ARTICLE

Physical Activity Levels of Physiotherapists across Practice Settings: A Cross-Sectional Comparison Using Self-Report Questionnaire and Accelerometer Measures

Sarah E. Neil-Sztramko, PhD;[*] *Armin Ghayyur, BSc, MPT;*[†] *Jeremy Edwards, BSc, MPT;*[†] *Kristin L. Campbell, BScPT, PhD*[†]

ABSTRACT

Purpose: This article describes the physical activity of physiotherapists in British Columbia and examines differences across practice settings using self-report questionnaire and accelerometer-derived measures. ***Methods:*** Public and private practice physiotherapists aged 18–65 years were recruited through employee email lists and word of mouth to this cross-sectional study. Participants ($n = 98$) completed the International Physical Activity Questionnaire–Long Form (IPAQ–L) online to quantify self-reported physical activity across various domains (occupational, leisure time, domestic, and transportation). Of these, 38 agreed to wear an accelerometer for 7 days to objectively measure physical activity. Descriptive statistics were used to describe self-reported and accelerometer-measured physical activity across domains, and inferential statistics were used to compare physical activity patterns across practice sites. The correlation and agreement between self-report questionnaire and accelerometer measures were also calculated. ***Results:*** Almost all (99%) of the physiotherapists self-reported meeting physical activity guidelines, and only 58% were classified as meeting guidelines when using accelerometers. Public practice physiotherapists self-reported more total, occupational, and domestic physical activity and had higher measured occupational physical activity than private practice physiotherapists. Overall, there was poor agreement between self-report questionnaires and accelerometers. ***Conclusions:*** Physiotherapists are an active group, with those in public practice reporting and participating in more physical activity than those in private practice.

Key Words: occupation; physical activity; survey.

RÉSUMÉ

Objectif : décrire l'activité physique des physiothérapeutes en Colombie-Britannique et examiner les différences parmi les milieux de pratique à l'aide d'un questionnaire d'auto-évaluation et de mesures d'un accéléromètre. ***Méthodologie :*** des physiothérapeutes en pratique publique et privée âgés de 18 à 65 ans ont été recrutés au moyen d'une liste de courriels d'employés et par le bouche-à-oreille pour participer à cette étude transversale. Les participants ($n = 98$) ont répondu au formulaire long du questionnaire international sur l'activité physique (IPAQ-LQ) en ligne pour quantifier leur activité physique autodéclarée dans divers domaines (travail, loisir, à la maison, transport). Parmi les participants, 38 ont accepté de porter un accéléromètre pendant sept jours afin de mesurer leur activité physique de manière objective. Des statistiques descriptives ont été utilisées pour décrire l'activité physique autodéclarée et mesurée par l'accéléromètre dans divers domaines. Des statistiques déductives ont été utilisées pour comparer les modèles d'activité physique au sein des milieux de pratique. La corrélation et la concordance entre le questionnaire d'auto-évaluation et les mesures de l'accéléromètre ont aussi été calculées. ***Résultats :*** presque tous (99 %) les physiothérapeutes ont déclaré respecter les lignes directrices en matière d'activité physique, alors que seulement 58 % d'entre eux ont été classés ainsi selon les mesures de l'accéléromètre. Les physiothérapeutes en pratique publique ont déclaré faire plus d'activité physique totale, liée au travail et à la maison et ont obtenu des mesures d'activité physique liée au travail plus élevées que les physiothérapeutes en pratique privée. Globalement, la concordance entre les questionnaires d'auto-évaluation et les accéléromètres était faible. ***Conclusions :*** les physiothérapeutes sont un groupe actif, et ceux en pratique publique déclarent et font plus d'activité physique que les physiothérapeutes en pratique privée.

Low levels of physical activity are of great concern to public health. Physical inactivity is responsible for an estimated 9% of all-cause mortality worldwide, and it is a major contributor to the prevalence of and premature mortality from many chronic diseases, including type 2 diabetes, coronary heart disease, and certain types of cancer.[1] The Canadian Society for Exercise Physiology has harmonized Canada's Physical Activity Guidelines

From the: *Faculty of Health Sciences, McMaster University, Hamilton, Ont.; †Department of Physical Therapy, University of British Columbia, Vancouver.

Correspondence to: Kristin L. Campbell, Department of Physical Therapy, University of British Columbia, 212 Friedman Bldg., 2177 Wesbrook Mall, Vancouver, BC V6T 1Z3; kristin.campbell@ubc.ca.

Contributors: All authors designed the study; or collected, analyzed, or interpreted the data; and drafted or critically revised the article and approved the final draft.

Competing Interests: None declared.

Acknowledgements: The authors thank Ryan Faunt and other members of the 2015 MPT student research group for their assistance with this project.

