https://doi.org/10.24095/hpcdp.37.5.03

Self-management of mood and/or anxiety disorders through physical activity/exercise

Louise Pelletier, MD (1); Shamila Shanmugasegaram, PhD (1); Scott B. Patten, MD, PhD (2); Alain Demers, PhD (1)

This article has been peer reviewed.

Abstract

Introduction: Physical activity/exercise is regarded as an important self-management strategy for individuals with mental illness. The purpose of this study was to describe individuals with mood and/or anxiety disorders who were exercising or engaging in physical activity to help manage their disorders versus those who were not, and the facilitators for and barriers to engaging in physical activity/exercise.

Methods: For this study, we used data from the 2014 Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component. Selected respondents (n = 2678) were classified according to the frequency with which they exercised: (1) did not exercise; (2) exercised 1 to 3 times a week; or (3) exercised 4 or more times a week. We performed descriptive and multinomial multiple 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: While 51.0% of the Canadians affected were not exercising to help manage their mood and/or anxiety disorders, 23.8% were exercising from 1 to 3 times a week, and 25.3% were exercising 4 or more times a week. Increasing age and decreasing levels of education and household income adequacy were associated with increasing prevalence of physical inactivity. Individuals with a mood disorder (with or without anxiety) and those with physical comorbidities were less likely to exercise regularly. The most important factor associated with engaging in physical activity/exercise was to have received advice to do so by a physician or other health professional. The most frequently cited barriers for not exercising at least once a week were as follows: prevented by physical condition (27.3%), time constraints/too busy (24.1%) and lack of will power/self-discipline (15.8%).

Conclusion: Even though physical activity/exercise has been shown beneficial for depression and anxiety symptoms, a large proportion of those with mood and/or anxiety disorders did not exercise regularly, particularly those affected by mood disorders and those with physical comorbidities. It is essential that health professionals recommend physical activity/exercise to their patients, discuss barriers and support their engagement.

Keywords: *mood disorders, depression, anxiety disorders, physical activity, exercise, self-management*

Highlights

- Even though physical activity/exercise is effective in decreasing mood and anxiety symptoms, 51% of those affected by a mood and/or anxiety disorder do not exercise at least once a week on a regular basis.
- Canadians with a mood disorder and those with physical comorbidities were less likely to exercise regularly (at least once a week).
- The most important factor associated with engaging in physical activity was to have received advice to do so by a physician or other health professional.
- Health professionals play a critical role in recommending and supporting engagement in physical activity/exercise, particularly for those with a mood disorder and physical comorbidities.

Introduction

While self-management has been part of an overall management strategy for chronic physical conditions such as diabetes, asthma and arthritis for some decades,[1,2] its use in mental illness is more recent.[3] Self-management is defined as the training, skill acquisition and interventions through which individuals who suffer from a disease take care of themselves in order to manage their illness.[3,4] The objectives of self-management are to decrease symptoms, enhance quality of life and prevent relapse or recurrence.[3,5]

Self-management in mental illness can be used as a complement to conventional clinical therapies such as medication and psychotherapy or as a first-line low-intensity intervention, especially among individuals with mild-to-moderate symptoms.[6] Among the many self-management interventions proposed for mood and anxiety disorders, the most frequently studied include bibliotherapy or computer-based cognitive behavioural therapy (CBT),[7-9] herbal therapies,[10-12] meditation or relaxation techniques[13-16] and physical activity/exercise.[17-22]

Author references:

1. Public Health Agency of Canada, Ottawa, Ontario, Canada

2. Department of Community Health Sciences & Mathison Centre for Mental Health Research & Education, Hotchkiss Brain Institute, University of Calgary, Calgary, Alberta, Canada

Correspondence: Louise Pelletier, Public Health Agency of Canada, 785 Carling Avenue, AL 6806A, Ottawa, ON K1A 0K9; Tel: 613-960-5339; Fax: 613-941-2057; Email: louise.pelletier@phac-aspc.gc.ca

Physical activity/exercise is thought to improve depression and anxiety symptoms through a number of physiological mechanisms as well as through its effect on sleep, sense of mastery and social interactions.[20,23,24] In general, it has been shown that an exercise program of at least 10 weeks or more, with relatively intense physical activity for at least 20 to 30 minutes at a frequency of 3 to 4 times per week, is effective for depression and for some anxiety disorders.[19,24,25]

Physical activity/exercise as a treatment has consistently been shown to be superior to control interventions and sometimes comparable to mainstream therapies (e.g. medication or CBT) for mild and moderate depression.[17-21] A limited number of studies on the effects of exercise as a treatment strategy for anxiety disorders have shown generally positive effects of exercise,[19,22] but the impact (effect size) is usually smaller than that observed for depressive symptoms.[26]

There is a lack of data describing individuals who engage in or conversely who do not engage in physical activity/exercise to help manage their mood and/or anxiety disorders. This is the first study in Canada to examine the uptake of this strategy in a nationally representative sample of people with mood and/or anxiety disorders living in the community. This knowledge could assist in developing or adapting interventions to promote the engagement of physical activity/exercise in this population. Thus, the objectives of the present study were

(1) to describe individuals with mood and/or anxiety disorders who are currently exercising (1 to 3 times a week and 4 or more times a week) versus those who are not engaging in exercise, in terms of sociodemographic and clinical characteristics;

(2) to determine whether there are associations between exercise frequency and perceived general and mental health and life satisfaction; and

(3) to describe facilitators and barriers for engaging or not engaging in exercise as a means to help manage mood and/or anxiety disorders in the population affected.

Methods

Data source

This study was based on data from the 2014 Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component (SLCDC-MA), a cross-sectional follow-up survey to the 2013 Canadian Community Health Survey (CCHS)—Annual Component. The 2014 SLCDC-MA was developed by the Public Health Agency of Canada, in collaboration with Statistics Canada and external experts, to provide information on the impact and management of mood and/or anxiety disorders among Canadian adults. Respondents aged 18 years and older who reported having a mood and/or an anxiety disorder as part of the 2013 CCHS were eligible to participate in the 2014 SLCDC-MA. The 2014 SLCDC-MA surveyed individuals living in private dwellings in the 10 Canadian provinces. Full-time members of the Canadian Forces, people living on reserves and other Aboriginal settlements, those residing in institutions and residents of certain remote regions and Canada's three territories (Nunavut, Northwest Territories and Yukon) were excluded from the sampling frame. These exclusions represented less than 3% of the overall target population. The 2014 SLCDC-MA was administered by trained personnel via a structured telephone interview (in English or French) during two data collection periods: November to December 2013 and February to March 2014. The methodology of the 2014 SLCDC-MA was described in an earlier publication.[27]

