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Flexible work: The impact of a new policy on employees' sedentary behaviour and physical activity

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Abstract

Objective:To assess change in physical activity (PA) and sedentary behaviour (SB) in office-based employees following the implementation of a flexible work policy which allowed working at home.

Methods:24 employees (62% female; 40±10years) completed an online questionnaire four weeks pre- and six weeks post- implementation of the policy. Changesin PA and SB were assessed using Wilcoxon signed-ranks test.

Results:There were no changes in PA following the introduction of the flexible work policy (Z= -.29, p>.05). Sitting time increased on days the employees worked at home (Z= -2.02, p>.05) and on days they worked at the office (Z= -4.16, p>.001).

Conclusions:A flexible work policy may have had a negative impact on sedentary behaviour in this workplace. Future work is needed to explorethe potential impact onworkplace sitting time.

Introduction

The workplace presents an opportunity to influence individuals' physical activity and sedentary behaviour. Approximately two thirds of adults are employed and most of these are in white-collar settings (1). Given that white-collar workers are particularly at risk of high sedentary behaviour and reduced physical activity in the workplace, and there are significant potential gains from improving these behaviours, there is a strong rationale for selecting the workplace as a prime point of intervention (2, 3).

There are significant benefits to be gained for both the employee and the employer from promoting physical activity. Physically active workers can deliver significant tangible benefits to the organisation, such as reduced costs associated with absenteeism, reduction in employee turnover and improved productivity (4, 5). There are also intangible benefits such as improved employee morale, employee engagement and a positive attitude towards the 'caring' organisation (6, 7). Many organisations have therefore come to view promoting physical activity as an additional employment benefit.

The workplace is a key contributor to the total time that individuals spend in sedentary behaviour, particularly in white-collar occupations. Thorp and Dunstan (8)reportedthat workersare 70% more sedentary on a work day than on a non-work day, and that this difference is even more pronounced during office hours. Similarly, Parry and Straker (2) reported that 81% of work time is spent in sedentary behaviour and furthermore, that sedentary time at work tends to occur in longer bouts (>30minutes) than non-work sedentary time. Clemes, O'Connell (3)also found that up to 71% of working time was spent in sedentary behaviour.

Prolonged occupational sitting can lead to increased financial costs for organisations. These include both direct costs, such as work-cover claims due to occupational injury, and indirect costs through absenteeism. Odeen, Magnussen (9)identified that reducing sedentary behaviour is an effective preventive measure for reducing future absence, particularly absence associated with musculoskeletal pain. There is also emerging evidence that reducing and interruptingprolonged sedentary behaviour is important for reducing mental distress in the workplace. Taylor, King (10) assessed the impact of booster breaks every 15 minutes to interrupt prolonged

sitting at five worksites and found the most commonly reported benefits were reduced stress, enhanced feelings about the workplace and increased enjoyment in the workplace. These associations appeared to be present regardless of physical activity levels.

The context for health promotion in the workplace is changing, with many organisations now starting to introduce flexible work policies. Flexible work can constitute either temporal flexibility (work scheduling and time constraints) or location flexibility (work from home, remote access). Currently, the most common types of flexible working arrangements are staggering start times, telework and extended leave entitlements(11). Casey and Grzywacz (12)determined that workplace flexibility was inversely associated with employee absence due to sickness and poor wellbeing.Hayman (13)found that flexible work schedules were positively linked with work life balance measures such as life satisfaction and wellbeing. This suggests that flexible schedules are associated with general employee positive health and wellbeing. It is possible that flexible work schedules may also be associated with adaptive levels of physical activity and sedentary behaviour in employees.

A small number of studies have assessed associations between workplace flexibility and physical activity, and most of these have focussed on work hours. Wemme and Rosvall (14)reported that lack of time and long work hours were related to low levels of physical activity. Grzywacz, Casey (15)assessed the relationship between workplace flexibility and frequency of physical activity in pharmaceutical company employees (mean age = 40years) using Annual Health Risk Assessment data over a 12-month period. They found that an increase in perceived flexibility also resulted in increased physical activity. This was confirmed in a recent study that found that hospital workers with higher job flexibility (ability to change shifts to meet personal demands) had higher levels of physical activity than those with low job flexibility(16).

