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Factors associated with delayed diagnosis of mood and/or anxiety disorders

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Abstract

Introduction: This study examined the association between time to diagnosis and sociodemographic and clinical characteristics as well as time to diagnosis and physical and mental health status, among Canadian adults with a self-reported mood and/or anxiety disorder diagnosis.

Methods: We used data from the 2014 Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component. The study sample (n = 3212) was divided into three time to diagnosis subgroups: long (> 5 years), moderate (1–5 years) and short (< 1 year). We performed descriptive and multinomial multivariate logistic regression analyses. Estimates were weighted to represent the Canadian adult household population living in the 10 provinces with diagnosed mood and/or anxiety disorders.

Results: The majority (61.6%) of Canadians with a mood and/or anxiety disorder diagnosis reported having received their diagnosis more than one year after symptom onset (30.0% reported a moderate delay and 31.6% a long delay). Upon controlling for individual characteristics, we found significant associations between a moderate delay and having no or few physical comorbidities; a long delay and older age; and both moderate and long delays and early age of symptom onset. In addition, a long delay was significantly associated with "poor" or "fair" perceived mental health and the greatest number of activity limitations.

Conclusion: These findings affirm that a long delay in diagnosis is associated with negative health outcomes among Canadian adults with mood and/or anxiety disorders. Time to diagnosis is particularly suboptimal among older adults and people with early symptom onset. Tailored strategies to facilitate an early diagnosis for those at greatest risk of a delayed diagnosis, especially for those with early symptom onset, are needed.

Keywords: *mood disorders, anxiety disorders, delayed diagnosis, health status, health surveys, population surveillance, Survey on Living with Chronic Diseases in Canada*

Highlights

- Only a minority (38.4%) of Canadian adults with a mood and/or anxiety disorder diagnosis reported having received their diagnosis within a clinically acceptable time frame, i.e. less than a year after symptom onset.
- Affected Canadians with a moderate delay in diagnosis (1–5 years) were more likely to have no or few physical comorbidities; those with a long delay (> 5 years) were more likely to be older; and those with either a moderate or long delay were more likely to have experienced early symptom onset.
- A long delay in diagnosis was associated with worse mental and physical health outcomes.
- Tailored strategies to facilitate an early diagnosis for those at greatest risk of a delayed diagnosis are needed.

Introduction

Early diagnosis and timely treatment are important in optimizing the overall health and well-being of those affected by mood and anxiety disorders.[1-3] However, despite the existence of effective treatments, a large proportion of Canadians with these disorders experience a delay in diagnosis, or remain undiagnosed.[4-9] Individual factors such as low mental health literacy, fear of stigmatization and a preference to manage one's own health, as well as health system factors such as limited access to mental health services and health professionals' insufficient knowledge, skills or time may all play a role.[5-7]

Given the high prevalence of mood and anxiety disorders in Canada and throughout the world,[10] delayed diagnosis or lack of diagnosis has important public health implications, since a diagnosis usually precedes treatment initiation. A delay in treatment of common mental disorders is associated with poorer health outcomes including a worsening of mental health status, the development of other mental disorders and an increased risk of suicide.[3,11,12] In addition, many social consequences are associated with early-onset untreated mental disorder, including school failure, teenage pregnancy, marital violence and inability to maintain employment and/or relationships.[13-15]

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Several international studies have attempted to quantify the average time to diagnosis and explore potential factors involved in delayed diagnosis and treatment after initial symptom onset among those with mood and/or anxiety disorders.[16-19] The only Canadian study on this topic, to our knowledge, was published almost 20 years ago and was based on data from the Ontario Health Survey; therefore, the results are not nationally representative.[20]

Using data from the 2014 Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component (SCLDC-MA), our objectives were twofold: (1) to identify the sociodemographic and clinical characteristics associated with time to diagnosis; and (2) to examine the relationship between time to diagnosis and physical and mental health status in a nationally representative sample of community-dwelling Canadian adults with a self-reported mood and/or anxiety disorder diagnosis.

Methods

Data source and study sample

The 2014 SLCDC-MA surveyed Canadians aged 18 years and older living in private dwellings from the 10 provinces who were identified through the 2013 Canadian Community Health Survey (CCHS) by way of responding "yes" to having received a mood and/or an anxiety disorder diagnosis from a health professional that had lasted, or was expected to last, six months or more (n = 3361; response rate = 68.9%).[21] Those excluded from the survey included residents of the three territories, persons living on Indian reserves or Crown lands, people in institutions, full-time members of the Canadian Forces and residents of certain remote regions, which together represent approximately 3% of the target population. The methodology of the 2014 SLCDC-MA and the sociodemographic profile of the final sample have been described elsewhere.[22] The term "mood and/or anxiety disorders" used when describing the results from this study refers to those who have self-reported professionally diagnosed mood disorders only, anxiety disorders only, or concurrent mood and anxiety disorders.

Study measures

Time to diagnosis subgroups

We calculated the time to diagnosis for each respondent by subtracting the age at which their symptoms first appeared from the age at which they first received their diagnosis. For those respondents with *concurrent* mood and anxiety disorders, time to diagnosis was calculated by subtracting the age of the respondent at the time of symptom onset for the disorder that emerged later from the age of the respondent at the time they received their latest diagnosis, regardless of whether these were the same disorder. We then categorized respondents into four mutually exclusive subgroups based on their calculated time to diagnosis: (1) symptoms preceded diagnosis by more than five years (long); (2) symptoms preceded diagnosis between one and five years (moderate); (3) symptoms occurred in the same year as diagnosis (short); and (4) symptoms followed diagnosis. The time interval for the specified subgroups was informed by previous studies, which found the receipt of a diagnosis within the same year as symptom onset to be associated with better health-related outcomes among those with mood and/or anxiety disorders.[1,2,12]

After excluding those respondents with symptoms that followed their diagnosis due to small subgroup size (n = 50), as well as those with missing responses to either of the questions used to calculate the time to diagnosis (n = 99), we were left with a final study sample of 3212 (Figure 1).