Study sample

In the 2013 CCHS, 5875 respondents indicated that they had been diagnosed with a mood and/or anxiety disorder by a health professional and met the eligibility criterion to participate in the 2014 SLCDC-MA. Of these respondents, 3361 participated in the 2014 SLCDC-MA and consented to share their data with the Public Health Agency of Canada (response rate = 68.9%). For the purpose of this study, respondents who replied "no" to *having* a mood and/or anxiety disorder that has been diagnosed by a health professional but "yes" to *having ever been diagnosed* were excluded from the study (n = 445). In addition, respondents who indicated that they were already engaging in physical activity for reasons other than to help manage their mood and/or anxiety disorders (n = 238) were also excluded from this study since physical activity/exercise frequency data were not collected from them. A total of 2678 Canadians with a mood and/or an anxiety disorder were included in our study (1134 with a mood disorder only, 576 with an anxiety disorder only and 968 with concurrent mood and anxiety disorders). The term "mood and/or anxiety disorders" used throughout this article refers to those who have self-reported, professionally diagnosed mood disorders only, anxiety disorders only, or concurrent mood and anxiety disorders. Figure 1 illustrates how respondents were selected for the final study sample.

Measures

In the 2014 SLCDC-MA, respondents were asked the following questions to confirm diagnosis of mood and/or anxiety disorders: (1) "Do you have a mood disorder such as depression, bipolar disorder, mania or dysthymia that has been diagnosed by a health professional?" and (2) "Do you have an anxiety disorder such as phobia, obsessive-compulsive disorder, panic disorder that has been diagnosed by a health professional?" Those who responded "yes" to either or both of these questions were included in this study.

Exercise subgroups

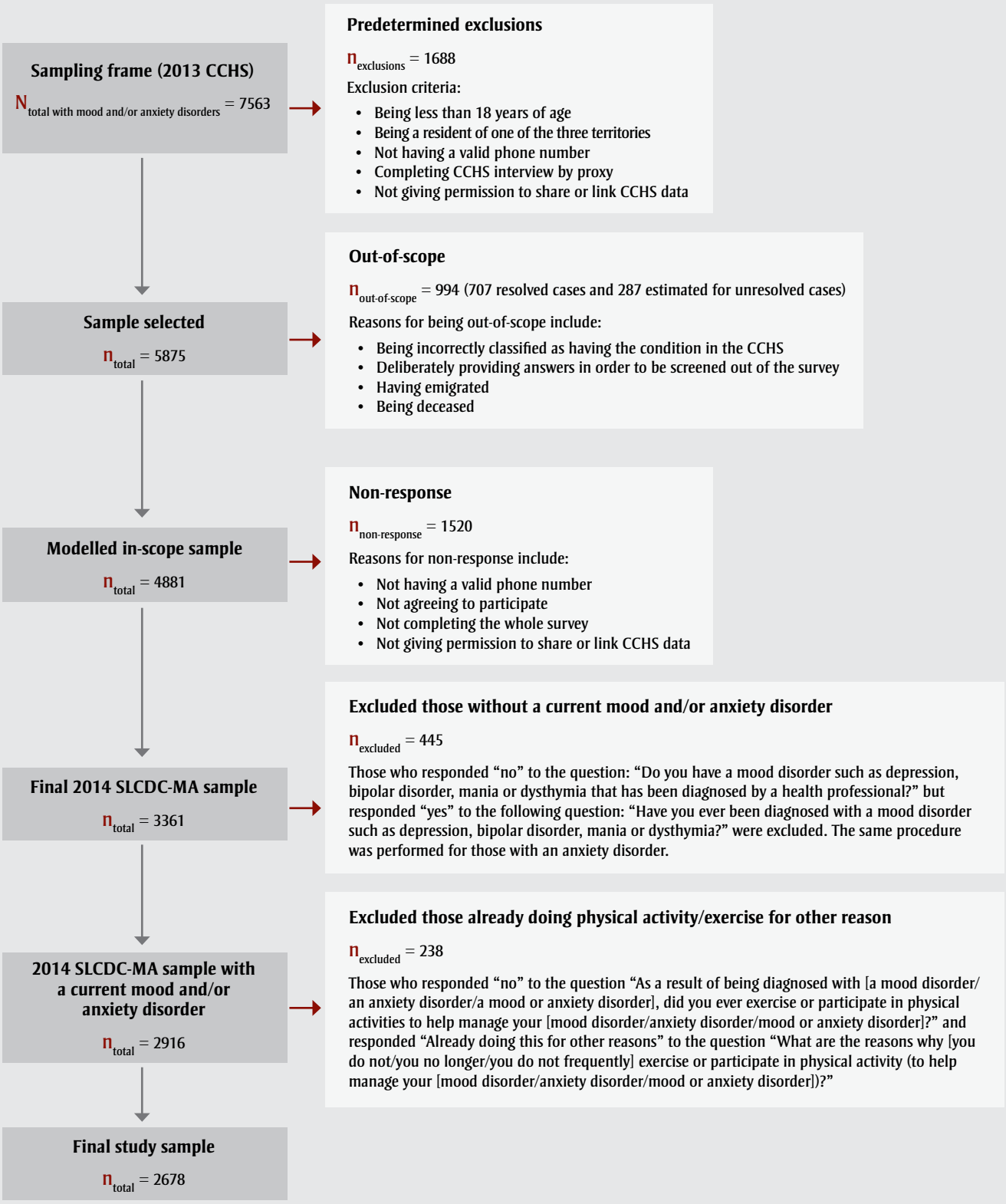
Respondents who answered "yes" to the question "As a result of being diagnosed with [a mood disorder/an anxiety disorder/a mood or anxiety disorder], did you ever exercise or participate in physical activities to help manage your [mood disorder/anxiety disorder/mood or anxiety disorder]?" were subsequently asked "Are you still doing this?" If the answer was affirmative, they were asked about the frequency of the activity with the following question: "How often do you do this?" Possible responses included every day, 4 to 6 times per week, 2 to 3 times per week, once a week, less than once a week and less than once a month. These frequencies were combined in the following three subcategories:

(1) "No exercise" (included those who responded "No" to the question "Did you ever exercise or participate in physical activities to help manage your [mood disorder/anxiety disorder/mood or anxiety disorder]?" and those who answered that they were engaging in exercise less than once a week or less than once a month);

(2) "1 to 3 times a week" (combined those who reported engaging in physical activity/exercise once a week or 2 to 3 times per week); and

(3) "4 or more times a week" (included those who were exercising 4 to 6 times a week or daily).

FIGURE 1
Flowchart illustrating how respondents were identified for the final study sample (n = 2678), 2014 SLCDC-MA



Abbreviations: CCHS, Canadian Community Health Survey; n, unweighted number; SLCDC-MA, Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Component.

