurrent validity (eg, other measures of loneliness and rumination) but also included measures tapping correlates established in other research as having a link with loneliness such as mattering.<sup>32,33</sup> Across two studies (using different participant samples), we were more adequately able to assess the extent to which the LATQ correlated to existing loneliness and rumination measures as well as other outcome variables it should reasonably be associated with based on the previous literature. Most notably, we sought to establish links between loneliness automatic thoughts and various measures of maladjustment in light of established links between depression and associated phenomena.

## Study I

### Participants

The sample comprised 282 university students (219 women, 62 men, and 1 non-binary). Their mean age was 22.3 years ( $SD = 4.7$ ). The sample was diverse in terms of self-reported ethnicity, with 17.7% Caucasian, 29.4% Asian/Pacific Islander, 17% Middle Eastern, 7.1% African American, 5% Latino/Hispanic, and 23.4% who reported “other.”

## Procedure

Participants were recruited through the undergraduate research participant pool at a large Canadian university. This research received ethics review and approval by the Human Participants Review Sub-Committee, York University's Ethics Review Board (Certificate #2020-178) and as such the present study complies with the Declaration of Helsinki. Data collection occurred in June of 2020 when the COVID-19 pandemic had resulted in most classes being only offered online and people were coping with increased physical isolation. Participants received credit towards their final introductory psychology grades in exchange for their participation. After providing their informed consent, the following self-report measures were administered and completed:

### Loneliness Automatic Thoughts Questionnaire

The Loneliness Automatic Thoughts Questionnaire<sup>31</sup> consists of nine thoughts that are related to the current experience of loneliness. The final set of items is provided in Table 2. We began with a 23-item pool. These items were then reduced in two phases to 10 items with two items being slightly re-worded. These items were then administered to the participants in the study from Besser and colleagues<sup>31</sup> with instructions and response format similar to those used for the Automatic Thoughts Questionnaire.<sup>2</sup> Analyses described in the study by Besser and colleagues<sup>31</sup> identified one item that was deleted because it had a mean that was lower than 2.00 and a standard deviation lower than 1.00. The nine remaining items had an internal consistency of 0.92 in the sample.<sup>31</sup>

### UCLA Loneliness Scale

This 20-item measure<sup>34</sup> assesses levels of perceived loneliness. Sample items include, "How often do you feel alone?" and "How often do you feel isolated from others?" Items are rated on a scale ranging from 1 (never) to 4 (always). Greater scores reflect a greater frequency of feeling alone. This scale possesses good psychometric properties.<sup>34</sup>

### The Persistent and Intrusive Negative Thoughts Scale (PINTS)

This five-item inventory<sup>35</sup> has been extensively used. Respondents are presented with five statements (eg, I lay awake at night thinking about things. When something upsets me, I think about it over and over) and they must make five-point ratings of how often this applies to them with options ranging from 1 (never) to 5 (almost always).

### The Marlowe-Crowne Social Desirability Scale

We used the abbreviated version of this instrument developed by Ballard in 1992.<sup>36</sup> It consists of 11 items in a true-false response format. One sample item is "I'm always willing to admit it when I make a mistake." Higher scores represent responding in a socially desirable manner.

## Results

### Descriptive Statistics

As mentioned previously, Table 1 depicts the descriptive statistics for all of the measures in the present study. The LATQ has demonstrated high internal consistency, with an alpha coefficient of 0.95 in the current study. This compares favorably to the alpha of 0.92 found in the study by Besser and colleagues.<sup>31</sup>

### Confirmatory Factor Analyses

A confirmatory factor analysis was performed to test a one-factor solution of loneliness automatic thoughts using maximum likelihood estimation procedures. The model comprised all nine items of the LATQ. The model was an adequate fit,  $\chi^2(27) = 142.896$ ,  $p = 0.001$ , CFI = 0.949, TLI = 0.931, SRMR = 0.031, RMSEA = 0.124, 90% CI [0.104, 0.144],  $p_{\text{close}} = 0.001$ . As shown before in Table 2, all LATQ items had factor loadings ( $\lambda$ ) of 0.75 or higher. Thus, the confirmatory factor analysis demonstrated that the LATQ is a unidimensional measure, which was predicted.