Physiotherapy Canada **2017; 69(2);152–160; doi:10.3138/ptc.2015-64**

for Adults with those of the World Health Organization, and it recommends that adults should achieve a minimum of 150 minutes per week of moderate to vigorous physical activity (MVPA), in bouts of 10 minutes or more.[2]

There are multiple domains in which an individual can be physically active, including physical activity that is completed as part of an occupation and physical activity performed outside of work hours (non-occupational), which includes leisure time (i.e., sport and recreation), domestic (i.e., house- or yardwork), and transportation. Physical activity in any of these domains may count toward the goal of 150 minutes per week of MVPA as long as the activity is of at least moderate intensity and undertaken in bouts of at least 10 minutes.

Physical activity can be measured by self-report (e.g., questionnaires or activity logs) or objective tools (e.g., accelerometers); each has its own strengths and limitations. Although self-report measures tend to overestimate physical activity as a result of recall and social desirability biases, they provide important information about physical activity in different domains. As objective measures, accelerometer measures overcome some of the limitations of self-report measures, but they may not capture certain activities well and may not be able to distinguish among physical activities across various domains.

Discrepancies in data obtained between self-report questionnaire and accelerometer measures of physical activity have been discussed in the physical activity measurement literature. (See the editorial by Colbert and Schoeller and the accompanying responses for a summary of differences between self-report and accelerometer measures.[3]) Population-based self-report questionnaire data collected using a validated physical activity questionnaire as part of the Canadian Community Health Survey have suggested that 52% of Canadians, and 59% of British Columbians, meet published physical activity guidelines.[4] However, population-based data collected using accelerometers as part of the Canadian Health Measures Survey have indicated that only 15% of Canadians may actually be meeting these guidelines.[5] Therefore, when possible, it is ideal to use both self-report and accelerometer measures to quantify physical activity.

Health practitioners, including physiotherapists, may have an important role to play in promoting physical activity to their patients. A study of Canadian medical students found that those who met physical activity guidelines were more likely to include recommendations for physical activity in discussions with their patients.[6] Similarly, Frank and colleagues[7] showed that female primary healthcare providers who were physically active were better suited to motivate and educate their patients on the importance of a physically active lifestyle. According to a recent cross-sectional survey, physiotherapists overwhelmingly believe that they should serve as role models for the promotion of physical activity and that they should "practise what they preach."[8(p1426)] Research conducted in the United States found that physiotherapists, as well as physiotherapy students and assistants, reported higher rates of physical activity than other health care professionals and the general population;[9] however, no studies have described the physical activity habits of physiotherapists in Canada. Physiotherapists may have more knowledge and education related to physical activity than other health care professionals or the general population. If physiotherapists in Canada are to be called on to act as physical activity experts and educators, it must first be determined whether they are leading by example and meeting current physical activity guidelines.

The primary objectives of this study were to (1) estimate physical activity levels in a group of physiotherapists with respect to published Canadian guidelines for physical activity and (2) compare the physical activity levels of physiotherapists in public and private practice settings. A secondary objective was to estimate the agreement between a self-report online questionnaire and an accelerometer in measuring physical activity. We hypothesized that a high proportion of physiotherapists would meet current physical activity guidelines and that physiotherapists would more accurately report their physical activity than has been reported for the general population.

METHODS

Study sample

We collected data cross-sectionally from a convenience sample of physiotherapists in British Columbia. Individuals aged 18–65 years who were registered with the College of Physical Therapists of British Columbia and were currently employed as physiotherapists were eligible to participate. Physiotherapists were ineligible if they self-reported a transient mobility impairment or a musculoskeletal or neurological condition that affected their level of physical activity. For logistical reasons, those whose home or workplace was more than 40 km from Vancouver were ineligible for the accelerometer portion of the study.

We recruited participants through employee email lists of local health authorities and through an advertisement in the Physiotherapy Association of British Columbia's monthly newsletter. Participants were also recruited from private clinics across Greater Vancouver through word of mouth and recruitment posters. The University of British Columbia Research Ethics Board approved this study, and participants provided informed consent.

Data collection

We collected data between September 2014 and March 2015. Participants were given a Web link to an anonymous online survey, which included demographic information and the self-report physical activity questionnaire. Using an online survey allowed us to maximize the sample size by including participants from across

British Columbia. After completing the online survey, participants were invited to participate in the accelerometer portion of the study by providing their email addresses. Interested participants were contacted by a member of the study team to determine eligibility and arrange for the delivery of the accelerometer and daily log. At the end of the 7-day accelerometer wearing period, participants were asked to complete a second self-report physical activity questionnaire for that week. Because of ethical and feasibility constraints, we were unable to link data from participants in the first and second portions of the study.