To date, no published studies have assessed relationships between workplace flexibility and sedentary behaviour. A flexible workplace could potentially reduce sedentary behaviour, as employees are not bound to an office environment, and are therefore enabled to interrupt prolonged occupational sitting time with other

tasks. In addition, flexible workplaces provide opportunities to complete work in short bursts throughout the day, rather than in one set work block.

The aim of this study was to assess the impact of the implementation of a flexible work policy in anoffice-based workplace on employees' sedentary behaviour and physical activity.

Methods

Study Design& Recruitment

This study used a single group pre-post design to evaluate a natural intervention. Participants were volunteers from a single business unit (N=50 employees) at a financial services organisation based in Brisbane, Australia. An information session was held at the workplace to present the study aim and requirements. All staff then received an email invitationto participate in the study. This included a link to the online survey, and survey completion was taken as informed consent. The online survey was administered four (4) weeks prior to policy implementation and six (6) weeks after policy implementation. Participants were allowed to complete the survey during normal working hours and no incentives for participation were offered. This study was approved by The University of Queensland Institutional Human Research Ethics Committee.

Intervention

The naturalistic intervention was the introduction of a flexible work policy. Prior to the flexible work policy, employees were expected to work at the office. Employees may however, have done some work from home on an ad hoc basis. However after the flexible work policy, employees were mandated to work from home at least one day per week.Employees were required to sign a 'social contract' that outlined organisational expectations (e.g. professional behaviour, adequate completion of work tasks) when working offsite. The policy did not contain any references to physical activity or sedentary behaviour. Details of the policy were provided to employees in team meetings, email and through the corporate intranet.

Measures

*Physical Activity:*Time spent in physical activity was assessed using items from the Active Australia survey (17). An adapted version of the questionnaire was used, with separate items to assess walking to get to or from places, and walking for recreation separately.Participantsreported the total number of sessions (frequency) and total time (duration) spent walking for recreation or exercise for at least 10 minutes at a time, walking to get to or from places for at least 10 minutes at a time, in vigorous physical activity (e.g. jogging, cycling, aerobics), and in other moderate intensity activities (e.g. gentle swimming, social tennis) over the past week. Reliability coefficients for each domain of physical activity range from 0.56–0.64, and correlations between self-reported physical activity and objectively measured activity are 0.43 and 0.52 for pedometer and accelerometer data respectively (18).

*Sedentary Behaviour*Participants were asked to record sitting time (hours and minutes) in five domains (work, travel, television, computer use for leisure, and other leisure). These items were split to ask about sitting time oneach of a usual work day working at home and a usual work day working at the office. This questionnaire has high test-retest reliability for weekday sitting at work, watching television and computer use (r=0.84-0.78), but lower reliability for weekend days across all domains (r=0.23-0.74) (19).Overall sitting time was determined as the sum of daily time spent in each domain (work, travel, television, computer use for leisure, and other leisure) on a usual work day at home and a usual work day at office. Sitting time was measured across all domains to capture potential displacement of sitting time as participants restructured their changed work location(e.g. sitting for travel may reduce, sitting for leisure may increase as participants work from home).

Participant characteristics Participants were asked about their gender, age, country of birth, marital status,income, level of education, height and weight. Work specific questions included organisational tenure and employment status.

Data management

*Physical Activity:*Overall self-reported time spent in physical activity was determined as the sum of time (mins/week) spent in moderate, walking (both transport and exercise/recreation) and vigorous activity, with vigorous activity time weighted by a factor of two (2) to reflect its higher intensity.

Extreme values were determined, a priori, as >840mins for a single activity type and >1680 weighted minutes for overall time spent in physical activity. No extreme values were identified.