### Correlational Analyses

Table 3 presents the correlations among loneliness automatic thoughts, loneliness, persistent and intrusive negative thoughts, and social desirability. The results revealed that loneliness automatic thoughts were positively correlated with

**Table 3** Correlations Among Loneliness Automatic Thoughts, Loneliness, Persistent and Intrusive Negative Thoughts, and Social Desirability – Study 1

Measures	1	2	3	4
1. Loneliness Automatic Thoughts	–			
2. Loneliness	0.74**	–		
3. Persistent and Intrusive Negative Thoughts	0.43**	0.39**	–	
4. Social Desirability	–0.22**	–0.22**	–0.19**	–

Notes:  $N = 282$ . \*\* $p < 0.01$ , two-tailed.

loneliness, as well as persistent and intrusive negative thoughts. Loneliness was positively associated with persistent and intrusive negative thoughts. Lastly, social desirability was negatively correlated with loneliness automatic thoughts, as well as loneliness, and with persistent and intrusive negative thoughts. The correlations with social desirability are not large in magnitude and are identical for the two loneliness measures.

## Study 2

Study 2 revisited the psychometric issues considered in our first study. In addition, we examined how scores on the LATQ related to scores on a variety of measures representing constructs that should be associated with frequent automatic thoughts and loneliness, such as mattering, which has been shown to predict various consequential outcomes.<sup>37</sup> A key objective of this study was to establish that the LATQ has a unique role in terms of predicting outcomes beyond the variance attributable to other loneliness measures.

Study 2 included several measures in addition to the LATQ. Our goals were to assess correlates in terms of unique ways to frame loneliness, but also evaluate a wide range of adjustment measures that tapped distress, hopelessness, and psychological pain. Our decision to include a specific focus on feelings of mattering versus not mattering stemmed, in part, from the results of recent research showing strong associations between loneliness and feelings of not mattering to others.<sup>38</sup> The unique challenges of the pandemic suggest that it is potentially illuminating to study feelings of the proposed link between loneliness and feelings of not mattering in keeping with Schlossberg's observation in 1989<sup>39</sup> that transitions can heighten worries and concerns about whether we matter to other people. If transitions heighten these concerns, we felt it could be potentially illuminating to examine the correlates of individual difference in adaptability to loneliness experienced during the pandemic.

## Participants and Procedure

The participants for this study were university students recruited through the undergraduate research participant pool at York University during the Fall 2021 semester, which represents a period of mandated COVID-19 pandemic social restrictions. Participants received research credit towards selected courses for their participation. This sample of 289 students had a mean age of 18.86 years ( $SD = 1.30$ ), as participants were recruited with restrictions within the 18 to 24 year age range. Of the 289 students, 234 students identified as female (81%), followed by 51 identified as male (17.6%), 3 individuals identifying as non-binary (1%), and one participant identifying as "Other" at 0.3% (demigirl).

Out of 289 participants, 43 individuals (14.9%) self-reported having been diagnosed with a mental health disorder. These diagnoses ranged from depression and anxiety, autism spectrum disorder, obsessive-compulsive disorder, anorexia, binge eating disorder, attention deficit hyperactivity disorder, post-traumatic stress disorder, borderline personality disorder, panic disorder, depersonalization disorder, and bipolar disorder.

The study was administered online through Qualtrics. After participants provided their informed consent, and they then completed a battery of self-report questionnaires, as summarized below.

## Measures

In addition to the LATQ and social desirability measures described earlier, the following additional measures were administered after obtaining informed consent:

### UCLA Loneliness Scale-8 (ULS-8)

An eight-item short form of the 20-item UCLA Loneliness Scale developed by Hays and DiMatteo in 1987<sup>40</sup> was included to assess the frequency levels of overall loneliness from 1 (never) to 4 (always). The eight items were selected because they all loaded highly on a single factor. The authors reported a correlation of 0.91 between their eight-item version and the full 20-item version.

