Not Flourishing Mental Health Is Associated with Higher Risks of Anxiety and Depressive Symptoms in College Students

Isabelle Doré
University of Toronto, CHUM Research Centre

Jennifer O'Loughlin
Université de Montréal, CHUM Research Centre

Marie-Pierre Sylvestre
Université de Montréal, CHUM Research Centre

Catherine Michelle Sabiston
University of Toronto

Guy Beauchamp
Quebec Network on Suicide Mood Disorders and Related Disorders

Marc Martineau
Cegep de l'Outaouais

Louise Fournier
Université de Montréal

Isabelle Doré, Department of Kinesiology and Physical Education, University of Toronto, Toronto, Ontario and CHUM Research Centre, Montréal, Québec; Jennifer L. O'Loughlin, Department of Social and Preventive Medicine, School of Public Health, Université de Montréal, Montréal, Québec and CHUM Research Centre, Montréal, Québec; Marie-Pierre Sylvestre, Department of Social and Preventive Medicine, School of Public Health, Université de Montréal, Montréal, Québec and CHUM Research Centre, Montréal, Québec; Catherine M. Sabiston, Faculty of Kinesiology & Physical Education, University of Toronto, Toronto, Ontario; Guy Beauchamp, Quebec Network on Suicide Mood Disorders and Related Disorders; Marc Martineau, Cegep de l'Outaouais, Gatineau, Québec; Louise Fournier, Department of Social and Preventive Medicine, School of Public Health, Université de Montréal, Montréal, QC.

Isabelle Doré is now at School of Kinesiology and Physical Activity Sciences, Faculty of Medicine, Université de Montréal and CHUM Research Centre, Montréal, Québec.

ABSTRACT

Youth mental health is a major public health concern. This study assesses whether baseline and short-term changes in mental health predict anxiety and depressive symptoms in college students. *Not flourishing* mental health at baseline was a risk factor for high levels of anxiety and depressive symptoms. Compared to participants with *stable flourishing* mental health, those who *declined to not flourishing* and those who were *stable not flourishing* had increased risks of high anxiety and depressive symptoms. Assessing mental health may be effective in predicting mental disorder symptoms and supports the need for mental health promotion interventions.

Keywords: mental health; flourishing; anxiety; depression; mental health promotion; college students.

RÉSUMÉ

La santé mentale des jeunes est un enjeu majeur de santé publique. Cette étude évalue si l'état initial et le changement de l'état de santé mentale permettent de prédire les symptômes anxieux et dépressifs chez les étudiants au collégial. Une santé mentale *non florissante* laisse présager un risque de symptômes anxieux et dépressifs. Comparativement aux jeunes *stables florissants*, ceux qui déclinent à *non florissants* et ceux *stables non florissants* présentent un risque accru de symptômes anxieux et dépressifs. L'évaluation de la santé mentale permet de prédire le risque de symptômes de troubles mentaux et renforce l'importance des interventions de promotion de la santé mentale.

Mots-clés : santé mentale; florissant; anxiété; dépression; promotion de la santé mentale; étudiants.

Transitioning from adolescence to adulthood is a critical developmental period involving biological, cognitive, emotional, and social role changes (Schulenberg, Sameroff, & Cicchetti, 2004). These changes occur concurrently from age 15 to age 30 (Arnett, 2000), necessitating ongoing personal, familial, academic, professional, and financial adaptation which can cause stress (Schulenberg et al., 2004) and increase vulnerability to mental disorders. Psychosocial functioning is also challenged, which can threaten mental health by contributing to the onset of anxiety and depressive symptoms (Kessler et al., 2005; Kosidou et al., 2012). Between 70% to 80% of mental disorders in adults occur for the first time before age 25 (Kessler et al., 2007; UNICEF, 2011), and youth age 15–24 are at highest risk of developing common mental disorders (Gilmour, 2014). According to the 2012 Canadian Community Health Survey – Mental Health (CCHS-MH), the 12-month prevalence of anxiety, depression, and substance abuse disorders was 18.5% among 15–24-year-olds, 11.4% in the 25–44 age group, 8.3% in the 45–64 age group and 3.2% in the 65 and over age group (Gilmour, 2014). These prevalence values demonstrate the importance of targeting mental health and symptoms of mental disorders among young adulthood.

Correspondence concerning this article should be addressed to Isabelle Doré, School of Kinesiology and Physical Activity Sciences, Faculty of Medicine, Université de Montréal, CEPSUM - 2100, boul. Édouard-Montpetit - bureau 7209, H3T 1J4. Email: isabelle.dore@umontreal.ca

Additionally, the prevalence of mental disorders in youth has increased in the last decade. In a large nationally representative survey of 600,000 participants, researchers found that more United States adolescents and young adults in the late 2010s experienced serious psychological distress, major depression and suicidal thoughts, and more attempted suicide compared to the mid-2000s (Twenge, Cooper, Joiner, Duffy, & Binau, 2019). More specifically, in adolescents aged 12 to 17 years, rates of major depressive episodes in the last year increased by 52% from 8.7% in 2005 to 13.2% in 2017, and by 63% in young adults aged 18–25 years from 8.1% in 2009 to 13.2% in 2017. Trends were weak or non-existent in adults aged ≥26 years. The authors suggested a generational shift with a steady rise in mood disorders and suicide-related outcomes for cohorts born from the early 1980s (millennials) to the late 1990s (iGen), potentially attributable to the rise in electronic communication and digital media as well as declines in sleep duration (Twenge et al., 2019). Furthermore, females consistently report higher levels of psychological distress (Adlaf, Demers, & Glikman, 2005), and anxiety and depressive symptoms (Lazaratou, Dikeos, Anagnostopoulos, & Soldatos, 2010; Reavley, McCann, & Jorm, 2011) compared to their male counterparts.