While "physical activity" refers to any activity that contracts muscles, expends energy and includes work, household or leisure activities, "exercise" refers to a planned, structured and repetitive body movement performed to improve or maintain physical fitness.[28] Despite the differences, these terms were used interchangeably in the survey questions and we are therefore using them interchangeably in this paper. In addition, given that we did not have information on the duration and the intensity of the physical activity/exercise sessions, we were not able to directly relate the observed frequency to the current Canadian Physical Activity Guidelines, which recommend at least 150 minutes of moderate-to-vigorous physical activity per week for adults aged 18 to 64 years.[29] While more physical activity provides greater health benefits, it is recognized that engaging in amounts below the recommended levels can still provide some health benefits.[30] Therefore, we considered that individuals incorporating physical activity/exercise at least once a week in their schedule were doing "regular" physical activity/exercise for the purpose of this study.

Sociodemographic and clinical characteristics

Sociodemographic variables included age (age groups were 18–34, 35–49, 50–64, and 65+ years), sex (female, male), respondent's level of education (less than secondary school graduation, secondary school graduation/no post-secondary, some post-secondary, and post-secondary graduation), household income adequacy quintiles (deciles, a derived variable by Statistics Canada,* transformed into quintiles), marital status (single/never married, widowed/divorced/separated, married/living common-law), geographic regions (British Columbia, Prairie region, Ontario, Quebec, Atlantic region), place of residence (urban, rural), and immigrant and Aboriginal statuses (yes, no).

Clinical characteristics included the type of disorders (mood disorder only, anxiety disorder only, and concurrent mood and anxiety disorders), the number of years since diagnosis (0–4, 5–19, and 20+), the number of physical comorbidities, the receipt of recommendation to exercise and the receipt of clinical treatment.

The number of physical comorbidities was determined by asking respondents if they had any of the following conditions diagnosed by a health professional that had lasted or were expected to last six months or longer: asthma, chronic obstructive pulmonary disease, arthritis, back problems, bowel disorder/Crohn disease or colitis, diabetes, heart disease, cancer, stroke and Alzheimer disease or any other dementia. Each reported disease was counted as a separate comorbidity and their summation was categorized in three groups (none, 1–2 and 3+). Receipt of a clinical recommendation to exercise was determined by asking respondents "Has a doctor or other health professional ever suggested participating in physical activity or exercise to help you manage your [mood disorder/anxiety disorder/mood or anxiety disorder]?", with a yes-or-no response format. Receipt of clinical treatment was defined as current use of prescription medications and/or psychological counselling as determined by the following questions: "Currently, are you taking any prescription medications for your [mood and/or anxiety] disorder?" (response options: "yes," "no"); and "In the past 12 months, did you receive psychological counselling to help manage your [mood and/or anxiety] disorder?" (response options: "yes," "no"). Those who responded "yes" to either were considered to be receiving clinical treatment.

Barriers to engaging in exercise

Those respondents who indicated that they do not or no longer exercise or participate in physical activity since their diagnosis were asked to specify the reason(s) why from the following list of barriers: "lack of will power/self-discipline," "time constraints/too busy," "prevented by physical condition," "didn't know it is important/recommended," "too costly/financial constraints," "other" and "no reason."

Health status

Perceived general health and mental health were evaluated using self-reported general health and mental health questions. From the five possible response options, we defined three categories: "poor health" included those who reported their health as "fair" or "poor"; "good health" was a category in itself; and "very good health" included those who reported their health as "very good" or "excellent." Life satisfaction was assessed by asking respondents how they feel about their life as a whole right now using a scale from 0 to 10, where 0 was "very dissatisfied" and 10 was "very satisfied." In our study, satisfaction with life was defined as "dissatisfied" (a response of 0–4), "neutral" (5) or "satisfied" (6–10).

Statistical analyses

To account for sample allocation and survey design, all estimates were based on weighted data using weights generated by Statistics Canada so that the data would be representative of the Canadian population aged 18 years and older living in the community, in the 10 provinces, with mood and/or anxiety disorders. Weights were adjusted for exclusions, sample selection, in-scope rates, non-response and permission to share and link.[32] Furthermore, variance estimates (95% confidence intervals and coefficients of variation) were generated using bootstrap weights provided with the data.[33] Only results with a coefficient of variation less than 33.3% are reported, as per Statistics Canada guidelines.[32]

We performed chi-square analyses to explore the relationships between the three physical activity/exercise subgroups and respondents' sociodemographic characteristics, number of comorbidities, type of disorders, number of years since diagnosis and use of conventional clinical treatment, and whether they had received a clinical recommendation to participate in physical activity or exercise.

We used multinomial multivariate logistic regression analysis to examine potential associations between exercise frequency (defined as no exercise, 1–3 times a week, 4 times or more a week) and perceived general and mental health, and life satisfaction, adjusting for all sociodemographic and clinical characteristics found statistically significant in the bivariate analyses. It should be noted that the data did not meet the proportional odds assumption

* This derived variable is a distribution of respondents in deciles (ten 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.[31]

required to use ordinal regression. Statistical significance was determined at the $p < .05$ level. We used SAS Enterprise Guide version 5.1 (SAS Institute Inc., Cary, NC, USA) for the data analyses.

Results

While 51.0% of the Canadians affected were not exercising to help manage their mood and/or anxiety disorders, about half were exercising at least once a week, with 23.8% exercising from 1 to 3 times a week and 25.3% exercising 4 or more times a week. Furthermore, we found important differences among those who exercised regularly (i.e. at least once a week) and those who did not (Table 1). Increasing age and decreasing levels of education and household income were associated with increasing frequency of inactivity. Differences were also observed among the provinces or regions of residence: while those from British Columbia (67.6%) were the most active, slightly more than 50% of individuals from Ontario and the Atlantic and Prairie regions did not exercise regularly.

In terms of clinical characteristics, Canadians with mood disorders (with or without anxiety) and those with physical comorbidities were less likely to exercise regularly. In addition, individuals with a more recent diagnosis (< 5 years) or long-term disease duration (20+ years) were less likely to exercise. Those who were treated with conventional clinical therapy (medication and/or psychotherapy) were slightly more likely to exercise 1 to 3 times a week; conversely, those with no clinical treatment were more likely to exercise 4 or more times a week. Finally, another important factor associated with doing physical activity/exercise was having received advice to do so by a doctor or other health professional.