Outcome measures

Self-report questionnaire

Participants self-reported physical activity using the International Physical Activity Questionnaire–Long Form (IPAQ–L).[10] The IPAQ–L requires respondents to recall their physical activity from the previous 7-day period using 27 questions about the frequency, duration, and intensity of activity on weekdays and weekends in four domains: (1) occupation, (2) transportation, (3) domestic, and (4) leisure. The IPAQ–L also includes three questions to quantify sedentary time. For each domain, metabolic equivalent (MET) values were assigned, where 1 MET = 3.5 ml of oxygen consumption per kilogram of body weight per minute of activity. Specific MET values were assigned for walking (3.3), moderate activity (3.0–4.0), cycling (6.0), and vigorous activity (5.5–8.0). Procedures for data cleaning and processing of the IPAQ–L data followed established guidelines, and data were analyzed by applying recommended data truncation rules to reduce over-reporting.[11] IPAQ–L data are presented as both MET hours per week and minutes per week to correspond with the accelerometer data. A recent meta-analysis found that the IPAQ–L offers a reasonable level of convergent validity compared with various accelerometer or pedometer measures (pooled correlation = 0.35)[12] and that it has similar test–retest reliability to other self-report physical activity measures (intra-class correlation coefficient [ICC] for total MVPA = 0.68).[13]

Accelerometer

The ActiGraph GT3X+ (ActiGraph, Pensacola, FL) was used to measure the direction and quantity of movement. This triaxial accelerometer measures movement in three planes to estimate total physical activity using 60-second epochs. The GT3X+ is highly correlated with measured oxygen consumption ($r = 0.81$, $p < 0.001$), thereby demonstrating strong validity.[14] Participants wore the accelerometer over the right hip during all waking hours for 7 consecutive days. Accelerometer measurement has been shown to have higher reliability (ICC = 0.97) when worn on the hip rather than on the wrist or ankle.[15] Participants completed a daily log indicating the times the monitor was put on in the morning and taken off at night and any times removed throughout the day, such as for bathing or swimming. To distinguish between occupational and non-occupational physical activity, hours of work for each day of wear were recorded.

Accelerometer data were downloaded and analyzed using ActiLife version 6.6.3 (ActiGraph, Pensacola, FL). Daily logs were reviewed to confirm wear time. As is standard practice for analysis of accelerometer data, only participants with valid wear time, defined as a minimum of 10 hours per day for at least 4 days, were included.[16] Freedson vector magnitude 3 algorithms were used to classify MVPA.[17] Physical activity data were summarized and analyzed (1) as total MVPA and (2) as MVPA occurring in bouts of 10 minutes or more. The latter data were used to correspond with both the IPAQ–L data and the current physical activity guidelines. Sedentary time was calculated and analyzed when it occurred in bouts of 10 minutes or more. Occupational activity was corrected for self-reported total work time per week to make comparisons across practice sites.

Data analysis

Statistical analyses were conducted using R for Mac OS X, version 3.2.1 (R Foundation for Statistical Computing, Vienna, Austria). Median, inter-quartile range, mean, SD, counts, and proportions were calculated when appropriate. Independent-sample *t*-tests and χ^2 tests were used to test for differences between public and private practice physiotherapists for all descriptive variables. Because physical activity was highly skewed, non-parametric Wilcoxon signed-rank tests were used to test for differences in physical activity and sedentary time between public and private practice physiotherapists. To compare self-report questionnaire and accelerometer measures of physical activity and sedentary time, the mean and SD of the difference was calculated, along with Pearson's correlation coefficient (r) and ICC with 95% CIs.

A power calculation was performed using G*Power, version 3.1.9.2. for Mac (Heinrich Heine University, Düsseldorf, Germany) to determine the sample size required to compare self-report questionnaire data with the accelerometer data using Pearson's correlation coefficient. A previous meta-analysis comparing the IPAQ–L with accelerometers found correlations ranging from 0.27 to 0.49;[18] thus, we selected the midpoint ($r = 0.39$) for our calculation. Using a significance level of 0.05 and a power of 0.8, a sample size of 36 was required for the accelerometer portion of the study.

RESULTS

Of the 211 physiotherapists who responded to the initial invitation to participate, 98 eligible participants provided complete survey responses on the IPAQ-L, and 38

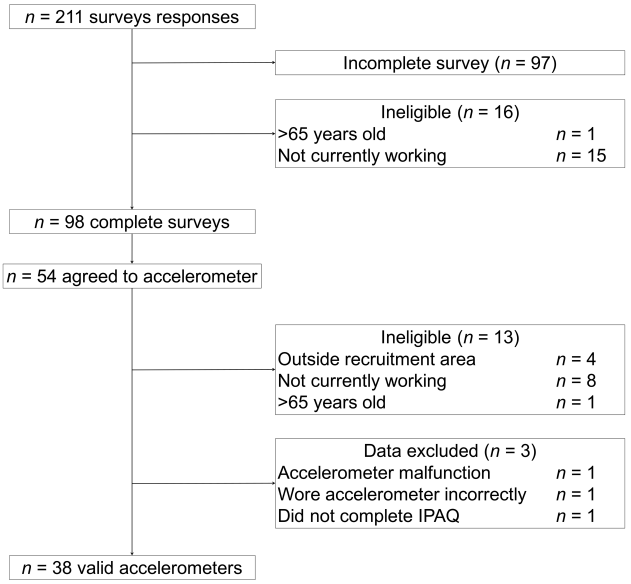

Figure 1 Participant flow through study.

provided complete accelerometer data (see Figure 1). Participants were predominantly female, with entry-level physiotherapy degrees (see Tables 1 and 2). Of those who agreed and were eligible to complete the accelerometer portion of the study, 25 worked in public practice, 10 worked in private practice, 2 participants worked in both public and private practice, and 1 participant did not report practice location (Table 2). Private practice physiotherapists had significantly higher BMI, but no other differences in descriptive characteristics were found.

