A tool for measuring workers' sitting time by domain: the Workforce Sitting Questionnaire

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ABSTRACT

Background Sitting time is an emerging health risk, and many working adults spend large amounts of time sitting each day. It is important to have reliable and accurate measurement tools to assess sitting time in different contexts.

Objective To validate the Workforce Sitting Questionnaire (WSQ), an adapted measure of total and domain-specific sitting time based on work and non-workdays for use in working adults.

Methods A convenience sample (N=95, 63.2% women) was recruited from two workplaces and by word-of-mouth in Sydney, Australia. Participants completed the WSQ, which asked about sitting time (1) while travelling to and from places; (2) while at work; (3) while watching TV; (4) while using a computer at home; and (5) while doing other leisure activities on work and non-workdays on two occasions, 7 days apart. Participants also wore an accelerometer for the 7 days between test and retest. They recorded the times they wore the accelerometer, the days they worked and their work times in a logbook. Analyses determined test–retest reliability with intraclass correlation coefficients (ICCs) and assessed criterion validity against accelerometers using Spearman's r and Bland–Altman plots.

Results Measuring total sitting time based on a workday, non-workday and on average had fair to excellent test–retest reliability (ICC=0.46–0.90) and had sufficient criterion validity against accelerometry in women (r=0.22–0.46) and men (r=0.18–0.29). Measuring domain-specific sitting at work on a workday was also reliable (ICC=0.63) and valid (r=0.45).

Conclusions The WSQ has acceptable measurement properties for measuring sitting time at work on a workday and for assessing total sitting time based on work and non-workdays. This questionnaire would be suitable for use in research investigating the relationships between sitting time and health in working populations.

INTRODUCTION

Working adults constitute a significant population group, and it is important that health promotion and non-communicable disease prevention efforts focus on working adults.[1] The increasing prevalence of chronic illnesses such as diabetes, obesity and cardiovascular disease has potentially significant negative effects on workforce participation and productivity in developed countries.[2 3]

Sedentary behaviour, of which sitting is a specific form, refers to low energy expenditure behaviour (1–1.5 metabolic equivalents,[4] and is distinct from physical inactivity or a lack of moderate-to-vigorous physical activity.[5] Recent literature suggests that sedentary behaviour is associated with health outcomes independent of physical activity.[6–9] This emerging health risk may have public health implications given the ubiquity of sitting[10] and the increasing prevalence of low-activity jobs and behaviours.[11–13]

Research about sitting measurement has focused on total sitting time[14 15] and leisure-time sedentary behaviours,[16] with less attention given to other domains in which sitting and sedentary behaviours occur (eg, at work and during transport). Given that sedentary pursuits account for a considerable proportion of daily energy expenditure,[17] it is important that valid and reliable measures of sitting are developed for use in surveillance and epidemiological research to elucidate the relationship between sitting and health.

The International Physical Activity Questionnaire (IPAQ) is frequently used to assess total sitting time in epidemiological research.[10 18 19] Although the IPAQ provides a reliable and valid assessment of total sitting time by week and weekend days,[14 15] researchers have also sought to measure the various types of sedentary behaviours and sitting in the different domains in which they occur to gain a more detailed picture of sitting.[20–22]

Marshall and colleagues[21] developed a measure of total and domain-specific sitting based on week and weekend days. Test–retest reliability was high for sitting at work, watching TV and using a computer at home on a weekday (r=0.84–0.78). Validation against activity logs suggested that this measure was acceptable for assessing domain-specific and structured weekday sitting time: that is, sitting on a weekday while at work and using a computer at home (r=0.69–0.74) but showed lower criterion validity for assessing total sitting time on a week or weekend day compared with accelerometers.

Marshall and colleagues[21] reported that time spent in routine activities was more accurately recalled than time spent in less structured activities. They also found that sitting time across all domains was more reliably and validly recalled for weekdays than for weekend days. Workers are employed under a variety of arrangements, such that they may be engaged in shift work or be employed to work on weekends with rest given during the weekdays. For this reason, we hypothesised that it may be more appropriate and accurate to assess sitting time by work and non-workdays than week and weekend days when dealing with a working population.