### The Loneliness Adaptability Scale

Loneliness adaptability was measured using a modified nine-item version of the Adaptability Scale<sup>41</sup> that we developed for this research. The modifications involved slightly rewording each of the nine items of the Adaptability Scale to focus on loneliness during the pandemic rather than the decontextualized form of adaptability that was the focus of the original instrument. Specifically participants were asked to complete the items “with reference to how you have been experiencing times you have been alone during the Covid-19 period. We are interesting in your typical reactions to being alone”. Sample items were “I am able to think through a number of possible options to assist me during the times spent alone”, I am able to develop new ways of going about things (eg distracting myself) to help me through times spent alone, and “To help me through times spent alone, I am able to draw on positive feelings (eg, enjoyment, satisfaction) and memories.” The items above are examples of cognitive, behavioral, and emotional adaptability. There were three items in each category. We used a seven-point response option scale ranging from “1” (strongly disagree) to “7” (strongly agree).

### The General Mattering Scale (GMS)

The GMS developed by Marcus and Rosenberg in 1987<sup>42</sup> is a five-item scale that measures the extent to which people perceive that they matter to others. In 2018, Flett<sup>43</sup> noted that this scale is the most widely used measure of mattering to others. A representative item is, “How important do you feel you are to other people?” Items were rated using a scale that ranged from 1 (not at all) to 4 (a lot). Higher scores indicate greater levels of perceived mattering. Factor analysis has shown that this scale is a unidimensional measure with good reliability and validity.<sup>44</sup>

### Anti-Mattering Scale (AMS)

This five-item scale<sup>45</sup> measures the degree to which people feel as though they do not matter to others. Sample items include, “How much do you feel like you don’t matter?” and “To what extent have you been made to feel like you are invisible?” Items are rated on a scale ranging from 1 (not at all) to 4 (a lot), with higher scores indicating higher anti-mattering. Flett and colleagues<sup>45</sup> have demonstrated across several studies that the AMS is a unidimensional measure with sufficient reliability and validity. Other evidence indicated that anti-mattering is a unique construct that is related to, but distinct from, feelings of mattering.<sup>45</sup>

Social Hopelessness Questionnaire (SHQ; Flett GL, Hewitt PL, Gayle B, Davidson LA, unpublished data, 2003). This 20-item questionnaire assesses negative beliefs in outcome expectancies in the interpersonal domain. Sample items include, “I will always have a hard time coping with some people” and “Some people do little to inspire hope in me.” Items are rated on a scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), with greater scores indicating greater social hopelessness. Flett and colleagues have shown this scale is unidimensional with adequate reliability and validity. Subsequent research in various contexts has attested to the reliability, validity, and usefulness of this measure.<sup>46,47</sup>

### The GAD-7 (Spitzer et al 2006)

This well-known seven-item measure<sup>48</sup> taps generalized anxiety in terms of symptoms and worry experienced over the last two weeks. It has been shown to have internal reliability and has concurrent validity.<sup>48</sup> It taps such tendencies as “worrying too much about different things”, and “trouble relaxing.”

### The CES-D-4

This abbreviated four-item version<sup>49</sup> of Radloff’s well-known 20-item scale<sup>50</sup> was developed for use in a sample of mothers in the postpartum period, but this version has been widely used and has an 8-item version. Melchior and colleagues<sup>49</sup> reported robust correlations between scores on this measure and the full scale as well as scores on another self-report depression measure.

## Unbearable Psychache Scale

This brief three item measure by Pachkowski and colleagues<sup>51</sup> is comprised of the three most extremely worded items from the longer Psychache Scale that tap psychological pain developed by Holden and colleagues.<sup>52</sup> Representative items include “I can’t take my pain anymore”, and “Because of my pain, my situation is impossible.” Scores on this measure are highly correlated with the full scale scores from the Psychache Scale.

## Results

### Descriptive Statistics

Table 4 displays the means, standard deviations, and alpha coefficients for all of the measures in the present study. As was the case in Study 1, the LATQ has high internal consistency, with an alpha coefficient of 0.94 in the current study.

### Confirmatory Factor Analyses

Similar to Study 1, a confirmatory factor analysis was conducted to validate our one-factor solution with the nine LATQ items using maximum likelihood estimation procedures. The model was an adequate fit,  $\chi^2(27) = 100.590$ ,  $p = 0.001$ , CFI = 0.960, TLI = 0.947, SRMR = 0.033, RMSEA = 0.097, 90% CI [0.077, 0.118],  $p_{\text{close}} = 0.001$ . As previously illustrated in Table 2, all LATQ items had factor loadings ( $\lambda$ ) of 0.64 or higher. Collectively, the results from the present study and Study 1 have provided evidence for a one-factor solution for this novel measure of loneliness automatic thoughts.