Almost all participants who completed the initial online survey self-reported levels of MVPA that met or exceeded the Canadian physical activity guidelines (Table 1). Participants reported an average of 1,274.5 minutes per week, or 182.1 minutes per day, of MVPA across all domains. Occupational physical activity accounted for the greatest number of active minutes, followed by leisure-time, transportation, and domestic physical activity. The greatest volume of physical activity (MET h/wk) was reported for leisure-time physical activity, followed by occupational, transportation, and domestic.

Table 1 Descriptive Characteristics and Self-Reported Physical Activity of Participants Who Completed the International Physical Activity Questionnaire ($n = 98$)

Characteristic	Mean (SD)	No. (%)
Age, y	39.3 (11.0)	
BMI, kg/m^2	23.4 (4.4)	
Gender		
Male		19 (19.4)
Female		79 (80.6)
Education		
Entry-level degree (BScPT, MPT)		80 (81.6)
Post–entry-level degree (MSc, MRSc, PhD)		18 (18.4)
Marital status		
Never married or single		22 (22.4)
Presently married or living with partner		66 (67.3)
Divorced or separated		9 (9.2)
Not reported		1 (1.0)
Self-report of meeting physical activity guidelines		
Yes		97 (99.0)
No		1 (1.0)
	Mean (SD)	Median (IQR)
Total activity, min/wk	1,274.5 (748.7)	1,092.0 (661.2–1,950.0)
Occupational activity, min/wk	498.4 (577.6)	240.0 (22.5–900.0)
Non-occupational activity, min/wk		
Leisure	406.8 (349.0)	335.0 (210.0–532.5)
Transportation	236.4 (217.2)	150.0 (72.5–368.8)
Domestic	220.4 (288.3)	115.0 (41.3–300.0)
Total activity, MET h/wk	98.5 (63.6)	77.8 (52.0–138.4)
Occupational activity, MET h/wk	32.1 (38.9)	15.6 (1.3–49.8)
Non-occupational activity, MET h/wk		
Leisure	38.2 (33.1)	33.1 (18.1–47.7)
Transportation	15.4 (15.5)	8.3 (4.3–23.1)
Domestic	12.9 (17.2)	6.0 (2.3–17.4)
Sedentary time, h/wk	34.6 (18.7)	31.3 (21.3–43.4)

Note. Percentages may not total 100 because of rounding.
IQR = inter-quartile range; MET = metabolic equivalent.

Table 2 Descriptive Characteristics of Participants Who Wore an Accelerometer

Characteristic	All participants ($n = 38$)	Public practice (no. = 27)*	Private practice (no. = 12)*	
		Mean (SD)		*p*-value†
Age, y	40.8 (10.2)	41.1 (10.2)	38.3 (10.8)	0.58
BMI, kg/m^2	22.3 (2.9)	22.9 (3.0)	21.1 (2.1)	0.03
		No. (%)		*p*-value†
Gender				
Male	2 (5.3)	2 (7.4)	0 (0.0)	0.91
Female	36 (94.7)	25 (92.6)	12 (100.0)	—
Employment type				
Full time	28 (73.7)	22 (81.5)	6 (50.0)	0.16
Part time	7 (18.4)	3 (11.1)	4 (33.3)	—
Not reported	3 (7.9)	2 (7.4)	2 (16.7)	—
Education				
Entry-level degree (BScPT, MPT)	36 (94.7)	26 (96.3)	11 (91.7)	0.34
Post–entry-level degree (MSc, MRSc, PhD)	2 (5.3)	1 (3.7)	1 (8.3)	—
Marital status				
Never married or single	9 (23.7)	7 (25.9)	2 (16.7)	0.74
Presently married or living with partner	27 (71.1)	18 (66.7)	10 (83.3)	—
Divorced or separated	2 (5.3)	2 (7.4)	0 (0.0)	—

Note. Percentages may not total 100 because of rounding.
*One participant did not report practice site; 2 participants reported work in both public and private practice and are counted in both categories.
† *p*-values were calculated for differences between practice sites using χ^2 tests for categorical variables and *t* tests for continuous variables.