Young people pursuing post-secondary education are particularly vulnerable during this developmental transition (Reyes-Rodríguez, Rivera-Medina, Cámara-Fuentes, Suárez-Torres, & Bernal, 2012). Specific challenges in this group relate to adapting to new, less supervised school environments, leaving the family home, study-work-family balance, and constant pressure to succeed (Reyes-Rodríguez et al., 2012; Schulenberg et al., 2004). Based on the Canadian results from the ACHA-NCHA II Spring 2016 survey, 28.5% of the 43,780 Canadian college student participants reported that they *felt overwhelming anxiety in the last two weeks,* 17.1% *felt so depressed that it was difficult to function in the last two weeks*; 3.0% had seriously *considered suicide in the last two weeks,* and 0.5% had *attempted suicide in the last two weeks* (American College Health Association, 2016). The ACHA-NCHA II provides the largest and most comprehensive data on the health of college students, and the results demonstrate a need for targeted efforts to help college students manage symptoms of mental illness and stress. Public health intervention is timely since high stress levels, symptoms of anxiety and depression, as well as psychological distress among students can hinder academic performance, and increase the risk of failure and student drop out (Storrie, Ahern, & Tuckett, 2010). Furthermore, mental disorders in youth predict chronicity, recurrence, and more severe mental disorders later in life (Garcia-Toro et al., 2013; NIMH, 2011), and the transition to adulthood represents a critical time window in which to promote mental health and prevent the onset of mental disorders. Consequently, optimizing mental health among youth is a major public health challenge and should be a priority (Kieling et al., 2011).

Mental health is not the absence of mental illness but rather a state of complete well-being encompassing the ability to enjoy life and deal with its challenges (OMS, 2004). Mental health is an essential resource that must be protected, nurtured, supported, and maintained (Barry, 2009). The Mental Health Promotion and Protection framework, which aims to promote the maintenance and improvement of mental health and protect against its loss (Davis, 2002; Keyes, 2007), relies on a model whereby mental health and mental illness are not extremes of one continuum, but two distinct yet related continua (Keyes, 2002). In this way, the absence of mental illness does not imply the presence of mental health and, conversely, the presence of mental health does not necessarily indicate the absence of mental illness. The evaluation of mental health should include both hedonic (i.e., mood and emotions) and eudemonic (i.e., functioning) dimensions of emotional,

psychological, and social well-being (Waterman, 1993). The presence of mental health characterized by high levels of emotional, social, and psychological well-being is considered a state of "flourishing" (Keyes, 2002).

There is growing interest in investigating the continua of positive mental health and symptoms or diagnoses of mental disorders. Specifically, a study of adults aged >20 years in the Netherlands reported that flourishing mental health reduced the risk of incident mood disorders by 28% over 3 years, and of anxiety disorders by 53% (Schotanus-Dijkstra, Ten Have, Lamers, de Graaf, & Bohlmeijer, 2016). A 10-year longitudinal study of adults aged 25–74 years found that well-being protects from internalizing mental disorders (i.e., depression, generalized anxiety disorder; Keyes, Dhingra, & Simoes, 2010). Similarly, in older adults (aged 51–67 years), people with low positive well-being were 7.16 times more likely to be depressed 10 years later (Wood & Joseph, 2010). Consistent with these findings, Koivumaa-Honkanen and colleagues (2004) found that poor life satisfaction was associated with an increased risk of moderate/severe depression 9 and 15 years later (Koivumaa-Honkanen, Kaprio, Honkanen, Viinamäki, & Koskenvuo, 2004). Researchers have also investigated the short-term association between mental health and depression. Low subjective well-being significantly predicted increased depression symptoms over 3 months among young adults beginning a medical internship (Grant, Guille, & Sen, 2013). Finally, using a cross-lagged panel design in a representative sample of adults, Lamers and colleagues (2015) found that after controlling for initial levels, psychopathological symptoms were longitudinally related to positive mental health and vice versa (Lamers, Westerhof, Glas, & Bohlmeijer, 2015). While this longitudinal evidence of associations between mental health and symptoms or diagnoses of mental disorders is informative, most of the findings are based on adult samples.

Studies of college students have all used cross-sectional designs (Keyes et al., 2012; Low, 2011) which precludes an understanding of whether mental health predicts symptoms of mental illness in students transitioning to adulthood. Increased understanding of this association in college students could inform interventions that aim to promote mental health and prevent mental disorders, with possibly profound public health benefit (Grant et al., 2013).

Filling gaps in existing research, the current study aimed to (1) investigate whether baseline mental health is a risk factor for probable mental illness disorders; (2) investigate whether changes in mental health over six months predict probable mental illness disorders; and (3) examine whether sex moderates the associations of interest. Consistent with theory and empirical evidence (Keyes, 2002), mental health was assessed as *flourishing* or *not flourishing*. Furthermore, to capture possible shifts in mental health, flourishing was further labelled as stable, improved to flourishing, declines to not flourishing, and stable not flourishing categories. Symptoms of mental illness disorders were assessed as anxiety and depression.