Sociodemographic characteristics

The sociodemographic characteristics we studied included cohort age, i.e. the age of the respondent at time of interview (age groups 18–34, 35–49, 50–64 and ≥ 65 years, and mean age); sex (female, male); marital status (single/never married, widowed/separated/divorced, married/living common-law); respondent's highest level of education (less than secondary school graduation, secondary school graduation/no post-secondary, some post-secondary education, post-secondary graduation); adjusted household income adequacy quintile (deciles, derived by Statistics Canada,* transformed into quintiles); place of residence (rural, urban); geographic region (Atlantic region, British Columbia, Ontario, Prairie region and Quebec); immigrant status (yes, no); and Aboriginal status (yes, no).

Clinical characteristics

The clinical characteristics we analyzed included age of symptom onset (age groups ≤ 19, 20–29 and ≥ 30 years, and mean age); number of physical comorbidities (0, 1-2 and ≥ 3); and type of disorder (mood disorders only, anxiety disorders only, and concurrent mood and anxiety disorders). The age of symptom onset was based on respondents' answers to the following questions: "How old were you when you first started experiencing symptoms related to your mood disorder?" and "How old were you when you first started experiencing symptoms related to your anxiety disorder?" The three age groups we chose for age of symptom onset were informed by previous studies and correspond to the following life stages: childhood/adolescence (≤ 19 years), young adulthood (20–29 years) and adulthood (≥ 30 years).[19,24,25] We determined the number of physical comorbidities using responses to questions regarding conditions diagnosed by a health professional that had lasted or were expected to last six months or longer, i.e. asthma, arthritis, back problems, chronic obstructive pulmonary disease, diabetes, heart disease, cancer, stroke, bowel disorder/Crohn's disease/colitis and Alzheimer disease/dementia. Each condition was counted as one physical comorbidity. The type of disorder was determined by asking respondents if they have or ever had a mood disorder (such as depression, bipolar disorder, mania or dysthymia) and if they have or ever had an anxiety disorder (such as phobia, obsessive-compulsive disorder or panic disorder) diagnosed by a health professional.

Physical and mental health status

The physical and mental health status measures included level of disability (severe, moderate, mild, none); number of activity limitations (≥ 3, 1–2, 0); perceived general health; perceived mental health; and satisfaction with life in general. Level of disability categories were derived from the Health Utilities Index (HUI), which measures the utility functions of eight domains including vision, hearing, speech,

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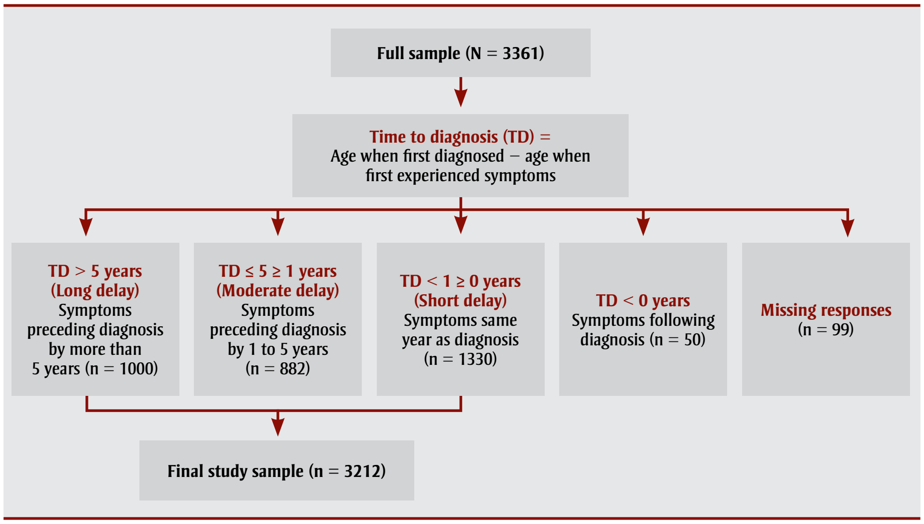
[*] This derived variable is a distribution of respondents in deciles (10 categories including approximately the same percentage of residents for each province) based on the adjusted ratio of their total household income to the low-income cut-off corresponding to their household and community size. It provides, for each respondent, a relative measure of their household income to the household incomes of all other respondents.[23]

FIGURE 1
Flowchart illustrating how respondents were categorized into the mutually exclusive time to diagnosis subgroups, 2014 SLCDC-MA



Abbreviations: n, unweighted number; SLCDC-MA, Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component; TD, time to diagnosis.

ambulation, dexterity, emotion, cognition and pain.[26] The four disability categories based on these global utilities scores were proposed by Feeny and Furlong[27] and validated by Feng et al.[28] using Canadian data. Number of activity limitations was categorized based on the number of times a respondent answered that they had experienced "a lot of restriction" in the past 12 months in "activities such as recreation, leisure, or hobbies"; "exercising or playing sports"; "social activities with family or friends"; "doing household chores"; "running errands or shopping"; "travelling or taking vacations"; and "taking care of yourself (such as dressing, bathing, and maintaining personal hygiene)" due to their mood and/or anxiety disorders. Perceived general health and perceived mental health were measured by asking respondents to rate their general and mental health as "excellent," "very good," "good," "fair," or "poor." Satisfaction with life in general was determined by asking respondents to rate how satisfied they are with their life using a scale of 0 to 10, where 0 means "very dissatisfied" and 10 means "very satisfied."