Sedentary Behaviour: Total self-reported time spent sitting was calculatedas the sum of daily time spent in each domain (work, travel, television, computer use for leisure, and other leisure). Data were grouped as usual work day at homeandusual workday at office, as reported by the participant.

Extreme values by domain were determined as:>180mins for travel, >720mins for work, and >480mins for the leisure related domains (television, computer use for leisure, other leisure). Extreme baseline (Pre) domain values were imputed with the sample mean. Extreme Post domain values were recoded with the case Pre value to allow for a conservative 'no change' between time points. Extreme values for overall sitting time (>960minutes/day) were then truncated to 960minutes.

Extreme values were identified on work at the office days for Travel (n=1) and on work at home days for Travel (n=1) and Computer use for leisure (n=2). Extreme overall sitting time was identified on work at the office days (n=2) and work at home days (n=3).If Usual hours working at home was reported as 0 at post-test, then Sitting time on a work at home day was adjusted to a null value for all domains (n=5). If Usual hours working the office was reported >0 and Sitting time in the Work domain on a work at the office day was reported as 0, then the domain value was recoded with the sample mean (n=1).

All fields were mandatory in the online survey resulting in no missing data.

Statistical Analyses

Overall time in physical activity was compared with national recommendations (at least 150 minutes per week) to determine the proportion of individuals meeting guidelines (20). Wilcoxon signed-ranks test was used to assess change in self-reported weighted time spent in physical activity, and in self-reported total time spent sitting,from before to after the policy implementation. Statistical analysis was completed using SPSS v22.

Results

Participant recruitment

An overview of participant recruitment is included in Figure 1. Just under half (46%) theinvited participants completed assessments pre- and post- policy implementation. Reasons for not completing full assessments were provided voluntarily to the recruiter upon participants receiving the second survey invitation: they included personal leave, leaving the department and withdrawal from the study(N=13).

Insert Figure 1 about here

Participant characteristics

Baseline characteristics of the 24 participants who completed both surveys are shown in Table 1.

Insert Table 1 about here

Physical Activity

Self-reported time spent in physical activity is presented in Table 2. The majority of participantsdid met the guideline of at least 150 weighted minutes of physical activity per week(20) at both time points (Pre=81%, Post=71%). The most commontype of physical activity was ‘walking for travel’ and the least common was ‘moderate physical activity’ (other than walking).

Insert Table 2 about here

There were no significant difference in weighted MVPA between Pre and Post assessments, Z= -.29, p>.05.

Sedentary Behaviour

Self-reported sitting timesin each domain on work daysare presented in Table 3. Overall sitting time on a usual work day at home increased after the intervention (Pre *Mdn*=60mins, Post *Mdn*=641mins) which demonstrates that individuals had commenced working from home in line with the policy. The domain with the highest time spent sitting (Post) was 'work' on both a usual work day at home and usual work day at the office. The domain with the lowest time sitting (Post) was 'other leisure' (other than computer and television) and 'travel' on a usual work day at home.

Insert Table 3 about here

There were significant increasesin total sitting time on a usual work day at the office, Z= -4.16, p>.001 and on a usual workday at home, Z= -2.02, p>.05. Individual changes in total sitting time are shown in Figure 2 and 3.

Insert Figure2 and 3 about here

Discussion

This study assessed the impact of the implementation of a flexible work policy on employees' physical activity and sedentary behaviour on work days. Analyses indicatedno significant difference in self-reported physical activity following implementation of a flexible work policy. However, significant increases in self-reported total sitting time on wereseen on both usualwork days at the office and at home.

There was no change in self-reported physical activity six weeks after the implementation of the flexible work policy. This is in contrast to otherstudies that found a positive association betweenworkplace flexibility and physical activity(12, 16, 21).These previous studies have,however,investigated overall workplace level of flexibility (such as job autonomy, etc.) and not the specific introduction of policies that include flexibility in working hours and/or location. Flexible work practices may have a greater impact on light intensity physical activity (e.g. household tasks), whichwas not captured in this survey. Anecdotally, participants indicated that

household errands such as washing clothes, general cleaning and cooking were interspersed with work-related tasks when working from home.

