

Original Research

# Predictors of mental health among male university employees during the first year of the COVID-19 pandemic

Danielle Maltais<sup>1,\*</sup>, Christiane Bergeron-Leclerc<sup>1</sup>, Véronique Gauthier<sup>2</sup>, Jacques Cherblanc<sup>1</sup>, Eve Boily<sup>1</sup>, Jacinthe Dion<sup>3</sup>, Eve Pouliot<sup>1</sup>, Oscar Labra<sup>4</sup>

<sup>1</sup>Human and Social Sciences, Université du Québec à Chicoutimi (UQAC), Saguenay, QC G7H2B1, Canada

<sup>2</sup>School of Social work and Criminology, Université Laval, Québec, QC G1V0A6, Canada

<sup>3</sup>Health Sciences, Université du Québec à Chicoutimi (UQAC), Saguenay, QC G7H2B1, Canada

<sup>4</sup>Human and Social Development, Université du Québec en Abitibi-Témiscamingue (UQAT), Rouyn-Noranda, QC J9X5E4, Canada

\*Correspondence: [danielle\\_maltais@uqac.ca](mailto:danielle_maltais@uqac.ca) (Danielle Maltais)

Submitted: 25 November 2021 Revised: 13 December 2021 Accepted: 11 January 2022 Published: 13 May 2022

## Abstract

**Background:** The COVID-19 pandemic forced university staff to change their work practices. This has had an impact on their work performance and has caused various stresses. Until now, little attention has been paid to males working in this type of educational institution. In this study, we sought to determine the impact of the COVID-19 pandemic on males working in educational institutions. **Methods:** A quantitative study with three phases of data collection was conducted at eleven Canadian universities. Between 264 and 371 males completed an online questionnaire with validated tests to measure their level of anxiety, depression and post-traumatic stress. **Results:** During the first year of the pandemic, anxiety and depression scale scores increased while post-traumatic stress scores decreased. This study also revealed that the feelings and meanings that males gave to the pandemic played a very important role in their mental health. **Conclusions:** University administrations should not underestimate the suffering that male employees may experience during a crisis such as the COVID-19 pandemic.

**Keywords:** mental health; COVID-19; academic employees; post-traumatic stress symptoms; anxiety; depression

## 1. Introduction

During the COVID-19 pandemic, all university teaching staff and employees, including professors, lecturers, managers, professionals and support workers, were confronted with a variety of obstacles in the pursuit of their professional activities. These challenges included a lack of training on the use of digital technology [1–4], limited or no access to research laboratories and work colleagues [5], the need to use new technologies to continue their research and academic/professional activities, and the institution of mandatory telework for everyone for periods ranging from a few weeks to several months [6,7]. During the first year of the pandemic, various public health sanitary measures, including lockdown, physical distancing, school and university closing and mandatory telework, were implemented to limit the spread of the virus [8]. These measures impacted the physical and mental health of the entire population, including people with paid jobs in institutions of higher education [7,9]. The few studies related to men's mental health revealed their vulnerability, particularly due to the financial, conjugal and family stressors generated by the pandemic [10–12]. Until now, however, very few researchers have paid attention to males working in university settings during the pandemic. With the exception of being paid and working in a university, these males do not form a homogenous group. Their working stability, salary, as well as level of freedom and opportunities varies according to

their job status. In view of these issues, we hypothesized that mental health disparities exist among male university employees, and as a result: (1) there are gender differences in prevalence rates and determinants of mental health [13], (2) there is an underrepresentation of males in health and mental health research [14–16] and (3) males are less likely than females to acknowledge their problems and to seek medical or psychosocial help [17–23]. This study will focus exclusively on males. The use of a sex specific approach in this research will help to develop mental health prevention measures targeting males [13]. This study aims to (1) establish a portrait of the mental health of these males and (2) identify the socioeconomic, organizational and contextual factors associated with generalized anxiety disorder, major depression and post-traumatic stress symptoms. This study hopes to provide a better understanding of the experience of this subgroup of the population that is often not well considered in studies of the factors which affect mental health in populations exposed to a disaster. The knowledge gained from this study will be helpful to professionals who work with males, recognizing that they may also have been affected by COVID-19 and allowing them to adapt their practices and develop actions to promote health and implement effective interventions for these individuals.



