Impact of increasing social media use on sitting time and body mass index

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Abstract

Issue addressed: Sedentary behaviours, in particular sitting, increases the risk of cardiovascular disease, type 2 diabetes, obesity and poorer mental health status. In Australia, 70% of adults sit for more than 8 h per day. The use of social media applications (e.g. Facebook, Twitter, and Instagram) is on the rise; however, no studies have explored the association of social media use with sitting time and body mass index (BMI).

Methods: Cross-sectional self-report data on demographics, BMI and sitting time were collected from 1140 participants in the 2013 Queensland Social Survey. Generalised linear models were used to estimate associations of a social media score calculated from social media use, perceived importance of social media, and number of social media contacts with sitting time and BMI.

Results: Participants with a high social media score had significantly greater sitting times while using a computer in leisure time and significantly greater total sitting time on non-workdays. However, no associations were found between social media score and sitting to view TV, use motorised transport, work or participate in other leisure activities; or total workday, total sitting time or BMI.

Conclusions: These results indicate that social media use is associated with increased sitting time while using a computer, and total sitting time on non-workdays.

So what? The rise in social media use may have a negative impact on health by contributing to computer sitting and total sitting time on non-workdays. Future longitudinal research with a representative sample and objective sitting measures is needed to confirm findings.

Key words: computer, screen time, sedentary behaviour, social networking.

Introduction

Sedentary behaviours, such as sitting, increases the risk of cardiovascular disease, type 2 diabetes, obesity, and poorer mental health status.[1–3] In Australia, 70% of adults sit for more than 8 h per day,[4,5] which is contributing to high levels of non-communicable diseases.[1,2,6] By understanding the correlates that drive sitting time, more effective interventions aimed at reducing sedentary behaviour can be developed.

An increasing leisure-time activity is social media use. (Social media is defined as 'websites and applications that enable users to create and share content or to participate in social networking.')[7] This paper focuses on social networking applications, such as Facebook, Twitter, and Instagram, which are the most popular forms of social media.[8] In 2014, 81% of the Australian population was able to access the Internet at home and 70% could access the Internet using their smartphone.[9] In 2014, 70% of the Internet users visited social media sites[9] and in 2015 ~14 million (57%) Australians used Facebook, the most popular social networking website, at least once a month.[10] Despite high and rising social media use, no studies have explored the connection between social media use with sitting time or body mass index (BMI).

Although no studies have examined social media use and its influence on sitting time and BMI, many studies have demonstrated

negative health outcomes of other screen-based behaviours including television viewing, computer and Internet use.[11–13] Increased TV viewing is associated with an increase in sitting time and the consumption of energy-dense foods,[3,11] which results in increased BMI levels and cardiovascular risk.[3,11] Computer game, and general computer and Internet use also leads to increased BMI[12,13] and chronic disease risk. A six-year prospective study found each one hour increment in TV time is associated with an 18% increased risk of cardiovascular disease mortality.[1] Social media, however, is being accessed more frequently via portable technologies (smartphones and tablets), which may affect the relationship social media use has with sitting and BMI.[9] Therefore, further research is needed to establish whether social media use increases sitting time and BMI.

The aim of the current study was to investigate the connection between social media use and BMI, sitting during leisure, TV, work, transport and computer use, and total sitting time on work and non-work days. Such findings will improve our understanding of how social media is affecting the health of Australians.

Methods

Sample

The Queensland Social Survey is an annual cross-sectional survey conducted by the Population Research Laboratory at Central Queensland University in Australia (CQU) using Computer-Assisted-Telephone-Interviewing (CATI). Data were collected between July and August 2013. A sample of Australian adults was randomly selected from a database with Queensland landline telephone numbers. To be eligible, participants must be aged 18 or more and reside in Queensland. Ethics approval was received from the Central Queensland University Human Research Ethics Committee (H13/06–120).

