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Bennie, Jason, Timperio, Anna, Dunstan, David, Crawford, David and Salmon, Jo 2010, Environmental correlates of physical activity in Australian workplaces, *International journal of workplace health management*, vol. 3, no. 1, pp. 25-33.

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# Environmental correlates of physical activity in Australian workplaces

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## Acknowledgements

The Pedestrian Council of Australia's National Walk Safely to Work Day and its evaluation were funded by the Commonwealth Department of Health and Ageing, Australia. AT, DC and DD are supported by the Victorian Health Promotion Foundation; JS is supported by a Heart Foundation and sanofi-aventis Career Development Award.

## Abstract

**Purpose** – The workplace is an ideal setting to promote physical activity. The purpose of this study is to examine associations with physical activity at and around the workplace.

**Design/methodology/approach** – Participants were recruited from a random sample of employed adults ( $n=1,107$ ) in capital cities and major regional centres in Australia. Self-reported barriers and participation in physical activity at and around the workplace were assessed. A multivariable logistic regression model adjusting for age, sex, occupational status, and overall physical activity assessed the odds of being active in this setting.

**Findings** – Of participants, 61 percent perceived being active in the workplace. Those who perceived their work colleagues and managers to be physically active, and those who indicated that their workplace provides facilities to support them being active had higher odds of being physically active at or around the workplace.

**Research limitations/implications** – A poor response rate, physically active sample and cross-sectional analysis prevent inferences about the causality of the findings.

**Originality/value** – The paper provides evidence of the potential for the multiple levels of influence on physical activity at and around the workplace.

## **Introduction and aims**

Physical inactivity is a behavioural risk factor that is associated with several chronic diseases, such as coronary heart disease, non-insulin dependent diabetes mellitus, osteoporosis, colon and breast cancer (US Department of Health and Human Services, 1996; Warburton *et al.*, 2006). Current estimates identify that less than half of the adult population in developed regions are meeting the minimum recommended physical activity guidelines (Bauman *et al.*, 2002; Stamatakis, 2005). Given that physical inactivity has several important health consequences, promoting population-wide physical activity is an urgent public health priority (World Health Organization, 2006).

The workplace is considered an important public health setting for physical activity promotion (Sallis and Owen, 1999). Several reviews examining the effectiveness of previous physical activity interventions delivered in workplaces have noted a small and short-lasting effect on participants' physical activity participation (Dishman *et al.*, 1998; Marshall, 2004; Matson-Koffman *et al.*, 2005; Engbers *et al.*, 2005). Nevertheless, a range of environmental and policy strategies for promoting physical activity and workplace health have been recommended (NICE, 2008, CDC, 2007). However, to ensure the development of effective strategies in the workplace, a better understanding of correlates of physical activity within this setting (Marshall, 2004) is needed. Indeed, while many studies have focused on the correlates of leisure-time physical activity (Troost *et al.*, 2002), little is known about the key factors that influence physical activity within working environments.

The limited research in this area has established that lack of time due to working demands is a common barrier to physical activity in workplaces in the USA (Jaffee *et al.*, 1999; Bowles *et al.*, 2002). A more recent study from the USA identified that workplaces with several physical activity-related policies (e.g. paid time for exercise participation) and physical environmental factors (e.g. access to fitness equipment) are more likely to have workers engaging in physical activity during work-breaks than those workplaces without such factors (Lucove *et al.*, 2007). While these studies provide evidence of some possible correlates of physical activity in the workplace, this area remains largely unexplored.

Emerging health behaviour theories such as social ecological models posit that individual, social and physical environmental factors may interact at multiple levels to influence physical activity (Sallis *et al.*, 2006; Spence and Lee, 2002). Few studies have applied a social ecological model for identifying the potential influences of physical activity in the workplace. Therefore, the aim of this study was to examine associations between several individual, social and physical environmental factors and physical activity at and around the workplace among a randomly-selected sample of employed adults in Australian capital cities and regional centres.

## **Methods**

### ***Design***

This was a cross-sectional study based on data collected as part of the evaluation of the Pedestrian Council of Australia's Walk to Work Day, which was held in November 2006. Data collection procedures followed the ethical principles outlined by the World Medical Association (Williams, 2005).