All of the sociodemographic and clinical characteristics and health status measures were collected as "current status" at the time of the interview.

Statistical analysis

We used cross-tabulation analyses to describe respondents' sociodemographic and clinical characteristics and physical and mental health status by time to diagnosis subgroup. We performed chi-square tests (for categorical variables) and logistic regression analyses (for count variables, i.e. cohort age and age of symptom onset) to explore relationships between time to diagnosis subgroups and respondents' characteristics and health status. We used multinomial multivariate logistic regression analyses to examine the independent associations between respondent characteristics and time to diagnosis, adjusting for all other respondent characteristics, as well as health status factors and time to diagnosis, adjusting for all respondent characteristics.

We also conducted several supplemental analyses to examine (1) the distribution of respondents by time to diagnosis subgroup and disorder type, and median time to diagnosis by disorder type; (2) the association between sociodemographic and clinical characteristics (with cohort age and age of symptom onset as count variables) and time to diagnosis (as a count variable) using a negative binomial regression analysis; and (3) the association between physical and mental health status and time to diagnosis (as a count variable) using multinomial multivariate logistic regression analysis. With respect to our median time to diagnosis calculation, we excluded those respondents within the short delay subgroup (i.e. time to diagnosis < 1 year) to permit a comparison of results with previous studies.[16-19,29] Data from the above supplemental analyses may be obtained by contacting the corresponding author.

To account for sample allocation and survey design, all estimates were based on weighted data using survey weights[†] generated by Statistics Canada so that the data would be representative of the Canadian household population aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis living in the 10 provinces. Furthermore, we generated variance estimates (95% confidence intervals and coefficients of variation) using the bootstrap weights provided with the data.[30] Only those results with a coefficient of variation of less than 33.3% are reported, as per Statistics Canada guidelines.[21] *P*-values less than .05 were considered statistically significant. We conducted all statistical analyses in SAS Enterprise Guide version 5.1 (SAS Institute Inc., Cary, NC, USA).

Results

The majority (61.6%) of Canadians aged 18 years and older with a mood and/or anxiety disorder diagnosis reported having received their diagnosis over a year after symptom onset. Of these, 30.0% received a diagnosis between one and five years after symptom onset (moderate delay) and 31.6% more than five years after symptom onset (long delay) (Table 1). The median time to diagnosis (excluding those who received a diagnosis within a year of symptom onset) among those with mood disorders only, anxiety disorders only, or both types of disorder was 5.0, 5.4, and 5.2 years, respectively (data not shown; available upon request).

Sociodemographic and clinical characteristics by time to diagnosis subgroup

We found significant relationships between time to diagnosis subgroups and cohort age, marital status, household income adequacy, geographical region, age of symptom

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[†] Statistics Canada adjusted sample weights for exclusions, sample selection, in-scope rates, non-response and permission to link and share.[21]

TABLE 1
Sociodemographic and clinical characteristics by time to diagnosis subgroup among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis (n = 3212), 2014 SLCDC-MA

Sociodemographic and clinical characteristics (cat)	Time to diagnosis subgroups Short[a] (n = 1330; 38.4%) % (95% CI)	Moderate[b] (n = 882; 30.0%) % (95% CI)	Long[c] (n = 1000; 31.6%) % (95% CI)	Chi-square test *p*-value
Cohort age (years)				< .001*
≥ 65	19.0 (16.5–21.4)	8.2 (6.3–10.2)	14.7 (11.7–17.6)	
50–64	35.8 (31.7–39.9)	23.8 (18.9–28.7)	32.4 (27.7–37.1)	
35–49	25.1 (21.3–28.9)	27.1 (21.8–32.4)	33.0 (27.5–38.6)	
18–34	20.1 (16.7–23.5)	40.9 (35.4–46.4)	19.9 (15.1–24.7)	
Sex				.902
Female	64.5 (60.0–69.0)	63.9 (58.6–69.3)	62.7 (57.3–68.1)	
Male	35.5 (31.0–40.0)	36.1 (30.7–41.4)	37.3 (31.9–42.7)	
Marital status				< .001*
Single/never married	22.3 (18.6–25.9)	34.7 (29.0–40.5)	22.9 (18.7–27.1)	
Widowed/separated/divorced	19.7 (16.5–22.9)	11.0 (7.8–14.1)	21.4 (17.1–25.8)	
Married/living common-law	58.0 (53.8–62.2)	54.3 (48.4–60.3)	55.7 (50.2–61.2)	
Respondent's highest level of education				.054
Less than secondary	16.0 (12.8–19.1)	10.3 (7.8–12.8)	10.0 (6.5–13.4)[d]	
Secondary	22.5 (18.3–26.7)	22.1 (17.6–26.5)	19.2 (15.0–23.4)	
Less than post-secondary	4.6 (2.8–6.4)[d]	6.7 (4.0–9.5)[d]	5.7 (3.3–8.1)[d]	
Post-secondary	57.0 (52.2–61.7)	60.9 (55.5–66.4)	65.2 (60.0–70.4)	
Household income adequacy quintile				.004*
Q1	25.1 (21.1–29.1)	19.8 (15.3–24.3)	22.7 (18.4–26.9)	
Q2	22.5 (18.5–26.5)	17.0 (12.7–21.3)	13.8 (10.5–17.2)	
Q3	21.3 (17.1–25.5)	25.9 (20.3–31.6)	19.9 (15.5–24.3)	
Q4	14.6 (11.8–17.5)	20.1 (15.2–25.0)	25.0 (20.1–29.9)	
Q5	16.5 (13.0–20.0)	17.2 (12.9–21.5)	18.7 (14.0–23.3)	
Place of residence				.332
Rural	17.8 (14.9–20.8)	19.0 (15.8–22.8)	15.5 (12.4–18.7)	
Urban	82.2 (79.3–85.1)	81.0 (77.2–84.7)	84.5 (81.3–87.6)	
Geographical region				< .001*
British Columbia	12.1 (9.1–15.2)	16.3 (12.0–20.5)	13.5 (10.3–16.7)	
Prairie	16.3 (13.3–19.2)	18.6 (14.4–22.8)	17.4 (13.3–21.5)	
Ontario	35.4 (31.1–39.7)	41.5 (35.6–47.3)	44.3 (39.1–49.5)	
Quebec	27.8 (24.0–31.6)	17.5 (13.1–21.8)	12.9 (9.4–16.4)	
Atlantic	8.4 (6.9–10.0)	6.2 (4.6–7.7)	12.0 (9.5–14.5)	
Immigrant status				.283
Immigrant	15.2 (10.4–20.0)	11.6 (6.9–16.2)[d]	10.5 (6.5–14.5)[d]	
Non-immigrant	84.8 (80.1–89.6)	88.4 (83.8–93.1)	89.5 (85.5–93.5)	
Aboriginal status				.102
Aboriginal	4.3 (2.7–6.0)[d]	6.9 (3.7–10.1)[d]	3.9 (2.3–5.5)[d]	
Non-Aboriginal	95.7 (94.0–97.3)	93.1 (89.9–96.3)	96.1 (94.5–97.7)	

