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Prevalence of anxiety and associated psychological factors in French-Canadian adolescents before, during and later in the COVID-19 pandemic

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Abstract

Mental health professionals and researchers worldwide are concerned about the impact of the pandemic on mental health, particularly that of adolescents who have been identified as a vulnerable subpopulation. This study was therefore interested in comparing the prevalence of anxiety and associated psychological factors in French-Canadian adolescents before the pandemic, in its early phase and late in the pandemic. Three independent cohorts were recruited at three time points, one before the pandemic (2019), one early in the pandemic (2020) and one later in the pandemic (2022). The full sample included 3963 French-Canadian adolescents ($M_{age} = 12.55$ years, 50.6% girls). They were invited to complete questionnaires targeting their anxiety and associated psychological factors (depressive symptoms, intolerance to uncertainty, cognitive avoidance, negative attitudes when faced with problems, self-esteem, self-efficacy, impact of anxiety on academic, social, and family activities). Their answers were analysed with multivariate analysis of variance. Results showed that several types of anxiety (panic symptoms, separation anxiety, social anxiety) did not differ between pre-pandemic and early-pandemic cohorts, but were lower in the late-pandemic cohort, whereas generalized anxiety was higher in the early-pandemic cohort and lower in the late-pandemic cohort. Moreover, self-esteem, self-efficacy and negative attitude towards problems were worse in the late-pandemic cohort compared with pre-pandemic and early-pandemic cohorts. Depressive symptoms were higher in the early-pandemic cohort compared to pre-pandemic and late-pandemic cohorts. Our study suggests that overall, the pandemic did not have longer-term negative effects on anxiety symptomatology, highlighting the importance of documenting the evolution of anxiety throughout the pandemic.

Introduction

During the COVID-19 pandemic, mainly between March 2020 and July 2021, the government placed sanitary measures such as social distancing to reduce the risk of virus transmission, leading to drastic changes in adolescents' daily lives¹. Schools were closed for months, extracurricular activities were cancelled and social gatherings with friends and extended family were not permitted. Many youths reported facing family financial hardship, troubled educational development, loneliness and social disconnection, and loss of important life moments¹. Thus, the accumulation of external stressors with the typical stress associated with adolescence, such

as the development of autonomy as well as the increased intensity of emotional experiences and social sensitivity², placed this age group at greater risk of experiencing mental health problems such as anxiety during the pandemic, especially since mental health problems were already in the rise in the adolescent population prior to the pandemic³.

Compared to pre-pandemic data, most studies found an increase in youth anxiety after the pandemic^{4,5}. An Indian cross-sectional study comparing self-reported anxiety symptoms between a pre-pandemic cohort in early 2020 and a post-pandemic cohort in mid-2021 found that anxiety increased during the pandemic⁴. In addition, results from a systematic review and meta-analysis also suggest that anxiety increased slightly during the pandemic⁶. However, some studies found that anxiety did not increase during the pandemic compared to pre-pandemic levels^{7,8}. A Canadian study including 5368 adolescents from Quebec, Ontario, and British Columbia compared the evolution of depression and anxiety between two cohorts⁹; both cohorts' first (2018-19) and third (2020-21) time points were identical; however, one cohort had a second time point before the pandemic (T2a = September 2019 to February 2020) whereas the other had a second time point after the start of the pandemic (T2b = May to June 2020). Both cohorts experienced an increase in depression and anxiety symptoms over time and did not differ at T2. Their results suggest that symptoms increased due to aging in both cohorts and do not support an adverse effect of the pandemic on mental health⁹.

