Vulnerability Factors Associated with College Adjustment Trajectories during the First Wave of the COVID-19 Pandemic

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Received: August 10, 2024 Accepted: September 14, 2024 Online Published: September 26, 2024

doi:10.5430/ijhe.v13n5p1 URL: https://doi.org/10.5430/ijhe.v13n5p1

Abstract

The COVID-19 pandemic has overturned the lives of students in higher education. In this quantitative longitudinal study, we examine trajectories of college adjustment (in terms of academic and social functioning) and associated personal vulnerability factors during the first wave of the pandemic. Ten Quebec colleges invited all their newcomer students as well as those already enrolled in an adapted service to complete a questionnaire twice: in October 2019 (pre-COVID-19) and April–May 2020 (peak of the first wave). The questionnaire included college adjustment scales and questions on disability status, GPA, parental incomes, and COVID-19 experience. The final sample comprises 1,435 students (mean age = 18.2 years) of which 42% are students with a learning or affective disorder. The trajectory analysis (growth mixture models) indicates that most students perceived moderate declines in academic and social adjustment during the first wave of COVID-19. Ten percent of students reported large declines in academic and social adjustment, whereas only 4% reported improvements. Students with mental health diagnosis, lower parental income, and lower high school GPA were generally at greater risk for following a low-functioning or worsening trajectory compared to other students. We recommend preventive measures to reduce the pandemic's long-term effects on academic and professional outcomes.

Keywords: COVID-19, adjustment to college, vulnerability factors, trajectories

1. Introduction

The COVID-19 pandemic has overturned the lives of higher education students. In early March 2020, college students were barred from public venues and gatherings and ordered to practice social distancing. Many saw their study programs completely interrupted for at least 2 weeks, and some received less professional support from their institution (World Health Organization [WHO], 2021). Subsequently, most higher education systems made a hurried switch to remote learning and psychological and academic support modes. It is then no surprise that many international studies reported the pandemic's negative impacts on college students' mental health (Copeland et al., 2021), particularly in the most vulnerable student populations (Lee et al., 2021). In terms of academic performance, evidence suggests negative effects caused by the sudden shift to remote learning and by the exposure to mobility restrictions, but positive effects due to a change in evaluation methods and home confinement during exam preparation (Bonacini et al., 2023).

Although preliminary findings suggest that more vulnerable students reported worsened problems, researchers base this conclusion mainly on cross-sectional analyses without considering either the natural heterogeneity of adjustment trajectories in student populations (Larose et al., 2019) or their heterogeneous vulnerability factors. Moreover, despite the many challenges that postsecondary students must meet (e.g., meeting teachers and study programs' demands, connecting with peers and adults in the college community, and managing and maintaining good physical and mental health) no researchers in longitudinal studies to date have attempted to validate the pandemic's hypothesized exacerbating effects of the pandemic. An empirical examination of this hypothesis is necessary to clarify preventive priorities if (or when) further waves or new pandemics arise. In this context, our main objectives in this paper are to describe longitudinal trajectories of two indicators of college adjustment (academic and social) in Québec students

during the first wave of COVID-19 and to determine whether these trajectories vary according to vulnerability factors measured prior to the first wave.

2. The Concept of Vulnerability

Brotherton and Cronin (2020) defined vulnerability as the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard (an extreme natural event or process). In college students, these characteristics may be social (e.g., weak social network, separation from the family), economic (e.g., unemployment, low income), physical (e.g., loss of physical assets, lack of material resources), academic (e.g., weak high school grade point average [GPA]), or psychological (e.g., presence of a disorder or disability). The presence of such characteristics may limit students' access to internal and external resources. On the one hand, students' vulnerability characteristics might affect internal resources such as academic competence, autonomy, and a feeling of belonging (Ryan & Deci, 2023), thereby limiting their ability to deal with the pandemic's effects. On the other hand, external resources such as parental, community, college, and government support could be more challenging for vulnerable students to access, thereby making it more difficult for them to adjust during a pandemic. Consequently, both individual and environmental characteristics would influence the degree of vulnerability, with potentially additive and interactive effects (Shi & Stevens, 2021). For Brotherton and Cronin (2020), vulnerability is a characteristic that is already present prior to the occurrence of a natural hazard. As such, it is distinct from an individual adjustment trajectory and methodologically should be measured prior to the hazard's occurrence.

3. Adolescent and Young Adult Adjustment to the Pandemic's First Wave

To date, researchers in several countries have conducted longitudinal studies to gauge the effects of the first wave on various adjustment indicators for adolescents and adults. Overall, and against popular opinion, the results are rather mixed. Researchers in some U.S. studies found increased feelings of depression and anxiety in both adolescents and adults between the fall of 2019 and the start of the pandemic in March 2020, as well as moderate improvements in health a few months after the first government measures were imposed (Daly & Robinson, 2020; Huckins et al., 2020; Magson et al., 2021). In a Canadian study, Watkins-Martin et al. (2021) observed a slight increase in rates of severe depression, but mainly for those who had the lowest levels of symptoms before the pandemic. In a Spanish study, adults showed increasing symptoms of anxiety after the first wave, even when the numbers of COVID cases and COVID-related deaths fell and government measures were relaxed (Planchuelo-Gómez et al., 2020). Other studies in Germany and the United Kingdom, which included one or more pre-pandemic data collections and another during the first wave (typically in April 2020), showed increased negative feelings (i.e., hostility and interpersonal sensitivity) in parents of adolescents (Achterberg et al., 2021; Widnall et al., 2020). Meanwhile, the adolescents showed decreases in internalized and externalized problems and feelings of anxiety and depression, indicating that the first wave might have affected them differently from their parents. In a sample of young Chinese adults (30–40 years old), post-traumatic symptoms decreased from the pandemic's start to 1 month later, even as the numbers of positive cases in China rose exponentially (Wang et al., 2020). Moreover, the researchers observed no changes in anxiety or depression over that time. A quasi-experimental study in Spain (Gonzalez et al., 2020) showed that higher education students who enrolled in 2019–2020 outperformed students in the two previous cohorts, notably due to their greater diligence and better oversight of their learning. Finally, a longitudinal study in the Netherlands showed no changes in the prevalence of severe anxiety or depressive symptoms from 2019 to March 2020 (van der Velden et al., 2020).

As the main longitudinal studies worldwide showed, this portrait suggests a certain heterogeneity in students' adjustment trajectories during the first wave of the pandemic. The reasons could be the different preventive interventions across the national health care and education systems and the varying assessment periods across the studies. An additional reason could be the unique ways that subgroups of students coped with the first wave. For some, it would have been a stressful situation due to, for example, greater exposure to the virus, loss of a job or income source, ruptured social or intimate relationships, and/or exposure to teaching modes that did not meet their need for belonging. Others might have enjoyed the opportunity to take a break, get back in shape, reconnect with family, and learn remotely (dovetailed with a greater need for autonomy). Unfortunately, existing studies to date do not consider this potential heterogeneity of adjustment trajectories. As some researchers have suggested (e.g., Li et al., 2020), adjustment to the pandemic could manifest variously: resilience, progressive worsening or lessening of symptoms, delayed appearance of symptoms, or resurgence of chronic disorders that predated the pandemic. To our knowledge, no researchers have described these diverse trajectories in a person-centered analysis or assessed their relative prevalence in a population of college students.