Measures

'Sitting time' was measured using the Workforce Sitting Questionnaire which has demonstrated adequate test-retest reliability (ICC = 0.63) and validity compared with accelerometry ($r = 0.45$).[4] The questionnaire assesses weekly sitting time (in minutes) during work, transport, computer-use outside work, TV viewing and other leisure-time activities on work and non-workdays. Average daily sitting in each domain was calculated. Average sitting time on workdays, non-workdays and total daily sitting time was also calculated.

In line with past research[8] the questions focused on social networking, which is the most popular form of social media.[8] 'Social media behaviour' was assessed by the following three questions:

(1) how often they visit social media websites, using the scale: 1 = Never, 2 = Less than once a month, 3 = Once a month, 4 = Once a week, 5 = Several times a week, 6 = Once a day, 7 = Several times each day, 8 = At least once every hour

(2) how many social media friends they have, using the descriptions: 1 = No such account, 2 = <10 friends, 3 = 10–25, 4 = 25–50,

5 = 50–75, 6 = 75–100, 7 = 100–200, 8 = 200–300, 9 = 300–500, 10 = >500

(3) perceived importance of social networks, using the scale 1 = Not important at all to 5 = Very important.

Cronbach's α for the three questions was 0.90 demonstrating good internal reliability. All three variables were recoded to have a possible range of 0–10 ((result/maximum possible value) × 10) and summed together to create a total social media score with a possible range of 0–30.

Scores were then categorised into three groups:

(1) 0 = no social media use

(2) 0.01–14.99 = low social media use

(3) 15–30 = high social media use.

'Sociodemographic factors' assessed included gender, age, education (no tertiary education, technical college and university) and occupation (white-collar worker, blue-collar worker and not employed). The not-employed category included respondents who participate in home duties and who are retired. A median split was applied to age; people under the median age of 57 were categorised as younger participants and people 57 or older were categorised as older participants.

'Body mass index' (BMI) was calculated by dividing participants' self-reported weight by height squared (kg/m^2).

Statistical analysis

Data were analysed using SPSS 21. After 153 participants were excluded for missing data on at least one of the variables, a total of 1140 participants were included in the analysis. Eight generalised linear models were conducted. Zero-inflated negative binomial models were used for predicting computer, work, leisure and total workday sitting models due to high zero counts and overdispersion.[14] Negative binomial generalised linear models were used for the remaining models predicting transport sitting, TV sitting, non-workday sitting, total sitting and BMI due to positive skew and overdispersion.[14] Gender, age, education level and occupation were entered as covariates in each model. The *p*-values were considered significant at 0.05.

Results

Demographic factors

Response rate of the survey was 41.2%, which is comparable to other telephone surveys.[15,16] Descriptive statistics of the sample are presented in Table 1. Half (52%) of the sample was under 57 years of age and 52% were male. The sample was therefore older than the Queensland population (median age of 37, including children) and the gender breakdown was similar to the Queensland population (males 50%).[17] A total of 37% had no tertiary education (similar to the Australian population of 41%) and 42% were not in paid employment (similar to the Australian population of 39%).[18] However, due to the older sample, a higher percentage of retirees is likely to be in this group compared with the population. Chi-square tests revealed that

a higher percentage of younger participants, females and white collar workers were high social media users and that a higher percentage of participants with no tertiary education did not use social media. Descriptive statistics of participants' BMI and sitting time in each social media category are presented in Table 2. Average BMI was 29.76, (s.d. = 11.53), which is in the overweight category, and average daily minutes of total sitting time was 413, (s.d. = 200), which presents a moderate risk for chronic disease.[19,20]

Generalised linear models

Outcomes for social media associations with domain specific, non-workday, workday and total sitting time are presented in Table 3. A significant association was found between high social media use and increased non-workday sitting time (OR = 1.19, s.e. = 0.08, P = 0.03). Participants who did not use social media were more likely to not use a computer (OR = 0.19, s.e. = 0.25, P < 0.001), and high social media use was associated with increased computer

sitting time (OR = 1.51, s.e. = 0.08, P < 001). No significant associations between social media and work, leisure, transport, TV, total workday, total sitting or BMI were found.