## 2. Literature review

During the first year of the pandemic, university employees had to fulfill new responsibilities that had repercussions not only on their workload but also on their mental health [7,9]. A number of different studies on this topic have shown that the increase in workload affected university employees by increasing their anxiety levels [24–28]. According to Santamaria *et al.* [29], professors have experienced more anxiety since March 2020 due to their workload, the lack of clear instructions from their administration, the lack of access to personnel and resources, and a lack of knowledge and training related to online teaching and job insecurity. Other obstacles also contributed to the number of professors facing emotional difficulties, such as online learning, poor or unstable internet connection, inadequate computer labs, and a lack of computers or direct contact with their students [6]. The lack of face-to-face interactions was also one of the causes of increased anxiety among university employees [30].

Other researchers pointed out that the anxiety of university employees could be related to a reduction of physical activity, vocal problems (e.g., hoarseness, a reduction in the volume of their voice), the onset of obsessive-compulsive behavior disorders, and taking sick leave [29, 31–34]. According to Karadem *et al.* [25], suffering from anxiety greatly reduces the quality of work life.

Furthermore, according to Alfawaz *et al.* [35], various sources of psychological stress led to severe depression in a considerable number of university employees, demonstrated by sleep problems, a lack of energy, and poor concentration [6,25,26,35]. Relationship problems at work were another factor that negatively affected the mental health of university employees by increasing their risk of anxiety, depression and insomnia, which in turn were detrimental to their quality of life at work [35]. Moreover, for professors, family-work balance and a lack of scientific productivity contributed to the onset of depressive disorders. Indeed, Matulevicius *et al.* [28] demonstrated that since the pandemic, professors with children aged five or under, stated that they produced fewer peer-reviewed papers, attended fewer funding committee meetings, submitted fewer manuscripts, and registered fewer new research projects as lead researcher, generating fewer research opportunities and activities. The feeling that their professional trajectory had slowed down during the pandemic was another factor that contributed to the onset of depression symptoms among professors. In addition to family-work balance, university employees raising their children alone, those with disabilities, and those at the end of their career (older individuals) were more likely to develop a depression disorder [29,36,37]. Craig *et al.* [38] stated that the pandemic and the related changes are associated with a reduction in the gaps between males and females concerning time-related stress. In that study, the percentage of males who always felt rushed rose from 11% to 24% during the

lockdown, while it remained relatively stable for females, increasing from 23% to 27% [38]. Shafer *et al.* [39] stated that fathers were participating more in tasks related to the care and education of their children after the beginning of the pandemic, which may have affected the time they were dedicating to their professional activities. Moreover, according to Santamaria *et al.* [29], university employees serving as a natural caregiver for someone with a chronic disease or living with someone with COVID-19 feared for their own health, a situation conducive to the development of major depression.

Although few studies looked at the presence or absence of symptoms of post-traumatic stress disorder during the pandemic, Casacchia *et al.* [6] point out that it is perfectly natural and normal to experience this kind of distress in this particular context. In another study on the experience of employees at a university that offers dental training, the authors state that 10% of their participants (n = 1862 from 28 different countries) developed severe post-traumatic stress due to the COVID-19 pandemic [40]. The main sources of stress behind this disorder were fear of contracting an infection, restricted mobility due to the lockdown, and concerns due to professional responsibilities related to research [40].

## 3. Materials and methods

### 3.1 Procedure

To achieve the two research objectives, a longitudinal study was undertaken to document the repercussions of the pandemic on the overall health of male university employees. This study was approved by the university's ethics committee on April 15, 2020. Started during the nationwide lockdown in April 2020, the study established a portrait of the overall health of these individuals, through three data collection phases in 11 university institutions. It was conducted all across the province of Québec (Canada) and polled 361 male university employees in April 2020 (Phase 1), 264 in November 2020 (Phase 2) and 371 in April 2021 (Phase 3). Among these participants, 39 took part in all three phases.

### 3.2 Instruments

The questionnaire designed for the study consists of validated scales that are described below and closed questions to describe the sociodemographic characteristics of the participants, the level of stress experienced, their feelings and fears related to the pandemic, as well as satisfaction with the assistance they received.