4. More Vulnerable Subpopulations of College Students

Researchers have well identified student subpopulations that are more likely to follow at-risk adjustment trajectories in college. Studies that predict academic success and graduation rates demonstrate that students who find it harder to adjust in college earned lower grades in high school (Larose et al., 2019), have a visible or nonvisible disability (Evans et al., 2017), come from more disadvantaged backgrounds (Larose et al., 2015), are first-generation students (Salusky et al., 2024), identify with a sexual or cultural minority (Evans et al., 2017), or are going through concomitant life events as they make the transition to college (e.g., leaving the family or community, separating from a loved one, in mourning—Cox et al., 2016). The underlying reasons for the vulnerability of these subpopulations are clear. Poor academic preparation and study habits hamper some students (Larose et al., 2019), others lack financial or educational resources (Coleman, 2023), and still others have specific social, identity, or cultural needs that the college fails to meet (Evans et al., 2017).

The question that remains unanswered is whether the pandemic exacerbated the risk of maladjustment for these student subpopulations. To answer this question clearly, it should be determined whether membership in vulnerable subpopulations (established before the pandemic) predicts membership in a worsening trajectory (i.e., things get worse after the pandemic starts). No study to date has provided such a fact. In line with other authors (Boals & Banks, 2020; Porat et al., 2020), we propose that the pandemic, with its collateral effects (e.g., temporary college shutdowns, urgent transition to remote learning modes, vetoes on gatherings, imposition of curfews), would exacerbate stress levels and mind wandering in more vulnerable students while reducing their feelings of autonomy, competence, and belonging. The potential outcomes for these subpopulations would be poorer adjustment and lower academic success during the pandemic.

5. The Present Study

Our first goal was to describe student trajectories of college adjustment during the onset of the first wave of the COVID-19 pandemic. We based the college adjustment trajectories on three time points: (a) October 2019, when the students were at the mid-point of their first college term; (b) early March 2020 (retrospectively, at the end of April), just before the Government of Québec announced the first cases of COVID-19; and (c) at the end of April 2020, as more and more sanitary and quarantine measures were imposed and the majority of colleges migrated to online learning. Consistent with previous research (Mayhew et al., 2016), we assessed two types of college adjustment: academic (i.e., meeting the demands of teachers and study programs) and social (i.e., connecting with peers and adults in the college community). We also asked the students about the courses that they had dropped and which courses they thought they might fail.

Second, we examined the predictive power for adjustment trajectories of four types of vulnerability factors: social/geographical (leaving the family to go to college, study region, student's age), academic (low high school GPA), psychological vulnerability (handicap status and type at college entry), and economic (parental income). We explored the additive effects of these factors, controlled for COVID-19 exposure, and included student's gender and study program path (pre-university vs. technical) (Note 1) as covariates, given their clear associations with distinct adjustment trajectories during the transition to college (Larose et al., 2019).

6. Method

6.1 Participants and Procedure

The participants were part of an ongoing longitudinal study that began in fall 2019 (October) with the aim of determining the effects of adapted services on academic adjustment and success for students with disabilities (SWD Transition study / Étudiants en situation de handicap pendant la transition [Students with Disabilities During the Transition]). The initial sample at T1 comprised 1,826 students (M_{age} = 18.2 years, SD = 3.8; 78.6% women) attending 10 French-language colleges in the province of Québec (32.9% in Montreal, 35.3% in Québec City, and 31.8% in central Québec). The students were taking different programs (pre-university: 56.5%, technical: 35.1, and Springboard (Note 2): 8.4%). In the fall of 2019, the students were either in their first college term (93.7%) or in their first term at the current college (6.3%). Of the initial sample, 41.2% disclosed a disability at college entry based on a professional diagnosis (this population was oversampled for the purposes of the larger study). Of these, 50% had attention deficit disorder with or without hyperactivity (ADHD), 48% had a mental health disorder such as anxiety or mood disorder, and 22% had a learning or language problem such as dyslexia or dysphasia. Comorbidity was present in 37% of the students with disabilities. Students at T1 received a $10 bookstore coupon as compensation for participating.

We reassessed all students in April 2020 when the first wave hit its peak in Québec (although this was not known at the time), with only a month left in the college year. Of the initial sample, 1,435 students (80%) participated in the second study phase, with proportions by gender, region, study program, and disability status remaining similar to those at Time 1. They responded to an online questionnaire on their experience of the second college term during the pandemic. A first iteration of the questionnaire contained items addressing their adjustment right before the lockdown (T2a, early March 2020), and a second iteration addressed their current state of adjustment (T2b, end of April 2020). Students at T2 received a $10 bookstore coupon as compensation for participating.

6.2 Measures

6.2.1 Vulnerability Factors

We measured the vulnerability factors at T1 with two questionnaires developed for this study: one sociodemographic and one academic. The items addressed the students' study region, college study program, gender, age, whether they had left the family to go to college, and parental income. Students also reported their high school GPA, whether they had received a professional diagnosis for a physical or psychological disorder, and if so, the nature of the disorder. Table 1 presents a description of these vulnerability factors with descriptive statistics.

6.2.2 Exposure to COVID-19

We measured the degree of exposure to COVID-19 at T2b with Section A of the QCovid19. Inspired by Lazarus and Folkman's (1984) transactional stress model (see Larose et al., 2023), our team developed and validated this questionnaire. The first six items addressed whether (0) or not (1) the students had experienced symptoms of, were tested for (this was still rare at that time), or were diagnosed with COVID-19 between March and the time of completing the questionnaire. We asked the same questions about individuals in their social circle (i.e., friends, parents, grandparents). We then calculated the degree of exposure by computing the mean of these six items (0 = no exposure; 1 = maximum exposure).

6.2.3 Adjustment to College

We assessed adjustment to college at T1, T2a, and T2b using two scales from the French version of the Student Adaptation to College Questionnaire (SACQ-F, Larose et al., 1996): academic adjustment (10 items, e.g., "I am satisfied with my academic performance in college," Omegas: T1 = 0.81; T2a = 0.83, T2b = 0.81) and social adjustment (6 items, e.g., "I am somewhat satisfied with my social life at college," Omegas: T1 = 0.85; T2a = 0.85, T2b = 0.86). We rated responses on a Likert scale from 1 (completely disagree) to 5 (completely agree). The validity and reliability of the SACQ-F were well demonstrated (Larose et al., 1996).

Table 1. Vulnerability Factors Assessed at Time 1 (October 2019) and Descriptive Statistics

Vulnerability factors	%	Mean (and SD)
Study region		
Montreal	32.9	
Quebec City	35.3	
Central Québec	31.8	
Study program		
Pre-university	56.5	
Technical	35.1	
Springboard	8.4	
Gender		
Female	78.6	
Male	21.4	
Leaving the family to go to college		
Yes	23.2	
No	76.8	
Parental incomes		
< $30,000	6.0	
$30,000–$59,999	17.1	
$60,000–$99,999	39.4	
$100,000–$129,999	16.0	
> $129,999	21.5	3.39 (1.21)
At least one parent with postsecondary education		
Yes	92.6	
No	7.4	
Disability (professional diagnosis)		
Yes	41.2	
No	58.8	
Nature of disability (with professional diagnosis)		
ADHD	50.0	
Mental health disorder	48.0	
Learning or language disorder	22.0	
Comorbidity	37.0	
High school GPA		81.1 (7.72)
Age		18.2 (3.57)

Notes. n = 1,826 for all vulnerability factors except the nature of diagnosis (n = 752). We used continuous scores in predictive analyses for parental incomes, high school GPA, and age.