Therefore, this study aimed to assess the measurement properties of an adapted version of the Marshall questionnaire (Workforce Sitting Questionnaire (WSQ)) for measuring total and domain-specific sitting based on work and non-workdays for use in working adults. This study examined the test–retest reliability and validity of the WSQ for measuring total sitting time on a workday, a non-workday and average per day and for sitting time at work on a workday.

METHODS

Participants

Participants were recruited from two workplaces and by word-of-mouth in Sydney, Australia. Only people older than 18 years with sufficient English proficiency and who were employed part time or full time were eligible to participate in the study.

All employees from participating workplaces were invited to join the study via internal email. Information posters and flyers at different sites within each workplace were use for advertising the study. Team leaders presented information about the study to workers who did not have email access at work. People who were not employees of participating workplaces but had heard about the study via word-of-mouth and contacted the researchers were also eligible to participate, provided they met the study inclusion criteria.

As an incentive to participate, all participants from one workplace entered in a draw to win one of six prize packs (eg, pedometers, cookbooks, skipping ropes) worth up to $A100 each, whereas participants from the second workplace earned points for a competition in their workplace wellness programme. Participants who completed the study received feedback about their accelerometer monitoring.

All people who expressed interest in joining the study received the participation information sheet (n=122); 102 people gave written informed consent to participating in the study, of which 95 people (93%) completed the study components. This study was approved by the University of Sydney Human Research Ethics Committee.

Procedures

Participants completed two self-report measures of sitting time twice, with 1 week between time 1 and time 2. They also provided details about demographic characteristics (age, education level, height, weight). Participants wore an accelerometer for the 7 days in between the first and second questionnaire assessment. Participants received and returned all study materials by post.

MEASURES

Workforce Sitting Questionnaire

We modified the original Marshall questionnaire[21] to suit a working population. The Workforce Sitting Questionnaire (WSQ) asked participants to report their time spent sitting (1) while travelling to and from places; (2) while at work; (3) while watching TV; (4) while using a computer at home; and (5) while doing other leisure activities on a workday and a non-workday in the last 7 days (see online supplementary appendix 1).

Total sitting time on a workday was defined as the sum of sitting time in all domains on a workday. Similarly, total sitting time on a non-workday was defined as the sum of sitting time in all domains on a non-workday. In addition, participants reported the number of days they were at work in the last 7 days, and this was used to calculate average total sitting time per day, defined as the average of total sitting time on work and non-workdays.

IPAQ measure of total sitting (concurrent validity)

The IPAQ was designed for use in population surveillance of physical activity with demonstrated reliability and validity in a study involving 12 countries.[14] A study on the measurement properties of the IPAQ sitting questions (last 7-day version) using samples from four countries reported good test–retest reliability (r>0.6) and acceptable validity against accelerometers (r=0.24–0.43) for women and men.[15] The IPAQ asked participants "During the last 7 days, how much time did you spend sitting on a week/weekend day?"

Accelerometer (criterion validity)

Participants wore an Actigraph GT1M accelerometer (Actigraph LLC, Fort Walton Beach, Florida, USA) on the right hip for the 7-day measurement period, removing it only for water-based activities and for sleeping. They also recorded the times they wore the accelerometer each day in a monitoring logbook and noted the days they worked and the times they started and finished work on workdays.