#### 3.2.1 Social Provision Scale – 5 items (SPS-5)

A short form of the Social Provision Scale [41] was used to determine the participants' level of social support. Based on the French-Canadian version of the SPS [42,43], this five-item validated form was developed to reduce the completion time for national health surveys [44]. The scale

consists of five items corresponding to the five subscales of the SPS-10: attachment (There are people I can count on in emergency) guidance (I feel part of a group of people who share my attitude and beliefs), social integration (I have close relationships that provide me with a sense of emotional security and well-being), reliable alliance (There is someone I could talk to about important decisions in my life) and reassurance of worth (I have a relationship where my competence and skill are recognized). Using a four-point Likert scale, the scores range from 0 to 20. A score of 15 or over indicates a high level of social support. In our study, the Cronbach's alphas for the SPS-5 ranged from 0.84 (T1) to 0.87 (T2 and T3), which is comparable to the validation study by Orpana *et al.* [44] (0.88).

### 3.2.2 Generalized Anxiety Disorder 7 (GAD-7)

The GAD-7 was developed as a short measure for anxiety disorders [45,46]. Seven items (e.g., Over the last two weeks, how often have you been feeling nervous, anxious, or on edge) assess the frequency of anxiety symptoms over the past two weeks on a four-point Likert-type scale ranging from 0 (never) to 3 (nearly every day). The total score ranges from 0 to 21, a higher score indicating a more severe functional impairment as a result of anxiety. A cut-off score of 8 and greater was used to identify anxiety disorder. The range of the Cronbach's alphas for this scale was from 0.90 (T2) to 0.91 (T1 & T3).

### 3.2.3 Patient Health Questionnaire (PHQ-2)

The PHQ-2 is an ultra-brief questionnaire [47] recommended for first-line depression screening. It has two Likert-type items ranging from 0 (never) to 3 (nearly every day) that measure the frequency of two symptoms of depression over the past two weeks, namely, "Little interest or pleasure in doing things" and "Feeling down, depressed or hopeless". The total score can range from 0 to 6, and a total score of 3 or higher is used as a cut-off score to indicate a depression disorder [47]. The Cronbach's alphas were fairly consistent over time in our study, ranging from 0.82 (T3) to 0.83 (T1 & T2).

### 3.2.4 Impact of Event Scale-6 (IES-6)

An abbreviated and validated version of the IES-Revised, the six-item IES, was used to measure post-traumatic stress symptoms related to the pandemic crisis, including intrusion (e.g., I thought about it when I did not mean to), hyper-arousal (e.g., I felt watchful or on-guard) and avoidance (e.g., I tried not to think about it) [48]. Participants had to report, on a five-point Likert scale ranging from 0 (not at all) to 4 (extremely), how distressed or bothered they were, over the past seven days. A total score was computed, with higher scores indicating more symptoms of post-traumatic stress. A cut-off score of 13 was used to detect post-traumatic stress disorder, to maximize specificity of detection [48]. The internal consistency of the scale was

very good as confirmed by the Cronbach's alphas of 0.86 (T1 & T2) and 0.87 (T3).

### 3.3 Data analysis

SPSS version 27 (IBM Corp., Armonk, NY, USA) was used to carry out the descriptive analysis, and SAS version 9.4 (SAS Institute Inc., Cary, NC, USA) was used for the variance analyses and the multiple linear regressions for each of the three mental health variables analyzed for this study (anxiety, depression and post-traumatic stress disorder). For the variance analyses, we applied a multiple linear regression model in which all the independent variables were initially included ( $n = 41$ ) and then eliminated one at a time until the model only included the significant variables. Bonferroni correction was used to avoid Type-1 error in the comparison of the categories of independent variables. Tests were also carried out to validate the variance homogeneity assumptions and normality of the residuals.

