Preventive Medicine Reports 10 (2018) 263–270

Contents lists available at ScienceDirect

Preventive Medicine Reports

journal homepage: www.elsevier.com/locate/pmedr

Naturally occurring workplace facilities to increase the leisure time physical activity of workers: A propensity-score weighted population study

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ARTICLE INFO

Keywords:
Physical activity
Workplace
Built environment
Health promotion
Exercise

ABSTRACT

The benefit of providing access to physical activity facilities at or near work to support the leisure time physical activity (LTPA) of workers is uncertain. We examined the association between access to physical activity facilities at or near work and the LTPA of workers after adjusting for a range of individual and occupational characteristics. Data was obtained from 60,650 respondents to the 2007–2008 Canadian Community Health Survey. Participants were employed adults ≥18 years of age who had no long-term health condition which reduced their participation in physical activity. Latent class analysis determined naturally occurring combinations of physical activity facilities at or near work. Each combination was balanced by 19 individual and occupational covariate characteristics using inverse probability of treatment weights derived from propensity scores. The association between combinations of physical activity facilities at or near work on LTPA level was estimated by multinomial logistic regression. Five different combinations of physical activity facilities were available to respondents at or near work. Data were analyzed in 2017. All possible physical facilities increased the likelihood for LTPA (OR, 2.08, 95% CI, 1.03–4.20) and other combinations were also positively associated. Respondents with no physical activity facilities were characterized as having a low education, low income, high physically demanding work, poor health and mental health, non-white racial background, and being an immigrant. Access to supportive workplace environments can help workers be physically active. Future research should assess a range of personal, social and environmental factors that may be driving this relationship.

1. Introduction

Regular physical activity confers substantial health benefits and is a main component of public health strategies and initiatives (Ainsworth and Macera, 2012; Warburton et al., 2006; Lee et al., 2012). Yet it is estimated that over half of adults fail to meet recommended levels of at least 150 min of moderate-intensity physical activity a week, and in turn, are at greater risk for several chronic diseases, premature mortality, anxiety and depression (Lee et al., 2012; World Health Organization, n.d.). Accordingly, improving physical activity participation is a major public health concern.

Workplaces are ideal settings to promote physical activity as the majority of working-aged adults spend a third of their day at work (Tudor-Locke et al., 2011; Harter and Arora, 2010). Evidence also suggests that physical activity participation boosts employee energy levels, morale, job satisfaction, the ability to cope with stress, and work productivity (Conn et al., 2009; Proper et al., 2002). Consequently, workplaces are increasingly incorporating physical activity facilities on-site such as the provision of gyms and wellness initiatives or access to off-site playing fields and pleasant places to be active (Mattke et al., 2013; Goetzel et al., 2014). Such strategies are supported by conceptual models suggesting that physical activity participation is not only influenced by personal, behavioral, and societal factors but also by environmental factors (Sallis et al., 2006; Saelens and Handy, 2008). These environmental factors (such as the built environment and access to facilities that promote physical activity) may influence constraints on behavior and perceptions making it easier or more difficult to participate in physical activity (Bauman et al., 2012; Booth et al., 2000). For example, more walkable environments may help those with health problems be active through recreational walking, while easy access to physical activity facilities can lower perceptions of inadequate time as a constraint to participation (Cerin et al., 2010).

To date, few studies have examined facilities and environmental factors in the workplace compared to other community settings. Yet

Abbreviations: LTPA, leisure time physical activity; CCHS, Canadian Community Health Survey; IPTW, inverse probability of treatment weights; KKD, kilocalories per kilogram of body weight per day

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https://doi.org/10.1016/j.pmedr.2018.03.013
Received 28 November 2017; Received in revised form 16 February 2018; Accepted 28 March 2018
Available online 03 April 2018
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initial findings have been promising in pointing to the value of the workplace environment in promoting physical activity (Lucove et al., 2007; Prodaniuk et al., 2004; Watts and Mâsse, 2013; Umstattd et al., 2011; Schwartz et al., 2009). For example, a study with a representative sample of Canadians found that workers with greater workplace physical activity facilities were more likely to be moderately active in their leisure time (Watts and Mâsse, 2013). Subsidized health club memberships for North Carolina workers were also associated with increased leisure time physical activity (LTPA) (Lucove et al., 2007). While any single type of workplace physical activity facility did not increase physical activity levels for Missouri workers, combinations of workplace facilities did (Dodson et al., 2018). For instance, providing outdoor facilities to incentivize physical activity at work did not help workers meet physical activity guidelines unless flexible time was also provided to be physically active while at work.

