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Perceived Health, Sedentary Time, Body Mass Index, and Breaks from Prolonged Sitting in the Workplace

Sonali Sarkar[1]*, Wendell C Taylor[2], Dejian Lai[1], Ross Shegog[1] and Raheem J Paxton[3]

[1]*School of Public Health, The University of Texas Health Science Center at Houston, TX, USA*

[2]*Department of Health Promotion and Behavioral Sciences, The University of Texas Health Science Center at Houston, TX, USA*

[3]*Institute for Healthy Aging and the School of Public Health, University of North Texas Health Science Center, TX, USA*

***Corresponding author:** *Sonali Sarkar, MD, MPH, DrPH, School of Public Health, The University of Texas Health Science Center at Houston, Houston, Texas 77030, USA, Tel: 281-216-6828, Email: sonalisarkar@yahoo.com*

Abstract

Objective: Perceived health, sedentary time, and body mass index are important indices of health. Perceptions about health are fundamental in motivating people to engage in health promoting behaviors. There are limited data related to employee health perceptions, sedentary time, and body mass index (assessing health status i.e., overweight/obesity). Therefore, we examined the association between perceived health, sedentary time, and body mass index. The two research questions were: 1) Do employees report a relationship between sedentary time and perceived health? 2) Do employees report a relationship between body mass index and perceived health?

Method: This cross-sectional study analyzed baseline data collected from 144 participants in the Booster Break workplace study. A secondary analysis of baseline data from the Booster Break study (intervention to break prolonged sitting behavior among office workers) was conducted. Descriptive statistics and logistic regression were performed using SPSS version 20.

Result: Sedentary time was not associated with employee perceived health in both the unadjusted and adjusted models, however, age (positively) [OR = 1.08; CI: 1.02-1.14; p = 0.01] and body mass index (inversely) [OR = 0.87; CI: 0.81-0.95; p = 0.001] were significantly associated with employee perceived health in the adjusted model at a significance level p < 0.05.

Conclusion: This study provides important information related to factors associated with perceived health. A better understanding of perceived health and motivation are important for employers and worksite program developers. Our findings suggest that more education is needed to inform the public about the relationships between sedentary behavior and health.

Keywords

Sedentary time, Perceived health, Body mass index, Booster breaks

Introduction

Perceived health is defined as self-perception of one's health status [1]. It is an important psychosocial construct that is strongly predictive of future morbidity and mortality [2,3]. Perceived health influences health behaviors such as taking breaks in sedentary time at worksites and employee adherence to physical activity [4]. Negative self-rated health at worksite is associated with low physical activity, overweight, obesity and comorbid health conditions [5]. In contrast, positive health perceptions are associated with regular physical activity and exercise [6]. A review of literature indicated that among the adult population poor perceptions of health was significantly associated with BMI not within normal range [7-9]. Prior worksite studies have also identified a relationship between employee self-reported health status, and non-normal body mass index that are critical to developing health promotion programs such as adherence to worksite physical activity [10]. Thus, there exists an important association between employee health perceptions and body mass index.

Sedentary time is defined as any waking time during which MET level is 1-1.5 [11]. Sedentary time and lack of moderate-to-vigorous physical activity are prevalent at worksites specifically in an office based setting accounting for more than 80% of working hours [12]. Sedentary behavior among office workers has increased with sitting for long hours in front of the computer, reading reports, and talking on the telephone while sitting [13]. It is estimated that approximately half of the sedentary time in the office setting is accumulated in prolonged bouts of 20 minutes or more [14]. Sedentary time has been independently associated with comorbidities and mortality and is emerging as a major public health problem [15-17]. In an earlier study, employees associated prolonged sedentary time at work places with poor health perception and voiced their concerns for musculoskeletal pain, fatigue and demotivation issues [18]. However, our study was different from the Gilson study that conducted four focus groups with a convenience sample of Australian government personnel (20 women and two men) and qualitatively elicited health perceptions associated with prolonged sitting at work.