6.2.4 Academic Success

To measure academic success, we asked the students to report the number of courses in which they enrolled in each semester (fall 2019 and winter 2020), the number of courses they had dropped, and the number of courses they would potentially fail. Based on these variables, we created a success rate index: [total no. of courses taken – (no. of

courses dropped + no. of potentially failed courses)] / total no. of courses taken. The index is expressed as a percentage.

6.3 Plan of Analysis

6.3.1 Growth Mixture Models

To estimate college adjustment trajectories, we followed Morin and Litalien's (2019) procedure. In a preliminary step, we saved factor scores (M = 0, SD = 1) from a longitudinal invariant measurement model (Millsap, 2011) and a two-factor (two adjustment dimensions) exploratory structural equation model (see Morin et al. (2016) for an explanation of the strengths of factor scoring for person-centered analysis). Based on the factor scores, we estimated growth mixture models (GMM) with Mplus 8.4 (Muthén & Muthén, 2015). We used a robust maximum likelihood estimator and full information maximum likelihood to handle missing data as well as 3,000 random sets of start values, 100 iterations, and 100 solutions for final stage optimization (Morin & Litalien, 2019). For each college adjustment dimension, we estimated one to seven latent trajectories based on linear GMMs (three time points), in which the latent variance-covariance parameters and time-specific residuals were constrained to be equal across the trajectories.

To select the optimal solution, we used both the theoretical meaning and the statistical adequacy of the solution (Marsh et al., 2009). We assessed statistical adequacy using relevant statistical indices: the Akaïke information criterion (AIC), the consistent AIC (CAIC), the Bayesian information criterion (BIC), and the sample-size adjusted BIC (ABIC). Lower AIC, CAIC, BIC, and ABIC values suggest a better-fitting model compared to a k-1 trajectory solution. When the indices continue decreasing with additional trajectories, we can use elbow plots to determine an optimal solution corresponding to the number of trajectories after which the slope flattens. Although entropy is not suitable for enumeration purposes (Morin & Litalien, 2019), a value closer to 1 indicates greater classification accuracy. Finally, we considered the optimal number of participants in each trajectory (target minimum of 50) to ensure the feasibility of subsequent prediction and comparison analyses.

6.3.2 Associations between Vulnerability Factors and Academic Success

Based on the solution with the optimal number of trajectories, we tested the associations with various predictors, including academic, sociogeographical, psychological, and economic variables (see Table 1). We entered the predictors directly into the final solution using multinomial logistic regressions. To ensure that the added predictors did not affect the trajectory definitions, we based our analysis on the start values obtained from the final solution. Finally, we examined the associations between the trajectories and academic success using analyses of variance (ANOVAs) followed by Student–Newman-Keuls post hoc tests.

7. Results

7.1 Trajectory Analysis

Table 2 presents the fit indices that guided the selection of the trajectory models (academic and social). An examination of the fit indices for the academic adjustment models (see Table 2) indicates that saturation occurred after we identified six trajectories. However, this six-trajectory model was not feasible because two groups that contained fewer than 20 participants duplicated two other clearly defined trajectories. Because we observed a similar problem for the five-trajectory model, we retained the four-trajectory model. The classification probabilities for these academic adjustment trajectories vary from 77% (trajectory 2) to 86% (trajectory 4). Similarly, the analysis for the social dimension converged on a four-trajectory model. The improvement of the fit indices stagnated after the fourth iteration for two of the four indices (CAIC and BIC). The other indices showed significantly less improvement over the previous models. In addition, the addition of a fifth trajectory resulted in only a duplication of an existing trajectory. The classification probabilities for the four-trajectory model are also excellent for social adjustment, which varies from 83% (trajectory 2) to 90% (trajectory 1).

Figure 1 shows the adjustment trajectories for each dimension (factor scores). For the academic dimension, 35% of participants follow a high-functioning trajectory, with 52% low functioning. Despite the significant linear effects tested on these two trajectories ($p < .05$), the variances in slope between measurement times indicate a slight improvement in academic adjustment before the pandemic ($slope_{t1t2a} = .045$ for high functioning, .125 for low functioning) and a moderate decline after the pandemic ($slope_{t2at2b} = -.210$ for high functioning, $-.215$ for low functioning).

Table 2. Growth Mixture Model Results (Unconditional Models)

Model	CAIC	AIC	BIC	ABIC	Entropy
Academic adjustment					
M1: 1 trajectory	12112.001	12061.927	12106.001	12080.586	N/A
M2: 2 trajectories	12045.563	11975.960	12036.563	12001.616	0.586
M3: 3 trajectories	12015.189	11926.058	12003.189	11958.711	0.689
M4: 4 trajectories	11982.769	11874.110	11967.769	11913.761	0.692
M5: 5 trajectories	11968.035	11839.848	11950.035	11886.496	0.676
M6: 6 trajectories	11949.924	11802.209	11928.924	11855.854	0.736
M7: 7 trajectories	11989.898	11822.655	11965.898	11883.297	0.704
Social adjustment					
M8: 1 trajectory	10147.350	10097.276	10141.350	10115.935	N/A
M9: 2 trajectories	9967.039	9897.436	9958.039	9923.092	0.720
M10: 3 trajectories	9933.383	9844.253	9921.383	9876.906	0.721
M11: 4 trajectories	9844.863	9736.204	9829.863	9775.855	0.775
M12: 5 trajectories	9847.746	9719.560	9829.746	9766.207	0.726
M13: 6 trajectories	9834.162	9686.447	9813.162	9740.092	0.758
M14: 7 trajectories	9859.690	9692.447	9835.690	9753.089	0.777

Notes. CAIC = constant AIC; AIC = Akaïke information criterion; BIC = Bayesian information criterion; ABIC = sample-size adjusted BIC.

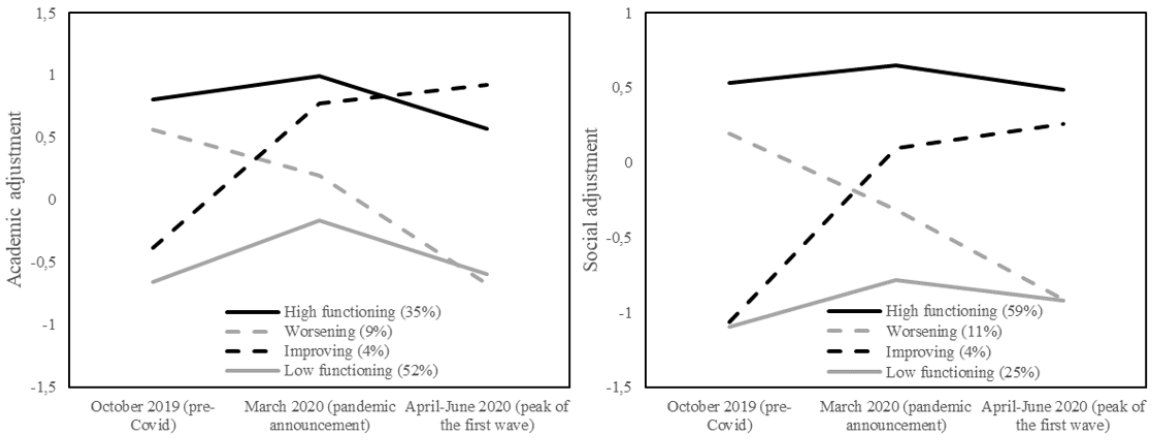

Figure 1. Estimated Growth Trajectories (Factor Scores) for College Adjustment (Academic and Social)

