

Trajectories of Psychological Distress during the COVID-19 Pandemic among Community-Dwelling Older Adults in Quebec: A Longitudinal Study.

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Abstract

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Objective: The COVID-19 pandemic and its associated public health directives may increase the risk for psychological distress among vulnerable older adults. This longitudinal study aimed to identify predictors of psychological distress trajectories among community-dwelling older adults in Quebec.

Methods: The study spanned four time points across 16 months and three waves of the COVID-19 pandemic. The sample included 645 community-dwelling older adults ages 60 years and older in Quebec. Participants completed telephone-based interviews that included the Kessler 6-item Psychological Distress Scale (K6) to assess psychological distress at each time point as well as information on socioeconomic, medical, psychological and COVID-19 related factors. Group-based trajectory modelling (GBTM) was used to identify distinct trajectories of psychological distress across time.

Results: Three group-based trajectories of psychological distress were identified: the resilient (50.5%), reactive (34.9%), and elevated distress groups (14.6%). Individuals with mobility issues, insomnia symptoms, COVID-19 related acute stress, general health anxiety, increased loneliness symptoms, and those unable to use technology to see others were more likely to be in the reactive and elevated groups than the resilient group. Those with past mental health problems had uniquely increased odds of being in the reactive group compared to the resilient group. Individuals living in poverty and those who reported taking psychotropic medication had increased odds of being in the elevated distress group compared to the resilient group.

Conclusion: These findings characterized distinct trajectories of psychological distress in older adults and identified risk factors for elevated distress levels.

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Sara Matovic, M.Sc., contributed to this thesis by participating in study conceptualization, data management, data analysis and writing of the original draft, and reviewing and editing of the thesis.

Sébastien Grenier, Ph.D., contributed to the conceptualization of the larger project and contributed to the review and editing of the thesis.

Helen-Maria Vasiliadis, Ph.D., contributed to the conceptualization of the larger project and contributed to the review and editing of the thesis.

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Jean-Philippe Gouin: This is part of a larger project supervised by Dr. Gouin. Dr. Gouin designed and conceptualized this larger project, contributed to the conceptualization of this thesis, data analysis, writing the original draft, reviewing and editing of the thesis.

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General Introduction

In response to the COVID-19 pandemic declared on March 11th, 2020,¹ the Quebec government implemented physical distancing and confinement measures. Specific directives targeted older adults who are at greater risk for COVID-19 complications and mortality. These included staying confined in their personal homes, prohibition of visits in hospitals and care centers for the elderly, and compulsory confinement in these residences.² Although these measures were important to curb the spread of the SARS-CoV-2 virus, they may have had negative collateral consequences such as increased psychological distress. These collateral consequences may be especially severe for older adults who were already socially isolated, whose access to care has been disrupted, and who were unable to adapt to the technological needs required to access social and healthcare services.³

Psychological distress is characterized by elevated symptoms of depression and anxiety.⁴ Studies conducted in Canada, the US and England show that the average trajectory of psychological distress in adults over the first few months of the pandemic followed a similar pattern: A peak during the initial stages of the pandemic, followed by a reduction in distress a few months later.⁵⁻⁸ While this data explains the population's initial reaction to the COVID-19 pandemic, it fails to capture changes in response as the population cycles through waves of increased infection rates, new SARS-CoV-2 variants, and the associated changes in public health measures.

During the first wave of the COVID-19 pandemic, community-dwelling older adults showed less psychological distress compared to other age groups.⁸⁻¹² While these results suggest that, on average, older adults experience less psychological distress than younger individuals, they do not capture the heterogeneity of outcomes for older adults. Specific subgroups of older adults may experience more adverse mental health consequences during COVID-19, such as those with disadvantaged socioeconomic backgrounds, increased need for medical services, and psychosocial risk factors. Indeed, previous studies indicate that prior health problems, inadequate income, feeling lonelier, living alone, exercising less, and losing employment were associated with worse mental health among older adults in the early stages of the pandemic.¹³⁻¹⁵ Altogether, these studies reported averaged trends over relatively short follow-ups without identifying factors that may contribute to distinct trajectories of elevated pandemic-related psychological distress. Accordingly, the purpose of this study was to characterize the evolution of psychological distress among older adults in Quebec over time and to understand the determinants of different trajectories of psychological distress levels.

Introduction

Numerous factors contribute to experiencing psychological distress, including sociodemographic, health-related, personality, lifestyle, psychological and environmental factors. The COVID-19 pandemic may have amplified the impact of these factors and led to different age groups being disproportionately impacted. For example, family visits to retirement homes were prohibited during certain waves of the pandemic due to the high risk of mortality in these centers, leaving older adults living in retirement homes disproportionately affected by the pandemic and at higher risk of feeling isolated and distressed. Therefore, it is essential to consider how specific sociodemographic, medical, and psychological factors contribute to increased psychological distress in older adult populations during the COVID-19 pandemic. Recognizing the impact of these factors on trajectories of psychological distress has important implications for clinical interventions and public policy.