Body mass index (weight Kg/height m^2) is an important physiological index often calculated to measure overweight and obesity [19]. Prior studies have reported that sedentary time (sitting time including increased television and screen time) was positively associated with greater body mass indices, overweight and obesity [20]. Thus, body mass index and sedentary time are positively

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associated [21]. However, the perceptions of relationships among body mass index, sedentary time, and perceived health have not been sufficiently investigated. To address this gap in the literature is important because perceptions can be the motivational underpinnings to change behavior and to engage in health-promoting behaviors.

Although the associations between perceived health, sedentary time, and body mass index have been examined among adults in other settings; these associations have not been documented among a population of fulltime employees [22,23]. This gap is significant because workplaces are where sedentary time is observed among employees in an office based setting [14]. It is important to understand the associations between sedentary time, body mass index, and perceived health so that planners can design appropriate employee wellness programs targeted specifically to the occupational environment and organizational culture. For example, perceived health can be an important motivating factor. If employees perceive their health as low or suboptimal then there may be a readiness to change behaviors. Tailoring messages and programs to this spectrum of perceived health is essential. On the other hand, if perceived health is good or excellent then maintaining this health status can be a motivating factor. Communication and programs should be tailored to employee perceived health. Therefore, it is critical to understand the factors associated with perceived health among employees and sedentary behavior.

For this study, our research questions were: Is there an association between employee's perceptions of sedentary time and health? Is there an association between BMI and perception of health? We hypothesized that there is a positive association between employee's perception of sedentary time and health. We also hypothesized that there is an inverse association between BMI and perceived health.

Methods

Booster Break Program

Booster Breaks are defined as "organized, routine work breaks intended to improve physical and psychological health, enhance job satisfaction, and sustain or increase work productivity" [24]. The Booster Break study was conducted from January 2009-2011. The core element of Booster Break program was to interrupt the extended periods of sedentary time at workplaces [25]. Booster Break sessions were composed of 5-15 participants in each group and were held at the same time each workday (mid-morning or mid-afternoon) during a work break. Details of the Booster Break Program are described elsewhere [25].

Study design, sample and setting: A cross-sectional study analysis was used. Participants in the Booster Break study completed a baseline survey. The sample included 26 male and 118 female employees whose job required sitting for more than five hours a day. Participants were included from four worksites (department of education, major hospital, law firm, court reporting and video department). Participants were excluded if they had any medical contraindications to perform moderate-to-vigorous physical activity.

Procedure: A secondary analysis of data from responses to the baseline surveys for the Booster Break program was performed. Sedentary times, perceived health, body mass index along with socio-demographic data from the participants in the Booster Break program were assessed using responses from the baseline surveys. The data were entered into the data editor of SPSS version 20.

Socio-demographic survey: The socio-demographic survey included 12 questions. These questions were occupation/job title, age, gender, race/ethnic identity, height, weight, educational level (seven categories from less than 7th grade to completed graduate degree), number of people in household, number of children under 18 in household, ages of children in household (if any), marital status, and annual household income (eleven categories ranging from <$10,000 to > $100,000).

Sedentary time measure: The sedentary time question was used from the short version of IPAQ (International Physical Activity Questionnaire) [26]. Sedentary time was self-reported and was assessed by a 2 item questionnaire asking the participant about time spent sitting on a weekday and on a weekend. It was a continuous variable measured as total sitting time in minutes per day per week. The sedentary time question from the IPAQ was found to be reliable when the test-retest duration was short (3 days) and the intra-class coefficient was 0.97 [27]. Test-retest reliability for the sedentary time question, recall within one week, assessed by Spearman's rho was 0.75 (range 0.58-0.94) [28]. The criterion validity between computer science application (CSA) activity monitor and IPAQ short form was acceptable and ranged from 0.33-0.45 [28].