### 3.4 Participants

Table 1 summarizes the socio-demographic characteristics of the respondents across the three measurement periods. Although slight variations were observed, participants' characteristics remained relatively stable over time. The majority of respondents were Caucasian ( $\pm 95\%$ ), Canadian citizens ( $\pm 94\%$ ), aged between 35 and 54 years old ( $\pm 62\%$ ), living with a partner ( $\pm 78\%$ ) and having children ( $\pm 67\%$ ). They were employed as professionals ( $\pm 30\%$ ;  $F = 4.67$ ;  $p < 0.05$ ), professors ( $\pm 25\%$ ;  $F = 3.31$ ;  $p > 0.05$ ), support staff ( $\pm 24\%$ ;  $F = 0.72$ ;  $p > 0.05$ ) and lecturers ( $\pm 20\%$ ;  $F = 11.00$ ;  $p < 0.05$ ). Across time, younger males (18–34) were more likely to complete the online survey than older males ( $\geq 55$ ) ( $F = 135.42$ ;  $p < 0.05$ ). Certain groups of people are also more likely to complete the survey. This pattern was observed with Indigenous males ( $F = 3.50$ ;  $p < 0.0005$ ), single males ( $F = 4.20$ ;  $p < 0.05$ ) and males who were living with their children more than 40% of the time ( $F = 17.93$ ;  $p < 0.05$ ). Six out of ten respondents reported a high level of social support (between 57.9% and 60.9%;  $F = 6.14$ ;  $p < 0.05$ ). Most of the males stated that their income remained stable from the beginning of the pandemic (between 82.2% and 90% in T1, T2 and T3;  $F = 0.06$ ;  $p < 0.05$ ), and that they were not worried about meeting the various needs of their family members ( $\pm 68\%$ ). A quarter of them ( $\pm 25\%$ ) deemed their daily stress level to be fairly or extremely high ( $F = 1.44$ ;  $p > 0.05$ ). The majority of the respondents were satisfied, throughout the first year of the pandemic, with the support strategies deployed across the university ( $\pm 70\%$ ;  $F = 1.90$ ;  $p > 0.05$ ), the steps taken for the provision of academic activities ( $\pm 70\%$ ;  $F = 0.29$ ;  $p > 0.05$ ), the information-sharing processes put in place by their employer ( $\pm 80\%$ ;  $F = 0.03$ ;  $p > 0.05$ ) and the involvement of staff members in decision-making (between 52.3% and 62.4%;  $F = 1.59$ ;  $p > 0.05$ ).

**Table 1. Sociodemographic characteristics of the participants.**

Characteristics	T1 %	T2 %	T3 %	F
	(n = 361)	(n = 264)	(n = 371)	
<b>Age</b>				
18–34	9.0	9.5	14.8	F = 153.42; $p < 0.05$
35–54	61.7	62.7	60.4	
55 or over	29.3	27.8	24.9	
<b>Living situation</b>				
Alone	16.1	24.6	24.9	F = 4.20; $p < 0.05$
In a couple	83.9	75.4	75.1	
<b>Has children</b>				
Yes	70.6	65.9	65.2	F = 1.25; $p > 0.05$
No	28.5	34.1	34.2	
<b>Lives more than 40% of the time with a child</b>				
Yes	31.0	51.5	52.4	F = 17.93; $p < 0.05$
No	69.0	48.5	47.6	
<b>Citizenship</b>				
Canadian citizen	93.6	93.9	93.3	F = 0.09; $p > 0.05$
Permanent resident	3.1	4.9	4.3	
Temporary resident	3.1	0.8	2.4	
Other	0.3	0.4	0	
<b>Racialized person</b>				
Yes	5.1	4.2	5.9	F = 0.45; $p > 0.05$
No	94.9	95.8	94.1	
<b>Indigenous person</b>				
Yes	0.8	0.4	3.0	F = 3.50; $p < 0.05$
No	99.2	99.6	97.0	
<b>In the last month, income:</b>				
Decreased	7.2	7.2	7.8	F = 0.06; $p < 0.05$
Remained stable	90.0	82.2	85.2	
Increased	2.8	9.5	6.5	
<b>Fear of meeting needs</b>				
None	68.7	67.4	68.5	F = 0.01; $p < 0.05$
A little	17.2	20.8	18.6	
Moderate	11.4	9.1	8.6	
A lot	2.8	1.1	3.8	
<b>Level of social support</b>				
Low	39.1	40.5	42.1	F = 6.14; $p < 0.05$
High	60.9	59.5	57.9	