METHODS

A longitudinal study was conducted among 1,527 students (58% female; mean age = 18.4, standard deviation (SD) = 2.4 years) in a single CEGEP (*Collège d'enseignement général et professionnel/College of General and Professional Education*) in Quebec, Canada. CEGEPs provide post-secondary school education including 2-year pre-university programs and 3-year career programs, which typically lead to employment. In Quebec, CEGEPs are an ideal setting in which to study youth in transition to adulthood because these

institutions provide post-secondary school education, 65% of Quebec youth attend CEGEP, and youth age 15–24 represent 93% of the CEGEP population (Ministère de l'Éducation du Loisir et du Sport, 2013). In Quebec, 56% of college students reported being stressed or very stressed, and 20% were depressed often or very often (Roy, 2008), also demonstrating a need to target this segment of Canadian students.

Data were collected in 88 of 103 (85.4%) compulsory physical education (PE) classes in the CEGEP. Scheduling precluded data collection in 15 PE classes. A total of 1,527 students completed questionnaires during class time at baseline (fall 2013) and provided an email address and telephone number for follow-up contact. No data were collected on those who did not participate; however, the high response proportion (87.4% of 1,746 eligible students) and the method of data collection (i.e., in-class questionnaires placed in envelopes after completion to assure anonymity) increased the probability that the sample was representative of the CEGEP population. In addition, the proportion of females in the current sample at baseline (58.1%) is similar to the proportion of females who attended the CEGEP in 2013–14 (55.4%). Six months after baseline, (spring 2014), 460 (30.1% of 1,527) participants (62.4% female; mean age at baseline = 18.5, SD 2.6 years) completed a follow-up web-based questionnaire.

This research was conducted in accordance with the Helsinki Declaration revised in 1989. This study was approved by the ethics review boards of the participating CEGEP (Certificate no CER-2013-06-ID) and the University of Montreal Faculty of Medicine (Certificate no 13-093-CERES-P), Quebec, Canada. Each participant provided written informed consent.

MEASURES

Mental Health

The MHC-SF includes items assessing positive emotions (i.e., emotional well-being) and positive functioning at both individual and social levels (i.e., psychological and social well-being). The MHC-SF has a 3-factor structure corresponding to emotional, social, and psychological well-being subscales; each subscale has good internal consistency and reliability; and sex-invariance has been demonstrated (Doré, O'Loughlin, Sabiston, & Fournier, 2017). Emotional well-being was measured with three items of happiness, satisfaction, and interest in life. Positive functioning included five social well-being items of social acceptance, social actualization, social contribution, social coherence, and social integration and six psychological well-being items of autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance (Keyes, 2005). On all 14 items, participants rated how often they felt "this way" during the last month on a 6-point Likert scale (0–5): *never, rarely, a few times, often, most of the time, all the time.* As proposed by Keyes (2005), mental health was categorized as *flourishing* if the participant responded "always" or "most of the time" to at least one of the three emotional well-being items, and at least six of the 11 positive functioning items. Participants responding "never" or "rarely" to at least one of the three emotional well-being items, and at least six of the 11 positive functioning items, were categorized as *languishing*. All others were categorized as *moderately mentally healthy*. Due to the low proportion of *languishing* participants (2.0% at baseline; 4.8% at follow-up) and because all states inferior to flourishing are associated with adverse health outcomes (Keyes & Simoes, 2012), this category was merged with *moderately mentally healthy* into one category to create a dichotomous mental well-being variable of *flourishing* and *not flourishing*.

Additionally, a 4-category *change in mental health* variable was created to reflect the evolution of mental health over time: (1) *stable flourishing* included participants who were flourishing at baseline and follow-up; (2) *improved to flourishing* included participants who changed from not flourishing at baseline to flourishing at follow-up; (3) *declined to non-flourishing* included participants who changed from flourishing at baseline to not flourishing at follow-up; and (4) *stable not flourishing*, which included participants who were not flourishing at baseline or follow-up.

Anxiety and Depressive Symptoms

Anxiety and depressive symptoms were measured using the Hospital Anxiety and Depression Scale (HADS), a brief screening questionnaire widely used to identify probable cases of anxiety or depression (Zigmond & Snaith, 1983) based on symptomatology. The HADS comprises seven items for anxiety (HADS-A) and seven items for depression (HADS-D) symptoms experienced in the previous seven days. Items are worded positively or negatively and each item was scored on a 4-point Likert scale (0–3) with scores ranging between 0 and 21 for each subscale. The French-Canadian version of HADS has good reliability (Cronbach's alpha ranges from 0.82–0.89), good discriminant validity, and a 2-factor structure reflecting anxiety and depression factors (Roberge et al., 2012). As recommended for the HADS French-Canadian version, a cut-off >10 on the HADS-A subscale to denote high anxiety symptoms, and a cut-off >7 on the HADS-D subscale high depressive symptoms; high symptoms indicate probable cases of anxiety and depression, respectively (Roberge et al., 2012).