Perceived health measure: Perceived health was self-rated. The questionnaire asked the participant "In general, you would rate your health as…" Employee perceived health was a categorical variable. The response categories were excellent, very good, good, fair and poor. Perceived health was measured by an item from the Health Related Quality of Life (HRQOL) questionnaire. Many published studies have used questions from the HRQOL survey. It has a test-retest reliability of 0.66-0.93 and an internal consistency that ranges from 0.65-0.93 [29].

Body mass index (BMI) measure: For measurement of body mass index, participants' weight in kilogram was obtained using a weight scale and height was measured in meters, which was then squared. Body mass index was calculated by dividing the weight (Kg) by the height (m^2) and is a standard measure in health related research with documented reliability and validity [30,31].

Data analysis

Descriptive statistics including frequencies, means, and percentages were computed. Logistic regression was performed using Statistical Package for the Social Sciences (SPSS) version 20. The observed data did not significantly deviate from the assumptions of the logistic model. The dependent variable (employee perceived health) was dichotomized into "good to excellent health" by collapsing the categories of excellent, very good and good health that were merged and was coded as 1. Conversely, "fair to poor health" was collapsed into the other category, merged and coded as 0. The rationale for collapsing the categories was to be consistent with previous literature [9,32]. Using binary logistic regression both unadjusted and adjusted analyses (controlling for the covariates age, sex, marital status, body mass index, educational and income level) were conducted to calculate odd ratios and 95% confidence intervals.

Results

Descriptive data

A total of 144 participants were included for the study. The mean (SD) age for the participants was 44 (±13) years. The socio-demographic characteristics indicated that 118 (82%) of the participants were females, 92 (64%) were married or living with a partner, and 95 (66%) had college level education (Table 1). Approximately 40 (28%) participants had an annual household income that ranged between 50-79,000 dollars or 100,000 dollars or higher.

The mean (SD) sedentary time was 892.47 (588.59) minutes per week (Table 2). Sedentary time was non-normal in distribution. The median and quartiles (25th, 50th, 75th percentile) for sedentary time were 720 and (540, 720, 1020) minutes per week. The mean (SD) BMI was 29.7 (±7) (Table 2).

Majority of the participants, a total of 55 (38%) self-rated their health as good, while 48 (33%) perceived their health as very good, 16 (11%) reported their health as excellent, 24 (17%) as fair, and only 1 (1%) participant self-rated health as poor (Table 2).

Perceived health when dichotomized into excellent to good health and fair to poor health, resulted in 119 (83%) of the participants, who self-rated their health as excellent to good vs. 25 (17%) of the participants, who self-rated their health as fair to poor.

Table 1: Demographic characteristics of the participants (n = 144).

	n (%)
Sex	
Male	26 (18)
Female	118 (82)
Marital Status	
Married/ living with a partner	92 (64)
Single/widow/separated	52 (36)
Education	
High school/GED	16 (11)
College-level	95 (66)
Graduate degree	33 (23)
Annual Household Income	
< 29 K	7 (5)
30-49 K	25 (17)
50-79 K	40 (28)
80-99 K	32 (22)
100K or higher	40 (28)

Table 2: Data on baseline study variables.

Variables	Mean (SD)
Sedentary time (minutes per week)	892.47 (588.59)
Body mass index (BMI)	29.7 (7)
Perceived Health	N (%)
a) Excellent	16 (11%)
b) Very Good	48 (33%)
c) Good	55 (38%)
d) Fair	24 (17%)
e) Poor	1 (1%)

Table 3: Unadjusted logistic regression between perceived health and study variables.