A prior study conducted by our research group compared different subtypes of adolescent anxiety across pre-pandemic (2019) and early-pandemic (2020) cohorts¹⁰, enabling a more nuanced characterization of anxiety-related differences over time. It expanded on a pre-planned evaluation of an anxiety prevention of anxiety delivered to young adolescents in Quebec High Schools. To capture more broadly the pandemic's impact on anxiety symptomology, the study included several psychological factors that play a central role in the development of anxiety, such as intolerance to uncertainty and self-efficacy, as well as depressive symptoms, that were measured as part of the evaluation protocol. Overall, most symptoms related to anxiety did not differ between the pre-pandemic and pandemic cohorts, except for generalized anxiety, test-related anxiety, and the impact of anxiety on young people's lives which increased during the pandemic¹⁰. Measuring different subtypes of anxiety as well as many associated variables provided a nuanced portrait of changes to mental health during the pandemic.

Research on the progression of adolescent anxiety throughout the later stages of the pandemic is scarce. A study found that anxiety increased early in the pandemic and remained high in 2022¹¹. Kiviruusu et al. (2023) also

found that in a cross-sectional population-based study with Finnish adolescents aged 13 to 20, both generalized and social anxiety subtypes were higher early in the pandemic (2021) and after the pandemic (2023) compared to before the pandemic. It remains unclear whether the pandemic will have long-term consequences on adolescent mental anxiety.

The present study builds on previous work¹⁰ and attempts to better estimate the effect of the pandemic on the prevalence of anxiety symptoms and associated psychological factors (depressive symptoms, intolerance to uncertainty, cognitive avoidance, negative attitudes when faced with problems, self-esteem, self-efficacy as well as the impact of anxiety on academic, social, and family activities) later in the pandemic based on data collected at a third time point in 2022.

Methodology

This study relied on data collected as part of the evaluation of the HORS-PISTE program - Exploration component designed and implemented by the *RBC Center for Academic Expertise in Mental Health* (Université de Sherbrooke). The evaluation protocol includes a series of standardized questionnaires (French versions) measuring anxiety symptoms and associated psychological factors administered before and after program participation in schools offering the program and at coinciding times in schools that do not offer the program. The data used for this study was collected from three independent samples school years in October to December 2019, 2021, and 2022. The current sample differs from the sample in our previous study¹⁰ as some previously used questionnaires (e.g. perfectionism) were dropped in the 2022 protocol.

Participants and procedures

Participants were 3963 French Canadian students in grade 7 and grade 8 attending 12 schools located in 3 rural regions of Quebec, namely Estrie, Montérégie, and Mauricie-Centre-du-Québec. They were recruited over three successive cohorts. The first cohort (prepandemic; $n_1 = 1,571$; 49.8% female, 50.2% male; $M_{age} = 12.66$) was recruited before the pandemic between October and December 2019 in 12 high schools. The second cohort (early-pandemic; $n_2 = 1,375$; 50.0% female, 50.0% male; $M_{age} = 12.59$ years) was recruited at the beginning of the pandemic between October and December 2020 in 11 high schools. The third cohort (late-pandemic; $n_3 = 1,017$ students; 51.9% female, 48.1% male; $M_{age} = 12.39$ years) was recruited later during the pandemic, after sanitary measures were abolished, between October and December 2022 in 8 high schools. Most students (86.6%) reported that their parents were born in Canada, suggesting that a minority of participants are first-or second-generation immigrants. Data were collected with either paper or online

questionnaires that was administered in the classroom setting by the teacher or a trained staff member. A total of six questionnaires were administered measuring anxiety, depressive symptoms, cognitions related to generalized anxiety, self-esteem, self-efficacy and the interference of anxiety with activities.