After we adjusted for all sociodemographic and clinical characteristics, we compared those exercising 1 to 3 times a week to those who did not exercise (Table 2). Individuals with less than secondary school education (vs. post-secondary diploma), those in the lowest income quintiles (Q1–Q3 vs. Q4–Q5), those with mood disorders with or without anxiety disorders (vs. those with anxiety only), those who were not advised to exercise by a health professional (vs. those who were) and those who were not treated with conventional clinical therapy (vs. those who were) were less likely to exercise 1 to 3 times a week. When we compared those who exercised 4 or more times a week to those who did not exercise, individuals' province or region (e.g. those living in all other regions vs. in British Columbia), type of disorders and advice by a health professional remained significant. The most important factor associated with physical activity/exercise participation (at any level) was to have had physical activity or exercise recommended by a health professional. Depending on the frequency of exercise, those not receiving advice to exercise had approximately 3 to 5 times lower odds of using exercise for self-management than those receiving such advice. Therefore, receiving or not receiving advice, based on the point estimate of the OR, is more strongly associated with physical activity/exercise than education, age, province and type of disorder.

Table 3 presents the associations between perceived well-being and physical activity/exercise frequency. In general, individuals who did not engage in exercise were more likely to rate their perceived general and mental health as "fair/poor" and to be dissatisfied with life. However, the association between self-reported mental health and physical activity/exercise frequency was not statistically significant. Even after adjusting for sociodemographic and clinical characteristics that could have impacted general well-being, the inverse association between exercising 1 to 3 times a week (vs. no exercise) and "fair/poor" or "good" general health (vs. "very good/excellent") and dissatisfaction (vs. satisfaction) with life remained (Table 4). Similarly, after adjustment, those exercising 4 or more times a week were less likely to report "fair/poor" or "good" general health (vs. "excellent"), "fair/poor" mental health (vs. "excellent") and dissatisfaction with life (vs. satisfaction) compared to those not exercising.

Among those with mood and/or anxiety disorders, the most frequently cited barriers to exercising at least once a week were as follows: "prevented by physical condition" (27.3%), "time constraints/too busy" (24.1%) and "lack of will power/self-discipline" (15.8%). Other unspecified reasons were mentioned by 25.0%. Cost was seldom mentioned as a barrier (2.1%).

Discussion

While regular physical activity/exercise has been shown to improve depression and anxiety symptoms,[26] approximately 50% of those diagnosed with these disorders in our study did not exercise regularly (i.e. at least once a week), highlighting an opportunity for improvement in the care and management of such individuals. Even though physical activity/exercise is usually considered an adjunct therapy to conventional clinical treatment (medication and/or psychotherapy) in most clinical guidelines,[34-36] it could also be used as a first-line, low-intensity intervention for mild-to-moderate mood and anxiety disorders, along with other self-management strategies.[6,37,38]

Findings from this study show that affected Canadians who were less likely to engage in physical activity/exercise were older, less educated, belonged to the lowest income quintiles and resided in Ontario and the Atlantic provinces compared to those who engaged. These results are similar to those of the general Canadian population who are inactive.[38]

As shown in other studies,[39,40] those with physical comorbidities were less likely to exercise (although this finding disappeared when we adjusted for age and other sociodemographic variables). Similarly, physical conditions (along with time constraints) were one of the most frequently cited barriers in our study. While the presence of a physical comorbidity may compound the perceived barriers to engaging in physical activity/exercise, a few recent reviews have strongly recommended the prescription of physical activity/exercise for the treatment and management of a large number of physical chronic conditions, as long as the type and intensity of physical activity/exercise are tailored to the condition.[40,41]

Although lack of will power/self-discipline was cited as a barrier by only 15% of those not engaging in physical activity/exercise, it has been shown previously that those with depression lack motivation and energy in a number of activities, particularly those requiring a certain level of effort and regularity.[42,43] This is supported by our study, which showed that those with a mood disorder (with or without a concurrent anxiety disorder) were less likely to exercise than those with an

TABLE 1
Sociodemographic and clinical characteristics among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis by exercise frequency (n = 2678), 2014 SLCDC-MA

Variable	Category	Did not exercise		Exercised 1 to 3 times per week		Exercised 4+ times per week		Chi-square test
		%	95% CI	%	95% CI	%	95% CI	*p*-value
Sex	Male	46.4	(40.2–52.6)	25.8	(19.6–32.0)	27.8	(22.2–33.4)	.44
	Female	48.6	(44.7–52.5)	27.7	(23.9–31.5)	23.6	(20.6–26.7)	
Age (years)	18–34	45.0	(38.3–51.6)	28.4	(21.5–35.3)	26.6	(20.1–33.2)	.055
	35–49	47.2	(40.1–54.3)	32.8	(25.4–40.1)	20.0	(14.8–25.2)	
	50–64	49.2	(43.8–54.6)	22.5	(17.9–27.2)	28.3	(23.8–32.8)	
	65+	52.5	(46.7–58.3)	21.7	(16.8–26.7)	25.8	(20.1–31.5)	
Marital status	Single, never married	50.3	(43.9–56.7)	24.0	(18.6–29.5)	25.7	(19.8–31.5)	.074
	Widowed/divorced/separated	51.5	(44.5–58.5)	20.2	(15.2–25.2)	28.3	(22.0–34.7)	
	Married/living common-law	45.7	(40.8–50.5)	30.6	(25.6–35.6)	23.7	(19.9–27.6)	
Respondent's education level	Less than secondary school	63.4	(55.6–71.1)	16.9[a]	(11.4–22.4)	19.7[a]	(13.4–26.1)	.001*
	Secondary school graduation	52.2	(45.7–58.6)	23.5	(17.7–29.3)	24.3	(18.5–30.1)	
	Some post-secondary	46.8[a]	(33.2–60.5)	32.3[a]	(18.2–46.4)	20.9[a]	(10.7–31.0)	
	Post-secondary graduation	42.8	(38.3–47.4)	30.2	(25.4–34.9)	27.0	(23.1–30.9)	
Household income adequacy quintiles	Q1–Q2 (lowest)	56.5	(51.6–61.4)	19.1	(15.2–23.1)	24.4	(20.1–28.6)	< .001*
	Q3 (middle)	49.5	(41.7–57.3)	23.6[a]	(16.7–30.4)	26.9	(19.9–33.9)	
	Q4–Q5 (highest)	36.9	(31.6–42.1)	38.3	(32.1–44.6)	24.8	(20.5–29.2)	
Immigrant	Yes	47.8	(36.1–59.6)	24.5[a]	(14.6–34.4)	27.7[a]	(17.0–38.4)	.80
	No	47.9	(44.2–51.5)	27.4	(23.8–31.1)	24.7	(21.9–27.5)	
Aboriginal	Yes	54.8	(43.6–65.9)	19.9	(10.7–29.2)	25.3[a]	(16.1–34.6)	.32
	No	47.6	(43.9–51.2)	27.6	(23.9–31.2)	24.9	(21.9–27.9)	
Place of residence	Rural	49.7	(44.1–55.2)	24.0	(18.5–29.5)	26.4	(21.3–31.4)	.52
	Urban	47.5	(43.6–51.4)	27.7	(23.8–31.6)	24.8	(21.6–28.1)	
Geographic region	British Columbia	32.4	(24.2–40.7)	26.3	(18.0–34.6)	41.2	(30.4–52.1)	< .001*
	Prairie	51.5	(43.6–59.4)	26.4[a]	(18.9–34.0)	22.0	(16.4–27.6)	
	Ontario	50.6	(44.4–56.7)	25.0	(19.3–30.6)	24.5	(19.9–29.0)	
	Quebec	48.2	(40.3–56.0)	35.3	(27.1–43.5)	16.5	(11.7–21.4)	
	Atlantic	50.8	(43.4–58.2)	22.5[a]	(15.8–29.2)	26.7	(19.7–33.8)	
Physical comorbidities (number)	None	43.3	(37.5–49.1)	33.0	(26.6–39.3)	23.7	(19.2–28.3)	.004*
	1–2	49.8	(45.1–54.6)	22.3	(18.5–26.0)	27.9	(23.6–32.3)	
	3+	54.8	(47.4–62.3)	25.1[a]	(18.1–32.2)	20.0[a]	(14.4–25.6)	
Disorder type	Mood disorder only	51.8	(47.0–56.6)	22.2	(17.9–26.6)	25.9	(21.6–30.3)	.005*
	Anxiety disorder only	37.6	(31.0–44.3)	35.5	(27.3–43.6)	26.9	(21.0–32.8)	
	Concurrent disorders	49.9	(44.1–55.6)	27.2	(21.7–32.7)	22.9	(18.4–27.5)	
Time since diagnosis (years)	0–4	51.7	(44.8–58.6)	27.1	(20.8–33.4)	21.2	(16.3–26.1)	.008*
	5–19	42.2	(37.2–47.1)	30.6	(25.1–36.1)	27.3	(22.8–31.8)	
	≥ 20	54.4	(48.4–60.5)	19.9	(15.5–24.3)	25.6	(20.4–30.8)	
Clinical treatment	Yes	47.5	(43.6–51.3)	29.3	(25.5–33.1)	23.2	(20.3–26.1)	.001*
	No	49.7	(41.7–57.6)	16.6[a]	(11.2–21.9)	33.8	(25.6–42.0)	
PA/exercise advice by HP	Yes	37.5	(33.6–41.5)	33.4	(29.0–37.8)	29.1	(25.5–32.7)	< .001*
	No	70.2	(64.9–75.4)	13.4[a]	(8.8–18.0)	16.4	(12.4–20.4)	