Variables	Beta Coefficient	Odds Ratio	95% CI	P value
Age, years	0.03	1.03	0.99 - 1.07	0.06
Sex				
Male	-0.44	0.65	0.23 - 1.82	0.41
Female (Ref)				
Marital Status				
Married/ partner	-0.62	0.54	0.20 - 1.46	0.23
Single/widow/separated (Ref)				
Body Mass Index (BMI)	-0.11	0.90	0.84 - 0.96	0.001
Education				
Graduate degree	0.72	2.05	0.52 - 8.12	0.31
College level	0.97	2.63	0.79 - 8.73	0.11
High school/GED (Ref)				
Annual Household Income				
< 29 K	-0.35	0.71	0.07 - 7.45	0.77
30-49 K	-0.19	0.82	0.17 - 4.05	0.81
50-79 K	-0.44	0.65	0.17- 2.50	0.53
80-99 K	-1.13	0.32	0.09 - 1.21	0.09
100K or higher (Ref)				
Sedentary time	0.00	1.00	1.001 - 1.002	0.21

Unadjusted logistic regression performed among the study variables and perceived health with one variable entered into the regression model at a time indicated that sedentary time (predictor) and perceived health (outcome) were unrelated [OR = 1.00; CI: 1.000-1.002; p = 0.21] (Table 3). However, BMI had a significant inverse association with perceived health [OR = 0.90; CI: 0.84-0.96; p = 0.001]. The negative regression coefficient for BMI was -0.11 which can be interpreted as one unit increase of BMI would be associated with 11% decrease of the log odds ratio of excellent to good employee perceived health.

Table 4: Adjusted logistic regression between perceived health and study variables.

Variables	Beta Coefficient	Odds Ratio	95% CI	P value
Age, years	0.07	1.08	1.02 - 1.14	0.01
Sex				
Male	-1.07	0.34	0.08 - 1.46	0.15
Female (Ref)				
Marital Status				
Married/ partner	-0.19	0.83	0.21 - 3.26	0.79
Single/widow/separated (Ref)				
Body Mass Index (BMI)	-0.13	0.87	0.81 - 0.95	0.001
Education				
Graduate degree	0.67	1.96	0.47 - 8.06	0.35
College level	-0.83	0.43	0.05 - 3.80	0.45
High school/GED (Ref)				
Annual Household Income				
< 29 K	-0.26	0.77	0.03 - 22.05	0.77
30-49 K	-0.38	0.69	0.09 - 5.39	0.69
50-79 K	-0.53	0.59	0.09 - 3.80	0.59
80-99 K	-1.41	0.24	0.05 - 1.33	0.24
100K or higher (Ref)				
Sedentary time	0.00	1.00	0.99 - 1.00	1.00

Adjusted logistic regression model indicated that after controlling for potential confounders (age, sex, marital status, BMI, education, income) in the model, sedentary time continued to be unassociated with perceived health [OR = 1; CI: 0.99-1.00; p = 0.56] (Table 4). However, we observed an incidental finding, age had a weak positive association with perceived health [OR = 1.08; CI: 1.02-1.14; p = 0.01]. The regression coefficient for age was 0.072 which can be interpreted as one year increase of age would be associated with 7% increase of log odds ratio of excellent to good employee perceived health. This was a secondary finding in our study.

Adjusted logistic regression model also indicated that after controlling for the covariates, body mass index (BMI) was inversely associated with perceived health [OR = 0.87; CI: 0.81-0.95; p = 0.001] (Table 4). The negative regression coefficient for BMI was -0.134 which can be interpreted as one unit increase of BMI would be associated with 13% decrease of log odds ratio of excellent to good employee perceived health.

Discussion

We examined the association between employee perceived health, sedentary time and body mass index. The study findings indicated that no significant association was found between sedentary time and perceived health which was similar to that of another study conducted [33] wherein the participants did not perceive any association between sedentary behavior and health perceptions. In contrast, previous worksite studies have reported that employees associated sedentary time with poor perceived health, primarily musculoskeletal problems and fatigue [4,18,34]. The employee health perceptions about self-rated health for chronic diseases associated with prolonged sedentary time could be due to psychosocial factors such as underlying defense mechanisms (denial or exaggeration) or lack of awareness for the health condition [35]. These inconsistent study findings further highlight the importance of identifying the factors associated with employee perceived health that are necessary to design and develop worksite interventions targeting breaks in employee sedentary time.