Measures

Anxiety symptoms

In 2019 and 2020, anxiety symptoms associated with various disorders (panic disorder, generalized anxiety disorder, separation anxiety disorder, social anxiety disorder) were measured using the French version of the *Screen for Child Anxiety Related Disorders Revised* questionnaire (SCARED-R-51^{12,13}). The 34 items (“I worry about other people liking me”) are scored on a 3-point Likert scale (0 =Never or almost never to 2= a lot). In 2022, another version of the questionnaire was used (SCARED-41¹⁴). This version has 41 items also scored on a 3-point Likert scale (0 =Never or almost never to 2= a lot). In this study, the Cronbach’s alphas obtained indicate acceptable internal consistency (panic disorder: $\alpha = 0.84$ (2019)/0.82 (2020)/ $\alpha = 0.83$ (2022); generalized anxiety disorder: $\alpha = 0.84$ (2019)/0.82 (2020) /0.83 (2022); separation anxiety disorder: $\alpha = 0.68$ (2019)/0.68 (2020)/0.70 (2022); social anxiety disorder: $\alpha = 0.78$ (2019)/0.82 (2020) /0.82 (2022)).

Impact of anxiety on the lives of adolescents

The *Child/Adolescent Anxiety Impact Scale*¹⁵ is used to measure the impact of anxiety symptoms on three major dimensions of a child’s or adolescent’s activities (school, social as well as family and home activities). The 26 items were scored using a 3-point Likert scale (0 = not at all to 3= a lot) where adolescents were asked to rate whether their anxiety symptoms in the past month made it hard to accomplish an activity (“Getting to school on time”). In this study, the Cronbach’s alpha obtained indicated excellent internal consistency ($\alpha = 0.86$ to 0.88 (2019)/ 0.86 to 0.90 (2020) / $\alpha = 0.86$ to 0.88 (2022)).

Self-esteem

The French version of the *Rosenberg Self-Esteem Scale*¹⁶ was used to measure adolescent’s perception of their own value. The questionnaire includes 10 items (“On the whole, I am satisfied with myself”) scored on a 4-point Likert scale (1 = strongly disagree to 4= strongly agree). In this study, the Cronbach’s alpha obtained for this tool indicated excellent internal validity ($\alpha = 0.89$ (2019)/0.89 (2020) / $\alpha = 0.90$ (2022))

Self-efficacy

The *Self-Efficacy Questionnaire for Children*¹⁷ was administered to measure adolescents’ social and emotional

self-efficacy. Both subscales were pooled together to provide a total self-efficacy score since they were strongly correlated. The 16 items were scored on a 5-point Likert scale (1 = not at all, 5= very well) where participants were asked to rate their perceived ability to perform a behavior or task (“How well can you have a chat with an unfamiliar person”). In this study, the Cronbach’s alpha obtained excellent internal consistency ($\alpha = 0.89$ (2019)/ $\alpha = 0.83$ (2020)/ $\alpha = 0.90$ (2022)).

Intolerance to uncertainty, negative attitude when faced with problems, and cognitive avoidance

The *Cognitions reliées à l’anxiété généralisée pour enfants questionnaire*¹⁸ was used to measure intolerance to uncertainty, negative attitude when faced with problems and cognitive avoidance. The 16-item (“When something scares me, I force myself to think about happy things”) questionnaire was scored using a 3-point Likert scale ranging from 1 (not at all) to 3 (a lot). In this study, the Cronbach’s alpha obtained indicated adequate internal consistency ($\alpha = 0.66$ to 0.82 (2019)/0.69 to 0.83 (2020) / $\alpha = 0.69$ to 0.81 (2022)).

Depressive symptoms

The French version of the *Children’s Depression Inventory*¹⁹ was used to measure depressive symptoms. This tool is comprised of 10 items (“Things bother me once in a while”). Participants must choose one of three statements that most accurately describes their situation in the previous two weeks. In this study, the Cronbach’s alpha obtained indicated excellent internal consistency ($\alpha = 0.84$ (2019)/0.82 (2020) / $\alpha = 0.83$ (2022)).