Based on findings by Keyes and colleagues (2010), the primary potential confounders of the associations investigated include sex, age, socioeconomic status (SES) or income, and race/ethnicity. As such, the models were adjusted for sex, age (16–17; 18–19; ≥ 20 years) and perceived SES. No data were collected on race/ethnicity since the annual college report stated that almost all students were Caucasian. Perceived SES was measured by *How do you see your economic situation compared to other people your age?* Response choices included *affluent, sufficient income, poor and very poor*. Due to the low proportion of participants responding very poor, this category was merged with poor. Perceived SES is a subjective measure that is defined as "an individual's perception of his or her place in the socioeconomic structure" (Singh-Manoux, Adler, & Marmot, 2003). This measure was used rather than household income because participants were transitioning to adulthood with respect to place of residence (i.e., some participants lived with their parents, some lived with their parents on the weekend and in an apartment or residence during the week, others lived alone, as a couple, or as co-renters) and their multiple sources of income (e.g., loans, scholarships, paid employment, financial assistance from parents). Similar proxy SES measures have been related to mental health (Quon & McGrath, 2014).

Data Analysis

Descriptive statistics were used to assess distributions over time and identify outliers. The association between the exposures (i.e., baseline mental health; change in mental health) and the outcomes (probable anxiety or depressive disorders at follow-up) was examined in multivariate logistic regression adjusting for baseline levels of anxiety and depression, age, sex, and perceived SES. The interaction between sex and

each exposure was tested. The significance level was set at 0.05. All statistical analyses were performed using R version 3.4.2.

RESULTS

There were no statistically significant differences between participants with baseline data only (n = 1,067) and those with follow-up data (n = 460) on age, perceived SES, baseline mental health, anxiety or depressive symptoms; however, females were more likely to participate at follow-up. The analytic sample comprised 454 participants (63.4% female) with complete data. Participants were aged 16 to 36 (Mean = 18.5, SD = 2.6) years; 37.9% were age 16 to 17 years, 46.7% were age 18 to 19 years and 15.4% were ≥20 years. Most participants reported sufficient income compared to same-age peers (50.0%) or being affluent (36.6%). Only 13.4% perceived that their SES was poor/very poor.

Change Over Time in Mental Health, Anxiety and Depressive Symptoms

One third (35.0%) of participants had *stable flourishing* mental health; 11.2% declined to *non-flourishing* over six months; 15.6% improved to *flourishing*, and 38.1% had *stable not flourishing* mental well-being (Table 1).

Table 1

Mental Health Status at Baseline and Follow-Up (n = 454)

	Mental Health Status at Follow-Up							
	Flourishing			Not Flourishing			Total	
Mental health status at baseline	n	%	(95% CI)	n	%	(95% CI)	n	%
Flourishing	159	35.0	(30.6, 39.4)	51	11.2	(8.3, 14.1)	210	46.2
Not flourishing	71	15.6	(12.3, 19.0)	173	38.1	(33.6, 42.6)	244	53.7
Total	230	50.7	-	224	49.3	-	454	100.0

CI = confidence interval

The proportion of participants with high anxiety symptoms was similar at baseline and follow-up (27.3% vs. 28.3%). However, of the 128 participants with high anxiety symptoms at follow-up, 54 (42.2%; i.e., 11.9% of the total sample) did not report these symptoms at baseline. The proportion of participants with high depressive symptoms was 16.7% at baseline and 20.5% at follow-up. Only 9.0% of participants reported high depressive symptoms at both time points. Among all participants, 11.5% had high depressive symptoms only at follow-up (Tables 2 and 3).

Table 2

Anxiety Symptoms at Baseline and Follow-Up (n = 454)

	Anxiety Symptoms at Follow-Up							
	Low			High			Total	
Anxiety symptoms at baseline	n	%	(95% CI)	n	%	(95% CI)	n	%
Low	276	60.8	(56.3, 65.3)	54	11.9	(8.9, 14.9)	330	72.7
High	50	11.0	(8.1, 13.9)	74	16.3	(12.9, 19.7)	124	27.3
Total	326	71.7	-	128	28.3	-	454	100.0

CI = confidence interval

Table 3

Depressive Symptoms at Baseline and Follow-Up (n = 454)

	Depressive Symptoms at Follow-Up							
	Low			High			Total	
Depressive symptoms at baseline	n	%	(95% CI)	n	%	(95% CI)	n	%
Low	326	71.8	(67.7, 75.9)	52	11.5	(8.5, 14.4)	378	83.3
High	35	7.7	(5.3, 10.2)	41	9.0	(6.4, 11.7)	76	16.7
Total	361	79.5	—	93	20.5	—	454	100.0

CI = confidence interval

Co-occurrence of high anxiety and depressive symptoms was observed. At baseline, among 76 participants with high depressive symptoms, 72.4% also reported high anxiety symptoms (12.1% of the total sample). At follow-up, 73.6% of the 93 participants with high depressive symptoms also reported high anxiety symptoms, representing 14.9% of the sample.

Baseline Mental Health and Anxiety and Depressive Symptoms

Relative to participants with *flourishing* mental health at baseline, those whose mental health was *not flourishing* were almost 4 times more likely to have a probable anxiety disorder at follow-up, even after controlling for covariates and baseline anxiety symptoms (Table 4, Model A). The risk of a depressive disorder was also higher among participants with *not flourishing* mental health after controlling for covariates and depressive symptoms. None of the sex interaction terms were statistically significant.