Sociodemographic Factors

Various sociodemographic factors have already been linked to increased mental distress in the general population and older adults during the COVID-19 pandemic, including being female, younger, living alone, having fewer years of education, and having financial hardships.^{5,14-17} These associations are consistent with what has been found in past psychiatric epidemiological studies.^{18,19} As mentioned above, an important sociodemographic factor to consider during the pandemic for older adults in Quebec is whether they live in a retirement home. In Quebec, non-essential visits to elderly care centers were prohibited for six months, from March 14, 2020, to September 21, 2020, at which point authorized caregivers could visit the seniors one at a time.² Starting March 23, 2020, there was compulsory confinement within both private and public seniors residences.² Different extents of confinement in retirement and long-term care homes continued over the subsequent three waves.² In the first wave of the COVID-19 pandemic in Quebec, nursing home deaths accounted for more than 80% of all Canadian COVID-19 deaths,²⁰ highlighting the urgent need for public health measures aimed at reducing the toll of the virus in older adults. Unfortunately, these public health measures led to increased social isolation, which had a negative impact on the mental health of older adults.^{21,22} In a US article, health practitioners in long-term care homes commented on the poor mental health reactions to the public health measures by the senior residents; for example, they explained that some residents had “stopped eating and given up” due to isolation from their families.²¹ Therefore, it is imperative to consider the role of living contexts on psychological distress in older adult populations during the pandemic.

Medical & Health Service Factors

Aging increases the risk of developing chronic diseases. In Canada, 73% of individuals 65 years and older had at least one of ten common chronic diseases, including hypertension, periodontal disease, osteoarthritis, ischemic heart disease, diabetes, osteoporosis, cancer, COPD, asthma and mood and anxiety disorders.²³ Over one-third of Canadian seniors have reported having two or more chronic diseases (i.e., multimorbidity), which can negatively impact their quality of life²³ and increase psychological distress.²⁴ Individuals with prior physical and mental health conditions are likely to be at risk for increased psychological distress during the COVID-19 pandemic due to the added challenges of these conditions in daily life. A study conducted on older

adults living in China reported that multiple physical health problems were associated with increased psychological distress during COVID-19, and increased distress was more prominent for those with newly emerging physical health problems than pre-existing health problems.²⁵ Moreover, in a study of Spanish older adults, having a current or past mental disorder increased the likelihood of experiencing anxiety symptoms during the COVID-19 pandemic.²⁶ In the Quebec older adult population, prior research reported that an increase in the number of chronic health problems over time increased the probability of having persistent mental health problems, which was associated with requiring health services due to psychological distress.²⁷ This finding is relevant in the context of the COVID-19 pandemic as there were massive disruptions to health services and increased barriers to accessing services, putting older adults at risk for experiencing increased chronic health issues and experiencing increased psychological distress.

The use of healthcare services during the COVID-19 pandemic may also cause distress due to fear of contracting the SARS-CoV-2 virus in these settings. Indeed, one study conducted in the UK reported a 16% reduction in healthcare seeking among older adults in 2020 compared to 2018/2019, highlighting that many older adults may not have received necessary care during the pandemic.²⁸ The same study also reported 25% more older adults presenting to the hospital for falls and injuries in the three months following the easing of restrictions compared to levels reported in 2018/2019.²⁸ Reduced activity due to stay-at-home orders and fear of contracting the virus likely plays a role in the increased falls. Studies tracking physical activity have shown declines in physical activity and increases in sedentary behaviour in the early stages of the pandemic.²⁹⁻³¹ A negative impact of reduced activity in older adults is an increased risk of frailty and decreased mobility, placing older adults at risk for falls, hospitalization, mortality, and distress.³² Studies of adults and older adults reported that sustained and progressive frail states and reduced mobility from lockdowns were associated with increased psychological distress during the pandemic.^{25,33} Therefore, older adults may be especially at risk of experiencing psychological distress due to hesitation with accessing healthcare services, mobility reductions, frailty increases, and increased risks of falls and hospitalization due to stay-at-home measures and fear of the negative consequences of the virus.

Lastly, records show that there has been a high prescription and use of psychotropic drugs among community-dwelling older adults in Quebec (between 20-48%).³⁴ Typically, these drugs are prescribed for short-term insomnia and anxiety relief but end up being used for long durations and may lead to negative consequences like memory impairments, psychomotor issues and falls, and psychiatric hospitalizations.³⁴ Factors such as sleep complaints, poor health perceptions, and poor mental health have all been associated with continued psychotropic drug use.³⁴ Considering the many challenging circumstances of the pandemic, older adults may be at increased risk for continued and increased use of psychotropic drugs. In Ontario, nursing homes have reported increases in antidepressant, trazodone and antipsychotic use in the first few months of the COVID-19 pandemic compared to prior years, whereas benzodiazepine use stayed the same.³⁵ In an older adult population in Spain, increased use of anxiolytics during the COVID-19 pandemic has been associated with higher levels of anxiety, depression and acute stress.³⁶ Considering that the prescription of psychotropic medication among older adults is common, it is important to consider psychotropic medication as both a contributor to and consequence of psychological distress.

Psychological factors

Key psychological predictors of psychological distress in older adults include perceived loneliness,³⁷ insomnia,³⁸ and subjective memory impairment.³⁹ One study from the UK examining psychological distress, loneliness and disability in older adults reported that subjective loneliness was the single most important predictor of psychological distress in their sample.³⁷ During the pandemic, stay-at-home measures and strict confinement measures within care homes may have put older adults at increased risk of feeling isolated and lonely. Indeed, one study examining well-being in older adults in England reported significant increases in loneliness during the COVID-19 pandemic accompanied by clinically significant increases in depressive symptoms and deterioration in their quality of life.⁴⁰ Similarly, a US study found that lonelier older adults experienced more psychological distress during the COVID-19 pandemic and that those with lower SES, poor physical health and low resilience were more likely to be lonely.¹⁵ Furthermore, discomfort with technology among older adults during the pandemic can be an additional barrier to staying socially connected during the COVID-19 pandemic. One study found that even after stay-at-home orders were lifted during the pandemic, a subgroup of older adults reported sustained increased psychological distress associated with discomfort with technology that limited their ability to engage with their social network.⁴¹