Table 3 Self-Reported Physical Activity and Sedentary Time of Participants Who Wore an Accelerometer

Characteristic	All participants ($n = 37$)*	Public practice (no. = 26)*	Private practice (no. = 11)*	
		No. (%)		*p*-value†
Meets physical activity guidelines				
Yes	36 (97.3)	26 (100.0)	10 (90.9)	0.63
No	1 (2.7)	0 (0.0)	1 (9.1)	—
		Median (IQR)		*p*-value†
Total MVPA, min/wk	630.0 (475.0–970.0)	912.5 (543.8–1,592.0)	440.0 (372.5–585.0)	<0.01
Occupational activity, min/wk	90.0 (0.0–360.0)	142.5 (30.0–360.0)	0.0 (0.0–92.5)	0.02
Non-occupational activity, min/wk	570.0 (400.0–775.0)	640.0 (535.0–847.5)	400.0 (180.0–552.5)	<0.01
Leisure time	280.0 (170.0–410.0)	310.0 (240.0–417.5)	170.0 (140.0–345.0)	0.20
Transportation	120.0 (40.0–240.0)	135.0 (62.5–296.2)	60.0 (15.0–112.5)	0.07
Domestic	60.0 (40.0–120.0)	90.0 (40.0–202.5)	20.0 (0.0–47.5)	<0.01
Total MVPA, MET h/wk	49.6 (33.8–72.6)	60.5 (35.3–104.1)	37.3 (25.7–51.6)	0.02
Occupational activity, MET h/wk	5.3 (0.0–19.8)	9.2 (1.7–23.9)	0.0 (0.0–5.3)	0.02
Non-occupational activity, MET h/wk	44.3 (27.9–59.5)	46.3 (33.3–62.7)	24.8 (18.9–51.6)	<0.05
Leisure time	27.2 (18.2–33.5)	28.6 (19.0–33.1)	21.3 (10.2–34.4)	0.41
Transportation	6.6 (2.2–15.4)	7.4 (3.7–19.6)	3.3 (0.8–6.2)	0.07
Domestic	3.3 (2.0–7.0)	4.5 (2.0–10.4)	1.0 (0.0–3.0)	<0.01
Sedentary time, h/wk	13.0 (10.0–18.0)	15.4 (11.5–17.4)	9.0 (8.4–26.5)	0.39

*One participant's data was removed from analysis because of over-reporting, 1 participant did not report practice site, and 2 participants who reported working in both public and private practice were included in both categories.
† *p*-values were calculated for differences between practice sites using the Wilcoxon signed-rank test.
IQR = inter-quartile range; MVPA = moderate to vigorous physical activity; MET = metabolic equivalent.

The self-reported physical activity and sedentary time for public and private practice physiotherapists who also wore an accelerometer are presented in Table 3. Total physical activity was higher for public practice than private practice physiotherapists, as a result of greater duration (min/wk) and volume (MET h/wk) of both occupational and non-occupational physical activity. Within non-occupational physical activity domains, public practice physiotherapists reported a trend toward greater durations and volumes across all domains; however, this was statistically significant only for domestic activity. No

Table 4 Objective Physical Activity and Sedentary Time of Participants Who Wore an Accelerometer

	All participants ($n = 38$)*	Public practice ($n = 27$)*	Private practice ($n = 12$)*	
		No. (%)		p-value†
Meets physical activity guidelines				
Yes	22 (57.9)	16 (59.3)	7 (58.3)	0.96
No	16 (42.1)	11 (40.7)	5 (41.7)	—
		Median (IQR)		p-value†
MVPA in bouts of ≥10 min, min/wk				
Total	158.0 (88.8–251.5)	188.9 (123.2–329.4)	165.2 (86.1–202.7)	0.32
Occupational	0.0 (0.0–19.3)	0.0 (0.0–29.3)	0.0 (0.0–6.3)	0.09
Non-occupational	153.0 (76.1–245.5)	177.3 (93.3–288.7)	150.6 (78.0–210.8)	0.46
MVPA, min/wk				
Total	390.9 (320.0–509.3)	458.8 (339.4–549.4)	357.4 (313.1–465.6)	0.11
Occupational	53.5 (32.3–120.0)	97.0 (47.2–125.1)	44.2 (34.3–59.6)	<0.01
Non-occupational	325.5 (234.2–408.2)	361.1 (220.1–436.9)	303.6 (253.9–385.4)	0.40
Sedentary time, h/wk				
Total	21.3 (15.3–34.5)	23.4 (17.2–31.9)	20.2 (16.2–23.7)	0.60
Occupational	4.3 (2.2–6.5)	5.5 (3.5–7.5)	3.1 (1.0–4.1)	<0.01
Non-occupational	17.9 (11.7–25.4)	18.9 (12.8–27.3)	16.6 (13.3–24.0)	0.99

*One participant did not report practice site, and 2 participants who reported working in both public and private practice were included in both categories.
† p-values were calculated for the difference between public and private practice using the Wilcoxon signed-rank test.
IQR = inter-quartile range; MVPA = moderate to vigorous physical activity.

Table 5 Comparison of Self-Report Questionnaire and Accelerometer-Measured Physical Activity and Sedentary Time ($n = 37$*)

MVPA	Mean (SD) difference	r	ICC (95% CI)
In ≥10-min bouts, min/wk			
Total	712.4 (671.9)	0.08	0.01 (0.00, 0.19)
Occupational	226.8 (326.7)	0.32	0.03 (0.00, 0.28)
Non-occupational	485.6 (452.1)	−0.05	0.00 (0.00, 0.17)
Min/wk			
Total	496.1 (609.1)	0.17	0.06 (0.00, 0.29)
Occupational	158.6 (309.1)	0.44	0.15 (0.00, 0.42)
Non-occupational	337.5 (443.2)	0.06	0.02 (0.00, 0.26)
Sedentary time, h/wk	−10.1 (13.6)	0.24	0.14 (0.00, 0.39)

*One participant's data was removed from analysis because of over-reporting.
MVPA = moderate to vigorous physical activity.

significant differences were found between groups for self-reported sedentary time.