Accelerometer activity counts were recorded in 10 s intervals and aggregated into 1 min epochs, which were then used to compute time spent in activity intensities. Non-wear time was classified as periods of consecutive strings of zero-count epochs lasting ≥60 min. Interruption intervals were included in the calculation of non-wear time whereby up to two epochs of <100 counts that appeared in the middle of long strings of zero-count epochs were filtered out.[23] Epochs with >20 000 counts were considered to be spurious.[24] Sedentary time was classified with the frequently used cut-point of <100 counts/min.[5]

A day of monitoring was considered valid when a participant wore the accelerometer for ≥10 h. A workday was a day the participant reported working and includes both time at work and outside of work. Time at work on a workday was determined through participant logbook records and was considered valid when the participant wore the accelerometer for ≥75% of their time at work.[25] Analyses involving workdays and non-workdays included participants with ≥5 valid days of monitoring,[26] whereas those involving week and weekend days included participants with ≥4 valid weekdays and ≥1 valid weekend day of monitoring.[14]

Statistical analysis

All analyses were performed with PASW Statistics 18 (formerly SPSS). We assessed test–retest reliability by comparing participants' responses on the questionnaires at time 1 and time 2 with intraclass correlation coefficients (ICCs). The analyses calculated ICCs using a two-way mixed model based on absolute agreement. The ICC was interpreted as indicating poor reliability (<0.4), fair to good reliability (0.4–0.75) and excellent reliability (>0.75).[27] Wilcoxon's signed-rank tests checked for absolute differences between time 1 and time 2 data.

The criterion validity of the instruments was assessed by comparing questionnaire responses at time 2 with accelerometer-measured sedentary time using Spearman's r and Bland–Altman plots. The questionnaire recall period matched the accelerometer monitoring period. The strength of correlation as indicated by Spearman's r was interpreted as weak (<0.30), low (0.30–0.49), moderate (0.50–0.69), strong (0.70–0.89) and very strong (≥0.90).[28]

We assessed concurrent validity by comparing participants' WSQ- and IPAQ-measured average total sitting time per day using Spearman's correlations.

RESULTS

Participant characteristics

Participant characteristics are shown in table 1. Participants were mostly women and of normal weight. Among female participants, around two-thirds were younger than 40 years and three-quarters had university-level education. Among the men, approximately half were aged 40–59 years and over 80% had trade/technical certificate or university-level education.

Test–retest reliability

The WSQ showed fair to excellent test–retest reliability by domain in women with ICCs ranging from 0.59 to 0.95 and poor to excellent test–retest reliability by domain in men with ICCs ranging from 0.23 to 0.86 (table 2). When all domains were summed to assess total sitting on a workday, non-workday and average per day, test–retest reliability was good to excellent with ICCs of 0.65–0.80 for all participants. Women had excellent test–retest reliability for reporting their total sitting time (ICC=0.77–0.90), whereas men had fair to good reliability (ICC=0.46–0.75). Test–retest reliability for total sitting on a non-workday was higher than that for a workday in both women and men, with men showing the largest difference.

As a comparison, test–retest reliability for measuring sitting by week and weekend days with the IPAQ was also good for all participants (ICC=0.65–0.73). Women had higher ICCs, suggesting good to excellent test–retest reliability (ICC=0.72–0.77), whereas men had lower ICCs, which suggested fair to good test–retest reliability (ICC=0.47–0.67).

Validity

In table 3, sitting time at work on a workday measured by the WSQ showed a low correlation for all participants and by gender groups with accelerometer sedentary time at work (r=0.38–0.45). The correlations between accelerometer and WSQ data for average total sitting time per day were of lower strength in men (r=0.26) than women (r=0.46). WSQ sitting time in all domains on a workday and non-workday had weak to low associations with accelerometer sedentary time data in both women and men (r=0.18–0.34).

Bland–Altman plots showed similar patterns (figures 1 and 2). Figure 1 shows that agreement between WSQ average total sitting time per day and accelerometer sedentary time was low. The mean differences in average total sitting time between the WSQ and accelerometers were significant (mean difference 44.55 min/day, $p<0.05$). Figure 2 shows a similar pattern for measuring sitting time at work on a workday when the WSQ was compared with accelerometers (mean difference 1.58 min/workday; $p>0.05$). Overall, participants tended to under-report at low values and over-report at high values, with comparable estimates in the mid-range using the WSQ compared with accelerometers.