Additionally, a National Institute on Aging study examining sleep disturbances in over 9000 elderly individuals reported that over 50% of older adults report some form of sleep complaint, including difficulty initiating or maintaining sleep and other insomnia symptoms.⁴² Stressful periods, such as the COVID-19 pandemic and imposed confinement measures, increase the risk for experiencing sleep disturbances,⁴³ putting older adults at an even higher risk for disrupted sleep and its negative consequences like increased distress. One study examining the relationship between COVID-19-related loneliness, COVID-19-related worries and sleep found that older adults with more COVID-19-related loneliness and worries had the most sleep problems during the pandemic.⁴⁴ Furthermore, a systematic review and meta-analysis reported that sleep problems during the COVID-19 pandemic were associated with psychological distress in numerous studied populations, with this association significantly higher among older individuals.⁴⁵

Subjective memory complaints also become more prevalent in aging populations. A review of community-based studies of older adults reported that the prevalence of memory complaints varies between 22 to 56%. A systematic review including cross-sectional and longitudinal data concluded that subjective memory complaints may be associated with mood changes, cognitive impairment, or future dementia and that it is difficult to disentangle these processes.³⁹ Perceived stress and depressive symptoms have also been associated with increased subjective memory complaints^{46,47} making the COVID-19 pandemic a potential risk factor for increased subjective memory complaints and subsequent distress. One study from Brazil reported that 30% of their adult sample reported subjective memory decline during the COVID-19 pandemic, and participating in physical activity reduced the likelihood of this subjective memory decline.⁴⁸ Similarly, one study from Italy in older adults reported that worsening subjective memory was associated with depressive symptoms and that regular exercise was associated with stable levels of subjective memory.⁴⁹

Considering the threat of the SARS-CoV-2 virus on health, particularly in older adults, it is important to consider how having the tendency to be excessively worried about being ill (i.e., health anxiety) affects levels of psychological distress during the COVID-19 pandemic. One study

conducted in Germany reported that individuals with greater trait health anxiety had more significant increases in SARS-CoV-2 virus-related anxiety over time than individuals with lower trait health anxiety, suggesting that higher trait anxiety is a risk factor for experiencing greater distress during a pandemic.⁵⁰ Similarly, whether or not an individual perceives the SARS-CoV-2 virus as dangerous if infected has implications for experienced distress. Studies from the US and Canada reported that beliefs about the threat of the SARS-CoV-2 virus to personal health were strong predictors of psychological distress and coping.^{16,51-53}

Lastly, the unpredictable, uncontrollable, disruptive, and disturbing effects of the COVID-19 pandemic can have resulted in high rates of peri- and post-traumatic stress symptoms reported by the general population.^{54,55} Reported PTSD-like reactions related to the COVID-19 pandemic occurred in relation to past, ongoing, and future pandemic events and also in response to both direct (i.e., COVID-19 diagnosis) or indirect (i.e., media) exposure to COVID-19.⁵⁴ In general, more PTSD symptomatology has been associated with higher daily psychological distress symptoms, namely depressive, anxiety, and somatic symptoms in community-dwelling older adults.⁵⁶ One study reported that continuous traumatic stress exposure, like the COVID-19 pandemic, was related to elevated levels of anxiety, depression and peri-traumatic stress symptoms during the pandemic.⁵⁷ Therefore, knowing whether individuals are experiencing PTSD-like symptoms related to the pandemic can help us better understand individuals' experience of psychological distress.

Altogether, it is important to consider how various psychological factors that may be exacerbated during the pandemic, that may be specific to the pandemic, and that may disproportionately affect older adults contributes to the experience of psychological distress in older adults during the COVID-19 pandemic.

Methods

Study Design and Participants

Using telephone-based interviews, four assessments were conducted over 13 months of the COVID-19 pandemic from May 6, 2020, to May 24, 2021 (Figure 1). At each assessment, participants completed standardized self-report measures. Participants were adults at least 60 years old who could speak French or English and had access to a phone. Participants were excluded if they presented with major cognitive impairments, as assessed by a cut-off score of 14 on the 16-item telephone version of the Mini-Mental Status Examination (T-MMSE).^{58,59}

Recruitment at Time 1 occurred from two older adult cohorts in Quebec: The *Centre de Recherche de l'Institut de Gériatrie de Montréal* (CRIUGM), a database of community-dwelling older adults who have voluntarily registered to be invited to participate in research projects related to aging, and *L'Étude sur la Santé des Aînés - Services* (ESA-Services), a sample of older adults living at home, waiting for medical services in primary health clinics across Quebec. At Time 2, 63 additional community-dwelling older adults were recruited through newspapers and radio ads.

A total of 1377 older adults from the CRIUGM, ESA-Services cohorts and ads were contacted to participate in the study. Of those contacted, 645 enrolled for a participation rate of 46.8%. In total, 582 participants (90.2%) completed Time 1, 493 participants (76.4%) completed Time 2, 512 participants (79.4%) completed Time 3 and 476 participants (73.8%) completed Time 4, with 338 participants (52.4%) who completed all four time points. Participants with a university-level education were more likely to complete two or more assessments ($\chi^2 = 5.42, df = 1, p = .02$). No other variables predicted attrition over time. This study was approved by the Centre intégré universitaire de santé et de services sociaux (CIUSSS) du Centre-Sud-de-l'Île-de-Montréal ethics review board. Oral consent was provided before starting the study.