### Correlational Analyses

Table 5 presents the correlations among all of the variables. Loneliness automatic thoughts were negatively correlated with loneliness adaptability and mattering, as well as positively correlated with loneliness, anti-mattering, social hopelessness, psychache, depression, and anxiety. Loneliness was negatively correlated with loneliness adaptability and mattering, as well as positively correlated with anti-mattering, social hopelessness, psychache, depression, and anxiety. Loneliness adaptability was negatively linked anti-mattering, social hopelessness, psychache, depression, and anxiety, and positively linked with mattering. In addition, social hopelessness was positively correlated with anti-mattering, psychache, depression, and anxiety, and negatively correlated with mattering. Anti-mattering was negatively correlated with mattering, which was expected and the correlation was not so high that they would be considered redundant with each other. Anti-mattering was also associated with higher levels of psychache, depression and anxiety, while mattering was associated with lower levels of these variables. Moreover, psychache was linked with greater levels of depression and anxiety, and depression and anxiety were positively correlated with each other. Finally, social desirability was negatively associated with loneliness automatic thoughts, loneliness, social hopelessness, anti-mattering, psychache, depression, and anxiety, as well as positively associated with loneliness adaptability and mattering.

**Table 4** Means, Standard Deviations, and Alphas for All Measures – Study 2

Variables	M	SD	Alphas
Loneliness Automatic Thoughts	18.52	9.03	0.94
UCLA Loneliness	18.92	5.20	0.86
Loneliness Adaptability	41.43	10.51	0.91
Social Hopelessness	59.18	14.92	0.90
Anti-Mattering	11.55	4.06	0.88
Mattering	13.74	3.12	0.77
Psychache	6.51	3.02	0.89
Depression	5.17	2.83	0.75
GAD-7	9.51	5.83	0.91
Social Desirability	5.78	2.33	0.60

Note: N = 289.

**Table 5** Correlations Among Loneliness Automatic Thoughts and Other Measures of Loneliness, Social Hopelessness, Mattering, Psychache, Depression, Anxiety, and Social Desirability – Study 2

Measures	1	2	3	4	5	6	7	8	9	10
1. LATQ	–									
2. Loneliness	0.63**	–								
3. LAS	–0.42**	–0.31**	–							
4. SHQ	0.55**	0.62**	–0.32**	–						
5. Anti-Matter	0.59**	0.69**	–0.31**	0.68**	–					
6. Mattering	–0.39**	–0.57**	0.26**	–0.47**	–0.48**	–				
7. Psychache	0.65**	0.56**	–0.46**	0.55**	0.57**	–0.36**	–			
8. Depression	0.64**	0.71**	–0.47**	0.53**	0.60**	–0.45**	0.64**	–		
9. Anxiety	0.50**	0.48**	–0.35**	0.51**	0.53**	–0.25**	0.58**	0.53**	–	
10. Social Des	–0.17**	–0.33**	0.17**	–0.37**	–0.36**	0.19**	–0.27**	–0.25**	–0.31**	–

Notes: N = 289. \*\*p < 0.01, two-tailed.

Abbreviations: LATQ, Loneliness Automatic Thoughts Questionnaire; LAS, Loneliness Adaptability Scale; SHQ, Social Hopelessness Questionnaire; Anti-Matter, Anti-Mattering; Psychache, Unbearable Psychache, and Social Des, Social Desirability.

## Regression Analyses

A series of multiple regression analyses were performed to examine which variables are important in predicting psychache, depression, and anxiety. Specifically, the predictors were loneliness automatic thoughts, loneliness, and loneliness adaptability. Before conducting these analyses, we checked for normality of the outcome variables (ie, psychache, depression, and anxiety) and the distributions all differed from normal. As a result, the robust bootstrapping procedure was used since it does not impose the assumption of normality. We generated 5000 bootstrap samples in order to provide estimates, standard errors, and 95% bias-corrected confidence intervals.