IPAQ average total sitting time per day showed low correlations with accelerometer sedentary time for all participants and for women and men (r=0.43–0.46). IPAQ sitting time on a weekday had low strength associations with accelerometer sedentary time in all groups, whereas correlation coefficients suggested weaker associations in all groups for sitting on a weekend day.

To determine concurrent validity, we compared participants' WSQ- and IPAQ-assessed average total sitting time per day (data not shown). Spearman's correlation coefficients suggested moderate strength associations for all participants (r=0.59, $p<0.01$) and for women (r=0.53, $p<0.01$) and men (r=0.69, $p<0.01$).

DISCUSSION

As research about the associations between sitting time and health grows,[6–9] it is important that reliable and accurate assessment tools are available to measure sitting time across

Table 1 Participant characteristics

	All		Women		Men	
Characteristics	**n**	**%**	**n**	**%**	**n**	**%**
Total	95	100.0	60	63.2	35	36.8
Age group (years)						
18–29	31	32.6	20	33.3	11	31.4
30–39	27	28.4	22	36.7	5	14.3
40–49	19	20.0	11	18.3	8	22.9
50–59	15	15.8	7	11.7	8	22.9
≥60	3	3.2	0	0.0	3	8.6
Education level						
Some high school	2	2.1	1	1.7	1	2.9
Completed all high school years	10	10.5	6	10.0	4	11.4
Trade/technical certificate or diploma	22	23.2	8	13.3	14	40.0
University	61	64.2	45	75.0	16	45.7
Self-reported body mass index (kg/m^2)*						
Underweight or normal weight (<25)	58	61.1	41	68.3	17	48.6
Overweight (25–30)	23	24.2	9	15.0	14	40.0
Obese (>30)	12	12.6	8	13.3	4	11.4
Number of days worked last week†						
≤3	4	4.3	4	6.8	0	0.0
4	13	13.8	10	16.9	3	8.6
5	69	73.4	44	74.6	25	71.4
≥6	8	8.5	1	1.7	7	20.0

*Data missing for two women.
†Data missing for one woman.

Table 2 Sitting times in different domains by self-report at times 1 and 2 and test–retest reliability