Our study also indicated that body mass index had a significant inverse association with perceived health. This finding is consistent with other worksite studies where workers with greater body mass indices perceived their health status as poorer than their counterparts with lower body mass indices [36,37]. Therefore, for overweight

employees to improve their health and participate in worksite physical activity programs, program planners can capitalize on the fact that these employees self-rate their health status lower than other employees. Thus, employee perceptions about self-rated health status can be target for worksite physical activity interventions [38,39].

Our study indicated that age had a weak positive association with perceived health, which is inconsistent with the literature as previous studies found a negative association between health perception and age [40]. One possible explanation for this finding could be that older employees who are still working are likely to be healthier and therefore, perceived their health to be good. Similar to our study, one study reported that in contrast to the common old age stereotypes, older workers did not have significantly poorer health [41]. Our study finding was also different from other worksite studies that reported a negative association between old age and employee health [42] and discussed the negative health perceptions and poor occupational health of older employees [43].

Limitations

The study was not without limitations. Employees volunteering to participate in a worksite physical activity study could have greater interest in physical activity at baseline. Therefore, the participants who chose to participate in the study may have been less sedentary, which may indicate that the characteristics of participants who were recruited in the study were different than those who were not. This possibility introduces a selection bias in the study. Because of the cross-sectional nature of this study, information on the predictor and outcome variables were collected and analyzed at one moment in time and therefore, the direction of causality cannot be determined. A majority of the participants self-rated their health as excellent-to-good while only a few self-rated their health as fair to poor. Our study did not employ any objective measures of sedentary time. However, published research studies have reliably used self-reported measures of sedentary time to provide valid results [44].

Participants in the Booster Break worksite study included only employees (law offices, major hospital wellness clinic, health department) in an office based occupational setting and most of the respondents were women (82%). Therefore, the generalizability of these results to all occupational and worksite setting is unknown and merits further study.

Strengths

The study had several strengths. The study had a much larger sample size compared to other similar worksite study [18], involved coworker led physical activity intervention at four worksites and quantitatively measured the association between sedentary time and employee perceived health after adjusting for potential confounders. Therefore, the unique features of our study, adds to the Gilson worksite study and significantly contributes to the literature. The sample for our study was derived from the original Booster Break study and was composed of a racially and ethnically diverse population, details of participant demographics are reported elsewhere [45]. Our study was novel as it included unique variables examining relationship between health perceptions, sedentary time and body mass index among workers in an office based setting. There are few worksite studies that have examined these associations. This cross-sectional analysis of the longitudinal study enabled us to understand the correlates of employee perceived health among workers at worksites which could be different from that of the general population. The study highlighted the fact that employee perceived health was not associated with sedentary time. One possible explanation is that the average sedentary time among participants in our study was less compared to other worksite studies and this could be a reason why no relationship was found with perceived health. Therefore, educational programs that provide knowledge about harmful effects of sedentary behavior and advocate health promoting behaviors such as breaking prolonged sitting time may be needed. This investigation is critical since overweight and obesity as measured by high body mass index is a growing epidemic and sedentary behavior at worksite is associated with cardiovascular diseases, morbidity and mortality. These adverse health outcomes associated with employee sedentary behavior mandates a greater need for educational programs to break the sedentary time and promote worksite physical activity.

Implication for future research

The growing epidemic of obesity and sedentary behavior calls for action from employers and researchers for interventions to break up prolonged sedentary time at work places [46,47]. Better information dissemination and longitudinal data are needed to create awareness and to create a better understanding among employers about the relationship between sedentary behaviors, body mass index, and employee health perception. This study may indicate a lag time from what researchers know to what the public knows. One previous study has indicated that self-perception of one's health (perceived health) precedes changing his or her health behavior [39]. Therefore, future research should be mindful of accurate and inaccurate perceptions related to health, sedentary behavior, and body mass index [28,48-50].

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