Accelerometer physical activity data showed that only 58% of physiotherapists met the Canadian Physical Activity Guidelines for Adults (see Table 4), with no difference between those in public and private practice. When only MVPA in bouts of 10 minutes or more was considered, no significant differences were found between public and private practice physiotherapists. When total MVPA was counted, public practice physiotherapists demonstrated higher occupational physical activity. Public practice physiotherapists also had higher occupational sedentary time, and no differences were found between practice settings for total or non-occupational sedentary time.

Overall, large discrepancies were found between self-report questionnaire and accelerometer physical activity and sedentary time among those who wore the accelerometer and completed the IPAQ–L (see Table 5). Large mean differences were found between the two tools for total MVPA and when examining occupational and non-occupational activity separately, regardless of whether MVPA was calculated in bouts of at least 10 minutes or as total minutes of MVPA. All correlations were poor, with the exception of total minutes per week of occupational MVPA ($r = 0.44$), and all ICCs showed little to no absolute agreement.

DISCUSSION

Overall, the physiotherapists included in this study were an active group: 99% of those who completed the self-report IPAQ–L and 58% of those who wore the accelerometer met the current Canadian physical activity guidelines. This is much higher than estimates reported

for the general Canadian population: 52% using a self-report questionnaire and 15% using accelerometers.[4,5] This suggests that our hypothesis was correct and that physiotherapists, as a highly active group, are poised to act as physical activity role models and advocates in the health care setting.

The high rates of physical activity observed in this study may be explained by myriad factors. First, physiotherapy is typically an active occupation, one that requires individuals to be on their feet doing a variety of physical tasks throughout the day. This is supported by the high levels of occupational physical activity, as measured by both the self-report questionnaire and accelerometry. Physiotherapists also receive years of education on types of physical activity and its importance for health and well-being and, as a result, may be more likely to participate in physical activity in their leisure time and as part of transportation time.

Compared with a sample of U.S. physiotherapists, a greater proportion of physiotherapists in this study met physical activity guidelines.[9] Using an online self-report questionnaire administered to 923 physiotherapists, Chevan and Haskvitz[9] found that 67% of physiotherapists met physical activity guidelines. One possible explanation for this discrepancy may be the tool used in the previous study, which captured only leisure-time physical activity. Also, the U.S. survey was administered to a larger sample of physiotherapists; thus, it may be more representative of the general population of physiotherapists and less influenced by volunteer bias.

Comparing physiotherapists across practice settings, those who worked in public practice had higher physical activity levels by self-report and accelerometer than private practice physiotherapists, particularly in the occupational domain. To our knowledge, no research exists that has examined physical activity across physiotherapy practice settings. Previous research conducted in other occupational groups has suggested that those who report more occupational physical activity participate in lower levels of physical activity in their leisure;[19] this inverse relationship between occupational and non-occupational physical activity was not observed in this study.

Possible reasons for differences in occupational physical activity across practice sites may be explained by the nature of the work. Public practice physiotherapists who work in a hospital setting may have more opportunity to walk for sustained periods throughout their workday because the hospital setting typically spans a larger geographic distance than a private clinic. Public practice physiotherapists also often provide assistance to patients during transfers and mobilization, which can be physically demanding. Private practice physiotherapists working in a private clinic may be less likely to perform these tasks, particularly if they serve a patient population with higher levels of physical function and who do not require transfer and ambulation assistance. Another possible explanation for differences in physical activity between physiotherapists in public and private practice could be that individuals with different personality types, including attitudes and behaviours related to physical activity, may choose to work in certain practice settings. However, we were unable to explore this hypothesis because attitudes and intentions toward physical activity were not measured in this study.

When comparing self-report questionnaires with accelerometer measures of physical activity in this sample, correlation and agreement were poor for both total and non-occupational MVPA. A fair correlation was found for occupational physical activity, which was higher when total minutes were included ($r = 0.44$) than when only activity that occurred in bouts of 10 minutes or more was counted ($r = 0.32$). Absolute agreement between self-report questionnaire and accelerometer measures of physical activity was poor, with ICC values ranging from 0.01 to 0.15. These findings imply that physiotherapists may not be any more accurate than the general population in reporting physical activity, and many physiotherapists may erroneously believe that they are getting more physical activity than they actually are. Although physiotherapists receive training in physical activity and exercise science and should understand what activities constitute MVPA, this greater knowledge and understanding do not translate into accurate reporting.