For the regression predicting psychache, loneliness automatic thoughts, loneliness, and loneliness adaptability were all entered into the predictor block (see Table 6). This model significantly predicted 49.3% of the variance in psychache scores,  $F(3, 285) = 92.23, p < 0.001$ . In terms of individual predictors, loneliness automatic thoughts and loneliness uniquely contributed to psychache. In addition, loneliness adaptability was negatively associated with psychache.

**Table 6** Summary of Multiple Regressions for Variables Predicting Psychache, Depression, and Anxiety – Study 2

Variables	R <sup>2</sup>	B	SE B	95% CI
<i>Predicting Unbearable Psychache</i>	0.493***			
Step 1				
Loneliness Automatic Thoughts		0.14***	0.02	[0.09, 0.18]
UCLA Loneliness		0.14***	0.04	[0.07, 0.21]
Loneliness Adaptability		–0.06***	0.02	[–0.09, –0.03]
<i>Predicting Depression</i>	0.604***			
Step 1				
Loneliness Automatic Thoughts		0.08***	0.02	[0.04, 0.11]
UCLA Loneliness		0.26***	0.03	[0.21, 0.32]
Loneliness Adaptability		–0.06***	0.01	[–0.08, –0.04]
<i>Predicting Anxiety</i>	0.314***			
Step 1				
Loneliness Automatic Thoughts		0.17***	0.04	[0.09, 0.25]
UCLA Loneliness		0.30***	0.07	[0.16, 0.43]
Loneliness Adaptability		–0.09**	0.03	[–0.14, –0.03]

Notes: N = 289. \*\*p < 0.01, \*\*\*p < 0.001.



**Table 7** Summary of Multiple Regression for Variables Predicting Loneliness Automatic Thoughts – Study 2

Variables	R <sup>2</sup>	B	SE B	95% CI
Step 1	0.506***			
Social Hopelessness		0.08*	0.04	[0.02, 0.15]
Anti-Mattering		0.51***	0.14	[0.25, 0.80]
Mattering		-0.19	0.15	[-0.48, 0.11]
Psychache		1.25***	0.16	[0.92, 1.55]

Notes: N = 289. \* $p < 0.05$ , \*\*\* $p < 0.001$ .

For the regression predicting depression, loneliness automatic thoughts, loneliness, and loneliness adaptability were all entered into the predictor block again (see Table 6). This model significantly predicted 60.4% of the variance in depression scores,  $F(3, 285) = 145.07, p < 0.001$ . Like in the first regression, all of the predictors uniquely contributed to depression in the expected directions.

For the final regression of this series, loneliness automatic thoughts, loneliness, and loneliness adaptability were all entered into the predictor block, and anxiety was entered as the outcome (see Table 6). This model significantly predicted 31.4% of the variance in anxiety scores,  $F(3, 285) = 43.57, p < 0.001$ . In terms of individual predictors, all of the predictors once again uniquely contributed to anxiety in the expected directions.

Lastly, one multiple regression analysis was performed to evaluate which variables are important in predicting loneliness automatic thoughts. Specifically, the predictors were social hopelessness, anti-mattering, mattering, and psychache. Prior to conducting this analysis, we checked for normality of the outcome variable (ie, loneliness automatic thoughts) and the distribution was positively skewed. Therefore, the same robust bootstrapping procedure was employed. For this regression, social hopelessness, anti-mattering, mattering, and psychache were all entered into the predictor block, with loneliness automatic thoughts entered as the outcome (see Table 7). This model significantly predicted 50.6% of the variance in loneliness automatic thoughts scores,  $F(4, 284) = 72.70, p < 0.001$ . The unique individual predictors of loneliness automatic thoughts were social hopelessness, anti-mattering, and psychache.

## Discussion

Research on the cognitive vulnerabilities in loneliness typically does not tend to consider the potential role of automatic thoughts specific to the experience of loneliness. The current research evaluated vulnerability and the cognitive aspects of loneliness by evaluating the psychometric properties and associated correlates of the LATQ. Our first goal was to test the psychometric properties of this new measure. It was found across two different samples that the scale items were measured with a high degree of internal consistency. Moreover, a confirmatory factor analysis found evidence of one factor with all items loading highly on this factor and this outcome was replicated with the data from our second sample.