Data analysis

All statistical analyses were performed using IBM’s SPSS (Statistical Package for Social Sciences) software v.25 (2017). Descriptive statistics were calculated for all variables of interest of all cohorts. A multivariate analysis of variance (MANOVA) was performed to examine differences between cohorts and genders on all variables of interest. Thirteen variables were included in the analysis: self-efficacy, self-esteem, intolerance to uncertainty, negative attitude when faced with problems, cognitive avoidance, depressive symptoms, impact of anxiety on academic activities, impact of anxiety on home and family functioning, impact of anxiety on social activities, panic symptoms, generalized anxiety, separation anxiety and social anxiety. The score used for each variable was the mean score per item. Year of data collection and gender were included as main effects and year*gender as an interaction effect to examine the moderating effect of gender on the differences observed between cohorts. One-way ANOVAs were performed if the main effects or interactions were significant ($p < 0.05$). When a main effect of Year was observed, pairwise

comparisons were also performed to further understand between-cohort differences. The Wilks' lambda test was used to confirm that significant differences were observed between the group.

Results

Descriptive results for all variables are presented in Table 1. Subsequent univariate ANOVA results are depicted in Table 2. The MANOVA uncovered a significant main effect of gender ($F(26.342) = 54.74, p < 0.001; \eta^2 = 0.17$) and of year ($F(26.685) = 18.70; p < 0.001; \eta^2 = 0.07$). The gender*year interaction was not significant ($p > 0.05$)

Table 1: Descriptive statistics for dependent variables by year and gender

Variable	Year	Boys		Girls		Total	
		M	SD	M	SD	M	SD
Panic symptoms	2019	0.19	0.31	0.42	0.46	0.31	0.41
	2020	0.17	0.28	0.42	0.46	0.30	0.40
	2022	0.17	0.28	0.46	0.46	0.31	0.40
Generalized anxiety	2019	0.65	0.48	1.02	0.51	0.84	0.53
	2020	0.72	0.46	1.04	0.53	0.88	0.52
	2022	0.50	0.42	0.94	0.55	0.71	0.54
Separation anxiety	2019	0.43	0.32	0.59	0.36	0.51	0.35
	2020	0.44	0.29	0.60	0.40	0.52	0.36
	2022	0.35	0.30	0.53	0.39	0.44	0.36
Social anxiety	2019	0.79	0.53	0.95	0.54	0.87	0.54
	2020	0.82	0.53	0.97	0.59	0.90	0.57
	2022	0.66	0.54	0.90	0.59	0.78	0.57
Impact of anxiety on academic activities	2019	0.82	0.72	0.88	0.65	0.86	0.69
	2020	0.89	0.78	0.93	0.67	0.91	0.72
	2022	0.74	0.69	0.87	0.59	0.80	0.65
Impact of anxiety on social activities	2019	0.67	0.62	0.75	0.60	0.71	0.61
	2020	0.74	0.64	0.78	0.60	0.76	0.62
	2022	0.63	0.60	0.81	0.61	0.72	0.61
Impact of anxiety on daily and family activities	2019	0.68	0.79	0.68	0.75	0.68	0.77
	2020	0.80	0.86	0.70	0.72	0.75	0.80
	2022	0.59	0.78	0.57	0.65	0.58	0.72
Self-esteem	2019	3.20	0.59	2.93	0.65	3.06	0.64
	2020	3.21	0.57	2.95	0.69	3.07	0.64
	2022	3.15	0.59	2.75	0.71	2.95	0.68
Self-efficacy	2019	3.59	0.77	3.34	0.66	3.46	0.73
	2020	3.61	0.63	3.42	0.63	3.51	0.64
	2022	3.43	0.77	3.02	0.73	3.23	0.77
Intolerance to uncertainty	2019	1.72	0.49	1.85	0.50	1.78	0.50
	2020	1.72	0.48	1.87	0.54	1.79	0.52
	2022	1.67	0.48	1.88	0.53	1.77	0.52
Negative attitude when faced with problems	2019	1.66	0.52	1.84	0.51	1.75	0.52
	2020	1.67	0.51	1.84	0.54	1.76	0.53
	2022	1.68	0.51	1.93	0.55	1.80	0.55
Cognitive avoidance	2019	1.79	0.49	2.01	0.46	1.90	0.49
	2020	1.80	0.49	1.99	0.46	1.90	0.48
	2022	1.81	0.45	2.02	0.45	1.91	0.46
Depressive symptoms	2019	0.34	0.31	0.52	0.41	0.43	0.38
	2020	0.32	0.29	0.47	0.36	0.40	0.33
	2022	0.33	0.29	0.59	0.40	0.46	0.37

indicating that differences observed between cohorts did not vary according to gender. Results from subsequent univariate ANOVAs are detailed below.