Sitting domain	Time 1 Median	Time 1 IQR 25th	Time 1 IQR 75th	Time 2 Median	Time 2 IQR 25th	Time 2 IQR 75th	Test–retest reliability ICC (95% CI)
All							
Sitting on work and non-workday (min/day) (WSQ) (n=91)							
Workday							
For transport	75	35	120	60	30	120	0.67 (0.54 to 0.77)
At work	390	320	435	390	300	420	0.63 (0.49 to 0.74)
Watching TV	120	60	180	90	60	150	0.91 (0.87 to 0.94)
Using a computer at home	30	0	60	30	0	60	0.56 (0.40 to 0.69)
Other leisure activities	60	0	90	48	0	90	0.68 (0.55 to 0.78)
Total, all domains	660	540	780	660	525	750	0.65 (0.51 to 0.75)
Non-workday							
For transport	60	30	120	60	30	120	0.60 (0.45 to 0.72)
At work	0	0	0	0	0	60	0.50 (0.33 to 0.64)
Watching TV	180	120	240	120	90	240	0.79 (0.69 to 0.85)
Using a computer at home	60	30	120	60	30	120	0.81 (0.73 to 0.87)
Other leisure activities	150	90	240	150	90	240	0.59 (0.44 to 0.71)
Total, all domains	510	360	690	534	360	720	0.80 (0.72 to 0.87)
Average total, work and non-workdays	601	513	729	589	497	731	0.76 (0.66 to 0.83)
Sitting on week and weekend days (min/day) (IPAQ) (n=88)							
Weekday	600	480	690	540	398	660	0.69 (0.56 to 0.78)
Weekend day	315	218	465	300	240	383	0.65 (0.51 to 0.76)
Total, week and weekend days	506	379	606	463	360	600	0.73 (0.61 to 0.81)
Women							
Sitting on work and non-workday (min/day) (WSQ) (n=57)							
Workday							
For transport	80	30	110	60	30	95	0.69 (0.53 to 0.81)
At work	420	360	450	390	360	450	0.79 (0.66 to 0.87)
Watching TV	120	60	165	90	60	150	0.95 (0.91 to 0.97)
Using a computer at home	30	0	60	30	0	60	0.59 (0.39 to 0.74)
Other leisure activities	60	0	75	48	0	60	0.74 (0.59 to 0.84)
Total, all domains	690	595	810	685	590	770	0.77 (0.65 to 0.86)
Non-workday							
For transport	60	30	120	60	30	90	0.63 (0.45 to 0.77)
At work	0	0	0	0	0	45	0.57 (0.37 to 0.72)
Watching TV	150	98	240	120	90	240	0.76 (0.62 to 0.85)
Using a computer at home	60	30	120	60	30	120	0.79 (0.66 to 0.87)
Other leisure activities	180	75	300	180	120	240	0.76 (0.62 to 0.85)
Total, all domains	510	355	660	534	365	690	0.85 (0.76 to 0.91)
Average total, work and non-workdays	620	529	766	591	540	752	0.90 (0.84 to 0.94)
Sitting on week and weekend days (min/day) (IPAQ) (n=57)							
Weekday	600	480	705	540	420	660	0.72 (0.57 to 0.83)
Weekend day	300	180	420	300	240	360	0.72 (0.56 to 0.82)
Total, week and weekend days	529	403	611	489	386	600	0.77 (0.62 to 0.86)
Men							
Sitting on work and non-workday (min/day) (WSQ) (n=34)							
Workday							
For transport	75	44	150	80	40	120	0.56 (0.27 to 0.75)
At work	360	233	405	330	180	420	0.51 (0.21 to 0.72)
Watching TV*	120	58	180	105	53	120	0.86 (0.70 to 0.93)
Using a computer at home	30	0	60	25	0	60	0.53 (0.24 to 0.73)
Other leisure activities	45	0	90	45	0	120	0.51 (0.21 to 0.72)
Total, all domains	596	521	750	616	404	713	0.46 (0.16 to 0.69)
Non-workday							
For transport	60	30	120	60	30	180	0.56 (0.28 to 0.75)
At work	0	0	4	0	0	68	0.29 (−0.04 to 0.56)
Watching TV*	180	120	240	120	120	240	0.81 (0.64 to 0.91)
Using a computer at home	60	30	135	75	26	135	0.83 (0.69 to 0.91)
Other leisure activities	150	120	240	120	60	240	0.23 (−0.12 to 0.53)
Total, all domains	510	360	723	525	360	728	0.75 (0.56 to 0.87)
Average total, work and non-workdays	570	486	691	562	467	697	0.57 (0.30 to 0.76)
Sitting on week and weekend days (min/day) (IPAQ) (n=31)							
Weekday	540	270	660	480	330	660	0.63 (0.36 to 0.80)
Weekend day	360	240	510	360	270	420	0.47 (0.15 to 0.70)
Total, week and weekend days	489	313	600	446	316	600	0.67 (0.42 to 0.83)

*Significant difference between time 1 and time 2, Wilcoxon's signed-rank test, $p<0.05$.
ICC, intraclass correlation coefficient; IPAQ, International Physical Activity Questionnaire; WSQ, Workforce Sitting Questionnaire.

different domains. This would help extend the understanding of the behavioural contexts of sitting and elucidate the relationship between sitting and health.