## 4. Results

### 4.1 Feelings about the pandemic

In the third assessment phase, nearly one male in two (48% to 53.2%) was afraid of being infected by the coronavirus. More than a third of them experienced the pandemic as a stressful event (36.4% to 42.8%) likely to harm them later (T1: 29.1%; T2: 34.2% and T3: 35.9%), while the majority felt that the crisis was preventing them from accomplishing an important activity or project ( $\pm 65\%$ ). More than a third of the males also felt that this event had caused them to lose something important (31.6% to 39%) and nearly one male in two perceived the pandemic as a challenge (42.9% to 48%). The level of satisfaction with the assistance received gradually declined over the course of the first year of the pandemic ( $F = 5.50$ ;  $p < 0.05$ ), as demonstrated by the fact that the percentage of respondents

who felt they were receiving less assistance than hoped was 17.8% in T1, 22.8% in T2 and 30.1% in T3.

### 4.2 Mental health of the respondents

Table 2 reveals that in all three assessment phases, similar proportions of respondents were suffering from generalized anxiety or depression. Furthermore, the percentage of respondents presenting these two mental disorders increased significantly over time, going from 30.3% in T1 to 42.3% in T3 for anxiety ( $F = 6.01$ ;  $p < 0.05$ ) and from 31.9% to 49.2% for depression ( $F = 11.76$ ;  $p < 0.001$ ). With regard to post-traumatic stress disorder, another trend can be seen: a reduction in the proportion of respondents presenting this disorder between T1 and T2 ( $F = 0.64$ ;  $p > 0.05$ ) and similar percentages between T1 and T3.

**Table 2. Mental health of participants.**

Characteristics	T1	T2	T3	F
Experiencing anxiety				
Yes	30.3	41.2	42.2	
No	69.7	58.8	57.8	F = 6.01; $p < 0.05$
Mean score	M = 6.86; SD = 5.468	M = 8.32; SD = 5.683	M = 8.39; SD = 5.693	
Experiencing depression				
Yes	31.9	46.1	49.3	
No	68.1	53.9	50.7	F = 11.76; $p < 0.001$
Mean score	M = 8.76; SD = 6.978	M = 10.82; SD = 7.210	M = 10.97; SD = 7.231	
Experiencing TSPT				
Yes	16.2	12.8	15.3	
No	83.8	87.2	84.7	F = 0.64; $p > 0.05$
Mean score	M = 7.91; SD = 5.056	M = 6.77; SD = 4.993	M = 6.93; SD = 5.299	

#### 4.3 Factors associated with the presence of symptoms of generalized anxiety

Table 3 presents the 14 variables that are significantly associated with the score earned on the anxiety scale. The results show that the more stressful the males considered their days to be and the more stressful an event they perceived the pandemic to be, the greater the anxiety they suffered. Respondents concerned about not being able to meet the needs of their household, and those who considered the pandemic to be a major challenge, developed more symptoms of anxiety, as did those who lost something important because of this event. Scores were also high among males with a low level of social support, those not working as professors or executives, and those who felt the pandemic would cause them harm later on. The younger the male and the greater the decrease in their income in the month preceding each of the three data collections, the more anxiety they experienced. Males who were not lecturers and those who felt that the pandemic was preventing them from accomplishing an important activity or project were also more anxious. Finally, the analyses show that the passage of time is a variable associated with the presence of anxiety symptoms in males working in universities, as the scores on the scale revealed that the presence of this mental health problem was significantly higher in the third assessment phase.

#### 4.4 Factors associated with the presence of symptoms of depression

In this analysis, ten independent variables were significant, seven of which are similar to those that explain the presence of higher scores in the assessment of anxiety symptoms. Table 3 shows that one of the three variables most strongly associated with the presence of symptoms of depression is finding one's days stressful, as was the case with anxiety. Having access to little social support, not having a child, not having received as much assistance as hoped for in order to deal with the various stressors related to the pandemic, and the passage of time, are also independent variables that are strongly associated with higher scores concerning depression. Respondents who felt that

the pandemic had caused them to lose something important, and those who were dissatisfied with the measures taken for the continuity of academic activities, also got higher scores on this scale. Considering the pandemic to be a stressful event is also one of the ten independent variables revealed to be significant for the score earned on this scale. Finally, the males who felt that the COVID-19 pandemic could harm them later or was a challenge were also in the same situation.