Other results indicated a small but significant negative association between scores on the LATQ and a social desirability measure. We maintain that this association is shared with other measures of loneliness in this study and in prior research<sup>53</sup> and this is one instance in which the association likely reflects substance rather than style or in addition to style in keeping with past discussions of how to interpret significant associations involving social desirability.<sup>54,55</sup> Here the associations were at a level comparable to the correlation between social desirability and loneliness that led Russell and colleagues<sup>34</sup> to conclude that their measure was not contaminated by social desirability bias.

Collectively, the correlations found across studies provided strong support for the concurrent validity of the LATQ and its potential usefulness in terms of its associations. Scores on the LATQ were associated significantly with levels of loneliness and poorer self-reported adaptability to loneliness as well as the reported experience of persistent and intrusive negative thoughts. The association with adaptability to loneliness is worth exploring in future research because our results suggest that people inundated with automatic thoughts are unable to adjust when they find themselves in the throes of loneliness and during times when they are alone.

The need to consider loneliness from a temporal perspective was also established by the obtained association between loneliness and social hopelessness. Students who experience frequent thoughts about being lonely tend to endorse a cynical view of their interpersonal futures and this likely extends to not being able to escape future loneliness.

Other findings linked loneliness automatic thoughts with higher levels of anti-mattering and lower levels of mattering to others. These results are in keeping with findings reported in the study by Besser and colleagues<sup>31</sup> as well as our previous work suggesting that many people who experience frequent and intense loneliness face “a double jeopardy” in terms of feeling both alone and unimportant or insignificant.<sup>38</sup> The robust association found here between scores on the LATQ and AMS signify that many people with an internal dialogue focus on loneliness perceive an interpersonal context in which they have been made to feel invisible and unheard as if they do not actually exist. It would seem essential when such people are receiving treatment to have a joint focus on their loneliness and their feelings of not mattering to other people. It is likely that these feelings extend to feelings of loneliness and not mattering in society and this element also merits becoming a focus.

Regarding their roles in mental health problems, loneliness automatic thoughts were also associated strongly with anxiety, depression, and reports of unbearable psychological pain (ie, psychache). These findings suggest various reasons to be concerned about people with these characteristics. It should be evident that when we shift to a person-focused perspective that some people are characterized not only by loneliness and related automatic thoughts, but also by feelings of anxiety, depression, and psychological pain and a pervasive sense of not mattering to other people. The link with psychache is especially noteworthy given that psychache is believed to be the key psychological correlate of suicide risk<sup>56</sup> and the measure used in this study has been shown in other research to be a more robust predictor of suicide ideation when pitted against other strong predictors such as hopelessness.<sup>57,58</sup> It is also likely, if not certain, that many people have an internal dialogue that is well hidden behind a front and they are suffering in silence. Indeed, these may be the lonely people most unlikely to seek help or to self-disclose how they are doing in ways that give the others the clues indicating that support and comfort are needed.

Given the various intercorrelations among the various measures included in the current research, we felt it essential to determine how the LATQ would fare as a predictor when pitted against other vulnerability factors. The regression results provided us with strong indications that the experience of loneliness automatic thoughts is a unique aspect and there is merit in considering loneliness from a cognitive perspective. The analyses showed that when considered along with loneliness and reported adaptability to loneliness that the LATQ scores predicted significant unique variance in levels of anxiety, depression, and psychological pain. The significant unique effect of the LATQ scores predicting unbearable psychache raises the possibility that thoughts about loneliness can also become quite unbearable and involves an internal dialogue that reaches a level that implicates these thoughts in potential vulnerability to suicide. If these thoughts are accompanied by feelings of shame, people will likely have significant concerns about experiencing stigma and perhaps self-stigma. It is also conceivable that many people will hide these thoughts by avoiding other people or putting on a false front when in the presence of other people.

Another regression analysis reflected a different approach because in this analysis, we treated LATQ scores in this analysis as an outcome measure. This analysis showed that loneliness automatic thoughts were predicted jointly and uniquely by elevated levels of anti-mattering, unbearable psychache, and social hopelessness. This finding attests to the significant distress experienced by some exceptionally lonely students and how there can be multiple factors that contribute to their loneliness and associated feelings of distress.