Measures

The primary outcome was psychological distress, as measured by the 6-item Kessler Psychological Distress Scale (K6).⁶⁰ Items assessing the frequency of anxious and depressive symptoms in the past two weeks were rated on a 5-point Likert-type rating scale. Cronbach alphas ranged from .75 - .85 across different time points. Participants who scored 11 or higher on the K6 demonstrate moderate levels of psychological distress associated with impaired functioning that may require mental health services.⁶¹

Other psychological factors were assessed using standardized questionnaires. Insomnia symptoms were measured with the Insomnia Severity Index (ISI; score range: 0-28),⁶² perceived loneliness was assessed with the short-form of the UCLA loneliness scale (score range: 3-9),⁶³ subjective memory impairments were measured with the shortened version of the Questionnaire d'Auto-Évaluation de la Mémoire (QAM; score range: 1-6),⁶⁴ and health anxiety was assessed using the Illness Attitude Scale (IAS; score range: 0-12).^{65,66} An adapted version of the PTSD checklist (PCL; score range: 0-68)^{67,68} was used to measure acute stress symptoms specific to COVID-19 (see Appendix A). Cronbach alpha's for all scales ranged from .77 to .90. The participants' perceived threat of the SARS-CoV-2 virus was assessed with one Likert-type question evaluating the extent to which they believed the virus was dangerous for them if they became infected (score range: 1-5). Higher scores corresponded to greater perceived threat.

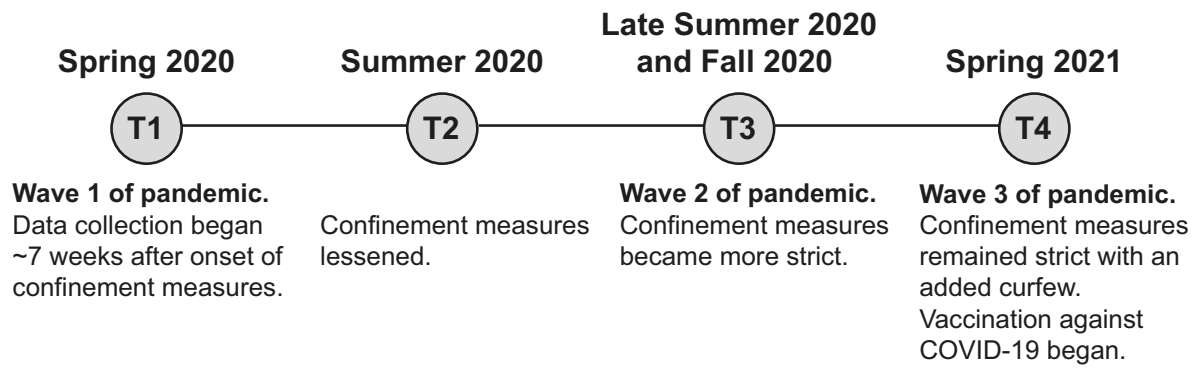


Figure 1. Timeline of data collection.

Four assessments were conducted over 13 months of the COVID-19 pandemic from May 6, 2020, to May 24, 2021. Each participant had at least one month between assessments.

Sociodemographic factors included age, self-reported gender, education, cohabitation status, poverty, and living in a retirement home. Living in poverty was considered as having an annual personal income of less than CAD 25,000.⁶⁹ Medical factors included whether participants reported having a history of mental and physical health problems in the past year. For history of mental health problems, individuals reported having experienced at least one of the following: depression, anxiety, alcohol or drug use, or other mental health problems requiring treatment. For physical health problems, individuals reported having experienced at least one of the following: hypertension or high blood pressure, cardiovascular problems, illness related to the lungs, kidneys, liver or immune system, cancer, diabetes, arthritis, gastrointestinal issues, migraines, chronic pain, or other physical problems requiring treatment. Participants were also asked whether they took psychotropic medications (e.g., antidepressants, anxiolytics, hypnotics) within the past seven days from when they completed their assessment. The level of mobility was measured with the EQ-5D (EuroQol-5D) mobility question assessing how difficult they found getting around on foot (score range: 1-5).⁷⁰ Higher scores reflected having more difficulty. Individuals' ability to use technology services was measured using one dichotomous question asking if they could use technology that allowed them to *see* others (e.g., via computer, tablet, or smartphone; response option: yes or no). Lastly, the health service measure was ascertained by having participants indicate whether they were hospitalized *or* visited the emergency room since the beginning of the pandemic and during the study follow-up period (response option: yes or no).

Statistical Modelling

Group-based trajectory modelling (GBTM) was used to model change in psychological distress over time and to identify distinct subgroups of older adults experiencing different patterns of change.^{71,72} In contrast to growth-curve modeling techniques, which account for individual variability relative to a single group mean, GBTM assumes that meaningful subgroups exist within a population.⁷¹ GBTM aims to reduce within-group variability so that intra-group individual trajectories converge around the same change trajectory while maximizing the variability between groups so that each group trajectory is empirically distinct. Identification of group trajectories of psychological distress was based on latent group-based trajectory modelling (LGTM),⁷² where each person is contained within a single subgroup across time points, as estimated by a maximum likelihood estimator. We examined solutions for 1 through 4 subgroups and examined linear and quadratic trajectories. Ultimately, we chose the three subgroup solution with a quadratic trajectory, based on a combination of statistical criteria (Akaike Information Criterion [AIC], Bayesian Information Criterion [BIC] and cross-validation error [CVE]), the distribution of group sizes, and stability of the different trajectory groups. Smaller AIC, BIC and CVE values indicate better model fit (Table 1).⁷³ To model the trajectories, we used all individuals ($N = 645$) as there was no difference in patterns of modelled trajectories when including those who completed assessment for at least one assessment versus those who completed assessments at all time points. All GBTM analyses were conducted using the 'crimCV' package in R.¹⁴⁷³ In addition to group-based trajectories, the average trajectory of all participants across time was examined using repeated-measure ANOVA.