In other words, once the pandemic arrived, both groups lost some of the academic adjustment gains they had made between the fall and the beginning of March 2020. However, these losses are relatively small compared to the inter-subject variations observed across the whole sample. In addition, two groups underwent major changes in academic adjustment. Of the participants, 9% (worsening) who functioned relatively well in fall 2019 showed slight declines in academic adjustment by the beginning of winter ($slope_{t1t2a} = -.090$) and greater declines with the arrival of the pandemic ($slope_{t2at2b} = -.435$). In contrast, 4% (improving) improved greatly in academic adjustment before the pandemic (improving trajectory; $slope_{t1t2a} = .290$) and stabilized afterward ($slope_{t2at2b} = .075$). Both these groups showed significant linear effects: positive for the improving group ($p < .001$) and negative for the worsening group ($p < .001$).

We obtained a similar profile for the social dimension, but with somewhat different percentages of participants. Thus, 59% followed a high-functioning trajectory (non-significant linear effect) and 25% a low-functioning trajectory (positive linear effect, $p < .001$). Both these groups showed slight improvements in social adjustment pre-pandemic ($slope_{t1t2} = .029$ and .078, respectively) and the inverse trend post-pandemic ($slope_{t2at2b} = -.212$ and $-.217$, respectively), suggesting some loss of previously achieved gains in social adjustment.

As was the case for the academic dimension, two groups underwent major changes in social adjustment. Of the participants, 11% (worsening) showed declines in social adjustment pre-pandemic ($slope_{t1t2a}$ = −.129) that slipped further at pandemic start ($slope_{t2at2b}$ = −.436). Another 4% of participants (improving) made significant improvements in social adjustment pre-pandemic ($slope_{t1t2a}$ = .289) that slackened post-pandemic ($slope_{t2at2b}$ = .073). Both groups showed significant linear effects: positive for the improving group ($p < .001$) and negative for the worsening group ($p < .001$).

7.2 Predictors of Trajectories

7.2.1 Academic Adjustment

Table 3 presents the vulnerability factors associated with the academic adjustment trajectories. Recall that we tested the contribution of these factors while controlling for degree of COVID-19 exposure. At the final data collection (spring 2020), less than 1% of participants (0.4%) had tested positive for COVID-19, whereas 19.4% reported that a member of their social circle had tested positive. The COVID-19 exposure index, which varies theoretically from 0 (no COVID-19 symptoms for themselves or a member of their social circle) to 1 (positive COVID-19 symptoms and test for themselves or a member of their social circle), showed an average value of .17 (SD = .21), indicating low exposure. To simplify the presentation of the predictors and to identify potential discriminant factors useful for prevention, we first considered the extreme trajectories (low vs. high). We then examined the predictors for the trajectories that start from the same point in October 2019 and deviate thereafter (i.e., high vs. worsening, low vs. improving).

Table 3. Predictors of Academic Adjustment

Predictors	Traj 1 (High) vs. 4 (Low)			Traj 2 (Worse.) vs. 4 (Low)			Traj 3 (Improv.) vs. 4 (Low)		
	Coef.	(SE)		Coef.	(SE)		Coef.	(SE)	
Gender (female)	0.50	(0.20)	*	0.36	(0.28)		1.52	(0.75)	*
Age	0.15	(0.04)	***	0.10	(0.04)	**	0.11	(0.06)	
Leaving family	−0.11	(0.22)		0.313	(0.26)		−0.25	(0.41)	
High school GPA	0.07	(0.02)	***	0.04	(0.02)	*	0.09	(0.03)	**
Parental income	0.31	(0.09)	***	0.28	(0.15)		0.33	(0.19)	
Quebec City	0.19	(0.18)		0.32	(0.31)		0.68	(0.52)	
Montreal	−0.21	(0.20)		0.42	(0.31)		−0.11	(0.51)	
ADHD	−0.67	(0.23)	**	−0.18	(0.30)		−0.02	(0.58)	
MHD	−0.74	(0.22)	***	−0.04	(0.27)		−0.02	(0.39)	
LD	0.11	(0.32)		0.50	(0.35)		−0.95	(0.92)	
Pre-university	−0.37	(0.33)		−0.27	(0.46)		−0.06	(0.84)	
Technical	0.07	(0.33)		0.41	(0.44)		0.67	(0.84)	
Predictors	Traj 1 (High) vs. 3 (Improv.)			Traj 2 (Worse.) vs. 3 (Improv.)			Traj 1 (High) vs. 2 (Worse.)		
	Coef.	(SE)		Coef.	(SE)		Coef.	(SE)	
Gender (female)	−1.02	(0.78)		−1.16	(0.75)		0.14	(0.32)	
Age	0.04	(0.06)		−0.01	(0.06)		0.04	(0.03)	
Leaving family	0.14	(0.43)		0.56	(0.44)		−0.42	(0.30)	
High school GPA	−0.02	(0.04)		−0.06	(0.04)		0.04	(0.02)	*
Parental income	−0.02	(0.20)		−0.05	(0.22)		0.04	(0.16)	
Quebec City	−0.49	(0.52)		−0.36	(0.53)		−0.13	(0.33)	
Montreal	−0.10	(0.52)		0.52	(0.53)		−0.63	(0.32)	*
ADHD	−0.65	(0.61)		−0.16	(0.58)		−0.49	(0.34)	
MHD	−0.72	(0.41)		−0.02	(0.43)		−0.71	(0.30)	*
LD	1.06	(0.93)		1.45	(0.94)		−0.39	(0.41)	
Pre-university	−0.31	(0.87)		−0.20	(0.91)		−0.10	(0.48)	
Technical	−0.59	(0.88)		−0.26	(0.91)		−0.34	(0.46)	

*p < .05; **p < .01; ***p < .001

Effect sizes for each significant predictor appear in parentheses in the text below (logit d). Unsurprisingly, several predictors are significant when comparing the low-functioning and high-functioning groups. First, male gender (d = .28), younger age (d = .08), weak high school GPA (d = .04), low parental income (d = .17), and presence of a disability (ADHD or MHD—d = .37 and .41, respectively) increase the risk of belonging to the low-functioning group. Of the studied variables, male gender and the presence of a disability were the strongest predictors for membership in this group. Second, low high school GPA (d = .04), studying on the island of Montreal (d = .35), and presenting a mental health disorder (d = .39) increase the probability of following a worsening (vs. a high-functioning) trajectory. Here, the presence of a mental health disorder and studying in Montreal have more explanatory weight than previous academic performance. Third, female gender (d = .84) and strong high school GPA (d = .05) increase the probability of an improving (vs. low- functioning) trajectory. Clearly, more girls follow this trajectory, with boys overrepresented in the low-functioning trajectory. Finally, we note that older age (d = .06) and stronger high school GPA (d = .02) are associated with greater likelihood of a worsening (vs. low-functioning) trajectory. However, these significant associations are weak.