In this study, we assessed the measurement properties of the WSQ, which measures total and domain-specific sitting based on work and non-workdays in a sample of working adults. The results indicated that the WSQ measured total sitting time with fair to excellent test–retest reliability and had acceptable criterion validity against accelerometers. Measuring average total sitting time with the WSQ correlated well with average total sitting time assessed by the IPAQ, indicating adequate concurrent validity. The WSQ also measured sitting time at work on a workday with sufficient reliability and validity. Overall, the WSQ has acceptable measurement properties for assessing sitting time at work on a workday and for assessing total sitting time based on work and non-workdays. It would be suitable for use in research with working adults that needs to assess occupational and total sitting time.

Domain-specific test–retest reliability was generally fair to excellent for work and non-workdays, consistent with the findings from previous research.[20 22 29] The test–retest reliability of assessing average total sitting time was also consistent with that reported in earlier studies.[15 20] Women had excellent test–retest reliability for reporting their average total sitting time and were more reliable than men for reporting their total sitting time on work and non-workdays.

The WSQ had acceptable criterion validity for assessing average total sitting time and day-specific total sitting time. The validity correlations for average total sitting time in this study were comparable to those found between IPAQ sitting

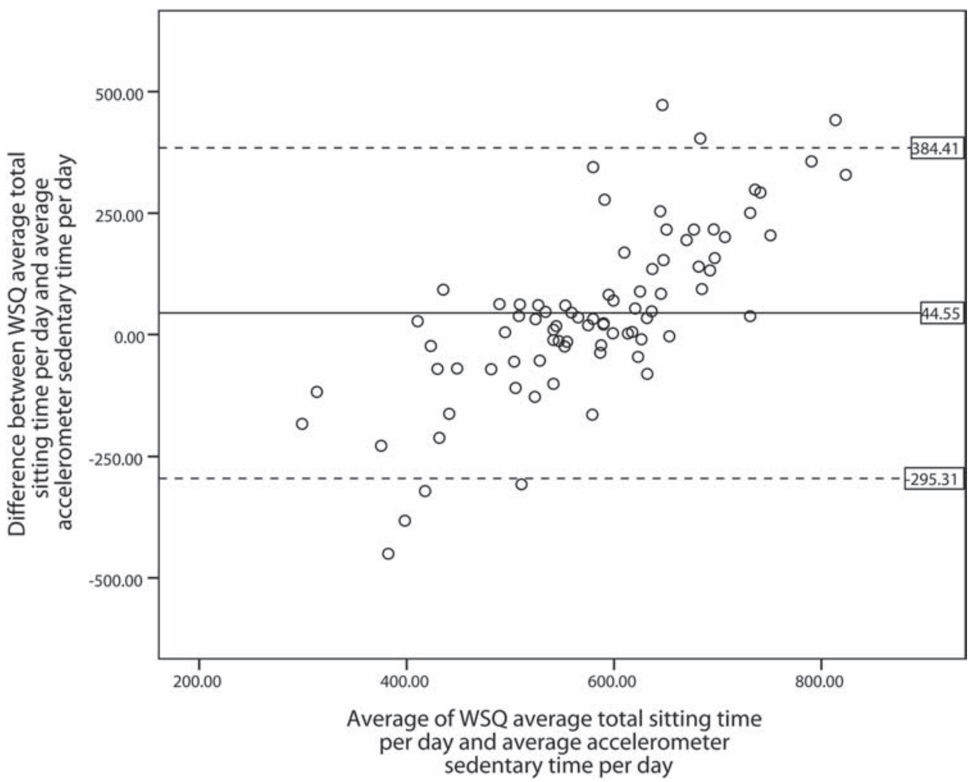

Figure 1 Comparing Workforce Sitting Questionnaire average total sitting time per day with average accelerometer sedentary time per day.