Descriptive analyses of predictors in each trajectory group were conducted (Table 1). Omnibus univariate analyses of variance (ANOVA) and chi-square analyses were used to test statistical differences across groups for continuous and categorical variables, respectively. To examine the prospective effect of different predictors, Time 1 data was used to predict the

trajectory group. If data was missing in Time 1, then the next available time point was used. In a few circumstances, other approaches were used: for the measure of health anxiety, the mean was obtained across available time points (Time 2-3) as health anxiety is shown to be stable across time.⁷⁴ For health service use, psychotropic medication, and technology use, the variable represented whether they answered yes or no in at least one of the four time points. Analyses were conducted using the stats, moments, twowaytests and rstatix libraries in R, and SPSS.

Next, a multinomial logistic regression model was estimated to identify the sociodemographic, psychological, medical and COVID-19 related factors that independently predicted membership in each subgroup. This analysis estimates, for each predictor of interest, an odds ratio (OR) of belonging to a target group compared to a reference group, over and above the other predictors. Significance testing was performed to determine if factors significantly predicted group membership. $P < .05$ was defined as statistically significant. This analysis was conducted using the 'nnet' package in R.⁷⁵

Table 1. Statistical Criteria for Different Models

Number of Groups	Linear (1), Quadratic (2)	Akaïke Information Criterion (AIC)	Bayesian Information Criterion (BIC)	Cross-validation error (CVE)	Smallest number of participants in a single group
1	1	2693450.12	2693467.69	4278.12	--
1	2	2680815.28	2680838.70	4268.19	--
2	2	1375756.91	1375809.61	3641.54	--
3	1	1096788.27	1096852.68	3520.51	94
3	2	1083260.72	1083342.70	3460.67	94
4	1	970087.75	970175.58	3655.57	68
4	2	941130.77	941242.02	3367.73	68

Results

Participants and Average Change of Psychological Distress Across Time

The mean age of the study sample was 78.69 ($SD = 5.67$) years old. The sample was predominantly female (73.1%) and white (98.8%). Most had post-secondary education (68.3%), did not live in poverty (74.4%), lived alone (55.6%) and believed that the COVID-19 virus was a threat to their health (94.4%). Based on the T-MMSE, only 1.6% had moderate cognitive impairment. Almost all individuals reported a history of at least one physical health problem (98.4%), 12.4% reported a history of mental health problems, and 31.3% took psychotropic medications during the follow-up period. Regarding health services, 30.4% required emergency or inpatient care, or both, during the 13-month study follow-up. Repeated measures ANOVA showed that there was a statistically significant change in psychological distress across time ($F(1.30, 923.40) = 63.25, p < .001$). Post-hoc comparisons showed that psychological distress was stable from Time 1 to Time 3, but increased at Time 4.

Trajectories

According to the GBTM procedure, the best fitting model was characterized by three quadratic trajectories (Table 1; Figure 2). Group 1 represents a resilient group (50.5% of the sample) and is characterized by overall low psychological distress levels. Group 2 represents a reactive distress group (34.9% of the sample), displaying a curvilinear change in psychological distress characterized by an elevation in distress at Time 1 followed by a decrease in distress at Time 2 and 3 compared to Time 1, and an increase in distress at Time 4. Lastly, group 3 (14.6% of the sample) represents an elevated distress group, where distress levels were significantly higher at Time 1, increased consistently across the first three time points, and then stabilized.

Predictors of Trajectories

Table 1 presents the descriptive statistics of the different trajectory groups. In univariate analyses, sociodemographic and medical predictors of belonging to the high distress group included being female, living alone, living in retirement homes, having a history of mental health problems and taking psychotropic medications. Table 2 presents the multivariate logistic regression predicting membership to the elevated or reactive trajectory groups compared to the resilient reference group. Those with greater mobility issues, insomnia symptoms, perceived loneliness, health anxiety, and COVID-19 acute stress symptoms were more likely to be in the reactive and elevated groups than the resilient group. Moreover, individuals who could not use technology had even greater odds of membership in the elevated distress group than the reactive distress group. Those who lived in poverty and took psychotropic medication had uniquely increased odds of membership in the elevated distress group, while individuals with a history of mental health problems were more likely to be in the reactive group than the resilient group.