7.2.2 Social Adjustment

Table 4 presents the vulnerability factors associated with the social adjustment trajectories. First, leaving the family to attend college (d = .32), low high school GPA (d = .01), low parental income (d = .18), presenting a mental health disorder (d = .67), and taking a program other than technical (d = .47) increase the probability of a low-functioning (vs. high- functioning) trajectory. The presence of a mental health disorder and enrollment in a non-technical program are the strongest predictors of a low-functioning trajectory. Second, low parental income (d = .23) and presenting a mental health disorder (d = .55) increase the risk of a worsening (vs. high-functioning) trajectory. Third, only strong high school GPA predicts an improving (vs. low-functioning) trajectory, but with a small effect size (d = .03). Finally, note that leaving the family to attend college (d = .59), low parental income (d = .24), and presenting a mental health disorder (d = .55) predict an improving trajectory (but with lower overall adjustment) over a high-functioning trajectory. Here again, having a mental health disorder appears to be the strongest predictor.

Table 4. Predictors of Social Adjustment

Predictors	Traj 1 (High) vs. 4 (Low)			Traj 2 (Worse.) vs. 4 (Low)			Traj 3 (Improv.) vs. 4 (Low)		
	Coef.	(SE)		Coef.	(SE)		Coef.	(SE)	
Gender (female)	−0.16	(0.19)		−0.19	(0.26)		0.28	(0.49)	
Age	0.00	(0.02)		0.03	(0.02)		−0.09	(0.07)	
Leaving family	−0.59	(0.19)	**	−0.12	(0.26)		0.49	(0.33)	
High school GPA	0.03	(0.01)	*	0.03	(0.02)		0.06	(0.03)	*
Parental income	0.33	(0.08)	***	−0.08	(0.12)		−0.11	(0.17)	
Quebec City	0.18	(0.18)		0.40	(0.27)		0.63	(0.38)	
Montreal	−0.06	(0.18)		0.33	(0.26)		0.44	(0.38)	
ADHD	−0.04	(0.19)		0.30	(0.25)		0.47	(0.43)	
MHD	−1.22	(0.18)	***	−0.22	(0.24)		−0.22	(0.36)	
LD	0.01	(0.27)		−0.20	(0.39)		−0.15	(0.61)	
Pre-university	0.27	(0.26)		0.41	(0.37)		−0.49	(0.51)	
Technical	0.85	(0.26)	***	0.43	(0.37)		−0.04	(0.50)	
Predictors	Traj 1 (High) vs. 3 (Improv.)			Traj 2 (Worse.) vs. 3 (Improv.)			Traj 1 (High) vs. 2 (Worse.)		
	Coef.	(SE)		Coef.	(SE)		Coef.	(SE)	
Gender (female)	−0.44	(0.46)		−0.47	(0.48)		0.04	(0.22)	
Age	0.10	(0.07)		0.12	(0.07)		−0.02	(0.03)	
Leaving family	−1.08	(0.32)	***	−0.61	(0.35)		−0.47	(0.24)	
High school GPA	−0.04	(0.03)		−0.04	(0.03)		0.00	(0.01)	
Parental income	0.44	(0.16)	**	0.02	(0.18)		0.41	(0.11)	***
Quebec City	−0.45	(0.36)		−0.24	(0.40)		−0.22	(0.25)	
Montreal	−0.50	(0.36)		−0.11	(0.40)		−0.39	(0.25)	
ADHD	−0.50	(0.41)		−0.17	(0.43)		−0.33	(0.24)	
MHD	−1.00	(0.36)	**	0.00	(0.38)		−1.00	(0.23)	***
LD	0.16	(0.59)		−0.05	(0.63)		0.20	(0.36)	
Pre-university	0.76	(0.50)		0.90	(0.54)		−0.15	(0.37)	
Technical	0.89	(0.48)		0.47	(0.53)		0.43	(0.37)	

*p < .05; **p<.01; ***p < .001

7.3 Adjustment Trajectories and Academic Success

We also examined whether academic success, expressed as the percentage of courses passed or ongoing in the 2019–2020 academic year, would vary according to the adjustment trajectory. The success rate score for the whole sample is 85.4%. ANOVAs followed by a posteriori Student–Newman–Keuls tests indicated that the success rate score varies according to membership in an academic adjustment trajectory, F (3, 1820) = 67.64, p < .001, eta^2 = .100. Students in the high-functioning group (93%) passed more courses than students in all other groups did. Students in the worsening (87%) and improving (87%) groups had lower scores than those in the high-functioning group but outscored the low-functioning group (79%). The success rate score also varies according to the social adjustment trajectory, F (3, 1820) = 29.26, p < .001, eta^2 = .046. Students in the high-functioning (89%) and improving (89%) groups obtained higher scores than students in the worsening (82%) group, who in turn scored higher than the low-functioning (78%) group did.

8. Discussion

This study had two objectives. The first was to describe academic and social adjustment trajectories of college students in Québec during the first wave of the COVID-19 pandemic. The second was to identify the vulnerability and academic performance factors associated with these trajectories.

8.1 Student Academic and Social Adjustment During the First Wave of the Pandemic

Our results suggest that the first wave of the pandemic had only moderate effects on academic and social adjustment for most of the participants. In our sample, 87% of the students (high- and low-functioning trajectories) showed slight improvements in academic adjustment between fall 2019 and the start of the winter 2020 term (84% for social adjustment), with subsequent moderate declines once the first wave hit. This pattern of change was identical for students with and without problems prior to the pandemic. In other words, these students appeared to have lost the modest gains they had made before the pandemic. In contrast, almost 10% of the students (worsening trajectory) decreased in terms of academic and social adjustment when the pandemic started (9% for academic adjustment and 11% for social adjustment). Although these students adjusted well in the fall of 2019, the pandemic would change that. Finally, 4% of the students (improving trajectory) showed gains in academic and social adjustment after the first college term despite the pandemic's arrival and the disruptions it caused to the education system (e.g., brief school interruptions and mandatory migration to distance learning).

These results suggest that the pandemic's first wave had moderate negative effects on academic and social adjustment for the great majority of the students, with severe negative effects for 10% and positive effects for about 4 %. This portrait provides a more nuanced understanding of how college students adapted to the pandemic's onset. Whereas some previous researchers found declining personal adjustment in groups of youth after the pandemic started (e.g., Bonacini et al., 2023; Planchuelo-Gómez et al., 2020), others found that these problems were not more pronounced than before the pandemic (Gonzalez et al., 2020; van der Velden et al., 2020), or that personal adjustment actually improved with the gradual implementation of sanitary and preventive measures (Daly & Robinson, 2020; Huckins et al., 2020; Magson et al., 2021). Uniquely, we suggest that academic and social adjustment trajectories are relatively heterogeneous in the student population, and that only 10% of students increased in vulnerability after the pandemic occurred. The findings also show that a large percentage of students who presented problems during the pandemic had these problems prior to the pandemic. This greatly qualifies the results of some correlational studies that suggest significantly higher vulnerability for most students (e.g., Aristovnik et al., 2020). Our findings call for universal interventions to redress the generally moderate negative effects observed for most students, combined with more targeted interventions to prevent dropout and social maladjustment in around 10% of students.

8.2 Predictors of Trajectories

The second study objective was to identify subpopulations of students who were more likely to follow at-risk trajectories during the pandemic. We begin by discussing the predictors of the worsening and improving trajectories, which presented atypical patterns at the start of the pandemic. We then turn to the predictors of the low-functioning trajectories, while considering that the adjustment problems that were present in this group during the pandemic were also present prior to the pandemic in fall 2019.