#### 4.5 Factors associated with the presence of symptoms of post-traumatic stress

With regard to post-traumatic stress disorder, eleven variables were significantly associated with higher scores on the scale used to identify the presence of this disorder among the participants. Four of the eleven independent variables that were retained in our regression model were strongly significant, three of which relate to the participants' perceptions of the pandemic. The males who considered the crisis to be a stressful event, who feared infection, and who viewed the pandemic as a challenge, earned higher scores on the scale to assess the presence of post-traumatic stress symptoms. The passage of time was also strongly associated with the score earned on this scale, but the trend for this variable differs from the two mental health problems documented earlier, because the respondents' scores were lower in T2 and T3 than in T1. Having a position other than a professorship was also associated with higher scores on the post-traumatic stress scale. The males who felt that the pandemic could harm them later, who were living with a child more than 40% of the time, and who were dissatisfied with the information communicated by their institution, were also at greater risk of earning a high score on the scale to detect the presence of post-traumatic stress symptoms. Fear of job loss, a reduction in income and access to little social support are the last three independent variables that were found to be significant for earning higher scores on this scale.

Table 3. Tests of fixed effects.

Variables	Generalized anxiety disorder (n = 811)	Major depressive disorder (n = 795)	Post-traumatic stress disorder (n = 869)
Sociodemographic characteristics <sup>1-2</sup>			
Age	$B = -0.03650^a$	–	–
Concern about capacity to meet family's needs	$B = 0.7962^a$	–	–
Change in income during previous month	–	–	Decrease-Stable $p = 0.7710$ Decrease-Increase $p = 1.7922^c$ Stable-Increase $p = 1.0212$
Level of social support	$B = -0.1370^b$	$B = -0.1023^a$	$B = -0.09806^c$
Having or not having children	–	$p = 0.5547^a$	–
Living or not living over 40% of the time with a child	–	–	$p = 0.8074^b$ (0.0047)
Professional characteristics			
Being or not being a professor	$p = 0.9961^b$	–	$p = 1.0056^b$
Being or not being a lecturer	$p = 1.0595^b$	–	–
Being or not being an executive	$p = 2.5207^b$	–	–
Daily stress	$B = 1.7226^a$	$B = 0.3837^a$	–
Level of satisfaction with communication of information	–	–	$B = -0.4943^b$
Level of satisfaction with means taken for continuity of academic activities	–	$B = -0.2117^b$	–
Level of satisfaction with support strategies deployed in the university community	$B = -0.5140^b$	–	–
Variables related to the pandemic			
Being afraid or not afraid to be infected	–	–	$p = -1.7497^a$
Level of assistance received	–	Less-As much $p = 0.4765^b$ Less-More $p = 1.1116^b$ As much-More $p = 0.6350$	–
Pandemic as a source of stress	$B = 1.0180^a$	$B = 0.2052^b$	$B = 1.5759^a$
Pandemic as a challenge	$B = -0.6445^a$	$B = -0.1346^c$	$B = -0.7051^a$
Impression that the pandemic led to the loss of something important	$B = 0.3693^b$	$B = 0.1526^b$	$B = 0.2826^c$
Impression that the pandemic will be damaging to me later	$B = 0.3911^c$	$B = 0.1460^c$	$B = 0.4068^c$
Impression that the pandemic is preventing me from carrying out important activities or projects	$B = -0.2983^c$	–	–
Time variables			
Passage of time	T1–T2 $p = -0.6877$ T1–T3 $p = -0.7595^c$ T2–T3 $p = -0.0718$	T1–T2 $p = -0.3748^b$ T1–T3 $p = -0.4014^b$ T2–T3 $p = -0.0266$	T1–T2 $p = 1.6222^a$ T1–T3 $p = 1.2587^a$ T2–T3 $p = -0.3635$

Notes:

1-The letter  $B$  is the beta value while the letter  $p$  is the Bonferonni-corrected  $p$ -value.2-The letters correspond to the statistically significant thresholds:  $a = p = < 0.0001$ ,  $b = p \leq 0.01$  and  $c = p \leq 0.05$ .