Abbreviations: CI, confidence interval; HP, health professional; OR, odds ratio; PA, physical activity; Q, quintile; 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] High sampling variability (coefficient of variation between 16.6 and 33.3%).

* Statistically significant at the $p < .05$ level.

TABLE 2
Adjusted odds ratio of having exercised "1 to 3 times a week" or "4 or more times a week" compared to "did not exercise" by sociodemographic and clinical characteristics among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis (n = 2678), 2014 SLCDC-MA

Variable (reference)	Category	Exercised 1 to 3 times per week vs. did not exercise			Exercised 4+ times per week vs. did not exercise		
		OR	95% CI	*p*-value	OR	95% CI	*p*-value
Sex (female)	Male	0.83	(0.54–1.25)	.37	1.13	(0.77–1.67)	.53
Age (18–34 years)	35–49 years	0.89	(0.51–1.55)	.68	0.68	(0.40–1.14)	.14
	50–64 years	0.69	(0.39–1.22)	.20	1.05	(0.61–1.80)	.86
	65+ years	1.10	(0.57–2.12)	.79	1.23	(0.67–2.28)	.51
Marital status	Single/never married	0.91	(0.55–1.50)	.71	1.16	(0.75–1.80)	.50
(married/living common-law)	Widowed/divorced/separated	0.95	(0.58–1.55)	.84	1.43	(0.87–2.35)	.16
Respondent's education level	Less than secondary school	0.55	(0.32–0.94)	.028*	0.66	(0.40–1.11)	.12
(post-secondary graduation)	Secondary school graduation	0.84	(0.53–1.34)	.46	0.74	(0.49–1.12)	.16
	Some post-secondary	1.00	(0.45–2.23)	.99	0.54	(0.24–1.23)	.14
Household income adequacy quintiles (Q4–Q5; highest)	Q1–Q2 (lowest)	0.39	(0.25–0.60)	< .001*	0.63	(0.42–0.96)	.033*
	Q3 (middle)	0.47	(0.28–0.78)	.003*	0.78	(0.48–1.26)	.31
Immigrant (no)	Yes	0.51	(0.13–2.03)	.34	1.56	(0.44–5.49)	.49
Aboriginal (no)	Yes	0.69	(0.30–1.60)	.39	0.94	(0.50–1.77)	.84
Place of residence (urban)	Rural	0.95	(0.61–1.49)	.83	1.08	(0.73–1.58)	.71
Geographic region (British Columbia)	Prairie	0.63	(0.31–1.30)	.21	0.36	(0.20–0.68)	.001*
	Ontario	0.69	(0.37–1.28)	.24	0.44	(0.25–0.80)	.007*
	Quebec	0.84	(0.43–1.65)	.61	0.32	(0.17–0.62)	< .001*
	Atlantic	0.53	(0.27–1.04)	.065	0.49	(0.25–0.95)	.035*
Physical comorbidities (none)	1–2	0.77	(0.50–1.18)	.22	0.87	(0.60–1.26)	.47
	3+	0.92	(0.53–1.62)	.78	0.70	(0.40–1.21)	.20
Disorder type	Concurrent disorders	0.51	(0.31–0.83)	.007*	0.43	(0.27–0.70)	< .001*
(anxiety disorder only)	Mood disorder only	0.53	(0.33–0.87)	.011*	0.69	(0.45–1.05)	.080
Time since diagnosis	0–4 years	0.77	(0.47–1.25)	.29	0.74	(0.47–1.14)	.17
(5–19 years)	≥ 20 years	0.68	(0.44–1.07)	.10	0.80	(0.52–1.22)	.30
Clinical treatment (yes)	No	0.68	(0.40–1.16)	.16	1.63	(1.02–2.61)	.043*
PA/exercise advice by HP (yes)	No	0.21	(0.15–0.31)	< .001*	0.31	(0.22–0.45)	< .001*

Abbreviations: CI, confidence interval; HP, health professional; OR, odds ratio; PA, physical activity; Q, quintile; 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. ORs adjusted for all sociodemographic and clinical characteristics.