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TABLE 1 (continued)
Sociodemographic and clinical characteristics by time to diagnosis subgroup among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis (n = 3212), 2014 SLCDC-MA

Sociodemographic and clinical characteristics (cat)	Time to diagnosis subgroups						Chi-square test *p*-value
	Short[a] (n = 1330; 38.4%) % (95% CI)		Moderate[b] (n = 882; 30.0%) % (95% CI)		Long[c] (n = 1000; 31.6%) % (95% CI)		
Age of symptom onset (years)							<.001*
≤19	13.4 (10.3–16.4)		35.3 (29.4–41.2)		55.2 (49.7–60.7)		
20–29	20.9 (17.3–24.5)		29.4 (23.4–35.5)		21.4 (17.0–25.9)		
≥ 30	65.8 (61.5–70.0)		35.3 (30.2–40.3)		23.4 (18.6–28.1)		
Physical comorbidities (number)							< .001*
0	34.5 (29.7–39.3)		50.8 (44.7–56.8)		39.0 (33.7–44.3)		
1–2	49.7 (45.0–54.3)		42.0 (36.3–47.8)		46.6 (40.9–52.2)		
≥ 3	15.8 (12.7–18.9)		7.2 (5.3–9.2)		14.4 (11.1–17.8)		
Disorder type							.936
Concurrent mood and anxiety disorders	29.9 (25.5–34.3)		31.5 (26.4–36.6)		32.5 (27.1–37.9)		
Anxiety disorder only	23.7 (19.9–27.5)		24.0 (18.4–29.6)		24.3 (19.6–29.0)		
Mood disorder only	46.4 (42.0–50.8)		44.5 (38.6–50.3)		43.2 (37.5–48.8)		
Sociodemographic characteristics (count)	**Mean**	**SE (*p*-value)[e]**	**Mean**	**SE (*p*-value)[e]**	**Mean**	**SE (*p*-value)[e]**	
Cohort age (years)	49.8	0.6 (Ref)	41.2	0.8 (< .001)*	48.5	0.7 (.184)	
Age of symptom onset (years)	37.5	0.7 (Ref)	28.1	0.7 (< .001)*	20.6	0.6 (< .001)*	

Abbreviations: cat, categorical variable; CI, confidence interval; count, count variable; n, unweighted number; Q, quintile; Ref, reference group; SE, standard error; SLCDC-MA, Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component.

Note: Percentages, 95% CIs, means and SEs are based on weighted data.

[a] Short = time to diagnosis within one year.

[b] Moderate = time to diagnosis between one and five years.

[c] Long = time to diagnosis more than five years.

[d] High sampling variability (coefficient of variation between 16.6% and 33.3%).

[e] Linear regression analyses.

* Statistically significant at *p*-value < .05 level.

onset and number of physical comorbidities (Table 1). In addition, we found that the mean age of symptom onset decreased with increasing time to diagnosis (i.e. 37.5, 28.1 and 20.6 years among those with short, moderate and long delay, respectively).

Upon adjusting for all sociodemographic and clinical characteristics, affected Canadians with moderate (vs. short) delay were more likely to have experienced symptom onset during childhood/adolescence or early adulthood (adjusted odds ratio [OR] = 3.5 and 1.9, respectively), and have no or few physical comorbidities (adjusted OR = 2.5 and 1.8, respectively) (Table 2). Those with long (vs. short) delay were more likely to be in the older cohort (adjusted OR = 7.5, 7.6 and 5.5 for those aged 65 + , 50–64 and 35–49 years, respectively), and to have experienced symptom onset during childhood/adolescence or young adulthood (adjusted OR = 33.7 and 3.7, respectively). We observed an estimated 8.0% decrease in time to diagnosis for every year increase in age of symptom onset, and a 5.0% increase in time to diagnosis for every year increase in age of respondents (data not shown; available upon request).