## 5. Discussion

This study documenting the mental health of males holding a paid job at a university reveals that males who could be considered as socially privileged, due to the stability of their socioeconomic and professional situation during the first year of the COVID-19 pandemic, were mentally affected by this event. Although sanitary restrictions were attenuated over this first year of the pandemic, males mental health declined. Thus, during the first phase of the survey (April 2020), the respondents were in a condition of almost complete lockdown. During the second phase, the measures were still strict (November 2020), but the prevalence of COVID-19 was reduced. In the third phase (April 2021), the restrictions were minimal and the health situation improved [49]. Thus, each of these semesters has its particularities regarding health measures, including the obligation to remain at home while carrying out one's professional duties, to offer distance learning courses as well as support to students. Our analysis demonstrated that during the first year of the public health crisis, the proportion of males experiencing anxiety and depression increased significantly. The observed prevalence of anxiety and depression symptoms in our sample is higher than what is observed in the Canadian population; meaning that males who participated in our study are particularly vulnerable [50]. The mental health of these males is similar to that observed in many other studies conducted with other groups of males or adults during the first year of the pandemic [10–12,51–53]. In the university setting, the pandemic probably accentuated a general trend that had been observed in recent years within universities, namely, the steady expansion of professional tasks and work overload [54,55], which were directly related to higher stress levels, performance anxiety, and professional burnout, as well as lower levels of well-being (Blinded for review, 2021) [54,56]. It is also important to emphasize that the males participating in this study are mainly in their midlife stage (35–64 years old) which is often punctuated by developmental tasks and crisis [57].

Like any other type of catastrophe, the pandemic seems to have caused an increase in stress levels in males and an increase in the presence of symptoms of post-traumatic stress, anxiety and depression [58–61], although the percentages of males presenting post-traumatic stress symptoms in the three assessment phases were lower than in studies carried out after natural disasters (e.g., floods, landslides, tsunami or earthquake) or technological disasters (e.g., bridge collapse, rail accident) [62,63]. In our study, fear of being infected by COVID-19 exacerbated the risk of developing post-traumatic stress disorder (PTSD). It should be noted that the fear of infection among the males in our study appears to be higher than observed in recent systematic surveys [64,65].

Our regression analyses show that five sociodemographic, professional or organizational characteristics are significantly associated, to varying degrees, to earning high

scores on the three scales used to establish the mental health portrait of males in the university setting who voluntarily participated in at least one of the three assessment phases in this longitudinal study. For the presence of symptoms of anxiety, depression or post-traumatic stress, a low level of social support and perceiving the pandemic as a source of stress, a challenge, an event that could harm them later or that caused them to lose something important are the variables associated with higher scores on the three scales used to assess the severity of these three disorders. These results align with studies that examined the connections between the perception of social support received, and the presence of mental health problems related to either the current public health crisis or other types of disasters [66–68]. The level of stress experienced on a daily basis is another variable shown to be related to two of the three mental health problems investigated, namely, anxiety and depression. As mentioned, one in three males ( $\pm 30\%$ ) suffered from these mental health problems during the first data collection (April 2020) and, a year later, one in two ( $\pm 50\%$ ) were in this situation. The build-up of various stressors experienced during the pandemic, including having to use different adaptation strategies to maintain work performance, is probably one of the factors that contributed to maintaining very high stress levels for males pursuing a career at a university. This study also demonstrates that with the passage of time, anxiety and depression scores increased, while PTSD scores decreased. The decrease in scores on the PTSD scale is probably due to the fact that a variety of social health measures to protect the public from the virus were implemented in the various regions of Québec and in university institutions. Moreover, as knowledge advanced about the way the virus spreads, over time the respondents probably adopted behaviors that reassured them.

This study also demonstrates that the feelings and meanings that males attributed to the pandemic played a very important role in their mental health. It is important to pay special attention to these factors when meeting males who are seeking support, by encouraging them to share their emotions, by working with them to help them assign another meaning to the pandemic, and by reassuring them about the potential affects this kind of event may have, not only in their professional life, but in their personal, conjugal, family and social life.