To our knowledge, this study is the first to compare self-report and objective measures of physical activity in physiotherapists specifically. It is key to note that neither tool is without error. The IPAQ–L, as a self-report measure, is prone to over-reporting errors of physical activity duration and intensity because of social desirability bias,[18] inaccurate recall,[20,21] or both. Social desirability bias may be particularly important to consider among physiotherapists, who may be expected to participate in regular physical activity by their patients and peers. Several suggestions have been made to address over-reporting in self-report questionnaires, such as using trained interviewers to administer the questionnaire and applying rules for data truncation.[22] Because of logistical issues, we were not able to use trained interviewers; however, data truncation rules were applied to the analysis of this data.

Although often considered the gold standard for field-based physical activity measurement, accelerometers do have inherent limitations.[3,23] They do not capture certain activities well, such as cycling, and activities primarily involving upper extremity movement. They are also not waterproof; thus, water-based activities are not captured at all. In our sample, many participants reported cycling activity in both the leisure and the transportation domains on the IPAQ–L, suggesting that the accelerometers may have underestimated physical activity for

these individuals. Participants were sent a link by email and asked to complete the IPAQ on the last day of accelerometer wear so that data from the two measures reflected the same 7-day period. However, not all questionnaires were completed on that day, and some participants may not have reported on the same wear period, thus explaining some lack of agreement.

It is interesting that the only fair correlation found was for occupational physical activity. This is consistent with findings from a previous study that aimed to validate the IPAQ–L, in which the occupational domain showed moderate agreement with actual workplace physical activity.[24] Occupational physical activity may be easier to recall because it is a predictable, structured part of one's week, with little week-to-week variation.

In addition to the limitations inherent in the physical activity measurement tools, several limitations should be considered when interpreting these results. First, although efforts were made to reach all physiotherapists who were members of the Physiotherapy Association of British Columbia through our advertisement in its monthly newsletter, not all physiotherapists may have read the recruitment advertisement or agreed to participate. In addition, not all physiotherapists in the province are members of the professional association. Second, our study sample may represent a sample of the most active physiotherapists—specifically, those who were interested in participating in a physical activity study. Our findings may therefore have overestimated the physical activity levels of all physiotherapists in British Columbia. Third, we had a larger number of participants in public practice respond to the accelerometer portion of the study, suggesting that our recruitment effort to reach those individuals was more successful. Because of logistical constraints, only participants who lived or worked within 40 km of Vancouver were eligible to participate in the accelerometer portion of the study. Finally, Vancouver is known to be an active city with excellent physical activity and public transit infrastructure and a generally moderate climate, but physical activity levels of physiotherapists are likely to vary greatly in other geographic locations. For these reasons, our sample cannot be said to be representative of the population of physiotherapists in British Columbia or Canada.

CONCLUSION

A greater proportion of physiotherapists in British Columbia meet the current Canadian physical activity guidelines of 150 minutes per week of MVPA than the members of the general population across Canada. Physiotherapists in public practice appear to be more active than those in private practice, particularly during occupational time. On the basis of these findings, physiotherapists may be in a position to lead by example in promoting regular physical activity to their patients and colleagues. Future research is needed to determine whether similar patterns of physical activity are seen in physiotherapists across Canada and whether physiotherapists who are more active than their peers are actually better at promoting good health by encouraging physical activity for chronic disease prevention and management.

KEY MESSAGES

What is already known on this topic

Health care professionals who are more physically active are more likely to recommend and counsel their patients on the benefits of being active.

What this study adds

Physiotherapists in this sample from British Columbia are a very active population, with most reporting physical activity levels well in excess of the recommended guidelines. Public practice physiotherapists seem to be more active than private practice physiotherapists, particularly during occupational time. Although highly trained in the physiology and benefits of physical activity, physiotherapists are not inherently more accurate in reporting their recent physical activity than the general population. Poor agreement between self-report and accelerometer measures indicates that physiotherapists may not be achieving the amount of physical activity that they believe they are.

REFERENCES

1. Lee IM, Shiroma EJ, Lobelo F, et al.; Lancet Physical Activity Series Working Group. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. Lancet. 2012;380(9838):219–29. http://dx.doi.org/10.1016/S0140-6736(12)61031-9. Medline:22818936
2. Tremblay MS, Warburton DE, Janssen I, et al. New Canadian physical activity guidelines. Appl Physiol Nutr Metab. 2011;36(1):36–46, 47–58. http://dx.doi.org/10.1139/H11-009. Medline:21326376
3. Colbert LH, Schoeller DA. Expending our physical activity (measurement) budget wisely. J Appl Physiol. 2011;111(2):606–7. http://dx.doi.org/10.1152/japplphysiol.00089.2011. Medline:21474698
4. Gilmour H. Physically active Canadians. Health Rep. 2007;18(3):45–65. Medline:17892251
5. Colley RC, Garriguet D, Janssen I, et al. Physical activity of Canadian adults: accelerometer results from the 2007 to 2009 Canadian Health Measures Survey. Health Rep. 2011;22(1):7–14. Medline:21510585
6. Holtz KA, Kokotilo KJ, Fitzgerald BE, et al. Exercise behaviour and attitudes among fourth-year medical students at the University of British Columbia. Can Fam Physician. 2013;59(1):e26–32. Medline:23341676
7. Frank E, Bhat Schelbert K, Elon L. Exercise counseling and personal exercise habits of US women physicians. J Am Med Womens Assoc. 2003;58(3):178–84. Medline:12948110
8. Black B, Marcoux BC, Stiller C, et al. Personal health behaviors and role-modeling attitudes of physical therapists and physical therapist students: a cross-sectional study. Phys Ther. 2012;92(11):1419–36. http://dx.doi.org/10.2522/ptj.20110037. Medline:22822236
9. Chevan J, Haskvitz EM. Do as I do: exercise habits of physical therapists, physical therapist assistants, and student physical therapists. Phys Ther. 2010;90(5):726–34. http://dx.doi.org/10.2522/ptj.20090112. Medline:20299411
10. Craig CL, Marshall AL, Sjöström M, et al. International Physical Activity Questionnaire: 12-country reliability and validity. Med Sci