There was a significant increase in total self reported sitting time on both usual work days at home and in the office.This increase in sitting onwork at home days is understandable, as most employees would have had to sit to complete their work at homeafter the introduction of the policy.The increase in total self reported sitting time on work at the officedayswas unexpected.Anecdotally, participants indicated that, after introduction of the flexible work policy, they sat more when in the office to accrue "time in lieu" so they would not have to work so many hours on their work-from-home days. Whilst this is acceptable within the bounds of a flexible workplace, the implications could be important, as these employees increasedtheir time spent in sedentary behaviour,both while working at home and at the office, and prolonged sedentary behaviour has detrimental health effects.

A limitation of this study wasthe high variability in frequency of working at home. It is possible that the findings would vary according to the degree of flexibility practices. Another limitation was the sample size. This study was only able to access one business unit, so the findings may be influenced by unit specific workplace factors (e.g. leadership style). Finally, this was an opportunistic study which assessed changes in PA and SB following introduction of a flexible work policy that did not specifically target these behaviours. It is possible that a policy or adjunct education to demonstrate how employees could use flexible work practices to improve health related behaviours may have been more effective. Despite these limitations, this study has provided evidence that a new approach may be required to reduce occupational sitting in contemporary workplaces.

Conclusions

To date, limited research has assessed the impact of flexible workplace policies on physical activity and sedentary behaviour. This study showedthat there may be anegative impact on sedentary behaviour, with employees in this workplace, increasing time spent sitting on both work at the office and work at home

days.Further investigation into the impacts of flexible work policies on sedentary behaviour is needed to explore the relationship between flexible work and sedentary behaviour. Future work could include objective measures of physical activity and breaks in sedentary behaviour. Improved understanding of the impacts of the modern workplace on employees'physical activity and sedentary behaviour will assist organisations in identifying and managing occupational risks in the business, and enable health promotion professionals to design workplace interventions that are specific to this new dynamic work environment.

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Figure captions

Figure 1. Participant recruitment flow chart

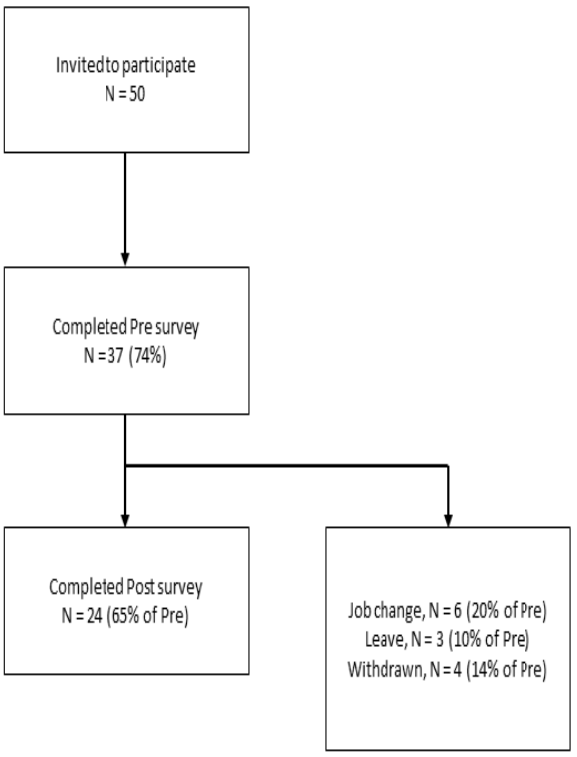

Figure 2. Individual changes in total time spent sitting on a usual work day at the office