8.3 Membership in a Worsening Trajectory

Students who disclosed a mental health disorder at college entry were at higher risk than other students were for following a worsening trajectory. Accordingly, they underwent declines in academic and/or social adjustment when the first wave of the pandemic hit. Of note, this vulnerability factor (mental health disorder) predicts academic and social trajectories independently of students' age, high school GPA, gender, study region, study program, and parental income. It is also the strongest predictor of membership in a worsening trajectory (both academic and social). This confirms our hypothesis that the pandemic would exacerbate academic and social problems in students who were already coping with a mental health disorder. Their fears, hopelessness, loss of control, and anxiety could have increased during the pandemic, placing them at greater risk for academic failure, solitude, and isolation (Copeland et al., 2021). This finding clearly indicates that this student subgroup should receive professional services tailored to their needs as quickly as possible when a situation like a pandemic arises. We believe that an effective response would require rapid, individualized, and mesosystemic follow-up, including input by parents and extracurricular professionals.

In terms of academic adjustment, students in the Montreal region, the only metropolitan setting in this sample, were also at greater risk for following a worsening trajectory than students from other regions (with smaller towns and cities) were. Arguably, this may be because Montreal had many more COVID-19 cases and associated deaths than

other regions of the province had during the first wave (Gouvernement du Québec, 2021). Thus, it is possible that the media coverage of the alarming numbers in Montreal contributed to a more generalized increase in academic problems in Montreal-based students. As other authors have suggested (Boals & Banks, 2020; Porat et al., 2020), media coverage can provoke anxiety, thereby increasing mind wandering in students and making them less inclined to study and meet academic expectations.

Finally, our results show that students with low parental income were more likely to follow a worsening social adjustment trajectory and consequently to suffer declines in social adjustment with the advent of the first wave. Behind the disadvantaged background lurk numerous practical problems, such as limited access to technology, inadequate work and study spaces at home, and higher risk for family dysfunction (UNESCO, 2021). These realities could explain the first wave's negative effects on social adjustment for students from disadvantaged backgrounds.

8.4 Membership in an Improving Trajectory

Only two factors predict membership in an improving trajectory. Girls (for academic adjustment) and students with a strong high school GPA (for academic and social adjustment) were more likely to follow an improving versus a low-functioning trajectory. In other words, male gender and weak high school GPA limited the odds of continuous improvements during the pandemic. Although the mean effect size in high school GPA was quite small, this result indicates that previous academic success may protect against potential or feared consequences of the pandemic. It also suggests that students differ in terms of the pandemic's ability to perturb them. Thus, academically stronger students would be more inclined to find positive ways to adapt to and take advantage of the situation, whereas weaker students would be less well equipped and have fewer opportunities to improve their lot. The rapid adjustment to online courses (for teachers and students) may have been more challenging for weaker students.

Female gender clearly was the most important determinant of membership in an improving academic adjustment trajectory. This suggests that more girls than boys were resilient and able to find constructive ways to cope with the pandemic and thus improve their academic performance. This finding echoes our previous study (Larose et al., 2023) in the sense that although girls suffered greater stress than boys did during the pandemic, they still found better and healthier ways to handle the experience (e.g., doing exercise and spending time with their family).

8.5 Membership in a Low-Functioning Trajectory

We begin by restating that the students who followed a low-functioning trajectory presented academic and social adjustment problems during the pandemic that were already present pre-pandemic. Thus, the significant predictors of following a low-functioning trajectory versus a high-functioning trajectory were risk factors for maladjustment to college that preceded the pandemic and were therefore independent of the first wave's effects. Nevertheless, they are informative about the students' adjustment trajectories in college.

With respect to academic adjustment, boys as well as students with lower high school GPA, low parental income, and ADHD or mental health disorders were at greater risk for presenting chronic functioning problems during the first year of college. These results confirm previous findings on adjustment trajectories (Larose et al., 2019), and they support the theorized influence of individual and pre-college characteristics on college adjustment and success (Mayhew et al., 2016).

With respect to social adjustment, leaving the family to study, low parental income, presenting a mental health disorder, and enrollment in a non-technical program raised the risk of chronic functioning problems in college. In this set of predictions, it is noteworthy and intriguing that enrollment in a technical program appears to facilitate social adjustment. It is possible that meeting up with peers who share similar professional aspirations facilitates social adjustment at college. It is also possible that social adjustment is easier in technical programs compared to the other programs (i.e., pre-university and Springboard) due to smaller classes, more frequent use of group projects, and greater proximity of professors.

8.6 Strengths and Limitations of the Present Study

This study includes several strengths. We examined a large sample containing a considerable number of students with disabilities. We also measured college adjustment prior to and during the pandemic and included growth mixture models in the analysis to account for the natural heterogeneity in student trajectories.

Nevertheless, we mention some limitations. First, the sample contains more girls (78.6%) than boys, which is not necessarily representative of Quebec's college student population. Indeed, girls made up 57.2% of the student population in fall 2019 (Fédération des cégeps, 2019). Therefore, we can only generalize the results to boys with caution. Second, we performed the measurement at Time 2a (early March 2020) retrospectively, at the same time as

Time 2b, when the first wave occurred. This could have created a recall bias in the assessment of college adjustment shortly before declaration of the pandemic. Finally, although we examined associations between adjustment trajectories during the COVID-19 pandemic and success rate scores after 1 year at college, we were unable to document the pandemic's effect on college dropout rates. A longer-term follow-up on the present sample would allow determining whether the pandemic influenced college dropout rates and whether this association varies according to students' adjustment trajectories.

9. Implications and Conclusion

The pandemic overturned postsecondary education systems along with the academic lives of students. Our results suggest that these disruptions had moderately negative effects on most students, with pronounced effects for only about 10%. These results call for postsecondary institutions to consider the use of universal interventions to reach most students combined with targeted interventions to prevent escalating adjustment problems for certain students. Below, we propose several universal and targeted intervention approaches aimed at limiting the negative effects of pandemics to come.

From a universal prevention perspective, educators and professionals must be better prepared to migrate their intervention methods when a pandemic occurs. Heavier workloads, fewer meaningful contacts with teachers and other educators, and lack of pedagogical support are some of the most frequent explanations that postsecondary students gave for academic adjustment problems during the pandemic's first wave (Aristovnik et al., 2020). In addition to training in technological skills during a pandemic, teachers and professionals should receive pedagogical training to better equip them to handle the transition and deliver effective teaching and support at a distance. Among others, the topics should include setting up online communal spaces for schoolwork and social interaction, setting up synchronous and asynchronous learning modes, managing workloads (particularly for vulnerable students), and making structured online support available to all students.

Still from a universal prevention perspective, it would also be useful to train teachers and professionals in the growth mindset approach (Li & Bates, 2020). The pandemic heightened students' anxieties about their ability to succeed. It could also have reinforced certain elitist views of teachers and professionals. Thus, managers, teachers, and professionals should learn how to foster cognitive and social skills within a supportive learning environment that strengthens students' beliefs in their ability to succeed (especially for more vulnerable students) and lessens their anxieties and worries during a pandemic. Modelling (i.e., using a student-centered perspective to demonstrate a desired behaviour), creating space for new ideas (innovating, risk taking), building time for self-reflection (on teaching and support strategies), and accepting and integrating formative feedback (collaborate work) are some of the relevant themes in the growth mindset approach for teachers and professionals. In addition, the Task, Authority, Recognition, Grouping, Evaluation, and Time framework (Qian et al., 2022), which fosters mastery goals as opposed to performance goals, could guide interventions to prevent some of the pandemic's adverse effects and to bolster student motivation to persevere despite it.