Discussion

Findings indicate that high social media use is associated with higher total non-workday sitting and computer sitting. Participants with high social media use engaged in 51% (an additional 42 min) more computer sitting and 19% (an additional 18 min) more non-workday sitting each day compared with those with no social media use. This increase in sitting time may be large enough to negatively affect health. Dunstan *et al*.[21] found an additional 60 min per day of sitting during TV viewing was associated with an 18% increased risk of cardiovascular disease mortality after controlling for smoking, blood pressure, cholesterol and diet, physical activity and waist circumference.[1,22] It is noteworthy that high social media use was

Table 1.   Descriptive statistics of sample demographics by social media use

Demographics	Social media use				X^2	P
	None	Low	High	Total		
	n (%)	*n* (%)	*n* (%)	*n* (%)		
Age (years)	46 (9.3)	79 (24.5)	166 (49.4)	291 (25.2)	205.7	<0.001
<45	241 (48.6)	163 (50.5)	135 (40.2)	539 (46.7)		
45–64	209 (42.1)	81 (25.1)	35 (10.4)	325 (28.1)		
≥ 65						
Gender					32.74	<0.001
Males	276 (56.4)	185 (57.8)	127 (38.4)	588 (51.6)		
Females	213 (43.6)	135 (42.2)	204 (61.6)	552 (48.4)		
Education					23.99	<0.001
No tertiary	218 (44.6)	100 (31.3)	100 (30.2)	418 (36.7)		
Technical college	105 (21.5)	83 (25.9)	96 (29.0)	284 (24.9)		
University						
Occupation					29.48	<0.001
White collar	199 (40.7)	166 (51.9)	191 (57.7)	556 (48.8)		
Blue collar	42 (8.6)	32 (10.0)	31 (9.4)	105 (9.2)		
Not employed	248 (50.7)	122 (38.1)	109 (32.9)	479 (42.0)		
Location					2.19	0.33
Urban	416 (84.2)	283 (87.9)	285 (85.1)	984 (85.5)		
Rural	78 (15.8)	39 (12.1)	50 (14.9)	167 (14.5)		
Total	489 (100)	320 (100)	331 (100)	1140 (100)		

Table 2.   Descriptive statistics of body mass index (BMI), domain specific and total sitting time (min) per day by social media use

Data from the 2013 Queensland Social Survey. M, mean; s.d., standard deviation

	Work	Leisure	Computer	Transport	TV	Total workday	Total non-workday	Total	BMI
	M (s.d.)	M (s.d.)	M (s.d.)	M (s.d.)	M (s.d.)	M (s.d.)	M (s.d.)	M (s.d.)	M (s.d.)
Social media use									
None	97.96 (138.55)	57.92 (83.26)	49.67 (78.36)	56.41 (81.94)	147.54 (94.06)	154.14 (224.97)	255.35 (195.56)	404.61 (207.27)	29.97 (11.03)
Low	126.73 (149.46)	52.48 (68.80)	68.96 (78.74)	53.89 (65.20)	130.18 (92.68)	185.82 (209.55)	246.56 (226.52)	427.83 (207.27)	28.73 (9.96)
High	127.86 (149.46)	58.54 (62.49)	91.47 (113.41)	54.18 (65.35)	122.53 (86.91)	181.64 (214.38)	272.94 (221.95)	447.53 (193.18)	30.26 (12.17)
Total	105.40 (142.28)	57.06 (73.71)	62.69 (89.46)	53.46 (72.30)	139.37 (98.57)	159.33 (212.59)	258.65 (210.93)	413.13 (200.14)	29.76 (11.53)

Table 3.   General linear modelling odds ratios of the association between social media use and daily domain-specific sitting time, daily total sitting time and BMI

Data from the 2013 Queensland Social Survey. Bold indicates significance level $P < 0.05$. All analyses controlled for age, gender, education, occupation and location. OR, odds ratio; s.e., standard error