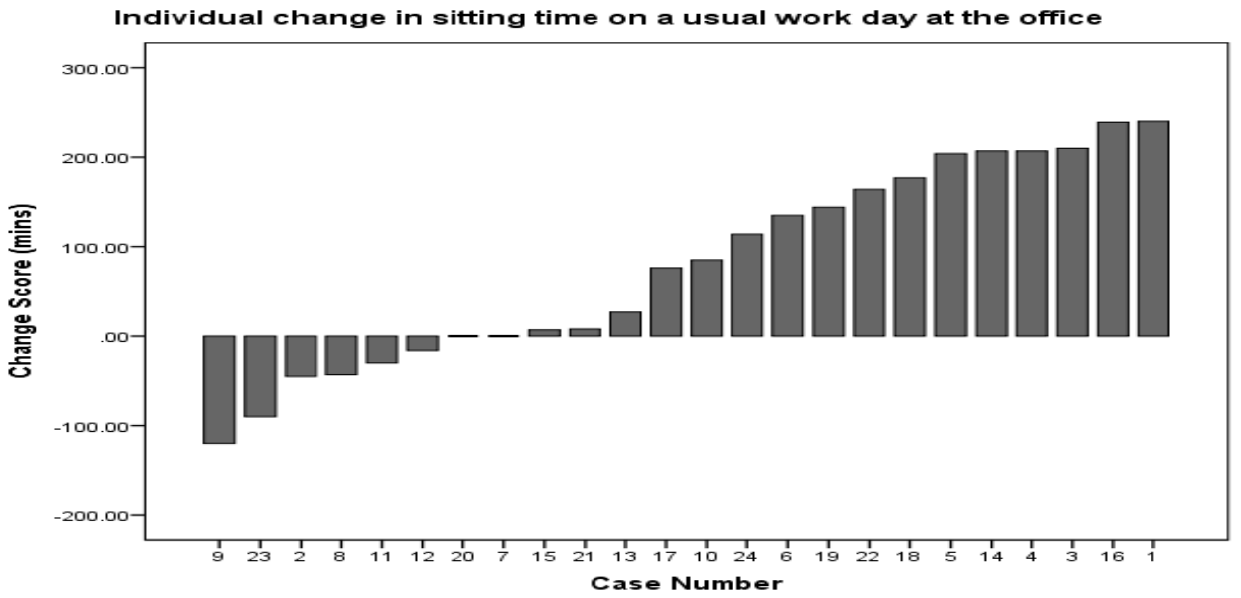

Figure 3. Individual changes in total time spent sitting on a usual work day at home