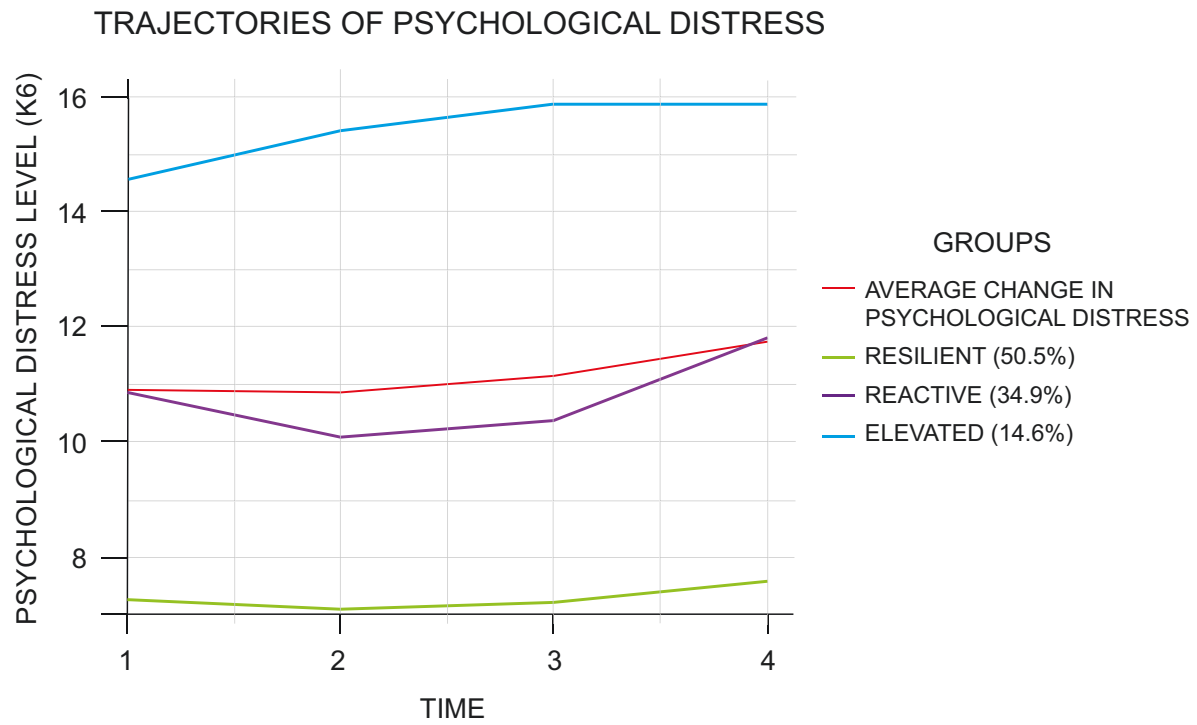


Figure 2. Trajectories of psychological distress.

Table 2. Descriptive statistics for trajectory groups

	Descriptive statistics for trajectories			Omnibus F/ χ^2 statistic
	Group 1 “resilient” N=326 <i>M</i> ± <i>SD</i> or (%)	Group 2 “reactive” N=225 <i>M</i> ± <i>SD</i> or (%)	Group 3 “elevated” N=94 <i>M</i> ± <i>SD</i> or (%)	
Sociodemographic				
Age	78.97±5.53 ^a	78.73±5.50 ^a	77.61±6.42 ^a	F = 2.00
Gender (Male)	33.44% ^a	22.85% ^b	13.48% ^b	$\chi^2 = 16.66$ ***
Education (Pre-university) ^d	56.21% ^a	50.72% ^a	55.17% ^a	$\chi^2 = 1.54$
Cohabitation (With others) ^e	51.44% ^a	40.57% ^b	29.35% ^b	$\chi^2 = 15.96$ ***
Poverty (Living in poverty)	23.32% ^a	20.65% ^a	44.58% ^b	$\chi^2 = 18.81$ ***
Retirement Home (Living in retirement home)	16.77% ^a	17.07% ^a	30.23% ^b	$\chi^2 = 8.60$ *
Medical Factors				
Mobility (EQ-5D) ^f	1.38±0.73 ^a	1.65±0.94 ^b	1.95±1.07 ^c	F = 16.98 ***
History of physical problems (Yes %) ^h	99.14% ^a	98.89% ^a	94.94% ^a	$\chi^2 = .031$ *
History of mental health problems (Yes %)	4.74% ^a	14.53% ^b	30.38% ^c	$\chi^2 = 36.67$ ***
Psychotropic medication (Yes %)	21.17% ^a	33.78% ^b	60.64% ^c	$\chi^2 = 53.83$ ***
Psychological factors				
Insomnia symptoms (ISI)	2.56±3.25 ^a	5.31±4.80 ^b	7.79±6.10 ^c	F = 60.43 ***
Loneliness symptoms (UCLA)	3.96±1.36 ^a	5.17±1.78 ^b	5.96±2.12 ^c	F = 66.46 ***
Subjective memory impairment (QAM)	1.66±0.58 ^a	1.99±0.60 ^b	2.14±0.80 ^c	F = 28.11 ***
Health anxiety (IAS)	2.07±2.04 ^a	4.15±2.34 ^b	5.73±2.90 ^c	F = 92.19 ***
COVID-19 related factor				
Perceived threat of SARS-CoV-2 virus ^{g,h}	3.35±1.13 ^a	3.54±1.67 ^a	3.67±1.07 ^a	F = 3.70 *
Acute stress symptoms (PCL)	4.51±4.40 ^a	9.93±6.74 ^b	18.30±11.74 ^c	F = 98.18 ***
Using technology to see others (Can't use %)	29.51% ^a	37.07% ^a	39.56% ^a	$\chi^2 = 4.85$
Health Service factor				
Utilization of emergency or hospitalization services (Yes %)	28.13% ^a	33.82% ^a	37.08% ^a	$\chi^2 = 5.68$

Note. * $P < .05$, ** $P < .01$, *** $P < .001$.

For categorical variables, percentages represent category in parentheses.

Different superscript letters a, b and c denote trajectory groups whose column proportions or means differ significantly from each other at the .05 level according to post-hoc analyses (bonferroni adjusted).

^dNone, primary, secondary, and college levels of education were grouped as “pre-university.”

^eCohabitation status was dichotomized as whether they lived alone or with others.

^fHigher mobility scores are indicative of worse mobility functioning.

^gHigher score are indicative of worse perceived threat

^hAlthough omnibus tests report statistically significant difference in group means, no post-hoc contrasts were statistically significant.