Differences in anxiety symptoms

The 2019, 2020 and 2022 cohorts differed on several variables, such as generalized anxiety ($F(2,344) = 28.57, p < 0.001; \eta^2 = 0.02$), separation anxiety ($F(2,344) = 15.38, p < 0.001; \eta^2 = 0.01$) and social anxiety ($F(2,344) = 13.33, p < 0.001; \eta^2 = 0.01$). Panic symptoms were not significantly different between cohorts across time ($p > 0.05$).

Post-hoc analyses revealed similar trends in generalized anxiety, separation anxiety and social anxiety, where anxiety was significantly lower in the 2022 (separation anxiety: $M = 0.44, SD = 0.36$; social anxiety: $M = 0.78, SD = 0.57$; generalized anxiety: $M = 0.71, SD = 0.54$) cohort compared to the 2019 (separation anxiety: $M = 0.51, SD = 0.35$; social anxiety: $M = 0.87, SD = 0.54$; generalized anxiety: $M = 0.84, SD = 0.53$) and 2020 (separation anxiety: $M = 0.52, SD = 0.36$; social anxiety: $M = 0.90, SD = 0.57$; generalized anxiety: $M = 0.88, SD = 0.52$) cohorts. Generalized anxiety was also significantly higher for the 2020 cohort compared to the 2019 cohort. Effect sizes ranged from very small to small ($\eta^2 = 0.008$ to 0.016).

Differences in the impact of anxiety

Cohorts differed as a function of year on the impact of anxiety on academic activities ($F(2,344) = 6.62, p < 0.001; \eta^2 = 0.00$) and on home and family activities ($F(2,344) = 12.67, p < 0.007; \eta^2 = 0.01$) but not on social activities ($p > 0.05$) as indicated by univariate ANOVAs.

A lower impact of anxiety with academic activities was reported in the 2019 ($M = 0.86, SD = 0.69$) and 2022 ($M = 0.80, SD = 0.65$) cohorts compared to the 2020 ($M = 0.91, SD = 0.72$) cohort. The impact of anxiety with home and family activities was also lower in the 2019 ($M = 0.68, SD = 0.77$) and 2022 ($M = 0.58, SD = 0.72$) cohorts compared to the 2020 ($M = 0.75, SD = 0.80$) cohort, but the impact was lower in the 2022 cohort than in the 2019 cohort. Effect sizes ranged were very small ($\eta^2 = 0.00$ to 0.01).

Differences in variables associated with anxiety

Univariate ANOVAs indicated that the 2019, 2020 and 2022 cohorts differed on several variables associated with anxiety, such as depressive mood ($F(2,344) = 8.13, p < 0.001; \eta^2 = 0.01$), self-esteem ($F(2,344) = 12.86, p < 0.001; \eta^2 = 0.01$), negative attitude when faced with problems ($F(2,344) = 4.04, p = 0.018; \eta^2 = 0.00$) and self-efficacy ($F(2,344) = 49.84, p < 0.001; \eta^2 = 0.01$). However, cohorts did not differ ($p > 0.05$) on measures of intolerance to uncertainty and cognitive avoidance, suggesting that these variables were similar between cohorts.