A drawback of previous research is that studies were generally not designed to disentangle the potential effects on physical activity levels related to individual characteristics (Bauman et al., 2012) and occupational factors (Kirk and Rhodes, 2011) in addition to the role of access to physical activities facilities at work. For example, differences in LTPA levels have been associated with age, gender, health and SES, while longer work hours, job strain and sedentary work have shown negative correlations. Furthermore, it is not clear which combinations of physical activity facilities that naturally occur in workplaces are most effective in promoting LTPA. For example, should workplaces invest in both a gym and fitness classes or is one or the other sufficient? Is access to a pleasant place to walk enough to promote LTPA? A more detailed examination of what types and combinations of physical activity facilities are currently available at or near workplaces and whether they are associated with increased participation in plausible types of activities (as opposed to estimates of overall LTPA that might have measured participation in less plausible activities) after controlling for other relevant factors is important. This information can help to better inform organizational decisions such as whether it is in a workplace's interests to incorporate some types of physical activity facilities given the potential costs and resources required.

This study drew on data from a national population health survey to examine the relationship of naturally occurring physical activity facilities at or near work (hereinafter referred to as “workplace facilities”) and worker LTPA levels after adjusting for a range of individual and occupational characteristics.

2. Methods

2.1. Data sources and sample

We analyzed the 2007–2008 Canadian Community Health Survey (CCHS), which collected cross-sectional information on the health status, health care utilization, and health determinants of the Canadian population (Béland, 2002). Responding to the CCHS was voluntary and data were collected over two years in non-overlapping two-month periods from January 2007 to December 2008, covering 97% of a target population, 12 years of age and over, living in the ten provinces and three territories of Canada. Excluded from data collection were persons living on Aboriginal settlements, full-time members of the Canadian armed forces, the institutionalized population, and certain regions of the provinces of Quebec and Nunavut. Data was collected directly from individuals representing 71,922 households agreeing to participate in 2007 and 72,580 in 2008. There was a national response rate of 77.6% in 2007 and 75.2% in 2008. More details about the CCHS are described elsewhere (Statistics Canada, 2009). Informed consent for the use of data for research purposes was obtained from all survey participants by Statistics Canada.

The study sample was drawn from employed or self-employed adults between the ages of 18 to 75 years, and had no long-term physical or mental health condition which frequently reduced their participation in activities at home or work.

2.2. Main independent variable: workplace facilities

Each respondent's access to physical activity facilities at or near work (”workplace facilities”) was ascertained from seven questions: “At or near your place of work, do you have access to: 1) a pleasant place to walk, jog, bicycle or rollerblade? 2) Playing fields or open spaces for ball games or other sports? 3) A gym or physical fitness facilities? 4) Organized fitness classes? 5) Organized recreational sports teams? 6) Showers and/or change rooms? 7) Programs to improve health, physical fitness or nutrition?” As each of these aspects might have different impacts on LTPA, naturally occurring combinations of workplace facilities frequently reported by respondents were generated using latent class analysis and examined as exposure groups.

2.3. Outcome: LTPA level

LTPA level was the primary study outcome and respondents were characterized according to energy expenditure cut points. Cut points were derived from the frequency and duration spent in 21 activities (such as walking, running, skiing etc.) and categorized according to Statistics Canada's definitions (inactive = < 1.5 kcal/kg/day (e.g. walking less than half an hour each day), moderately active = between 1.5 and 2.9 kcal/kg/day (e.g. walking 30 to 60 min a day, or taking an hour-long exercise class three times a week); active = > 3 kcal/kg/day (e.g. walking an hour a day or jogging 20 min a day).

We examined LTPA as a single outcome and by specific types of activities undertaken. Engagement in specific activities was explored to compare the extent to which changes in LTPA levels were plausibly influenced by workplace facilities versus less plausible relationships. For example, having a pleasant place to walk is plausibly associated with workers engaging in walking and jogging and it is less plausible that they play ice hockey. Aggregate estimates for the relationship between workplace facilities and less plausible activities was considered an estimate of the potential bias due to unmeasured confounding as illustrated in Appendix Fig. 1. Unmeasured confounding might include reporting bias (where respondents over-report their participation in all types of physical activities) or selection bias (where respondents more likely to be active prefer to work where they have greater access to workplace facilities). Physical activities were categorized into cut-offs based on Canada's Physical Activity Guidelines (Canadian Society for Exercise Physiology, n.d.).

2.4. Study covariates

Because data were generated from a population survey and not a randomized control trial, the potential effects of unmeasured factors on study estimates were reduced by balancing combinations of the workplace facilities exposure variables by pre-specified baseline covariate characteristics of survey respondents using inverse probability of treatment weights (IPTW) derived from propensity scores. Nineteen covariate characteristics were selected a priori based on the physical activity and health behavior literature and used to generate propensity scores.

Individual factors: age; sex, marital status (and having a child under the age of 25); immigrant; education; ethnicity; BMI; daily fruit and vegetable intake; smoker status; alcohol consumption; perceived health and mental health.

Occupational covariates: income; hours worked per week; working at home; job stress; and physical demands of work (from Statistics Canada's National Occupational Classification). Seasonality effects on LTPA were considered and a seasonality variable was derived based on whether the CCHS was administered during cold weather months or warmer months. Details on all response variables are in Table 1.

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