### 5.1 Strengths of this study

This correlational study examined the answers of 263 to 371 men to an online survey conducted over three measurement times. The number of male respondents is relatively large. The survey has been started in April, 2020, during the total containment in the Quebec province. The Quebec population has never been confronted with a pandemic situation – and for this reason the study is exploratory. Therefore, the power calculation could not have been done before we started the study. According to Hoening and

Heisey [69], it would be scientifically inappropriate to calculate it posteriori [69]. Despite this limitation, the relative homogeneity of this sample allows us to state with confidence that the findings presented can be considered representative of mid-life males working in Quebec universities. One of the strengths of this study is the use of an online survey that was able to quickly contact a large number of employees in different universities during a nationwide lockdown [70]. The online surveys also made it easier to contact the participants during the lockdown and to get answers on sensitive topics [70]. The main novelty of this study is that it focuses on a subgroup of the population (middle-life males) that is often considered to be at lower risk for mental health problems than children or adolescents, females, individuals with physical or cognitive health problems, and the elderly [71]. This study shows that between one-third and one-half of the males who completed the survey showed symptoms related to anxiety and depression throughout the first year of the pandemic and that more than 15% showed manifestations of post-traumatic stress at T3.

### 5.2 Limitations of the study

Although this study documents the consequences of the COVID-19 pandemic on the mental health of males with paid jobs in a university – it does have some limitations. It is possible that the males who completed the questionnaires over- or under-stated their answers or refused to answer certain sensitive questions. Furthermore, to reduce the time required to complete the questionnaire online, we had to use abridged versions of the various tests to identify the presence of the mental health problems being investigated. The short versions of these tests were all validated in advance with adults, however, and they offer good psychometric qualities. Since the study sample was non-probabilistic, it is possible that males with similar characteristics completed the questionnaire as they felt more implicated in the topic under study. It is also impossible to generalize our results to all males in Canada or elsewhere in the world who hold a job in other workplaces, since working conditions in higher education institutions may differ. Finally, the public health restrictions that the employees had to uphold may have been applied differently in universities, which may have had an influence on their mental health.

## 6. Conclusions

The mental health of males with paid jobs at a university was not spared by the COVID-19 pandemic. Despite the low risk of losing their job or their source of income; they, like the population at large, faced many challenges that tested their adaptive capacity and their ability to perform at work in the university setting. For example, for professors, delays in their research activities may have a negative outcome for career advancement. Although most of the males working in universities could generally count on job and income stability, a considerable number of them wor-

ried about not being able to meet their family's needs, which had an effect on their level of anxiety and post-traumatic stress. Based on the results of this study, it is important for university administrations to take care of their staff members during a crisis by not underestimating the suffering that some of their male employees may be experiencing.

According to our findings, interventions targeting key risk factors may be relevant. For example, increasing social support or improving subjective appraisal of social support may be relevant. Similarly, it appears that stress supports and assistance (such as fear of income or job loss, and telecommuting adjustment) could be improved or further promoted. Our results also show that these supports should be maintained or increased over time, as the needs seem to persist throughout the waves of the pandemic.

The COVID-19 crisis led to a “significant and unprecedented worsening of population mental health” [50]. OECD encourages employers to support the mental health of their employees [50]. Strengths-based mental health promotion strategies aiming at improving literacy, reducing stigma, lowering stress, addressing workload issues and promoting help-seeking behavior should be considered [72–74]. The implementation of a peer support service in university settings would be another effective strategy to improve male mental health [75,76]. Given that males do not easily seek medical or psychosocial help, it is important to maximize efforts within the workplace (the university) to reach them in order to improve their mental health. A program involving strategies to engage males should be a part of all service initiatives to protect the mental health of employees in institutions of higher learning during periods of high stress such as pandemics [21].

### Author contributions

DM and CB-L designed the research study. DM, CB-L and JC performed the research. JD, EP, JC and OL revised the manuscript and add some references. DM and CB-L analyzed the data. DM, CB-L, JC and VG wrote the manuscript. EB did the literature review and revised all the references in the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

### Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional committee: CER-UQAC (2020-491).

### Acknowledgment

We would like to thank the men who participated in this study as well as the unions and associations that helped us recruit them. We would also like acknowledge David Émond (<https://deltastatistique.ca/>) for his assistance with data analysis.



## Funding

This research was funded by the Fondation de l'université du Québec (FUQAC) (2021–2022), by the Centre intersectoriel en santé durable de l'UQAC (CISD) and by the Fédération québécoise des professeures et professeurs d'université (FQPPU).

## Conflict of interest

The authors declare no conflict of interest.

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