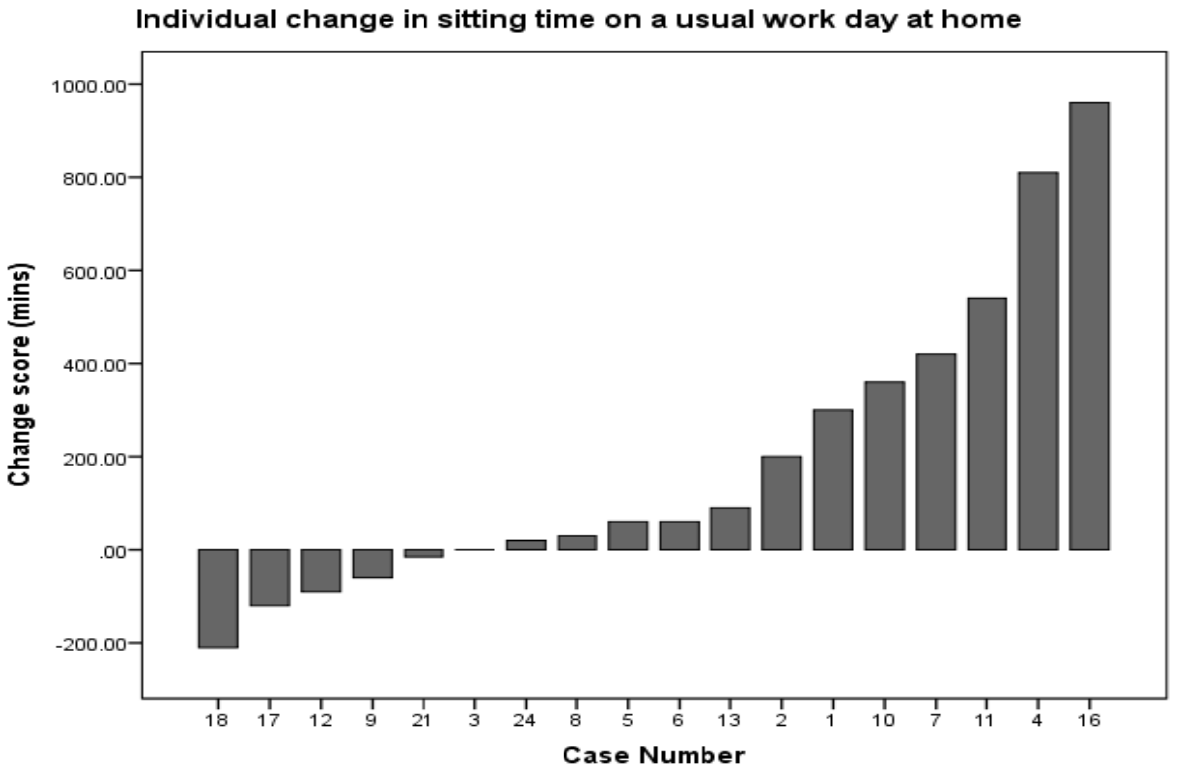

Table 1. Participant characteristics N=24

Age (years)	
Mean (SD, range)	40 (10, 21-59)
BMI (SD, range)	26 (4.6, 17.6-35)
	%
Gender	
Male	38
Female	62
Living situation	
Single	27
Couple with no children	27
Couple with children	46
Highest Qualifications	
Secondary school	48
Certificate or Diploma	24
Undergraduate degree	24
Postgraduate degree	4
Employment status	
Full-time	87
Part-time	13
Years of service	
Less than 2 years	5
3 to 5 years	8
More than 5 years	87

Table 2. Self-reported time spent in physical activity (minutes/week) N=24

	Pre[a] Median (IQR[b])	Post[a] Median (IQR[b])	Δ *p*-value[c]
Walking for travel	95 (45-150)	120 (60-210)	0.266
Walking for recreation & exercise	35 (0-120)	60 (0-90)	0.731
Vigorous physical activity	60 (0-180)	35 (0–202)	0.113
Moderate physical activity	0 (0-0)	0 (0-23)	0.310
Weighted MVPA[d]	375 (131-750)	330 (110-757)	0.770

[a]*Pre was 4 weeks prior to implementation, Post was 6 weeks after implementation*

[b]*Interquartile range*

[c]*Wilcoxon signed-ranks test*

[d]*MVPA=Moderate to Vigorous Physical Activity, items were summed with vigorous activity weighted by 2 to account for higher intensity*

Table 3. Self-reported time spent sitting (minutes/day) on a usual work day at home and usual work day at office N=24

	Sitting on a usual day when working at office			**Sitting on a usual day when working at home**		
Domain (sitting for)	Pre[a]	Post[a]	**Δ**	Pre[a]	Post[a]	**Δ**
	Median (IQR[b])	Median (IQR[b])	*p*-value[c]	Median (IQR[b])	Median (IQR[b])	*p*-value[c]
Work	420 (377-480)	450 (420-480)	0.158	30 (0-442.5)	450 (0-480)	0.358
Travel	60 (2.5-63.75)	80 (60-120)	0.003**	0 (0-0)	0 (0-15)	0.798
Television	91.5 (17-120)	75 (60-120)	0.954	0 (0-60)	60 (45-120)	0.028*
Computer use for leisure	60 (0-60)	60 (18.75-60)	0.056	0 (0-58)	60 (27.5-240)	0.065
Other leisure	0 (0-30)	30 (0-60)	0.116	0 (0-30)	30 (0-60)	0.082
Total time spent sitting	646.5 (576-721)	705 (630-863)	0.007**	60 (0-644.5)	641 (510-847.5)	0.042*

[a]*Pre was 4 weeks prior to implementation, Post was 6 weeks after implementation*

[b]*Interquartile range*

[c]*Wilcoxon signed-ranks test*

**=<.05, **=<.01*