* Statistically significant at the $p < .05$ level.

anxiety disorder only. New types of approaches and therapies such as motivational interviewing[44] and behavioural activation[45] may help individuals who lack motivation and energy to initiate and maintain new lifestyle behaviours. One of the objectives of behavioural activation is to increase positive reinforcement from the environment by encouraging individuals to increase engagement in pleasant and rewarding activities.[45,46]

The advice from a doctor or other health professional to participate in physical activity/exercise was the most important factor associated with being active at least once a week. Although the lack of knowledge and time constraints have been cited as the main barriers for prescribing physical activity/exercise by health professionals,[47-50] research has shown that family physicians are effective in increasing physical activity/exercise among primary care patients.[47,51] In light of these findings, it is essential that health professionals recommend physical activity/exercise to their patients with

TABLE 3
Perceived health and life satisfaction status among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis by physical activity/exercise frequency (n = 2678), 2014 SLCDC-MA

Variable	Category	Did not exercise		Exercised 1–3 times per week		Exercised 4+ times per week		Chi-square test
		%	95% CI	%	95% CI	%	95% CI	*p*-value
Perceived general health	Excellent/very good	35.6	(29.8–41.5)	35.6	(28.7–42.5)	28.8	(23.6–34.0)	< .001*
	Good	50.0	(44.5–55.5)	25.1	(20.7–29.5)	24.9	(20.1–29.7)	
	Fair/poor	61.7	(55.5–67.9)	17.9	(13.2–22.6)	20.4	(15.3–25.5)	
Perceived mental health	Excellent/very good	43.7	(37.9–49.6)	26.2	(20.1–32.3)	30.1	(24.7–35.4)	.053
	Good	45.7	(40.4–51.1)	30.5	(24.9–36.1)	23.8	(19.4–28.1)	
	Fair/poor	54.6	(48.2–60.9)	23.2	(17.4–28.9)	22.3	(17.0–27.6)	
Life satisfaction	Satisfied	43.3	(39.4–47.2)	30.9	(26.8–35.0)	25.8	(22.6–29.0)	< .001*
	Neutral	55.6	(45.9–65.3)	17.2[a]	(10.6–23.7)	27.2[a]	(18.4–36.1)	
	Dissatisfied	71.2	(62.4–79.9)	11.0[a]	(6.3–15.7)	17.8[a]	(10.1–25.5)	

Abbreviations: CI, confidence interval; 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] High sampling variability (coefficient of variation between 16.6 and 33.3%).

* Statistically significant at the $p < .05$ level.

mood and/or anxiety disorders and support their engagement.

A recent systematic review of studies on physical activity/exercise and depression suggests the following guidelines for health professionals: (1) both aerobic and anaerobic activity are effective, therefore the choice should be based on patient's preference; and (2) in terms of duration and frequency, sessions should last for at least 30 minutes three times a week.[52] Participation in group activities and regular supervision and monitoring appear to increase the chance of successful outcomes by sustaining motivation and adherence.[47,52] Simple and practical strategies such as prescription of physical activity/exercise and use of pedometers and logbooks have also been shown to be helpful.[47,53,54] Most importantly, the primary goal is to encourage the patient to be active (regardless of the type, duration and frequency of activity) and to ensure that the selected physical activity/exercise is seen as pleasurable.[24,51,52] Lastly, interventions designed to increase self-management through exercise will need to address the barriers presented by comorbid chronic conditions and develop strategies to deal with the issue of time constraints.

Finally, our study demonstrated an association between physical activity/exercise and perceived well-being. Individuals who did not engage in exercise were more likely to report "fair/poor" general health and dissatisfaction with life compared to those who exercised at least once per week, even after adjusting for all sociodemographic and clinical characteristics that could affect perceived well-being. However, since the 2014 SLCDC-MA is a cross-sectional survey, the direction of the association could

TABLE 4
Adjusted odds ratio of having exercised "1 to 3 times a week" or "4 or more times a week" compared to "did not exercise" by perceived health and life satisfaction status among Canadians aged 18 years and older with a self-reported mood and/or anxiety disorder diagnosis (n = 2678), 2014 SLCDC-MA

Variable (reference)	Category	Exercised 1–3 times per week vs. did not exercise			Exercised 4 + times per week vs. did not exercise		
		OR	95% CI	*p*-value	OR	95% CI	*p*-value
Perceived general health	Fair/poor	0.33	(0.19–0.56)	< .001*	0.40	(0.25–0.64)	< .001*
(excellent/very good)	Good	0.50	(0.32–0.77)	.002*	0.59	(0.40–0.88)	.010*
Perceived mental health	Fair/poor	0.69	(0.41–1.15)	.15	0.57	(0.37–0.90)	.015*
(excellent/very good)	Good	0.96	(0.62–1.49)	.85	0.71	(0.49–1.04)	.078
Satisfaction about life	Dissatisfied	0.29	(0.16–0.50)	< .001*	0.46	(0.25–0.83)	.011*
(satisfied)	Neutral	0.53	(0.31–0.93)	.027*	0.87	(0.54–1.41)	.58

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

Notes: ORs and 95% CIs are based on weighted data. ORs adjusted for: sex, age, marital status, education, household income, region, comorbidity, diagnosis type, clinical management and advice by health professional.

* Statistically significant at the $p < .05$ level.

not be determined and we were not able to assess whether respondents reported better health and life satisfaction because they were engaging in exercise, or alternatively, whether they were exercising because they felt better. Also, it is interesting to note that there were no major differences in terms of well-being among those reporting exercising 1 to 3 times a week versus 4 or more times a week. This may reflect the fact that the psychological (e.g. self-esteem, self-efficacy) and social impact of engaging in physical activity/exercise are as important as its physiological effects.[52]

Strengths and limitations

The 2014 SLCDC-MA is the only national survey to have collected detailed information on the experiences of a large sample of Canadians with a diagnosed mood and/or anxiety disorder, allowing us to study the association between physical activity/exercise as a self-management strategy and the affected individuals' sociodemographic and clinical characteristics, perceived well-being and reported barriers.

This study has a few limitations that warrant mentioning. First, the 2014 SLCDC-MA had a lower response rate (68.9%) compared to previous cycles (75%–83%).[55,56] This phenomenon has been observed in other health surveys, both nationally and internationally.[57] While this may introduce bias due to non-response, it should be noted that Statistics Canada made adjustments accounting for those who were excluded or did not respond to the survey.[32] Second, the absence of questions on type, duration and intensity of physical activity/exercise and severity of the disease limited the focus of our study. Third, the fact that we excluded those who were already exercising for reasons other than self-management may have had an impact on some of the results, although they accounted for less than 10% of the sample (8.4%). On the other hand, given that the focus of this study was on self-management strategy and finding ways to improve participation in this intervention, they would not have been representative of this specific population. Fourth, since the 2014 SLCDC-MA is a cross-sectional survey, causal inferences between perceived well-being and physical activity/exercise cannot be drawn.