Physical and mental health status by time to diagnosis subgroup

We found a significant relationship between time to diagnosis subgroups and all five health status measures (level of disability, number of activity limitations, perceived general health, perceived mental health and satisfaction with life in general) (Table 3). After controlling for individual characteristics, affected Canadians with long (vs. short) delay in diagnosis were more likely to report the greatest number of activity limitations (i.e. ≥ 3), and “poor” or “fair” mental health (adjusted OR = 2.1 and 2.3, respectively) (Table 4). For every year increase in time to diagnosis, there was an increase in odds of having the most activity limitations (compared to no activity limitations) and “poor” or “fair” mental health (compared to “very good” or “excellent” mental health) of 5.0% and 4.0%, respectively (data not shown; available upon request).

Discussion

To our knowledge, this is the first study to examine factors associated with time to diagnosis among Canadian adults with a self-reported mood and/or anxiety disorder using a population-based sample. Results demonstrated that only a minority (38.4%)

TABLE 2
Association between sociodemographic and clinical characteristics and time to diagnosis subgroup among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis (n = 3212), 2014 SLCDC-MA

Sociodemographic and clinical characteristics	Time to diagnosis subgroups				Type 3 analysis of effect *p*-value
	Moderate[a] (n = 882) vs. short[b] (n = 1330) OR[d] (95% CI)	*p*-value	Long[c] (n = 1000) vs. short[b] (n = 1330) OR[d] (95% CI)	*p*-value	
Cohort age (years)					< .001*
≥ 65	0.8 (0.4–1.5)	.456	7.5 (3.4–16.4)	< .001*	
50–64	1.1 (0.6–1.9)	.825	7.6 (3.8–15.2)	< .001*	
35–49	1.3 (0.8–2.2)	.324	5.5 (2.6–11.5)	< .001*	
18–34	1.0 (Ref)		1.0 (Ref)		
Sex					.662
Female	1.1 (0.7–1.5)	.752	0.9 (0.6–1.3)	.500	
Male	1.0 (Ref)		1.0 (Ref)		
Marital status					.103
Single/never married	1.1 (0.7–1.7)	.599	0.7 (0.4–1.2)	.235	
Widowed/separated/ divorced	0.8 (0.5–1.3)	.413	1.4 (0.9–2.2)	.177	
Married/living common-law	1.0 (Ref)		1.0 (Ref)		
Respondent's highest level of education					.742
Less than secondary	0.7 (0.5–1.1)	.137	0.7 (0.4–1.3)	.270	
Secondary	1.0 (0.7–1.4)	.818	0.8 (0.5–1.2)	.349	
Less than post-secondary	1.2 (0.6–2.5)	.688	1.1 (0.5–2.5)	.896	
Post-secondary	1.0 (Ref)		1.0 (Ref)		
Household income adequacy quintile					.152
Q1	1.0 (0.6–1.7)	.925	0.8 (0.4–1.4)	.372	
Q2	0.9 (0.5–1.6)	.781	0.7 (0.4–1.3)	.214	
Q3	1.3 (0.7–2.1)	.390	0.9 (0.5–1.8)	.843	
Q4	1.4 (0.8–2.4)	.274	1.5 (0.8–2.7)	.224	
Q5	1.0 (Ref)		1.0 (Ref)		
Place of residence					.089
Rural	1.1 (0.8–1.6)	.438	0.7 (0.5–1.1)	.089	
Urban	1.0 (Ref)		1.0 (Ref)		
Geographic region					.001*
British Columbia	2.3 (1.3–4.1)	.007*	1.8 (1.0–3.3)	.072	
Prairie	1.7 (1.0–2.8)	.063	1.5 (0.9–2.8)	.146	
Ontario	1.9 (1.2–2.9)	.007*	2.1 (1.3–3.5)	.004*	
Atlantic	1.2 (0.7–1.9)	.582	2.5 (1.5–4.3)	.001*	
Quebec	1.0 (Ref)		1.0 (Ref)		
Immigrant status					.472
Immigrant	1.4 (0.4–5.5)	.625	2.4 (0.6–9.7)	.220	
Non-immigrant	1.0 (Ref)		1.0 (Ref)		
Aboriginal status					.335
Aboriginal	1.5 (0.7–2.9)	.293	0.9 (0.4–1.8)	.701	
Non-Aboriginal	1.0 (Ref)		1.0 (Ref)		

Continued on the following page

TABLE 2 (continued)
Association between sociodemographic and clinical characteristics and time to diagnosis subgroup among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis (n = 3212), 2014 SLCDC-MA

Sociodemographic and clinical characteristics	Time to diagnosis subgroups: Moderate[a] (n = 882) vs. short[b] (n = 1330) OR[d] (95% CI)	*p*-value	Long[c] (n = 1000) vs. short[b] (n = 1330) OR[d] (95% CI)	*p*-value	Type 3 analysis of effect *p*-value
Age of symptom onset (years)					< .001*
≤ 19	3.5 (2.1–6.0)	< .001*	33.7 (17.6–64.7)	< .001*	
20–29	1.9 (1.2–3.0)	.007*	3.7 (2.2–6.3)	< .001*	
≥ 30	1.0 (Ref)		1.0 (Ref)		
Physical comorbidities (number)					.019*
0	2.5 (1.5–4.3)	.001*	1.5 (0.9–2.4)	.152	
1–2	1.8 (1.1–2.9)	.013*	1.0 (0.7–1.7)	.859	
≥ 3	1.0 (Ref)		1.0 (Ref)		
Disorder type					.472
Concurrent mood and anxiety disorders	1.1 (0.8–1.5)	.650	1.4 (0.9–2.2)	.114	
Anxiety disorder only	0.8 (0.5–1.3)	.444	1.1 (0.7–1.7)	.690	
Mood disorder only	1.0 (Ref)		1.0 (Ref)		

Abbreviations: CI, confidence interval; n, unweighted number; OR, odds ratio; Q, quintile; Ref, reference group; SLCDC-MA, Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component.