## **Sample**

In November 2006, random digit dialling was used to recruit participants in all eight capital cities and major regional centers in Australia. Persons were invited to participate if they were currently employed either full or part-time and spoke English.

## **Survey administration**

Using the Computer Assisted Telephone Interview (CATI) technique, a survey was administered over the telephone by a commercial survey company. A standard script was provided for the interviewers. This was an anonymous survey; contact telephone numbers were not recorded and no identifying information was collected.

## **Measures**

### ***Sociodemographics***

Participants were asked to self-report their age, collapsed to: 18-39; 40-54; and 55+ years.

Employment status was collapsed to: full time; and part-time.

Educational attainment was collapsed to: <12 years; ≥12 years; and University.

Occupational domain was collapsed to: professional; white collar; and blue collar (coded *Australian Standard Classification of Occupations* coding system (ASCO) (n.d.).

### ***Leisure-time and transport-based physical activity***

The Active Australia Survey (AAS) (Brown *et al.*, 2004) was used to assess the proportion of participants meeting public health recommendations of a minimum of 150 mins/week in moderate- to vigorous-intensity physical activity. Participants reported the total time in the previous week they spent walking for recreation or leisure, walking for transport (i.e. to get to or from places), other moderate physical activity (e.g. swimming), and vigorous-intensity physical activity (e.g. jogging, cycling). Since the amount of energy expended in vigorous-intensity physical activity is approximately double that of moderate-intensity physical activity and there are additional health benefits from being vigorously active (Brown *et al.*, 2004), time spent in vigorous physical activity was doubled. All physical activity items were then summed to create a total leisure-time and transport-based physical activity estimate. Participants were dichotomized as sufficiently active for health (≥150 mins/week) or insufficiently active (<150 mins/week).

### ***Physical activity at or around the workplace***

Participants responded to the question “I regularly participate in physical activity at or around the worksite”. Response options on a five-point scale ranged from strongly disagree to strongly agree; but for the purpose of analysis, responses were collapsed into two categories:

1. strongly agree and agree; and

2. strongly disagree, disagree, neutral and do not know.

The concurrent validity of this item based on independent *t*-tests found that those who reported being active at or around the worksite were significantly more active overall (using data from the Active Australia Survey – Brown *et al.*, 2004) compared with those who were not active at work (mean 442.2±419.4 v. mean 286.4±275.3 respectively;  $p < 0.001$ ). In addition, using Chi-square tests a higher proportion of those who reported being active at work (79.3 per cent) were found to be sufficiently active for health compared with those who reported not being active at work (67.5 per cent;  $p < 0.001$ )

### ***Individual, social and physical environmental influences on physical activity within the workplace***

In keeping with social ecological models of health behaviour (Sallis *et al.*, 2006; Spence and Lee, 2002) participants were asked to report their level of agreement (five-point Likert scale: strongly agree to strongly disagree) with a series of nine statements about physical activity in the workplace. These items encompassed individual barriers (e.g. lack of time, bored with exercise in the workplace), social factors (e.g. social norms, social support and physical activity modelling by work colleagues and managers) and physical environmental factors (e.g. facilities that support physical activity within the workplace). The full list of statements is presented in Table I. Response options were collapsed into two categories:

1. strongly agree and agree; and
2. strongly disagree, disagree, neutral and do not know.

### **Statistical analysis**

Descriptive statistics were used to portray the demographic profile of participants and to report perceived influences on physical activity in and around the workplace. Collinearity between items was assessed using Pearson's correlation tests and two of the items (“my work colleagues believe it is important to participate in physical activity” and “my manager or boss believes it is important to participate in physical activity”) were correlated  $>0.4$ , therefore the variable with the lowest association with being active at work (work colleagues' beliefs) was removed from the multivariable analyses. Forced entry multivariable logistic regression models adjusting for age, sex, occupational status and meeting physical activity guidelines and each of the nine statements about influences on physical activity at and around the workplace were performed to predict the odds ratios (OR) and 95 per cent confidence intervals (CI) of a person engaging in physical activity at the workplace. Results were analyzed using SPSS 14.0.