Conclusion

While physical activity/exercise has been shown to reduce depression and anxiety symptoms in addition to many other health benefits such as increasing overall wellness and preventing or mitigating other chronic diseases, its uptake was challenging for at least 50% of those affected by these disorders in our study. Individuals who were more likely not to exercise shared many of the sociodemographic characteristics also observed in the general population. Engaging in physical activity/exercise was particularly difficult for those affected by a mood disorder and those with physical comorbidities, although exercise may be particularly important for these individuals.

The most important factor associated with exercising was the recommendation by a doctor or other health professional. Health practitioners play a critical role in recommending physical activity/exercise and supporting its engagement, particularly for those with a mood disorder and physical comorbidities.

Acknowledgements

The authors would like to thank Siobhan O'Donnell for her thorough review. Scott B. Patten is a Senior Health Scholar with Alberta Innovates, Health Solutions. No external financial or material support was obtained for this study.

Conflicts of interest

The authors declare no conflict of interest.

Authors' contributions

Louise Pelletier (LP), Alain Demers (AD) and Shamila Shanmugasegaram (SS) conceptualized the study, AD analyzed the data and LP and SS drafted the paper. All four authors contributed to the interpretation of the data and provided comments to the draft paper.

References

1. Barlow J, Wright C, Sheasby J, Turner A, Hainsworth J. Self-management approaches for people with chronic conditions: a review. Patient Educ Couns. 2002;48(2):177-87.
2. Newman S, Steed L, Mulligan K. Self-management interventions for chronic illness. Lancet. 2004;364(9444):1523-37.
3. Yeung A, Feldman G, Fava M. Self-management of depression: a manual for mental health and primary care professionals. Cambridge (UK): Cambridge University Press; 2009. 206 p.
4. Bodenheimer T, Lorig K, Holman H, Grumbach K. Patient self-management of chronic disease in primary care. JAMA. 2002;288(19):2469-75.
5. Health Council of Canada. Self-management support for Canadians with chronic health conditions: a focus for primary health care. Toronto (ON): Health Council of Canada; 2012. 64 p.
6. National Institute for Health and Clinical Excellence. Common mental health disorders: identification and pathways to care. London (UK): National Institute for Health and Clinical Excellence; 2011 [Clinical Guideline CG123]. 55 p.
7. Spek V, Cuijpers P, Nyklícek I, Riper H, Keyzer J, Pop V. Internet-based cognitive behaviour therapy for symptoms of depression and anxiety: a meta-analysis. Psychol Med. 2007;37(3):319-28.
8. Gellatly J, Bower P, Hennessy S, Richards D, Gilbody S, Lovell K. What makes self-help interventions effective in the management of depressive symptoms? Meta-analysis and meta-regression. Psychol Med. 2007;37(9):1217-28.
9. Lewis C, Pearce J, Bisson JI. Efficacy, cost-effectiveness and acceptability of self-help interventions for anxiety disorders: systematic review. Br J Psychiatry. 2012;200(1):15-21.
10. Pittler MH, Ernst E. Kava extract versus placebo for treating anxiety. Cochrane Database Syst Rev. 2003;(1):CD003383.
11. Linde K, Berner MM, Kriston L. St John's wort for major depression. Cochrane Database Syst Rev. 2008;(4):CD000448.
12. Sarris J, Kavanagh DJ. Kava and St. John's Wort: current evidence for use in mood and anxiety disorders. J Altern Complement Med. 2009;15(8):827-36.
13. Strauss C, Cavanagh K, Oliver A, Pettman D. Mindfulness-based interventions for people diagnosed with a current episode of an anxiety or depressive disorder: a meta-analysis of randomised controlled trials. PLOS ONE [Internet]. 2014 Apr 24 [cited 2016 Apr 12];9(4):e96110. Available from: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0096110

14. Jorm AF, Morgan AJ, Hetrick SE. Relaxation for depression. Cochrane Database Syst Rev. 2008;(4):CD007142.

15. Chen KW, Berger CC, Manheimer E, et al. Meditative therapies for reducing anxiety: a systematic review and meta-analysis of randomized controlled trials. Depress Anxiety. 2012;29(7): 545-62.

16. Goyal M, Singh S, Sibinga EM, et al. Meditation programs for psychological stress and well-being: a systematic review and meta-analysis. JAMA Intern Med. 2014;174(3):357-68.

17. Wipfli BM, Rethorst CD, Landers DM. The anxiolytic effects of exercise: a meta-analysis of randomized trials and dose-response analysis. J Sport Exerc Psychol. 2008;30(4):392-410.

18. Mead GE, Morley W, Campbell P, Greig CA, McMurdo M, Lawlor DA. Exercise for depression. Cochrane Database Syst Rev. 2009;(3): CD004366.

19. Saeed SA, Antonacci DJ, Bloch RM. Exercise, yoga, and meditation for depressive and anxiety disorders. Am Fam Physician. 2010;81(8):981-6.

20. Wolff E, Gaudlitz K, von Lindenberger BL, Plag J, Heinz A, Ströhle A. Exercise and physical activity in mental disorders. Eur Arch Psychiatry Clin Neurosci. 2011;261 Suppl 2: S186-S191.

21. Cooney GM, Dwan K, Greig CA, et al. Exercise for depression. Cochrane Database Syst Rev. 2013;(9):CD004366.

22. Carek PJ, Laibstain SE, Carek SM. Exercise for the treatment of depression and anxiety. Int J Psychiatry Med. 2011;41(1):15-28.

23. Lopresti AL, Hood SD, Drummond PD. A review of lifestyle factors that contribute to important pathways associated with major depression: diet, sleep and exercise. J Affect Disord. 2013;148(1):12-27.

24. Asmundson GJ, Fetzner MG, Deboer LB, Powers MB, Otto MW, Smits JA. Let's get physical: a contemporary review of the anxiolytic effects of exercise for anxiety and its disorders. Depress Anxiety. 2013;30(4):362-73.

25. Herring MP, O'Connor PJ, Dishman RK. The effect of exercise training on anxiety symptoms among patients: a systematic review. Arch Intern Med. 2010;170(4):321-31.

26. Wegner M, Helmich I, Machado S, Nardi AE, Arias-Carrion O, Budde H. Effects of exercise on anxiety and depression disorders: review of meta-analyses and neurobiological mechanisms. CNS Neurol Disord Drug Targets. 2014;13(6):1002-14.