Turning to targeted prevention, students with a mental health disorder or disadvantaged background must be priority targets for future preventive measures. Postsecondary institutions should identify these students and offer them meaningful, ideally individualized, support. Numerous concrete means of support are possible. For instance, college administrators could make "sunshine calls" at college entry and repeatedly during the first term to ascertain students' well-being. They should analyze students' technology needs in case a pandemic hits and teachers must migrate their materials and methods to online platforms. Vulnerable students should have priority access to adapted services and other professional services at the college. Tutorials should be provided to prevent learning delays. Experienced teachers should ensure online or in-person mentoring to strengthen the student–school connection. Above all, students should feel supported, and that the school both understands and meets their needs.

This study demonstrates that a non-negligible minority of postsecondary students presented adjustment problems when the COVID-19 pandemic's first wave hit. The results underscore the plight of the more vulnerable subgroups of students, including those who are coping with a mental health disorder, come from a disadvantaged background, or are studying at a metropolitan centre such as Montreal. In future, postsecondary schools and governments should invest in universal measures such as teacher training programs in technical and pedagogical skills as well as targeted measures to provide individualized support to higher-risk students.

Acknowledgments

We based the results presented in this article on a longitudinal study of the college transition in students with disabilities. The Action concertée sur la Réussite et Persévérance scolaire under the Fonds Québécois de Recherche

Société et Culture (2019-PZ-264654) largely funded this study. The Human Sciences Research Council (1008-2020-0037) and the Québec Ministry of Health and Social Services (20-CR-00102) provided additional support. We extend our thanks to the 10 Québec colleges (Sainte-Foy, Garneau, Limoilou, Mérici, Maisonneuve, St-Laurent, Bois-de-Boulogne, Marie-Victorin, Ste-Hyacinthe, and Sherbrooke) that contributed to the data collection.

References

Achterberg, M., Dobbelaar, S., Boer, O.D., & Crone, E. A. (2021). Perceived stress as mediator for longitudinal effects of the COVID-19 lockdown on wellbeing of parents and children. *Scientific Reports, 11*, 2971. https://doi.org/10.1038/s41598-021-81720-8

Aristovnik, A., Keržič, D., Ravšelj, D., Tomaževič, N., & Umek, L. (2020). Impacts of the COVID-19 pandemic on life of higher education students: A global perspective. *Preprints*, 1-34. https://doi.org/10.20944/preprints202008.0246.v1

Boals, A., & Banks, J. B. (2020). Stress and cognitive functioning during a pandemic: Thoughts from stress researchers. *Psychological Trauma: Theory, Research, Practice, and Policy, 12*(S1), S255-S257. https://doi.org/10.1037/tra0000716

Bonacini, L., Gallo, G., & Patriarca, F. (2023). Unraveling the controversial effect of Covid-19 on college students' performance. *Scientific Reports, 13*, 15912. https://doi.org/10.1038/s41598-023-42814-7

Brotherton, G., & Cronin, M. (Eds.). (2020). *Working with Vulnerable Children, Young People and Families* (2nd ed.). Routledge. https://doi.org/10.4324/9780429055218

Coleman, J. (2023). Financial Aid Knowledge and Resources among First-Generation College Students. *College and University, 98*(3), 10-19. https://doi-org.acces.bibl.ulaval.ca/https://www.aacrao.org/research-publications/quarterly-journals/college-university-journal/issue/c-u-vol.-98-no.-3-summer-2023

Copeland, E., McGinnis, E., Bai, Y., Adams, Z., Nardone, H., De vadanam, V., Rettew, J., & Hudziak, J. J. (2021). Impact of COVID-19 Pandemic on College Student Mental Health and Wellness. *Journal of the American Academy of Child & Adolescent Psychiatry, 60*, 134-141. https://doi.org/10.1016/j.jaac.2020.08.466

Cox, B. E., Reason, R. D., Nix, S., & Gillman, M. (2016). Life happens (outside of college): Non-college life-event and students' likelihood of graduation. *Research in Higher Education, 57*(7), 823-844. https://doi.org/10.1007/s11162-016-9409-z

Daly, M., & Robinson, E. (2020). Psychological distress and adaptation to the covid-19 crisis in the United States. *Journal of Psychia tric Research*. https://doi.org/10.1016/j.jpsychires.2020.10.035

Dong, E., Du, H., & Gardner, L. (2020). An interactive web-based dashboard to track COVID-19 in real time. *The Lancet infectious diseases, 20*, 533-534. https://doi.org/10.1016/S1473-3099(20)30120-1

Doreleyers, A., & Knighton, T. (2020). *Pandémie de COVID-19 : Répercussions scolaires sur les étudiants du niveau postsecondaire au Canada*. https://www150.statcan.gc.ca/n1/pub/45-28-0001/2020001/article/00015-fra.pdf

Evans, N. J., Broido, E. M., Brown, K. R., & Wilke, A. K. (2017). *Disability in higher education: A social justice approach.* San Francisco, CA: Jossey-Bass. https://doi.org/10.1080/19496591.2018.1506798

Fédération des cégeps. (2019). *Légère baisse du nombre d'étudiants au cégep.* https://fedecegeps.ca/communiques/2019/08/legere-baisse-du-nombre-detudiants-au-cegep-2/

Gonzalez, T., de la Rubia, M. A., Hincz, K. P., Comas-Lopez, M., Subirats, L., Fort, S., & et Sacha, G. M. (2020). Influence of COVID-19 confinement on students' performance in higher education. *PLoS ONE, 15*(10), e0239490. https://doi.org/10.1371/journal.pone.0239490

Gouvernement du Québec. (2021). https://www.quebec.ca/sante/problemes-de-sante/a-z/coronavirus-2019/situation-coronavirus-quebec/?gclid=CjwKCAjwrPCGBhALEiwAUl9X0z9_vsdetjaJ25tEc8yKUJepOUCdUjGw7ZLsHRw2tj7gy7XhpTtW5RoC5REQAvD_BwE

Hamza, C. A., Ewing, L., Heath, N. L., & Goldstein, A. L. (2021). When social isolation is nothing new: A longitudinal study psychological distress during COVID-19 among university students with and without

preexisting mental health concerns. *Canadian Psychology/Psychologie canadienne, 62*(1), 31. https://doi.org/10.1037/cap0000260

Huckins, J. F., daSilva, A. W., Wang, W., Hedlund, E., Rogers, C., Nepal, S. K., Wu, J., Obuchi, M., Murphy, E. I., Meyer, M. L., Wagner, D. D., Holtzheimer, P. E., & Campbell, A. T. (2020). Mental health and behavior of college students during the early phases of the COVID-19 pandemic: Longitudinal smartphone and Ecological Momentary Assessment Study. *Journal of Medical Internet Research, 22*(6), Article e20185. https://doi.org/10.2196/20185