### **Results**

#### ***Demographic characteristics of the sample***

In total, 6,368 telephone calls were made and 5,261 refused to take part in the survey (238 language problems), resulting in a final sample of 1,107 (21.6 per cent response rate). Table II shows the demographic characteristics of the sample, which comprised similar proportions of women and men. Almost half of the sample was aged 40-54 yrs and more

than half were involved in white collar occupations. Most of the sample had either 12 years of education or had attended university and were employed full-time.

### ***Physical activity at or around the workplace***

Of participants, 61 percent perceived being active in the workplace. A higher portion of men (66 per cent) reported being active at or around the workplace than women (59 per cent;  $p=0.013$ ), and a higher portion of blue collar workers (73 per cent) reported being active at or around the workplace than white collar (62 per cent) and professional workers (60 per cent:  $p=0.014$ ).

### ***Associations between individual, social and physical environmental factors and physical activity at or around the workplace***

The distribution of responses ( per cent agree) and odds of being active in the workplace according to the individual, social and physical environmental factors are reported in Table I. No individual-level factors (e.g. lack of time, bored walking same route) were significantly associated with physical activity at or around the workplace; although lack of time approached significance. Two of the five social items were significantly positively associated with being active at and around the workplace. Those who perceived that their work colleagues were physically active at work were more than two-and-a-half times as likely to report being active at work themselves; and those who perceived their employer or manager to be active at work were almost two times as likely to report being physically active in that setting. Respondents who perceived that their workplace provides facilities supporting physical activity were more than two times as likely to be active at or around the workplace.

### **Discussion**

The aim of this study was to describe perceptions of individual, social and physical environmental factors related to physical activity and associations with workplace physical activity in a sample of employed Australian adults. The results suggest that there are various levels of influence associated with workplace physical activity, particularly the social factors of perceiving work colleagues and managers to be active, and also, having a physical environment within the workplace that supports physical activity.

It has been previously reported that being around active people provides social reinforcement for the observers to be active themselves (Sallis *et al.*, 1989; Sallis and Owen, 1999). However, there has been limited research on the association of physical activity of other people in the workplace and their own physical activity levels. The effects of high-level support for workplace health behaviour modelling have been previously implicated as an important factor that may influence employees' own health-related behaviour (Hammond *et al.*, 2000). In that intervention, managers were instructed to promote the intervention and act as role models, thus assisting in influencing employee intervention participation (Hammond *et al.*, 2000). In the current study, while perceiving their manager regularly participates in physical activity at and around work was associated with higher odds of participating in workplace physical activity, the physical activity of work colleagues had a slightly stronger association. In addition under half the sample (41 per cent) and just over half (52 per cent) agreed with the statement that they regularly see their managers and

work colleagues participate in physical activity at and around the workplace, respectively. Results from this study suggest intervention strategies targeting employers' and employees' physical activity at work may be more effective than strategies that focus on employees only.

In the current study the perception that the workplace had a physical environment that supports activity was significantly associated with physical activity at and around the workplace. These results are consistent with a recent US study that examined the physical environmental influence of physical activity in the workplace (Lucove *et al.*, 2007). In that study, it was identified that workplaces which had several physical activity-related environmental factors and policies in place were more likely to participate in work-break physical activity than those who did not. It is important to note that in our study only half the sample agreed that their workplaces offered facilities that supported workplace physical activity. This suggests that a substantial proportion of this sample are employed within workplaces that do not support employees from being active at the workplace. This further highlights the need for in-depth research to examine specific attributes of the physical environment that may support or encourage physical activity. For example, the presence of showers or bicycle racks, or a policy that supports regular planned physical activity breaks at work be useful support structures for promoting physical activity at and around the workplace. Further research is also required to examine the feasibility of short breaks throughout the working day, particularly in desk-based occupations and that identifies the role played by organizational policies and management support of such strategies.

Although not a significant correlate, only 31 per cent of the sample perceived that they were "unable to find the time each day to walk for recreation or leisure as a means of getting to and from places". This is in contrast to previous studies which have found that lack of time is a frequently-cited barrier to physical activity in the workplace (Jaffee *et al.*, 1999; Bowles *et al.*, 2002). However, this perception of sufficient time to be active throughout the working day needs to be better understood. It is unclear whether employees feel they have enough time for walking groups/meetings, or utilizing opportunities for incidental physical activity throughout the working day such as taking stairs instead of lifts. It is important to understand the feasibility of such strategies within the workplace setting particularly if barriers such as lack of time can be overcome.