27. O'Donnell S, Cheung R, Bennett K, Lagacé C. The 2014 Survey on Living with Chronic Diseases in Canada on Mood and Anxiety Disorders: a methodological overview. Health Promot Chronic Dis Prev Can. 2016; 36(12):275-88.

28. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Public Health Rep. 1985;100(2):126-31.

29. Tremblay MS, Warburton DER, Janssen I, et al. New Canadian physical activity guidelines. Appl Physiol Nutr Metab. 2011;36(1):36-46.

30. Clarke J, Janssen I. Is the frequency of weekly moderate-to-vigorous physical activity associated with the metabolic syndrome in Canadian adults? Appl Physiol Nutr Metab. 2013;38(7):773-8.

31. Statistics Canada. Canadian Community Health Survey (CCHS)—Annual Component: derived variable (DV) specifications 2013. Ottawa (ON): Statistics Canada; 2014. 117 p.

32. Statistics Canada. Survey on Living with Chronic Diseases in Canada: detailed information for 2014 (mood and anxiety disorders) [Internet]. Ottawa (ON): Statistics Canada; 2014 Oct [cited 2016 Jun 24]. Available from: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function = getSurvey&SDDS = 5160

33. Rust KF, Rao JN. Variance estimation for complex surveys using replication techniques. Stat Methods Med Res. 1996;5(3):281-310.

34. Kennedy SH, Lam RW, Parikh SV, Patten SB, Ravindran AV. Canadian Network for Mood and Anxiety Treatments (CANMAT) clinical guidelines for the management of major depressive disorder in adults. J Affect Disord. 2009;117(Suppl 1):S1–S2.

35. Davidson JR. Major depressive disorder treatment guidelines in America and Europe. J Clin Psychiatry. 2010; 71(Suppl E1):e04.

36. Katzman MA, Bleau P, Blier P, et al. Canadian clinical practice guidelines for the management of anxiety, posttraumatic stress and obsessive-compulsive disorders. BMC Psychiatry [Internet]. 2014 Jul 2 [cited 2016 Apr 12];14(Suppl 1):S1. Available from: https://bmcpsychiatry.biomedcentral.com/articles/10.1186/1471-244X-14-S1-S1

37. Knapen J,Vancampfort D, Moriën Y, Marchal Y. Exercise therapy improves both mental and physical health in patients with major depression. Disabil Rehabil. 2015; 37(16):1490-5.

38. Lorenzo-Luaces L, DeRubeis RJ, Bennett IM. Primary care physicians' selection of low-intensity treatments for patients with depression. Fam Med. 2015;47(7):511-6.

39. O'Donnell S, Rusu C, Bernatsky S, et al. Exercise/physical activity and weight management efforts in Canadians with self-reported arthritis. Arthritis Care Res (Hoboken). 2013;65(12):2015-23.

40. Pedersen BK, Saltin B. Exercise as medicine - evidence for prescribing exercise as therapy in 26 different chronic diseases. Scand J Med Sci Sports. 2015;25(Suppl 3):1-72.

41. Hoffmann TC, Maher CG, Briffa T, et al. Prescribing exercise interventions for patients with chronic conditions. CMAJ. 2016;188(7):510-8.

42. Roshanaei-Moghaddam B, Katon WJ, Russo J. The longitudinal effects of depression on physical activity. General Hospital Psychiatry. 2009;31: 306-315.

43. Krämer LV, Helmes AW, Seelig H, Fuchs R, Bengel J. Correlates of reduced exercise behaviour in depression: the role of motivational and volitional deficits. Psychol Health. 2014;29(10): 1206-25.

44. Rubak S, Sandbaek A, Lauritzen T, Christensen B. Motivational interviewing: a systematic review and meta-analysis. Br J Gen Pract. 2005; 55(513):305-12.

45. Ekers D, Webster L, Van Straten A, Cuijpers P, Richards D, Gilbody S. Behavioural activation for depression; an update of meta-analysis of effectiveness and sub group analysis. PLOS ONE [Internet]. 2014 Jun 17 [cited 2016 Apr 12];9(6):e100100. Available from: http://journals.plos.org/plosone/article?id = 10.1371/journal.pone.0100100

46. Blumenthal JA, Smith PJ, Hoffman BM. Is exercise a viable treatment for depression? ACSMs Health Fit J. 2012; 16(4):14-21.

47. Thornton JS, Frémont P, Khan K, et al. Physical activity prescription: a critical opportunity to address a modifiable risk factor for the prevention and management of chronic disease: a position statement by the Canadian Academy of Sport and Exercise Medicine. Clin J Sport Med. 2016;26(4):259-65.

48. Walsh JM, Swangard DM, Davis T, McPhee SJ. Exercise counselling by primary care physicians in the era of managed care. Am J Prev Med. 1999; 16(4):307-13.

49. Kennedy MF, Meeuwisse WH. Exercise counselling by family physicians in Canada. Prev Med. 2003;37(3):226-32.

50. Petrella RJ, Lattanzio CN, Overend, TJ. Physical activity counseling and prescription among Canadian primary care physicians. Arch Intern Med. 2007;167(16):1774-81.

51. Grandes G, Sanchez A, Sanchez-Pinilla RO, et al. Effectiveness of physical activity advice and prescription by physicians in routine primary care: a cluster randomized trial. Arch Intern Med. 2009;169(7):694-701.

52. Nyström MB, Neely G, Hassmén P, Carlbring P. Treating major depression with physical activity: a systematic overview with recommendations. Cogn Behav Ther. 2015;44(4):341-52.

53. Beaulac J, Carlson A, Boyd RJ. Counseling on physical activity to promote mental health: practical guidelines for family physicians. Can Fam Physician. 2011;57(4):399-401.

54. Frémont P, Fortier M, Frankovich RJ. Exercise prescription and referral tool to facilitate brief advice to adults in primary care. Can Fam Physician. 2014;60(12):1120-2.

55. Statistics Canada. Survey on Living with Chronic Diseases in Canada: user guide - December 2009 [Internet]. Ottawa (ON): Statistics Canada. 2010 Jan [cited 2016 Jun 24]. Available from: www.statcan.gc.ca/imdb-bmdi/document/5160_D5_T1_V1-eng.htm#a11

56. Statistics Canada. Survey on Living with Chronic Diseases in Canada: user guide - November 2011 [Internet]. Ottawa (ON): Statistics Canada; 2011 Nov [cited 2016 Jun 24]. Available from: http://www23.statcan.gc.ca/imdb-bmdi/document/5160_D4_T1_V2-eng.htm

57. Bladon TL. The downward trend of survey response rates: implications and considerations for evaluators. Can J Program Eval [Internet]. 2009 Fall [cited 2016 Jun 24];24(2):131-56. Available from: http://www.evaluationcanada.ca/secure/24-2-131.pdf