Note: ORs and 95% CIs are based on weighted data.

[a] Moderate = time to diagnosis between one and five years.

[b] Short = time to diagnosis within one year.

[c] Long = time to diagnosis more than five years.

[d] Adjusted for all other sociodemographic and clinical characteristics in the model.

[*] Statistically significant at *p*-value < .05 level.

of affected Canadians received a diagnosis within a clinically acceptable time frame, i.e. less than a year after symptom onset. These findings are consistent with those from an international study involving 11 countries, which found 40% of respondents with mood and anxiety disorders sought treatment in the same year as symptom onset.[25] Since affected individuals who had not yet received a diagnosis from a health professional were not included in the 2014 SLCDC-MA, our results likely overestimate the proportion of those who received a timely diagnosis.

Studies suggest that individuals with a mood disorder are, in general, quicker to seek and receive a diagnosis compared to those with an anxiety disorder. For instance, the median time to diagnosis (excluding those who received a diagnosis within the same year as symptom onset) was found to be one and 16 years in Belgium,[19] one and 21 years in China,[31] four and 23 years in US,[29] four and 29 years in Australia,[18] and 14 and 30 years in Mexico[17] for mood and anxiety disorders, respectively. While results from our supplemental analysis demonstrated somewhat similar median time to diagnosis among Canadians with mood and anxiety disorders (i.e. 5.0 and 5.4 years, respectively), we found a larger difference in median time to diagnosis upon exploring specific types of mood and anxiety disorders, e.g. depression (4.4 years) and general anxiety disorder (6.2 years) (data not shown; available upon request). These findings may be explained by what we know about these disorders in terms of the patient's severity of symptoms (i.e. symptom severity predicts health service use) and perceived need and help-seeking behaviours (i.e. mood disorders and concurrent mood and anxiety disorders are strong predictors of perceived need).[32,33]

Our findings with respect to the association between sociodemographic and clinical characteristics and time to diagnosis are generally corroborated by those in the literature. For instance, we found affected Canadians' age of symptom onset to be associated with a delayed diagnosis (i.e. those with symptom onset during childhood/adolescence [≤ 19 years] and early adulthood [20–29 years] compared to those older [≥ 30 years] were more likely to fall into the moderate and long vs. the short time to diagnosis subgroup) which was also the case in previous studies.[16-20,25,34,35] Results from our supplemental analysis provided further confirmation of this association by demonstrating that for every year increase in age of symptom onset, there was an 8.0% decrease in time to diagnosis upon controlling for all other respondent characteristics (data not shown; available upon request).

Potential explanations for our findings include, but are not limited to, the fact that younger individuals are (1) dependent on the assistance of adults to initiate a mental health referral;[36] (2) often limited

TABLE 3
Physical and mental health status factors by time to diagnosis subgroup among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis (n = 3212), 2014 SLCDC-MA

Physical and mental health status factors	Time to diagnosis subgroups			Chi-square test *p*-value
	Short[a] (n = 1330) % (95% CI)	Moderate[b] (n = 882) % (95% CI)	Long[c] (n = 1000) % (95% CI)	
Level of disability				.032*
Severe	38.9 (34.4–43.4)	29.3 (24.0–34.5)	40.0 (34.6–45.4)	
Moderate	22.8 (18.3–27.3)	22.7 (17.9–27.4)	23.0 (18.2–27.8)	
Mild	27.0 (23.1–31.0)	36.5 (30.4–42.5)	25.3 (20.8–29.7)	
None	11.3 (8.0–14.6)	11.6 (8.1–15.1)	11.7 (8.2–15.3)	
Activity limitations (number)				.001*
≥ 3	15.1 (11.8–18.4)	13.7 (9.9–17.4)	25.2 (19.7–30.7)	
1–2	17.2 (13.8–20.7)	20.0 (15.0–24.9)	18.7 (14.7–22.7)	
0	67.7 (63.4–72.0)	66.4 (60.8–71.9)	56.1 (50.5–61.7)	
Perceived general health				.045*
Poor or fair	29.7 (25.4–34.1)	19.1 (15.1–23.2)	25.3 (20.6–30.1)	
Good	33.5 (28.7–38.3)	37.8 (32.0–43.7)	36.5 (31.0–41.9)	
Very good or excellent	36.8 (32.2–41.3)	43.1 (36.6–49.6)	38.2 (32.6–43.9)	
Perceived mental health				.021*
Poor or fair	22.5 (18.4–26.7)	25.0 (20.3–29.7)	31.3 (25.7–36.9)	
Good	43.8 (38.9–48.6)	40.9 (35.0–46.8)	43.8 (38.0–49.5)	
Very good or excellent	33.7 (29.6–37.8)	34.1 (28.4–39.8)	25.0 (20.8–29.2)	
Satisfaction with life in general				.005*
Very dissatisfied or dissatisfied	11.0 (8.4–14.1)	6.3 (3.7–9.0)	12.1 (8.5–15.7)	
Neither satisfied nor dissatisfied	13.5 (10.1–17.0)	7.5 (4.5–10.5)	12.2 (8.9–15.6)	
Very satisfied or satisfied	75.5 (71.4–79.6)	86.2 (82.3–90.1)	75.7 (71.0–80.4)	

Abbreviations: CI, confidence interval; n, unweighted number; SLCDC-MA, Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component.