Table 3. Multivariate logistic regressions for trajectory groups

Predictor Variables	Multivariate Logistic Regression	
	Group 2 OR “reactive” [95% CI]	Group 3 OR “elevated” [95% CI]
<i>Sociodemographic</i>		
Gender (ref: Male)	1.25 [0.59, 1.91]	0.90 [0.23, 1.57]
Education (ref: Pre-university) ^a	1.19 [0.62, 1.76]	2.53 [0.85, 4.21]
Cohabitation (ref: With others) ^b	1.46 [0.74, 2.18]	0.90 [0.30, 1.50]
Poverty (ref: Not living in poverty)	0.70 [0.33, 1.07]	5.11 [1.46, 8.76] [*]
Retirement home (ref: Not living in retirement home)	1.07 [0.47, 1.67]	2.66 [0.83, 4.49]
<i>Medical Factors</i>		
Mobility (EQ-5D) ^c	1.85 [1.26, 2.44] ^{**}	2.01 [1.16, 2.86] ^{**}
History of physical problems (ref: 0-1) ^d		
2	1.35 [0.67, 2.03]	0.80 [0.22, 1.38]
3+	0.48 [0.21, 0.75]	0.43 [0.12, 0.74]
History of mental health problems (ref: No)	3.79 [1.21, 6.37] [*]	3.93 [0.93, 6.93]
Psychotropic medication (ref: No)	0.89 [0.46, 1.32]	3.80 [1.31, 6.29] [*]
<i>Psychological factors</i>		
Insomnia symptoms (ISI)	1.12 [1.04, 1.20] ^{**}	1.20 [1.07, 1.33] ^{**}
Subjective memory impairment (QAM)	1.58 [0.93, 2.23]	1.99 [0.87, 3.11]
Loneliness symptoms (UCLA)	1.48 [1.22, 1.74] ^{***}	1.65 [1.24, 2.06] ^{***}
Health anxiety (IAS)	1.47 [1.27, 1.67] ^{***}	1.76 [1.41, 2.11] ^{***}
<i>COVID-19 related factor</i>		
Perceived threat of SARS-CoV-2 virus ^e	0.86 [0.63, 1.09]	0.73 [0.44, 1.02]
Acute stress symptoms (PCL)	1.16 [1.08, 1.24] ^{***}	1.33 [1.21, 1.45] ^{***}
Able to use technology to see others (ref: Yes)	2.11 [1.08, 3.14] [*]	4.06 [1.42, 6.70] ^{**}
<i>Health Service factor</i>		
Utilization of emergency or hospitalization services (ref: No)	1.84 [0.94, 2.74]	1.62 [0.55, 2.69]

Note. ^{*} $P < .05$, ^{**} $P < .01$, ^{***} $P < .001$. Ref = reference group. Odds ratios were calculated relative to the resilient group.

^a Education was dichotomized as whether they attended university or not. None, primary, secondary, and college levels of education were grouped as “pre-university.”

^b Cohabitation status was dichotomized as whether they lived alone or with others.

^c Higher mobility scores are indicative of worse mobility functioning.

^d Groups were categorized into those who had a history of zero or one, two, or three or more physical illnesses to examine the impact of multimorbidity on distress.

^e Higher scores are indicative of worse perceived threat.

Discussion

This study examined trajectories of psychological distress, as measured by the K6, among older adults in Quebec, Canada, across four time points spanning three waves of the COVID-19 pandemic. Analyses revealed that the average distress was relatively stable across the first three time points (i.e., between Spring 2020 / Wave 1 and Fall 2020 / Wave 2), but increased in psychological distress at the last assessment (i.e., Spring 2021 / Wave 3). Furthermore, three distinct trajectories of psychological distress emerged, highlighting the heterogeneity in response to the COVID-19 pandemic among older adults. About half of the participants followed a low distress trajectory and were considered the resilient group. Two additional trajectories were identified: a reactive group with a curvilinear distress trajectory that wavered around clinical ranges, and an elevated group exhibiting sustained clinical levels of distress.

Past studies examining longitudinal trends of psychological distress in the general population during the COVID-19 pandemic reported an increase in distress symptoms in the first few weeks post-declaration of the pandemic, followed by a decrease in symptoms.⁵⁻⁸ In older adult populations, studies reported more stable levels across time, including a smaller increase in distress symptoms after the onset of the pandemic and less change in distress levels over time.^{5,8,76,77} Similarly, in the present sample the average longitudinal trend of psychological distress among older adults was stable across the first three time points spanning May to December 2020. However, this study reported that the average distress levels increased during the fourth assessment collected from February to May 2021 in the context of prolonged confinement measures and despite high vaccine uptake, providing insight into longer-term average changes in psychological distress that other studies have not yet captured.

In addition, the prevalence of older adults who experienced clinically significant distress throughout all time points was 14.6%, as indicated by an average score above the K6 clinical cut-off within the elevated trajectory group. This prevalence is similar to previous studies reporting that between 7.3 and 16.7% older individuals (55+ years old) experienced clinically significant levels of distress in the early months of the pandemic.^{5,8,76,78,79} Furthermore, the elevated distress reported by this group in the early months of the pandemic continued to rise across the following two time points, and were sustained in the fourth time point. This has significant implications as persistent distress increases the risk of psychiatric disorders during and after the pandemic.⁷⁶ Also, by Time 4, individuals from the reactive subgroup (34.9% of the sample), on average, endorsed levels of distress symptoms that crossed the K6 clinical threshold, indicating a potential need for mental health services and highlighting the increasing prevalence of clinically significant distress levels in the context of prolonged confinement and enduring COVID-19 related stressors.

In multivariate analyses, past history of mental health disorders predicted membership in the reactive group, while taking psychotropic medication within the past seven days uniquely predicted membership in the elevated distress group. In this study, 72.1% of individuals reporting one or more past mental health problems were also taking psychotropic medication (results not shown). These findings suggest that screening for a history of mental health disorders and recent medication of psychological symptoms can identify individuals at risk for experiencing elevated distress during the pandemic. This may be particularly important for those with a history of mental health disorders who are not taking psychotropic medication, as they are a vulnerable group who may not have current access to medical care.