Change in Mental Health and Anxiety and Depressive Symptoms

Relative to *stable flourishing* participants, those whose mental health was *stable not flourishing* were 7 times more likely to have high anxiety symptoms at follow-up (Table 4, Model B). The risk was three times higher among participants whose mental health declined to *not flourishing*. Similarly, participants with *stable not flourishing* mental health and those who declined to *not flourishing* were more likely to have high depressive symptoms at follow-up. Relative to *stable flourishing* participants, those whose mental health improved to flourishing did not have an increased risk of high anxiety or depressive symptoms. Only one sex interaction term was statistically significant (OR [95%CI] = 0.10 [0.01, 0.72]), suggestive that the association between *declined to not flourishing* (relative to *stable flourishing)* and high anxiety symptoms was weaker in females.

Table 4

Association Between Baseline Mental Health (Model A), Change in Mental Health (Model B), and High Anxiety or Depressive Symptoms at Follow-Up (n = 454)

	High anxiety symptoms		High depressive symptoms	
	OR	95% CI	OR	95% CI
Model A				
Anxiety or depressive symptoms (baseline)[a]				
Low	1.0		1.0	
High	**5.1**	**(3.1, 8.4)**	4.7	(2.6, 8.6)
Mental health status (baseline)				
Flourishing	1.0		1.0	
Not flourishing	**3.7**	**(2.2, 6.4)**	2.6	(1.4, 4.6)
Model B				
Anxiety or depressive symptoms (baseline)[a]				
Low	1.0		1.0	
High	4.8	(2.9, 8.1)	4.9	(2.6, 9.4)
Change in mental health status				
Stayed flourishing	1.0		1.0	
Improved to flourishing	2.3	(1.0, 5.5)	1.1	(0.3, 4.2)
Declined to not flourishing	**3.3**	**(1.3, 8.1)**	11.1	(3.8, 32.6)
Stayed not flourishing	**7.6**	**(3.9, 15.0)**	11.3	(4.5, 28.5)

[a]Models adjusted for sex, age, and perceived SES. The model predicting anxiety also includes *baseline anxiety symptoms;* the model predicting depressive disorders also includes *baseline depressive symptoms*.
CI = Confidence Interval
Bold type indicates statistically significant results ($p < 0.05$).

DISCUSSION

To our knowledge, this is the first longitudinal study to examine the association between mental health and symptoms of common mental disorders in youth pursuing post-secondary studies. The current study investigated whether flourishing mental health at baseline or changes in mental health within a single academic year (i.e., over a relatively short time period) are associated with high anxiety or depressive symptoms in college students.

Past research on changes in mental health focused primarily on emotional well-being (Eid & Diener, 2004). Results from the current study extend the literature by showing that mental health assessment including all three forms of well-being (i.e., emotional, social, and psychological well-being) vary over a short time period (i.e., 6 months) among college students. The current findings align with previous research in adults (Keyes et al., 2010) showing that mental health varies over short time periods suggestive that it is a dynamic state that may need frequent assessment in terms of supporting and evaluating health promotion and public health wellness interventions (Russell-Mayhew, 2006). These results are also consistent with studies suggesting that symptoms of mental disorders vary over time (Ge, Natsuaki, & Conger, 2006) and that anxiety and depressive symptoms co-occur in youth (Cummings, Caporino, & Kendall, 2014). The observed variation in anxiety and depressive symptoms suggests that youth transitioning to adulthood experience changes in their life over short time-periods that directly affect symptoms of mental disorders (Schulenberg & Zarrett, 2006). These findings confirm previous reports suggesting that anxiety and depression frequently occur concurrently and sequentially in college students and that symptoms of one disorder often increases the risk of the other over time (Garber & Weersing, 2010).

Consistent with reports that mental health is inversely associated with depression symptoms (Grant et al., 2013), in the current study *non-flourishing* mental health was identified as a risk factor for both high anxiety and depressive symptoms. While past symptoms of anxiety and depression were risk factors for future mental disorders symptoms, change in mental health also predicts high anxiety and depressive symptoms. Relative to participants whose mental health was *stable flourishing*, those whose mental health declined or was *stable not flourishing*, had a higher risk of high anxiety and depressive symptoms, even after accounting for baseline symptoms of anxiety or depression and potential confounders. Furthermore, participants whose mental health improved to *flourishing* did not have a higher risk of developing an anxiety or depressive disorder. The current results support the hypothesis that gains in mental health protect against the risk of high mental disorders symptoms, while declines in mental health increases the risk (Keyes et al., 2010). The current study results are the first to support this hypothesis over 6 months, within the same academic year, among college students. Others have reported that screening for mental health and mental disorders may help in predicting suicidal behaviour or impaired academic performance in American college students (Keyes et al., 2012). Given that there is high comorbidity between anxiety and depression, future work is needed to explore the impact of mental health in youth with high levels of both anxiety and depressive symptoms.

The only statistically significant sex interaction in this study suggested that declines from flourishing to not flourishing mental health affected females to a lesser extent than males in terms of the risk of anxiety. Females usually experience higher levels of stress, psychological distress, and depressive symptomatology than males as well as lower levels of mental health (Ge et al., 2006; Kouros & Garber, 2014). However,

compared to males, females report higher levels of coping strategies including emotional social support, instrumental social support, and venting emotions (Eschenbeck, Kohlmann, & Lohaus, 2007). In a previous study, coping preferences among females mediated the relationships between gender and depressive symptomatology suggesting that instrumental social support may be particularly helpful for females (Malooly, Flannery, & Ohannessian, 2017). It is possible that, when experiencing declines in mental health or well-being, the social support coping strategy used by females protects them from developing high anxiety symptoms. This proposition requires further research attention.