This is one of few studies to examine associations between individual, social and physical environmental factors and physical activity in the workplace. Our findings have identified some potentially important correlates of physical activity at or around the workplace to target, such as modelling of physical activity by fellow work colleagues and managers, and having a workplace environment that supports physical activity. Strengths include the use of a large, randomly selected sample of employed adults in capital cities and major regional centers. Limitations include the low response rate and cross-sectional design, which prevents inferences about the causality of the findings. In addition, a large proportion of the sample were employed in white collar or professional occupations and were well educated thus limiting the generalizability of the sample. Avoiding such biases in the future may be challenging, particularly if using random sampling techniques. However, administering surveys within workplaces that have a high proportion of participants in less skilled occupations may overcome some of these biases. The telephone interview method of survey administration may also have generated socially-desirable responses. The outcome measure perceived physical activity at and around the workplace does not differentiate

between occupational activity and non-work-related physical activity. In addition, a significantly higher proportion of the sample met the physical activity public health guidelines than the general population (Bauman *et al.*, 2002; Stamatakis, 2005), however, the current study includes only employed adults which may in part explain these differences.

## Conclusion

The workplace is considered to be an ideal setting for physical activity promotion (Sallis and Owen, 1999). However, little is known about correlates of physical activity in this setting. Notwithstanding the inherent limitations, the results from this exploratory research provide some evidence of the multiple levels of perceived influence on physical activity in the workplace. Future studies should examine the feasibility of social and physical environmental approaches for promoting physical activity in and around the workplace. Such research should incorporate the use of objective instruments to assess physical activity (such as accelerometers) and audit tools to assess the workplace physical and policy environments.

Statement	% Agreed	AOR	95% CI Lower	95% CI Upper
<i>Individual factors</i>				
I get bored with walking the same routes all the time	33.4	0.84	0.63	1.10
I am unable to find the time each day to walk for recreation or leisure as a means of getting to and from places	31.3	0.75	0.55	1.01
<i>Social factors</i>				
My work colleagues regularly participate in physical activity at or around work (e.g., using the stairs instead of lift, going for a walk during lunch or walking to work)	52.2	2.86	2.12	3.87
My employer would not allow time for me to walk during breaks at work	22.9	0.99	0.71	1.38
My managers or boss believe that it is important to participate in physical activity	66.7	1.15	0.85	1.57
My managers or boss regularly participate in physical activity at or around work (e.g., using the stairs instead of lift, going for a walk during lunch or walking to work)	40.4	1.99	1.46	2.80
I do not have a friend/work colleague or family member to walk with	27.6	0.99	0.72	1.36
<i>Environmental</i>				
My workplace provides facilities that support me being active at or around work? (e.g., showers, bicycle racks)	46.7	2.21	1.65	2.97
<b>Notes:</b> <sup>a</sup> Adjusted for age, sex, occupational status, sufficiently active				

**Table I.** Proportion agreeing to statements relating to physical activity and adjusted<sup>a</sup> odds ratios (AOR) and 95 percent confidence intervals (95 percent CI) associated with physical activity in and around workplace

**Table I** Proportion agreeing to statements relating to physical activity and adjusted<sup>a</sup> odds ratios (AOR) and 95 percent confidence intervals (95 percent CI) associated with physical activity in and around workplace

	<i>n</i>	%
<i>Sex</i>		
Men	470	42.5
Women	637	57.5
<i>Age</i>		
18-39 yrs	412	37.3
40-54 yrs	503	45.3
55 + yrs	192	17.4
<i>Education</i>		
> 12 years	158	14.1
12 years	466	42.0
University	483	43.5
<i>Employment</i>		
Full-time	699	63.2
Part-time	408	36.8
<i>Occupation</i>		
Professional	353	31.9
White collar	593	52.7
Blue collar	161	14.4
<i>Sufficiently active</i>		
Yes	803	74.9

**Table II.**  
Demographic profile of  
the sample

**Table II** Demographic profile of the sample

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