Note: Percentages and 95% CIs are based on weighted data.

[a] Moderate = time to diagnosis between one and five years.

[b] Short = time to diagnosis within one year.

[c] Long = time to diagnosis more than five years.

* Statistically significant at *p*-value < .05 level.

in their ability to communicate their mental health problems, and as a result do not generate enough concern to initiate a mental health referral;[34] (3) inclined to develop coping strategies such as behaviour modification in order to lessen the impact of living with a mental disorder;[16] (4) less likely to be in contact with medical practitioners compared to adults, especially primary care physicians, who often make the initial diagnosis;[37] and (5) limited in their understanding and ability to recognize mental health issues such as symptoms associated with mood or anxiety disorders.

In addition to age of symptom onset, we found cohort age to be associated with delayed diagnosis, i.e. older cohorts (groups aged 65 + , 50–64 and 35–49 years) were more likely to fall into the long versus short time to diagnosis subgroup compared to the younger cohort (aged 18–34 years). Results from our supplemental analysis provided further confirmation of this association by demonstrating that for every year increase in age there was a 5.0% increase in time to diagnosis holding all other individual characteristics constant (data not shown; available on request). These findings are consistent with previous reports demonstrating that older cohort and early age of symptom onset were associated with a delay in seeking initial treatment for more than one year.[16-20,25,34,35] Collectively, these results may offer some evidence that younger Canadian adults with mood and/or anxiety disorders are more apt to seek care than their older counterparts as a result of improved help-seeking behaviours among younger cohorts in recent years. This behaviour could in part be due to recent public mental health campaigns targeting youth in an effort to reduce stigma and increase awareness of mental illness. Such efforts have previously been shown to positively affect help-seeking patterns in mental illness.[38]

We found that those with no physical comorbidities, and to a lesser extent those with one to two, were more likely to fall into the moderate (vs. short) time to

TABLE 4
Association between physical and mental health status factors and time to diagnosis subgroups among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis (n = 3212), 2014 SLCDC-MA

Physical and mental health status factors	Time to diagnosis subgroups				Type 3 analysis of effect *p*-value
	Moderate[a] (n = 882) vs. short[b] (n = 1330)		Long[c] (n = 1000) vs. short[b] (n = 1330)		
	OR[d] (95% CI)	*p*-value	OR[d] (95% CI)	*p*-value	
Level of disability					.269
Severe	0.9 (0.5–1.6)	.741	0.9 (0.5–1.7)	.746	
Moderate	1.2 (0.7–2.1)	.528	1.1 (0.5–2.1)	.880	
Mild	1.2 (0.7–2.0)	.501	0.7 (0.4–1.3)	.246	
None	1.0 (Ref)		1.0 (Ref)		
Activity limitations (number)					.036*
≥ 3	0.9 (0.6–1.5)	.788	2.1 (1.2–3.5)	.007*	
1–2	1.1 (0.8–1.7)	.535	1.4 (0.9–2.3)	.186	
0	1.0 (Ref)		1.0 (Ref)		
Perceived general health					.386
Poor or fair	1.0 (0.6–1.7)	.919	1.0 (0.6–1.7)	.964	
Good	1.4 (0.9–2.0)	.159	1.4 (0.9–2.2)	.098	
Very good or excellent	1.0 (Ref)		1.0 (Ref)		
Perceived mental health					.008*
Poor or fair	1.2 (0.8–1.8)	.483	2.3 (1.5–3.6)	.000*	
Good	1.0 (0.7–1.4)	.804	1.4 (1.0–2.2)	.077	
Very good or excellent	1.0 (Ref)		1.0 (Ref)		
Satisfaction with life in general					.156
Very dissatisfied or dissatisfied	0.7 (0.4–1.4)	.304	1.2 (0.6–2.4)	.601	
Neither satisfied nor dissatisfied	0.6 (0.3–1.0)	.035*	1.1 (0.6–2.0)	.739	
Very satisfied or satisfied	1.0 (Ref)		1.0 (Ref)		

Abbreviations: CI, confidence interval; n, unweighted number; OR, odds ratio; Ref, reference group; SLCDC-MA, Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component.

Note: ORs and 95% CIs are based on weighted data.

[a] Moderate = time to diagnosis between one and five years.

[b] Short = time to diagnosis within one year.

[c] Long = time to diagnosis more than five years.

[d] Adjusted for age, sex, marital status, highest level of education attained (respondent), household income adequacy, place of residence, geographic region, immigration status, Aboriginal status, age of symptom onset, number of physical comorbidities and disorder type.

* Statistically significant at *p*-value < .05 level.

diagnosis subgroup, relative to those with three or more physical comorbidities. This finding is supported by previous studies showing that those without comorbid physical chronic conditions have fewer health care encounters and are therefore less likely to be diagnosed and treated for their mental health issues than those with them.[39,40]

Regarding affected Canadians' health status, we found those with long delay were more likely to report the most (≥ 3) activity limitations and "poor" or "fair" mental health. Results from our supplemental analysis provided further confirmation of this, demonstrating that for every year increase in time to diagnosis there was a 5.0% and 4.0% increase in odds of having three or more activity limitations (relative to those with no activity limitations) and "poor" or "fair" mental health (relative to those with "very good" or "excellent" mental health), respectively, upon controlling for all other individual characteristics (data not shown; available upon request). A lack of negative health status findings among those with a moderate (vs. short) delay may in part be attributed to a possible threshold effect for both activity limitations and mental health status, which could take up to five years (at the rate of 5.0% and 4.0% per year, respectively) to reach a significant health impact.