The current findings have implications for public health. First, being *stable flourishing* or *improving* mental health to flourishing may protect against mental disorders, suggesting the need for strategies to promote mental health. In contrast, declines in mental health predict increases in the risk of mental disorders, suggesting that strategies are needed to protect mental health (Keyes et al., 2010). Comprehensive strategies to promote mental health that target all college students, including those at risk of developing mental disorders (Barry & Jenkins, 2007), might have an impact on enhancing happiness, individual and social functioning, as well as reduce the incidence of common mental disorders (i.e., anxiety and depression). Innovative mental health promotion strategies adapted to college students should include on-campus and community-based interventions, and involve multiple stakeholders (Centre for Innovation in Campus Mental Health, 2015; Conley, Durlak, & Kirsch, 2015). A recent systematic review suggests that setting-based mental health promotion interventions should be privileged for post-secondary students (Fernandez et al., 2016). Examples of effective interventions include physical activity, especially in a social context such as informal group or team sports (Doré, O'Loughlin, Schnitzer, Datta, & Fournier, 2018; Eime, Harvey, Brown, & Payne, 2010; Eime et al., 2013), online mental health promotion interventions (Clarke, Kuosmanen, & Barry, 2015), and mental health literacy training programs for teachers and students (Centre for Innovation in Campus Mental Health, 2015).

Strengths of this study include the longitudinal design, which permitted investigating whether mental health is associated with probable anxiety or depression. Use of a comprehensive measure of mental health encompassing emotional, psychological and social well-being permitted assessment of all mental health dimensions. The focus on young people in transition to adulthood, an age group in which mental disorders often first manifest (Kosidou et al., 2012; Schulenberg et al., 2004) and that is often overlooked because of recruitment difficulties, is another strength.

Limitations include the inherent social desirability associated with self-report measures that may result in misclassification. The analytical approach did not account for measurement constraints and correlated error variances that might occur because the same measure (HADS) was used for both anxiety and depression symptoms. Although the HADS is a valid and reliable screening tool to identify probable cases of anxiety and depression based on high symptomatology, a structured psychiatric evaluation (i.e., Composite International Diagnostic Interview-Short Form [CIDI-SF]) should be used to provide a complete assessment and diagnosis of mental disorders. Finally, high attrition could have resulted in selection bias. However, although a higher proportion of females participated at follow-up, there were no other important differences between participants with and without follow-up data.

Despite the urgent need for action to counter increasing anxiety and depression in youth, public health interventions to promote mental health and prevent mental disorders are uncommon. In Quebec, most mental

health programs in colleges target suicide prevention. Results of the current study indicate that efforts should be invested in developing interventions to promote, enhance, and protect mental health and prevent the onset of mental disorders. Future research should explore the mechanisms underpinning the association between mental health and mental disorders. For example, social support (Lin, Dean, & Ensel, 2013), self-esteem (Mann, Hosman, Schaalma, & De Vries, 2004) and resilience (Dumont & Provost, 1999) might underpin the protective effect of *flourishing* mental health on anxiety and depressive symptoms. Research is also needed to help tailor mental health promotion interventions to youth transitioning to adulthood, especially those in college.

CONCLUSIONS

Mental health that is *not flourishing* predicts probable anxiety and depressive disorders in college students over short time periods. Relative to participants whose mental health was *stable flourishing*, those who declined to *not flourishing* and those whose mental health was *stable not flourishing* were more likely to have a probable anxiety and depressive disorders. Assessing mental health may help predict future anxiety and depression among college students. Mental health promotion strategies are needed to enhance and protect mental health, especially among youth pursuing postsecondary studies.

REFERENCES

Adlaf, E., Demers, A., & Glikman, L. (2005). *Canadian campus survey 2004.* Retrieved from Toronto: https://collections.ola.org/mon/25005/309709.pdf

American College Health Association. (2016). *American College Health Association-National College Health Assessment II: Canadian Reference Group Executive Summary Spring 2016.* Retrieved from Hanover, MD: http://oucha.ca/pdf/2016_NCHA-II_WEB_SPRING_2016_ONTARIO_CANADA_REFERENCE_GROUP_EXECUTIVE_SUMMARY.pdf

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469.

Barry, M. M. (2009). Addressing the determinants of positive mental health: Concepts, evidence and practice. *International Journal of Mental Health Promotion, 11*(3), 4–17.

Barry, M. M., & Jenkins, R. (2007). *Implementing mental health promotion*: Elsevier Health Sciences.

Centre for Innovation in Campus Mental Health. (2015). *Environmental Scan of Promising Practices and Indicators Relevant to Campus Mental Health*. Retrieved from Toronto, ON.

Clarke, A. M., Kuosmanen, T., & Barry, M. M. (2015). A systematic review of online youth mental health promotion and prevention interventions. *Journal of Youth and Adolescence, 44*(1), 90–113.

Conley, C. S., Durlak, J. A., & Kirsch, A. C. (2015). A meta-analysis of universal mental health prevention programs for higher education students. *Prevention Science, 16*(4), 487–507.