Table 2: Univariate ANOVA results

Variable	Gender			Year			Post-hocs for year
	F	sig	η^2	F	sig	η^2	
Panic symptoms	378.79	<0.001	0.099	0.822	0.440	0.000	-
Generalized anxiety	496.23	<0.001	0.126	28.574	<0.001	0.016	2022 < 2019***. 2020*** 2020 > 2019*
Separation anxiety	196.61	<0.001	0.054	15.379	< 0.001	0.009	2022 < 2019***. 2020***
Social anxiety	92.60	<0.001	0.026	13.329	< 0.001	0.008	2022 < 2019***. 2020***
Impact of anxiety on daily and family activities	139.46	<0.001	0.039	12.668	< 0.001	0.007	2020 > 2019*. 2022*** 2022 < 2019**
Impact of anxiety on academic activities	20.07	<0.001	0.006	6.616	0.118	0.004	2020 > 2019*. 2022***
Impact of anxiety on social activities	2.17	0.140	0.001	2.135	< 0.001	0.001	-
Self-esteem	157.06	<0.001	0.044	12.856	0.550	0.007	2022 < 2019*. 2020*
Self-efficacy	10.69	0.001	0.003	49.839	0.001	0.028	2022 < 2019*. 2020*
Intolerance to uncertainty	198.78	<0.001	0.055	0.333	< 0.001	0.000	-
Cognitive avoidance	90.89	<0.001	0.026	0.598	0.716	0.000	-
Negative attitude when faced with problems	121.92	<0.001	0.034	4.044	0.018	0.002	2022 > 2019*
Depressive symptoms	274.58	<0.001	0.074	8.126	< 0.001	0.005	2020 < 2019*. 2022***

a *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Post-hocs revealed similar trends for self-esteem and self-efficacy, where scores were significantly lower for the 2022 (self-esteem: $M = 2.95$, $SD = 0.68$; self-efficacy: $M = 3.23$, $SD = 0.77$) cohort compared to the 2019 (self-esteem: $M = 3.06$, $SD = 0.64$; self-efficacy: $M = 3.46$, $SD = 0.73$) and 2020 (self-esteem: $M = 3.07$, $SD = 0.64$; self-efficacy: $M = 3.51$, $SD = 0.64$) cohorts. Negative attitude when faced with problems was higher in the 2022 cohort ($M = 1.80$, $SD = 0.55$) compared to the 2019 cohort ($M = 1.75$, $SD = 0.52$). In contrast, depressive symptoms did not differ between 2022 ($M = 0.46$, $SD = 0.37$) and 2019 cohorts ($M = 0.43$, $SD = 0.38$); however, it was lower in 2020 ($M = 0.40$, $SD = 0.33$) compared to 2019 and 2022 cohorts. Effect sizes were very small ($\eta^2 = 0.00$ to 0.001).

Gender differences

Univariate ANOVAs showed significant main effects of gender on all anxiety and associated variables, except the impact of anxiety on social activities ($p > 0.05$).

Girls scored higher than boys on all symptom scales, including panic symptoms ($F(1,344) = 378.79$, $p < 0.001$; $\eta^2 = 0.10$), generalized anxiety ($F(1,344) = 496.23$, $p < 0.001$; $\eta^2 = 0.13$), separation anxiety ($F(1,344) = 196.61$, $p < 0.001$; $\eta^2 = 0.13$), social anxiety ($F(1,344) = 92.60$, $p < 0.001$; $\eta^2 = 0.03$), depressive symptoms ($F(1,344) = 274.58$, $p < 0.001$; $\eta^2 = 0.07$) as well as on intolerance to uncertainty ($F(1,344) = 90.89$, $p < 0.001$; $\eta^2 = 0.03$), negative attitude toward problems ($F(1,344) = 121.92$, $p < 0.001$; $\eta^2 = 0.03$), cognitive avoidance ($F(1,344) = 157.06$, $p < 0.001$; $\eta^2 = 0.04$), impact of anxiety on school activities ($F(1,344) = 10.69$, $p < 0.001$; $\eta^2 = 0.00$) and impact of school on social activities ($F(1,344) = 20.07$, $p < 0.001$; $\eta^2 = 0.01$). However, boys scored significantly higher than girls on self-esteem ($F(1,344) = 198.78$, $p < 0.001$; $\eta^2 = 0.06$)

and self-efficacy ($F(1,344) = 139.46$, $p < 0.001$; $\eta^2 = 0.04$). Effect sizes ranged from very small to medium ($\eta^2 = 0.00$ to 0.13).