Larose, S., Duchesne, S., Boivin, M., Vitaro, F., & Tremblay, R. (2015). College completion: A longitudinal examination of the role of developmental and specific college experiences. *International Journal of School and Educational Psychology, 3*, 143-156. https://doi.org/10.1080/21683603.2015.1044631

Larose, S., Soucy, N., Bernier, A., & Roy, R. (1996). Exploration des qualités psychométriques de la version française du « Student Adaptation to College Questionnaire ». *Mesure et Évaluation en Éducation, 19*, 69-94. https://doi.org/10.7202/1092213ar

Larose, S., Duchesne, S., Litalien, D., Denault A.-S., & Boivin, M. (2019). Adjustment trajectories during the college transition: Types, personal and family antecedents, and academic outcomes. *Research in Higher Education, 60*, 684-710. https://doi.org/10.1007/s11162-018-9538-7

Larose, S., Bureau, J., Cellard, C., Janosz, M., Beaulieu, C., Boisclair-Châteauvert, G., & Girard-Lamontagne, A. (2023). How college students with and without disabilities experienced the first wave of the Covid-19 pandemic? A stress and coping perspective. *Research in Higher Education.* https://doi.org/10.1007/s11162-023-09756-5

Lee, J., Jeong, H.J., & Kim, S. (2021). Stress, Anxiety, and Depression Among Undergraduate Students during the COVID-19 Pandemic and their Use of Mental Health Services. *Innov High Educ, 46*, 519-538. https://doi.org/10.1007/s10755-021-09552-y

Li, Y., & Bates, T. C. (2020). Testing the association of growth mindset and grades across a challenging transition: Is growth mindset associated with grades? *Intelligence, 81*, 101471. https://doi.org/10.1016/j.intell.2020.101471

Li, H. Y., Cao, H., Leung, D. Y. P., & Mak, Y. W. (2020). The psychological impacts of a COVID-19 outbreak on college students in China: A longitudinal study. *International Journal of Environmental Research and Public Health, 17*(11), 3933. https://doi.org/10.3390/ijerph17113933

Magson, N. R., Freeman, J. Y. A., Rapee, R. M., Richardson, C. E., Oar, E. L., & Fardouly, J. (2021). Risk and protective factors for prospective changes in adolescent mental health during the COVID-19 pandemic. *Journal of Youth and Adolescence, 50*(1), 44-57. https://doi.org/10.1007/s10964-020-01332-9

Mayhew, M. J., Rockenbach, A. N., Bowman, N. A., Seifert, T. A., Wolniak, G. C., Ernest T. Pascarella, & Patrick T. Terenzini. (2016). *How College Affects Students: Volume 3. 21st Century Evidence That Higher Education Works.* San Francisco, CA: Jossey-Bass.

Millsap, R. E. (2011). *Statistical approaches to measurement invariance.* Routledge/Taylor & Francis Group. https://doi.org/10.4324/9780203821961

Morin, A. J. S., Meyer, J. P., Creusier, J., & Biétry, F. (2016). Multiple-group analysis of similarity in latent profile solutions. *Organizational Research Methods, 19*(2), 231-254. https://doi.org/10.1177/1094428115621148

Morin, A., & Litalien, D. (2019). Mixture modeling for lifespan developmental research. In *Oxford Research Encyclopedia of Psychology*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190236557.013.364

Muthén, L.K., & Muthén, B.O. (1998-2015). *Mplus User's Guide. Seventh Edition*. Los Angeles, CA: Muthén & Muthén.

Planchuelo-Gómez, Á., Odriozola-González, P., Irurtia, M.J., & et de Luis-García, R. (2020). Longitudinal evaluation of the psychological impact of the COVID-19 crisis in Spain. *Journal of Affective Disorders, 277*, 842-849. ISSN 0165-0327. https://doi.org/10.1016/j.psychres.2020.113108

Porat T, Nyrup R, Calvo RA, Paudyal P, & Ford E. (2020). Public Health and Risk Communication During COVID-19—Enhancing Psychological Needs to Promote Sustainable Behavior Change. *Front. Public Health, 8*, 573397. https://doi.org/10.3389/fpubh.2020.573397

Qian, Q., Lau, K., & Chen, P. (2022). Development and Validation of a Dichotomous Classroom Goal Structure Questionnaire Using the TARGET Framework. *Journal of Psychoeducational Assessment, 40*(7), 839-852. https://doi.org/10.1177/07342829221103180

Ryan, Richard M., & Edward L. Deci. (2023). Acting as One: Self-Determination Theory's Scientific and Existential Import', in Richard M. Ryan (ed.), *The Oxford Handbook of Self-Determination Theory* (2023; online edn, Oxford Academic, 23 Feb. 2023). https://doi.org/10.1093/oxfordhb/9780197600047.013.59

Salusky, I., Monjaras-Gaytan, L., Ulerio, G., Forbes, N., Perron, G., & Raposa, E. (2024). The Formation and Role of Social Belonging in On-Campus Integration of Diverse First-Generation College Students. *Journal of College Student Retention: Research, Theory & Practice, 26*(2), 473-499. https://doi.org/10.1177/15210251221092709

Shi, L., & Stevens, G. D. (2021). *Vulnerable populations in the United States*. Hoboken, New Jersey: Jossey-Bass.

Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of Medical Internet Research, 22*(9), e21279. https://doi.org/10.2196/21279

UNESCO. (2021). *Impact du Covid19 sur l'éducation*. https://fr.unesco.org/covid19/educationresponse

Van der Velden, P. G., Contino, C., Das, M., van Loon, P., & Bosmans, M. W. G. (2020). Anxiety and depression symptoms, and lack of emotional support among the general population before and during the COVID-19 pandemic. A prospective national study on prevalence and risk factors. *Journal of Affective Disorders, 277*, 540-548. https://doi.org/10.1016/j.jad.2020.08.026

Watkins-Martin, K., Orri, M., Pennestri, M. H., Castellanos-Ryan, N., Larose, S., Gouin, J. P., Ouellet-Morin, I., Chadi, N., Philippe, F., Boivin, M., Tremblay, R. E., Côté, S., & Geoffroy, M. C. (2021). Depression and anxiety symptoms in young adults before and during the COVID-19 pandemic: evidence from a Canadian population-based cohort. *Annals of general psychiatry, 20*(1), 1-12. https://doi.org/10.1186/s12991-021-00362-2

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health, 17*, 1729. https://doi.org/10.3390/ijerph17051729

World Health Organization. (2021). https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports

Widnall, E. C., Winstone, L., Mars, B., Haworth , C. M. A., & Kidger, J. L. (2020). *Young People's Mental Health during the COVID-19 Pandemic*. University of Bristol. https://sphr.nihr.ac.uk/wp-content/uploads/2020/08/Young-Peoples-Mental-Health-during-the-COVID-19-Pandemic-Report-Final.pdf

Notes

Note 1. In Québec, college and university education programs are separate. College starts after 11 years of schooling (6 years of primary, 5 years of secondary) and offers either 2 years of general pre-university training (e.g., social, scientific, arts, administration) or 3 years of technical training.

Note 2. Springboard to a DCS (081.06): Pathway to Success. A training program that helps students upgrade their qualifications so they can enter or be readmitted to a pre-university or technical program. http://www.education.gouv.qc.ca/fileadmin/site_web/documents/enseignement-superieur/081.06-Tremplin-DEC-VA.pdf