Cummings, C. M., Caporino, N. E., & Kendall, P. C. (2014). Comorbidity of anxiety and depression in children and adolescents: 20 years after. *Psychological Bulletin, 140*(3), 816.

Davis, N. J. (2002). The promotion of mental health and the prevention of mental and behavioral disorders: Surely the time is right. *International Journal of Emergency Mental Health*, *4*(1), 3–30.

Doré, I., O'Loughlin, J. L., Sabiston, C. M., & Fournier, L. (2017). Psychometric evaluation of the Mental Health Continuum–Short Form in French Canadian young adults. *The Canadian Journal of Psychiatry, 62*(4), 286–294.

Doré, I., O'Loughlin, J. L., Schnitzer, M. E., Datta, G. D., & Fournier, L. (2018). The longitudinal association between the context of physical activity and mental health in early adulthood. *Mental Health and Physical Activity, 14*, 121–130.

Dumont, M., & Provost, M. A. (1999). Resilience in adolescents: Protective role of social support, coping strategies, self-esteem, and social activities on experience of stress and depression. *Journal of Youth and Adolescence, 28*(3), 343–363.

Eid, M., & Diener, E. (2004). Global judgments of subjective well-being: Situational variability and long-term stability. *Social Indicators Research, 65*(3), 245–277.

Eime, R. M., Harvey, J. T., Brown, W. J., & Payne, W. R. (2010). Does sports club participation contribute to health-related quality of life? *Medicine and Science in Sports and Exercise, 42*(5), 1022–1028.

Eime, R. M., Harvey, J. T., Sawyer, N. A., Craike, M. J., Symons, C. M., Polman, R. C., & Payne, W. R. (2013). Understanding the contexts of adolescent female participation in sport and physical activity. *Research Quarterly for Exercise and Sport, 84*(2), 157–166.

Eschenbeck, H., Kohlmann, C.-W., & Lohaus, A. (2007). Gender differences in coping strategies in children and adolescents. *Journal of Individual Differences, 28*(1), 18–26.

Fernandez, A., Howse, E., Rubio-Valera, M., Thorncraft, K., Noone, J., Luu, X., . . . Salvador-Carulla, L. (2016). Setting-based interventions to promote mental health at the university: A systematic review. *International Journal of Public Health, 61*(7), 797–807.

Garber, J., & Weersing, V. R. (2010). Comorbidity of anxiety and depression in youth: Implications for treatment and prevention. *Clinical Psychology: Science and Practice, 17*(4), 293–306.

Garcia-Toro, M., Rubio, J. M., Gili, M., Roca, M., Jin, C. J., Liu, S.-M., . . . Blanco, C. (2013). Persistence of chronic major depression: A national prospective study. *Journal of Affective Disorders, 151*(1), 306–312.

Ge, X., Natsuaki, M. N., & Conger, R. D. (2006). Trajectories of depressive symptoms and stressful life events among male and female adolescents in divorced and nondivorced families. *Development and Psychopathology, 18*, 253–273.

Gilmour, H. (2014). Positive mental health and mental illness. *Health Reports, 25*(9), 3.

Grant, F., Guille, C., & Sen, S. (2013). Well-being and the risk of depression under stress. *PloS one, 8*(7), e67395.

Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustun, T. B. (2007). Age of onset of mental disorders: A review of recent literature. *Current Opinion in Psychiatry, 20*(4), 359.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6), 593–602.

Keyes, C. L. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior, 43*(2), 207–222.

Keyes, C. L. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology, 73*(3), 539.

Keyes, C. L. (2007). Promoting and protecting mental health as flourishing: A complementary strategy for improving national mental health. *American Psychologist, 62*(2), 95.

Keyes, C. L., Dhingra, S. S., & Simoes, E. J. (2010). Change in level of positive mental health as a predictor of future risk of mental illness. *American Journal of Public Health, 100*(12), 2366–2371.

Keyes, C. L., Eisenberg, D., Perry, G. S., Dube, S. R., Kroenke, K., & Dhingra, S. S. (2012). The relationship of level of positive mental health with current mental disorders in predicting suicidal behavior and academic impairment in college students. *Journal of American College Health, 60*(2), 126–133.

Keyes, C. L., & Simoes, E. J. (2012). To flourish or not: Positive mental health and all-cause mortality. *American Journal of Public Health, 102*(11), 2164–2172.

Kieling, C., Baker-Henningham, H., Belfer, M., Conti, G., Ertem, I., Omigbodun, O., . . . Rahman, A. (2011). Child and adolescent mental health worldwide: evidence for action. *The Lancet, 378*(9801), 1515–1525.

Koivumaa-Honkanen, H., Kaprio, J., Honkanen, R., Viinamäki, H., & Koskenvuo, M. (2004). Life satisfaction and depression in a 15-year follow-up of healthy adults. *Social Psychiatry and Psychiatric Epidemiology, 39*(12), 994–999.

Kosidou, K., Hellner-Gumpert, C., Fredlund, P., Dalman, C., Hallqvist, J., Isacsson, G., & Magnusson, C. (2012). Immigration, transition into adult life and social adversity in relation to psychological distress and suicide attempts among young adults. *PloS one, 7*(10), e46284.

Kouros, C. D., & Garber, J. (2014). Trajectories of individual depressive symptoms in adolescents: Gender and family relationships as predictors. *Developmental Psychology, 50*(12), 2633.