Discussion

The aim of this study was to better estimate changes in the prevalence of subtypes of anxiety and associated psychological factors in French-Canadian adolescents as the pandemic progressed by comparing data collected before the pandemic, during the pandemic, and late-pandemic, after the sanitary measures were lifted, in three samples of adolescents.

Separation anxiety, social anxiety, and panic symptoms did not differ between the pre-pandemic cohort and the early-pandemic cohort, whereas generalized anxiety was higher in the early-pandemic cohort. These findings diverge from the results of a meta-analysis that found a slight increase in anxiety levels during the early stages of the pandemic⁶. However, most studies rely on self-report questionnaires assessing generic anxiety symptomology or generalized anxiety, likely providing a better estimate of generalized anxiety. This supports our finding that generalized anxiety was worse in the early-pandemic cohort. In contrast, few studies investigated the pandemic's impact on social anxiety, separation anxiety or panic symptoms. Our findings are aligned with one such study that reported no change in the prevalence of social anxiety early in the pandemic²⁰. It is plausible that adolescents worried more early in the pandemic as a result of the many changes to their lives and new stressors faced, such as troubled educational development, loneliness and social disconnection, physical inactivity and loss of important life moments¹. Generalized anxiety symptoms may therefore have been a temporary response to the novel and stressful

context caused by the pandemic whereas social anxiety, separation anxiety or panic symptoms may not have been as strongly impacted.

Separation anxiety, generalized anxiety and social anxiety symptoms were lower in the late-pandemic cohort compared to pre-pandemic and early-pandemic cohorts. These findings contrast with the little available research on the progression of anxiety in later stages of the pandemic, which found that anxiety and social anxiety remained high^{11,21}. In Quebec (Canada), there was a province-wide social mobilization stemming initiatives like the provincial Interministerial Action Plan on Mental Health (2022-2026) that aimed to finance school and community activities and trainings to promote youth mental health. A Canadian study found that involvement of public health institutions with high school following the start of the pandemic led to a decrease in anxiety²². Students in the late-pandemic cohort receiving such interventions may have led to a decrease in anxiety symptoms. However, these findings must be interpreted with caution as a different version of the questionnaire was used to measure anxiety in the late-pandemic cohort.

The impact of anxiety on social activities remained unchanged at the three time points. In contrast, the impact of anxiety on academic activities was higher in the early-pandemic cohort compared to the pre-pandemic and late-pandemic cohorts, who did not differ. The impact of anxiety on home and family activities was also higher in the early-pandemic cohort; however, it was lower in the late-pandemic cohort compared to the pre-pandemic cohort. There is a notable discrepancy between objectively measured anxiety symptoms and the subjective appraisal of anxiety's impact on functioning. Since some studies found that quality of life worsened during the pandemic^{23,24}, the impact of the pandemic on adolescents' lives may have confounded their perception of anxiety's impact on their functioning. In the case of the impact of anxiety on social activities, adolescents may have more easily attributed the disruption of social activities to the pandemic instead of anxiety.