Our findings related to age of symptom onset and time to diagnosis are of significant public health importance given that almost half of Canadian adults with mental illness experience symptom onset during childhood or adolescence.[41] Moreover, the early onset of mental health issues has been shown to be strongly associated with adverse social events[13-15] that are more severe and debilitating than when these issues occur later.[42] Furthermore, those experiencing early onset of mental health issues are more likely to develop secondary comorbid conditions, which in turn can worsen symptoms related to their primary mental disorder and impede treatment responsiveness.[43] As a result, public health policy and programs that target the young, parents and educators are key in the early detection and timely diagnosis of those with childhood and adolescent onset of mood and/or anxiety disorders. To that end, several national initiatives, including the Canadian Collaborative Mental Health Initiative,[44] the Patient's Medical Home initiative[45] and the Adolescent/young adult Connections to Community-driven, Early, Strengths-based and Stigma-free services (ACCESS) program,[46] as well as provincial initiatives[47,48] have been implemented. In addition to public health policy and programs that target youth, other important initiatives include prevention and early intervention programs that focus on reducing risk factors associated with mental illness and enhancing protective factors among those whose symptoms are still subclinical.[49]

Other countries have successfully implemented innovative anti-stigma campaigns which targeted young people with the goal of improving their mental health help-seeking behaviours. For instance, in Germany, a film festival featuring films and documentaries on the subject of mental illness has been effective in reducing stigma and improving help-seeking attitudes among adolescents.[50] Similarly, an Australian youth mental health community awareness campaign designed to improve mental health literacy and early help seeking among young people has had positive outcomes in terms of increased mental illness awareness and reduced perceived barriers to help seeking.[51] Furthermore, some countries that have employed youth mental health service access programs have also demonstrated positive results. For example, an Australian program called "Headspace," aimed at promoting and supporting early intervention for young people aged 12 to 25 years with mental health issues, has been evaluated with a 93% service satisfaction rate among its users.[52] Also, in the UK, community screening programs using the Strengths and Difficulties Questionnaire (SDQ) have been successful in facilitating early detection of child psychiatric disorders.[53]

Strengths and limitations

This study has a number of strengths, including its large, population-based sample and survey administration by trained personnel; however, its results should be interpreted in consideration of a number of limitations.

First, the estimated time to diagnosis is subject to recall bias and dating inaccuracies as the calculation is based on the respondents' ability to recall the age at which their symptoms first occurred and the age at which they were diagnosed with their mood and/or anxiety disorder. The most common form of dating error is telescoping, in which past experiences are recalled as having occurred more recently than they actually did. This effect is more prominently found in older adults,[54] and can lead to an underestimation of the time to diagnosis.[16] The changing nature of mood and anxiety disorders poses a particular challenge in this regard, given that the respondents' most recent or most severe episode is likely easier to recall than their first episode.

Second, we were not able to stratify our main analyses by disorder type due to sample size limitations. Being able to do so would have made it easier to detect and interpret any potential differences in the associations between time to diagnosis and individual characteristics as well as physical and mental health status by disorder type. Furthermore, while research has found acceptable-to-good agreement between self-reported physical health conditions and diagnoses made by medical professionals,[55] validation of the questions used in the 2013 CCHS and 2014 SLCDC-MA to ascertain self-reported mood and anxiety disorder diagnosis, and the questions used in the 2014 SLCDC-MA to capture self-reported mood and anxiety disorder subtypes, have not been conducted.

Third, ethnicity has previously been reported as an important factor in delayed treatment;[16] however, due to sample size limitations we were not able to explore the impact of ethnicity on time to diagnosis.

Fourth, despite the fact that access to mental health services varies by jurisdiction due to differences in factors such as health care policy and mental health services access and availability, consideration of these issues in our analysis was beyond the scope of this study.

Fifth, in those cases where symptoms reported were subclinical, time since symptom onset may have erroneously translated into a diagnostic delay given that the reporting of such symptoms may have prolonged the reported time to diagnosis unnecessarily.

Conclusion

Our findings affirm that a long delay in diagnosis is associated with negative physical and mental health status among Canadian adults with mood and/or anxiety disorders. Among the several factors associated with a lengthy delay, symptom onset in childhood/adolescence or early adulthood is of particular importance. In addition to increasing public awareness of the importance of early symptom recognition, public health initiatives should target children and adolescents and their support networks in order to improve their help-seeking behaviours, which ultimately may facilitate an early diagnosis and timely treatment. Further research with more detailed stratification by type of disorder is required to better understand the factors associated with an early diagnosis and the ensuing health impacts. Furthermore, longitudinal trials evaluating the long-term effects of assertive outreach to increase awareness of the significance of timely diagnosis, with a particular focus on children and adolescents, would be of value.

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Conflicts of interest

The authors declare no conflicts of interest.

Authors' contributions

RC contributed to the study concept, carried out the data analysis and writing of the manuscript. SO contributed to the study concept and writing of the manuscript. All authors informed the data analysis, assisted in the interpretation of results, critically revised the manuscript and approved the final version.

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