Lamers, S. M., Westerhof, G. J., Glas, C. A., & Bohlmeijer, E. T. (2015). The bidirectional relation between positive mental health and psychopathology in a longitudinal representative panel study. *The Journal of Positive Psychology, 10*(6), 553–560.

Lazaratou, H., Dikeos, D. G., Anagnostopoulos, D. C., & Soldatos, C. R. (2010). Depressive symptomatology in high school students: The role of age, gender and academic pressure. *Community Mental Health Journal, 46*(3), 289–295.

Lin, N., Dean, A., & Ensel, W. M. (2013). *Social support, life events, and depression*. Academic Press.

Low, K. G. (2011). Flourishing, substance use, and engagement in students entering college: A preliminary study. *Journal of American College Health, 59*(6), 555–561.

Malooly, A. M., Flannery, K. M., & Ohannessian, C. M. (2017). Coping mediates the association between gender and depressive symptomatology in adolescence. *International Journal of Behavioral Development, 41*(2), 185–197.

Mann, M. M., Hosman, C. M., Schaalma, H. P., & De Vries, N. K. (2004). Self-esteem in a broad-spectrum approach for mental health promotion. *Health Education Research, 19*(4), 357–372.

Ministère de l'Éducation du Loisir et du Sport. (2013). *Indicateurs de l'éducation - Édition 2013*. Retrieved from Québec: http://www.education.gouv.qc.ca/fileadmin/site_web/documents/PSG/statistiques_info_decisionnelle/Indicateurs_educ_2013_webP.pdf

NIMH. (2011). *Depression*. Retrieved from https://www.nimh.nih.gov/health/publications/depression/index.shtml

OMS. (2004). *Investir dans la santé mentale*. Retrieved from Genève: https://apps.who.int/iris/handle/10665/42896

Quon, E. C., & McGrath, J. J. (2014). Subjective socioeconomic status and adolescent health: A meta-analysis. *Health Psychology, 33*(5), 433.

Reavley, N. J., McCann, T. V., & Jorm, A. F. (2011). Actions taken to deal with mental health problems in Australian higher education students. *Early Intervention in Psychiatry, 6*(2), 159–165.

Reyes-Rodríguez, M. L., Rivera-Medina, C. L., Cámara-Fuentes, L., Suárez-Torres, A., & Bernal, G. (2012). Depression symptoms and stressful life events among college students in Puerto Rico. *Journal of Affective Disorders*, *145*(3), 324–330.

Roberge, P., Doré, I., Menear, M., Chartrand, É., Ciampi, A., Duhoux, A., & Fournier, L. (2012). A psychometric evaluation of the French Canadian version of the Hospital Anxiety and Depression Scale in a large primary care population. *Journal of Affective Disorders*, *147*(1–3), 171–179.

Roy, J. (2008). *Entre la classe et les McJobs: Portrait d'une génération de cégépiens*: Les Presses de l'Université Laval.

Russell-Mayhew, S. (2006). Key concepts from health promotion evaluations: What psychology needs to know. *International Journal for the Advancement of Counselling, 28*(2), 167.

Schotanus-Dijkstra, M., Ten Have, M., Lamers, S. M., de Graaf, R., & Bohlmeijer, E. T. (2016). The longitudinal relationship between flourishing mental health and incident mood, anxiety and substance use disorders. *The European Journal of Public Health, 27*(3), 563–568.

Schulenberg, J. E., Sameroff, A. J., & Cicchetti, D. (2004). The transition to adulthood as a critical juncture in the course of psychopathology and mental health. *Development and Psychopathology, 16*(4), 799–806.

Schulenberg, J. E., & Zarrett, N. R. (2006). Mental health during emerging adulthood: Continuity and discontinuity in courses, causes, and functions. In J. J. Arnett & J. L. Tanner (Eds.), *Emerging adults in America: Coming of age in the 21st century* (p. 135–172). American Psychological Association.

Singh-Manoux, A., Adler, N. E., & Marmot, M. G. (2003). Subjective social status: its determinants and its association with measures of ill-health in the Whitehall II study. *Social Science & Medicine, 56*(6), 1321–1333.

Storrie, K., Ahern, K., & Tuckett, A. (2010). A systematic review: Students with mental health problems—a growing problem. *International Journal of Nursing Practice, 16*(1), 1–6.

Twenge, J. M., Cooper, A. B., Joiner, T. E., Duffy, M. E., & Binau, S. G. (2019). Age, period, and cohort trends in mood disorder indicators and suicide-related outcomes in a nationally representative dataset, 2005–2017. *Journal of Abnormal Psychology*, *128*(3), 185–199.

UNICEF. (2011). *La Situation des enfants dans le monde 2011. L'adolescence: L'âge de tous les possibles*: UNICEF. https://www.unicef.org/french/publications/index_57468.html

Waterman, A. S. (1993). Two conceptions of happiness: Contrasts of personal expressiveness (eudaimonia) and hedonic enjoyment. *Journal of Personality and Social Psychology, 64*(4), 678.

Wood, A. M., & Joseph, S. (2010). The absence of positive psychological (eudemonic) well-being as a risk factor for depression: A ten year cohort study. *Journal of Affective Disorders, 122*(3), 213–217.

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica, 67*(6), 361–370.