Social media	Work[A] Logit model OR (s.e.)	Work[A] Count model OR (s.e.)	Leisure[A] Logit model OR (s.e.)	Leisure[A] Count model OR (s.e.)	Computer[A] Logit model OR (s.e.)	Computer[A] Count model OR (s.e.)	Transport[B] Count model OR (s.e.)	TV[B] Count model OR (s.e.)	Total workday[A] Logit model OR (s.e.)	Total workday[A] Count model OR (s.e.)	Total non-workday[B] Count model OR (s.e.)	Total[B] Count model OR (s.e.)	BMI[B] Count model OR (s.e.)
None	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Low	0.78 (0.21)	1.05 (0.09)	0.79 (0.18)	0.92 (0.07)	**0.29 (0.25)**	1.11 (0.08)	0.93 (0.07)	0.95 (0.07)	0.87 (0.40)	0.96 (0.06)	1.07 (0.07)	1.04 (0.07)	0.96 (0.02)
High	0.94 (0.23)	1.03 (0.05)	0.77 (0.19)	1.12 (0.07)	**0.18 (0.29)**	**1.52 (0.08)**	0.93 (0.08)	0.94 (0.08)	1.21 (0.39)	0.96 (0.06)	**1.19 (0.08)**	1.11 (0.08)	0.99 (0.02)

[A] Zero-inflated negative binomial model, which includes a logit model of the odds of having zero minutes of sitting and a count model of the odds of higher (>1.00) or lower (<1.00) sitting time.

[B] Negative binomial model, which includes a count model of the odds of higher (>1.00) or lower (<1.00) sitting time.

positively associated with computer sitting, despite social media increasingly being accessed via smartphones and tablets, which allow the user to move around or stand during use. The association between social media use and computer sitting time could be due to the older age of the participants, who are more likely to access social media through computers.[9] Past research has found that high levels of sitting outside of work hours affects health more than sitting during work hours.[23] The current study findings suggest that the high level of sitting time on non-workdays is in part due to social media use. Those who have a higher number of non-work days such as part-time workers, may need to monitor their social media use to ensure it is not contributing to high sitting time on their non-work days.

No associations were found between social media and sitting while watching TV, working, using motorised transport, during leisure-time activities, total workday sitting and total sitting. While past research has found a significant association between TV, computer and Internet use and overall sedentary behaviour,[13] the findings from this study suggests that social media use does not affect total sitting time. This may be due to social media use making up a smaller percentage of sitting time, or that social media use may be a more 'active' screen use behaviour because it is increasingly accessed through smartphones, tablets and other portable devices[9] that make it possible to use social media while moving around. It is possible that the lack of association found between social media use and some of the domains of sitting (e.g. work, TV, driving) is because the activity being completed while sitting requires the users attention. For example, it is illegal to use a smartphone while driving in Australia.[24] An alternative explanation is that the tool used to assess social media use was not sensitive enough to capture social media use in these domains. This requires further investigation.

Social media use was not associated with BMI. This is in contrast to the sitting time caused by TV viewing, computer use and Internet use which has been associated with increased BMI.[11,13] The lack of association between social media use and BMI may be due to the affect social media use has is too small to detect, or that unlike TV sitting[3,11] social media use is not associated with food consumption. It is also possible that social media use exposes people to information about healthy eating and exercise that may have a positive effect on BMI. Further research is required to determine the reasons for the lack of association between social media use and BMI.

Strengths of the study include a large random sample of participants, use of a validated questionnaire to measure sitting time, and the equal gender breakdown. Limitations include the cross-sectional self-reported data of people with landlines, and the older age of the sample. Future longitudinal research should be conducted with objective measures of sedentary behaviour that allows matching social media use to sitting time in different domains. Future research is also needed to explore whether the lack of associations between social media use and total sitting time, BMI and sitting in many of the domains is due to the rise of social media use through portable

devices that allow people to multitask while using social media (e.g updating Facebook status while watching TV or walking). Further, the impact of social media on the population may have been underestimated in this study due to the older age of participants.

Conclusion

This study is the first to examine associations of social media use with sitting time and BMI. Findings suggest that social media is associated with high computer and non-workday sitting time. Future research using a representative sample, objective sitting measures and detailed measures of how social media is accessed needs to be conducted to determine whether social media should be addressed when trying to reduce computer and non-workday sitting time.

Acknowledgements

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