Table 3 Criterion validity of self-report measures of sitting time with accelerometer-measured sedentary time

		Accelerometer											
		All				Women				Men			
Measure	Sitting time (min/day)	n	Median	IQR (25th to 75th)	r	n	Median	IQR (25th to 75th)	r	n	Median	IQR (25th to 75th)	r
WSQ	At work, workday	81	360	311–394	0.45**	50	366	337–408	0.38**	31	344	275–378	0.41*
	Total, all domains, workday	82	600	562–648	0.34**	51	606	563–648	0.31*	31	583	562–654	0.29
	Total, all domains, non-workday	76	486	417–550	0.23*	45	465	418–538	0.22	31	507	392–558	0.18
	Average total, work and non-workdays	82	567	518–606	0.40**	51	571	532–607	0.46**	31	566	484–603	0.26
IPAQ	Weekday	75	598	542–643	0.47**	48	598	553–639	0.43**	27	598	536–661	0.57**
	Weekend day	75	493	421–550	0.31**	48	471	421–541	0.28	27	496	430–562	0.37
	Average total, week and weekend days	75	565	511–606	0.46**	48	561	512–604	0.45**	27	570	493–607	0.43*

*p<0.05, **p<0.01.
IPAQ, International Physical Activity Questionnaire; WSQ, Workforce Sitting Questionnaire.

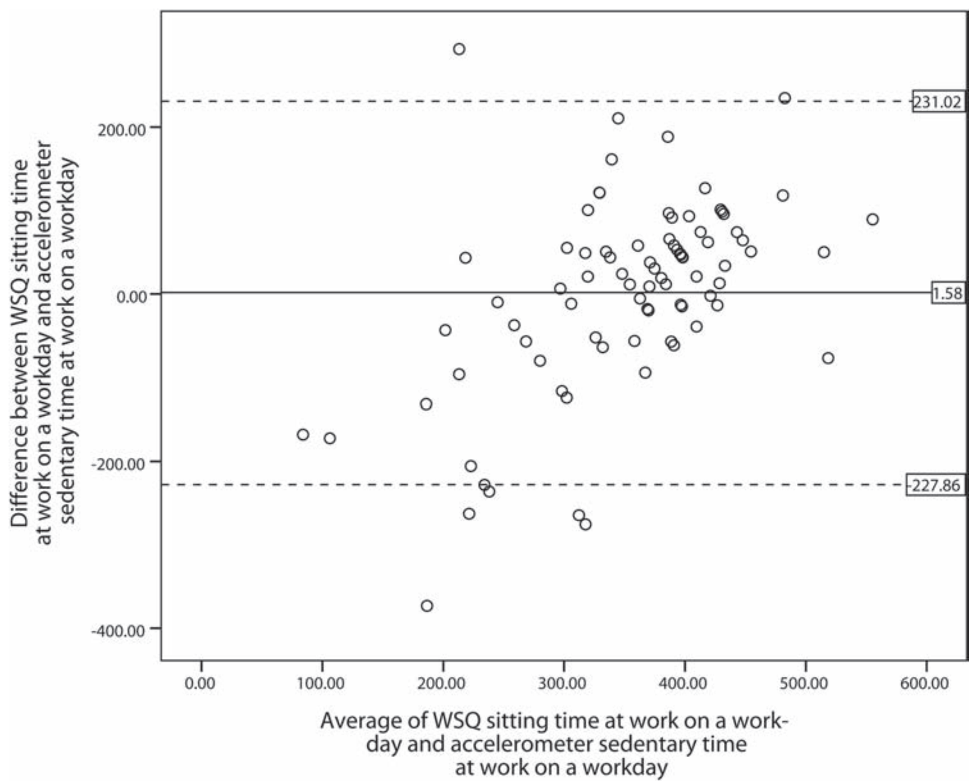

Figure 2 Comparing Workforce Sitting Questionnaire sitting time at work on a workday with accelerometer sedentary time at work on a workday.

time and accelerometer-measured sedentary time reported in previous studies (r=0.20–0.51)[14 15] and higher than those reported for a multiple domain sedentary behaviour questionnaire (r=(−0.03) in men, r=(−0.08) in women),[30] suggesting adequate validity for assessing average total sitting time. At the day-specific level, the WSQ had higher correlations for assessing sitting in all domains on a workday than on a non-workday, consistent with the pattern of validity characteristics for week and weekend days seen in the original Marshall questionnaire.[21]