This new context may have also had a lasting impact on adolescents' sense of worth and competence, as both self-esteem and self-efficacy did not differ in pre-pandemic and early-pandemic cohorts, but was lower in the late-pandemic cohort. Negative attitude when faced with problems followed a similar evolution. These results are consistent with two studies that found that self-esteem was worse in 2022²⁵ and in 2023²⁶ compared to pre-pandemic samples. Confinement as well as the suspension of school activities and sports may have prevented adolescents from facing new activities and challenges. Thus, the resumption of activities in 2022 may have been challenging for them, hindering their sense of self-efficacy and self-worth. Living

through uncertain and stressful events may also have altered adolescents' attitude when faced with problems. In contrast, the depressive mood had a unique trajectory, as it was lower in the early-pandemic cohort compared to the pre-pandemic and late-pandemic cohorts. These results contrast with some studies that found that depressive symptoms increased early in the pandemic^{20,27}. However, as most studies used longitudinal data, it is possible that the measured increase in depressive symptoms was due to aging and not to pandemic effects whereas the current study measured anxiety in same-aged youth at three points in time. One study found that the increase in depressive symptoms from 2019 to spring 2020 in the pandemic was half the increase in depressive symptoms from 2018 to 2019²⁸. Moreover, another study found that depressive symptoms were lower in countries where the government, like Canada, rapidly implemented public health policies²⁹. They argued that swift policies may have mitigated the impact of the pandemic on depressive symptoms by increasing certainty and resilience against uncertainty. The absence of differences in intolerance to uncertainty across cohorts also supports this hypothesis. It is also possible that changes in lifestyle at the start of the pandemic led to a temporary decrease in depressive symptoms as many youths reported engaging in hobbies, socializing, or exercising to cope during the pandemic³⁰. In contrast, cognitive avoidance remained similar across cohorts, suggesting that the use of this maladaptive coping strategy may be relatively resistant to external disruptions such as the pandemic.

Our study found that girls in all cohorts had higher symptomatology on all mental health indicators, indicating that they systematically reported being worse off than boys. These results are consistent with substantial evidence documenting this gender gap in mental health world-wide before the pandemic³¹ as well as post-post-pandemic^{32,33}.

Strengths, Limitations and Implications

Some limitations must be considered when interpreting the data. It is possible that the results reflect differences inherently present between cohorts; however, since the data is cross-sectional and not longitudinal, results cannot be attributable to aging effects, as anxiety tends to increase across adolescence^{9,20}. The measure of anxiety also has a different number of items in the late-pandemic cohort. While most questions are identical, slight differences could be a source of bias. In addition, as the sample consists only of young adolescents, the results are not generalizable to the overall adolescent population. However, our results provide a more focused overview of young adolescents' mental health, which is rarely the subject of such studies. Data were also collected using self-reported data, which may not reflect an objective portrayal of the participant's symptoms. However, a measure of the interference of

anxiety on adolescent's lives was included, which supports the interpretation of self-reported anxiety.

Future Directions

This study is one of the first to document the long-term progression of anxiety symptoms and associated variables in adolescent cohorts after the sanitary measures to limit the spread of COVID-19 were lifted. Our results suggest that overall, the pandemic did not have longer-term negative effects on all measured subtypes anxiety (i.e. separation anxiety, generalized anxiety, social anxiety, panic symptoms), which might have improved later in the pandemic (except panic symptoms, which remained the same). Some studies have found that living through periods of stress and hardship can increase resilience³⁴ and even lead to positive effects³⁵. It is possible that interventions put in place in Quebec contributed to the resilience of youth and that our results indicate the success of such interventions, such as the HORS-PISTE program aiming to prevent anxiety in youth of all ages. More studies should aim to capture positive outcomes of stressful events such as the COVID-19 pandemic. Moreover, anxiety symptoms related to different types of disorders (i.e. separation anxiety, generalized anxiety, social anxiety, panic disorder) showed different patterns of change between cohorts. Thus, different subtypes of anxiety should be assessed separately to capture such differences.

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical Approval and Informed Consent

This study was approved by the Sherbrooke University Education and Social Sciences Ethics Committee (#2017-1586). Informed consent was obtained from all individual participants included in the study or from their legal guardians.

Data Availability

Data is conserved by the *Centre RBC d'expertise universitaire en santé mentale*.

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