Also, more severe symptoms of insomnia and perceived loneliness predicted membership in the reactive and elevated distress groups. These findings are consistent with other studies that associate increases in loneliness and poorer sleep quality with elevated distress and worse mental health in the early phases of the pandemic.^{13,80–83} Both increased health anxiety and COVID-19 related acute stress also emerged as predictors of membership in reactive and elevated distress groups. Health anxiety may be a specific factor contributing to increased distress considering the threat of the SARS-CoV-2 virus on health.⁸⁴ Furthermore, increased severity of COVID-19 related acute stress predicting psychological distress further highlights that traumatic stress symptoms related to the pandemic may fuel increased psychological distress. Implications of these findings are that mitigating psychological distress in older adults during the pandemic and beyond may include managing psychological symptoms through evidence-based psychotherapies for insomnia⁸⁵ and health anxiety,⁸⁶ as well as promoting healthy coping and stress management strategies like positive reframing, engaging in regular physical activity, practicing relaxation techniques, engaging with supportive listening lines and promoting social connection.^{6,87–89}

Furthermore, having reduced mobility increased the likelihood of membership in both reactive and elevated distress groups in our older adult sample. Lower mobility is linked to an increased dependence on others.⁹⁰ A collateral consequence of physical distancing measures is a reduction of help from others. Indeed, 71.2% of our sample reported having reduced support since the beginning of the pandemic, including reduced help from close others and services assisting with their medical needs (results not shown). Furthermore, lower mobility is associated with reduced social engagement⁹¹ and increased fear of falling.⁹² One study reported that lockdown measures during COVID-19 led to a decline in mobility and consequently increased psychological distress, especially among older adults. Interventions to improve or maintain mobility during confinement periods that include strength, balance and walking exercises⁹³ may be essential for this group. Similarly, the results highlight older adults unable to use visual technology were more likely to experience higher distress. Being unable to use visual technology to communicate with others leads to challenges maintaining social connections and accessing health services through virtual platforms. This finding highlights the importance of facilitating ways older adults can access technology and learn how to use it to increase social connectedness and access health services. Behavioural programs already exist that have shown an ability to increase long-term social connectedness and decrease depressive symptoms in older adults.⁹⁴ Lastly, living in poverty is uniquely associated with an increased likelihood of membership in the elevated distress, highlighting the impact of socioeconomic disparities in our sample of older adults experiencing clinical levels of distress.

Strengths and Limitations

The key strength of the present study is the longitudinal design spanning four time points across 13 months. However, some limitations are important to consider. First, these analyses were based on data primarily collected from a non-random sample of older adults from *CRIUGM* and *ESA-Services*, as well as self-selected older adults who responded to ads, leading to a sampling bias of individuals who are educated, white, self-identify as female, and have the availability and capacity to participate. Therefore, these findings may not be generalizable to different ethnic groups, genders, those from more disadvantaged sociodemographic backgrounds and older adults living in long-term care facilities. Furthermore, data collection for this study occurred seven weeks after the beginning of the pandemic; therefore, the acute increase in psychological distress at the

beginning of the pandemic, as seen in other studies,^{7,8,11} was not fully captured. Next, multiple studies have indicated that perception of the threat of the COVID-19 virus is associated with increased distress in adult samples;^{16,51–53} however, this association was not found in this study. One explanation is that the perceived threat of COVID-19 was measured using a single, non-validated item specific to how dangerous individuals believed the virus to be if they were infected. Alternatively, older adults may be a subgroup of the population where life experiences have made them more resilient to apparent community threats.

Conclusion

To the best of our knowledge, this study is the first to examine the long-term trajectories of psychological distress in older adults in Quebec, Canada. Overall, this study identified three distinct trajectories of psychological distress, including a group exhibiting chronically elevated levels of distress (14.6% prevalence) and a group exhibiting reactive levels of distress around severity levels that may require mental health services (34.9% prevalence). Predictors of elevated distress include taking psychotropic medication, experiencing symptoms of insomnia, health anxiety, and COVID-19 related acute stress, experiencing increased perceived loneliness, having reduced mobility, being unable to use technology to see others, and living in poverty. These factors can help identify at-risk individuals and provide insight into potential prevention and intervention strategies to mitigate distress. Longitudinal designs are needed to continue to track the evolution of psychological distress as the pandemic unfolds.

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Appendix A

The adapted PTSD Checklist (PCL) measuring acute stress symptoms specific to COVID-19:

In the past two weeks, how often did you experience...

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing memories, thoughts, or images of the virus COVID-19 situation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Repeated, disturbing dreams of the virus COVID-19 situation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Suddenly acting or feeling as if part of the situation related to the virus COVID-19 was happening again (as if you were reliving it)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Feeling very upset when something reminded you of the virus COVID-19 situation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Having physical reactions (e.g., heart pounding, trouble breathing, sweating) when something reminded you of the virus COVID-19 situation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Avoiding thinking about or talking about the virus COVID-19 situation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Avoiding activities or situations because they reminded you of the virus COVID-19 situation?.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Trouble remembering important parts of the virus COVID-19 situation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Loss of interest in activities that you used to enjoy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Feeling distant or cut off from other people?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Feeling emotionally numb or being unable to have loving feelings for those close to you?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Feeling as if your future will somehow be cut short?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Trouble falling or staying asleep?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Feeling irritable or having angry outbursts?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Having difficulty concentrating?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Being “super-alert” or watchful or on guard?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Feeling jumpy or easily startled?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>