We also assessed the measurement properties of one specific domain of sitting, namely sitting at work on a workday, and found acceptable criterion validity. The correlations in this study were comparable to those reported for a workplace sitting time questionnaire (r=0.29)[31] and higher than those reported for a measure of doing office or paperwork (r=(−0.004) in men, r=(−0.04) in women).[30] The criterion validity of measuring sitting time at work has been examined previously against self-report activity diaries and shown higher estimates than the current findings.[21] Nonetheless, this study provided a higher level evidence of criterion validity because it measured sedentary time objectively with accelerometers, whereas self-report comparison measures are considered less adequate.[32]

Future research to assess the criterion validity of the other non-work domain-specific sitting parts of this measure (eg, watching TV and sitting for transport on work/non-workdays) would be beneficial. This may involve using objective measurement of sitting in conjunction with activity or time use diaries. Time use diaries may be sufficient at a basic level because research has shown that they are valid and reliable measures of non-occupational sedentary behaviour.[25]

Furthermore, the adaptation of the original Marshall questionnaire was based on the assumption that it may be more accurate to measure sitting time by work and non-workdays than week and weekend days in a working adult population. Although we did not test this assumption, we did compare estimates of average total sitting time per day measured using the WSQ with the IPAQ sitting measure. We found moderate strength correlations between the WSQ and the IPAQ (r=0.53–0.69), indicating sufficient concurrent validity. Thus, measuring total sitting time by work and non-workdays seems to be at least comparable to that assessed by week and weekend days and does not contradict our assumption. The WSQ also allows researchers to measure sitting time in multiple domains, whereas the IPAQ measures total sitting time as one broad indicator. Hence, the results from this study support the use of the WSQ for measuring sitting time in a working population.

A limitation of this study was the use of a convenience sample, which may have resulted in possible biases. There were differences found between men and women in test–retest reliability and validity for measuring domain-specific and total sitting time. The proportion of women with university-level education was higher than that of men with the same education level (75% vs 45.7%, respectively), whereas the pattern was reversed with respect to proportions of women and men with trade or technical level education (13.3% vs 40%, respectively). A greater proportion of men was also overweight compared with women (40% vs 15%, respectively). These differences between the sexes may account for the variation in measurement properties of the WSQ seen in women compared with men. There were also only three participants aged 60 years or older. Thus, the generalisability of this instrument for use in other working adult populations may be somewhat limited and further research is needed; for example, in workers with lower education levels and in those aged 60 years or older.

The main strength of this study was that accelerometers were used to objectively assess the criterion validity of the measure of total sitting time and sitting at work on a workday.[32] By asking participants to complete a daily logbook, we were able to determine the specific days and times participants wore the accelerometer, including days they worked and the times they were at work. Although the accelerometer is not considered a true gold standard measure of sitting time because it does not detect body posture, recent findings indicate that the accelerometer cut-point of <100 counts/min (using Actigraph GT1M) agrees well with the activPAL (which assesses body posture, including sitting and standing) for classifying behaviour as sedentary.[33]

CONCLUSIONS

The WSQ has acceptable measurement properties for assessing total sitting time based on work and non-workdays in working adults. It also has sufficient reliability and validity for assessing sitting time at work on a workday. We suggest that this measure of total and domain-specific sitting time be used in research about occupational and total sitting time and in studies of the relationship between sitting time and health in working populations.

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Competing interests None.

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Provenance and peer review Not commissioned; externally peer reviewed.

Contributors JYC designed and managed the study, analysed and interpreted the data and drafted the manuscript. HPvdP, SD, JK and AEB contributed to study conception and design. HPvdP helped with coordinating the study and assisted with data analysis. All authors contributed to the interpretation of the data and critically revised the manuscript for intellectual content.

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