Collectively, the findings described in this article and in the recent article by Besser and colleagues<sup>31</sup> attest to the presence of meaningful individual differences in the frequency of experiencing thoughts about loneliness. One way of interpreting this research is that it signifies when core needs are not satisfied, such as the need for connection and relatedness, many people with unmet needs will have an internal dialogue and associated thoughts prompted by the realization of their important psychological needs not being met. It is likely that for most people, failure to meet any core need of personal importance will also elicit automatic thoughts about the inability to satisfy this need. Such thoughts will certainly heighten the salience of these themes and from a cognitive perspective, they may come to dominate certain people. The LATQ was constructed to help provide a window into this lonely mind.

The current research was conducted during the pandemic and it is possible that this had an impact on our results, especially in terms of the mean scores found on the LATQ and the other loneliness measures in this research. While we regard the timing of this research to be a factor that makes this research both timely and relevant, it is clearly the case that the LATQ should be evaluated post-pandemic.

While our primary focus was on the LATQ and its features, the findings from this study provide some potentially important insights into the nature of loneliness and the factors associated with it. Clearly, this research makes it more evident that loneliness has a cognitive element that has gone unmeasured and there are some people who may become cognitively preoccupied and dominated by thoughts related to being lonely and other thoughts that are related to automatic thoughts about loneliness. In addition, we learned from Study 2 that people vary considerably in the ability to adapt to feelings of loneliness and low adaptability is associated with more frequent loneliness-related thoughts. The results from Study 2 indicate that loneliness can be accompanied by considerable psychological pain and hopelessness along with feelings of being unimportant and insignificant. Given these findings, we are beginning to consider a conceptual model with a cognitive focus that seeks to account for when loneliness becomes unbearable.

## Limitations and Future Directions

Of course, the current results must be interpreted within the context of limitations. First, and foremost, many of the associations found in the current study merit being examined in longitudinal research and we must reiterate that causal statements are not warranted based on cross-sectional research. It is also evident that these results should not be generalized beyond university students from Canada and there is a need to broadly examine loneliness automatic thoughts in various populations. Having said that, loneliness is actually more prevalent, though at times less noticed during the adolescent and young adult years<sup>18</sup> and so this was considered to be a critical age group to begin with in establishing the measurement properties.

Future research is needed to test numerous issues about the experience and assessment of loneliness automatic thoughts. At a psychometric level, the scale needs to be evaluated broadly, including the key issue of the temporal stability of loneliness-related thoughts. It is generally assumed that automatic thoughts are state-like rather than trait-like, but given that some people experience chronic loneliness, the trait-like aspects of loneliness automatic thoughts may receive support in future research. On a related note, our initial evidence suggests that the LATQ merits inclusion as a key outcome measure in psychotherapy and counseling research designed to evaluate the effectiveness of therapeutic interventions designed to alleviate levels of loneliness.

At a more substantive level, it will be important to assess loneliness automatic thoughts in longitudinal research to determine if they represent a vulnerability or risk factor. The current work focused on mental health outcomes and future research must consider health-related indices. On a related note, it is likely that loneliness-related automatic thoughts play a role in the sleep difficulties known to accompany loneliness.<sup>59</sup> Also, research is needed, perhaps from a preventive perspective, to evaluate the extent to which LATQ scores are sensitive to change. Finally, the current research was based on self-assessments of frequency of thoughts over the past week. There is considerable potential in including assessments of loneliness thoughts when examining loneliness and its correlates in research involving daily assessments.

In summary, the current research extended past research by showing that the LATQ is seemingly a reliable and valid unidimensional measure and it has a unique role to play when assessing loneliness. Elevated scores on this measure were associated with anxiety, depression, and unbearable psychological pain and scores on the LATQ were also linked with measures of persistent and intrusive negative thoughts and negative appraisals of future interpersonal experiences. This research illustrates the usefulness and need to consider loneliness from a cognitive perspective and it provides another route that can account for the distress experienced by lonely people.

## Disclosure

The authors report no conflicts of interest in this work.

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