Sports Exerc. 2003;35(8):1381–95. http://dx.doi.org/10.1249/01.MSS.0000078924.61453.FB. Medline:12900694

11. IPAQ Group. Guidelines for the data processing and analysis of the International Physical Activity Questionnaire: short and long forms [Internet]. The Group; 2005 [cited 2015 Jul]. Available from: https://www.researchgate.net/file.PostFileLoader.html?id=56f92d66615e27-d49a658031&assetKey=AS%3A344600888791041%401459170662924
12. Kim Y, Park I, Kang M. Convergent validity of the International Physical Activity Questionnaire (IPAQ): meta-analysis. Public Health Nutr. 2013;16(3):440–52. http://dx.doi.org/10.1017/S1368980012002996. Medline:22874087
13. Brown W, Bauman A, Chey T, et al. Comparison of surveys used to measure physical activity. Aust N Z J Public Health. 2004;28(2):128–34. http://dx.doi.org/10.1111/j.1467-842X.2004.tb00925.x. Medline:15233351
14. Kelly LA, McMillan DG, Anderson A, et al. Validity of ActiGraphs uniaxial and triaxial accelerometers for assessment of physical activity in adults in laboratory conditions. BMC Med Phys. 2013;13(1):5. http://dx.doi.org/10.1186/1756-6649-13-5. Medline:24279826
15. Ozemek C, Kirschner MM, Wilkerson BS, et al. Intermonitor reliability of the GT3X+ accelerometer at hip, wrist and ankle sites during activities of daily living. Physiol Meas. 2014;35(2):129–38. http://dx.doi.org/10.1088/0967-3334/35/2/129. Medline:24399138
16. Matthews CE, Hagströmer M, Pober DM, et al. Best practices for using physical activity monitors in population-based research. Med Sci Sports Exerc. 2012;44(1 Suppl 1):S68–76. http://dx.doi.org/10.1249/MSS.0b013e3182399e5b. Medline:22157777
17. Sasaki JE, John D, Freedson PS. Validation and comparison of ActiGraph activity monitors. J Sci Med Sport. 2011;14(5):411–6. http://dx.doi.org/10.1016/j.jsams.2011.04.003. Medline:21616714
18. Adams SA, Matthews CE, Ebbeling CB, et al. The effect of social desirability and social approval on self-reports of physical activity. Am J Epidemiol. 2005;161(4):389–98. http://dx.doi.org/10.1093/aje/kwi054. Medline:15692083
19. Burton NW, Turrell G. Occupation, hours worked, and leisure-time physical activity. Prev Med. 2000;31(6):673–81. http://dx.doi.org/10.1006/pmed.2000.0763. Medline:11133334
20. Fjeldsoe BS, Winkler EA, Marshall AL, et al. Active adults recall their physical activity differently to less active adults: test-retest reliability and validity of a physical activity survey. Health Promot J Austr. 2013;24(1):26–31. Medline:23575586
21. Bauman A, Ainsworth BE, Bull F, et al. Progress and pitfalls in the use of the International Physical Activity Questionnaire (IPAQ) for adult physical activity surveillance. J Phys Act Health. 2009;6(Suppl 1):S5–8. http://dx.doi.org/10.1123/jpah.6.s1.s5. Medline:19998844
22. Rzewnicki R, Vanden Auweele Y, De Bourdeaudhuij I. Addressing overreporting on the International Physical Activity Questionnaire (IPAQ) telephone survey with a population sample. Public Health Nutr. 2003;6(3):299–305. http://dx.doi.org/10.1079/PHN2002427. Medline:12740079
23. Bassett DR Jr. Validity and reliability issues in objective monitoring of physical activity. Res Q Exerc Sport. 2000;71(Suppl 2):S30–6. http://dx.doi.org/10.1080/02701367.2000.11082783. Medline:10925822
24. Kwak L, Hagströmer M, Sjostrom M. Can the IPAQ-long be used to assess occupational physical activity? J Phys Act Health. 2012;9(8):1130–7. http://dx.doi.org/10.1123/jpah.9.8.1130. Medline:22207150