Preventive Medicine 102 (2017) 120–126

Contents lists available at ScienceDirect

Preventive Medicine

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

The longitudinal relation between self-reported physical activity and presenteeism

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ARTICLE INFO

Article history:
Received 28 January 2017
Received in revised form 27 June 2017
Accepted 5 July 2017
Available online 8 July 2017

Keywords:
Physical activity
Presenteeism
Workplace

ABSTRACT

This study evaluates the longitudinal relation between self-reported physical activity and health related work limitations (also known as presenteeism) among employees from a public university system. A retrospective longitudinal study design was used to examine research aims. Data were from self-reported health assessments collected from employees at a large University System in Texas during the 2013–2015 plan years ($n = 6515$).Work limitations were measured using the self-report 8-item work limitations questionnaire. Latent growth curve models were used to test whether: 1) baseline physical activity was associated with baseline work limitations; 2) changes in physical activity were related to changes in work limitations; and 3) baseline physical activity predicted changes in work limitations. Models were adjusted for demographic and health-related variables. The final adjusted growth curve model demonstrated excellent fit. Results revealed baseline physical activity was inversely associated with baseline work limitations ($\beta = -0.12$, $p < 0.001$). In addition, changes in physical activity were related to changes in work limitations ($\beta = -0.33$, $p = 0.02$). However, no relation was found between baseline physical activity and changes in work limitations ($\beta = -0.06$, $p = 0.42$). Results provide evidence that increasing physical activity among employees leads to decreases in health-related work limitations. Therefore, promoting physical activity among employee populations can help prevent and reduce presenteeism.

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1. Introduction

Increased physical activity is a central component of worksite health promotion programs (O'Donnell, 2014). Physical activity prevents and controls chronic diseases (Physical Activity Guidelines Advisory Committee, 2008), which can positively impact key worksite outcomes such as health-related work limitations (also known as presenteeism). Presenteeism is a key indicator of lost productivity while at work (Amick & Gimeno, 2007; Lerner et al., 2003). Studies indicate presenteeism substantially contributes to indirect costs associated with poor health among employees (Goetzel et al., 2004; Loeppke et al., 2009; Chapman, 2005).

Multiple cross-sectional studies in worksites have reported an inverse association between physical activity and presenteeism (Pronk et al., 2004; Burton et al., 2005; VanWormer et al., 2011; Williden et al., 2012; Elizabeth Brown et al., 2013; Burton et al., 2014). However, there are few longitudinal studies examining how changes in physical activity relate to presenteeism. Past longitudinal studies have reported decreases in health risks (e.g. physical inactivity, poor diet, high stress, tobacco use, etc.) were associated with improvements in presenteeism (Pelletier et al., 2004; Burton et al., 2006; Shi et al., 2013; Lenneman et al., 2011; Kirkham et al., 2015). However, when isolating changes in physical inactivity risk, results were inconsistent with some reports of no association (Pelletier et al., 2004; Burton et al., 2006) and others with a significant inverse association (Shi et al., 2013; Lenneman et al., 2011; Kirkham et al., 2015). Physical inactivity risk has been inconsistently defined between studies (<1 day/week (Burton et al., 2006), <3 days/week (Shi et al., 2013), <5 days/week of activity (Pelletier et al., 2004; Kirkham et al., 2015), or <150 min of moderate intensity or 75 min of high intensity per week (Lenneman et al., 2011)), but is captured to represent people who need to increase activity to achieve additional health benefits. Given the small number of studies, inconsistent classifications of physical inactivity, a focus on transitions from being at risk for physical inactivity to not at risk, and differing results, an important research gap remains for longitudinal studies evaluating whether changes in physical activity relate to changes in presenteeism.

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http://dx.doi.org/10.1016/j.ypmed.2017.07.003
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Many studies evaluating the relation between physical activity and presenteeism have relied on health assessment data (Burton et al., 2005; Burton et al., 2014; Pelletier et al., 2004; Burton et al., 2006; Shi et al., 2013; Lenneman et al., 2011; Kirkham et al., 2015; Callen et al., 2013; Boles et al., 2004; Kowlessar et al., 2011). Health Assessments serve multiple purposes including informing employees about their health risks, providing information for a tailored action plan, and providing data for decision makers to offer and evaluate population health and wellness services. Using health assessment data in research studies has disadvantages and advantages. A key disadvantage is health assessments often sacrifice specificity of measures to improve their broad range of coverage. As a result, there is little space for comprehensive measures that have been scientifically tested for reliability and validity. However, there are numerous advantages. Health assessments not only cover a wide range of health topics but employers commonly distribute health assessments to their entire employee population regularly (frequently annually). Therefore, large samples of longitudinal data to assess health behavior trends can become accessible. However, previous longitudinal studies have been limited by using two time points of data with a focus on changes in physical activity risk status over time (Pelletier et al., 2004; Burton et al., 2006; Shi et al., 2013; Lenneman et al., 2011; Kirkham et al., 2015). As a result, no known studies have used methods that incorporate more than two time points of data to more effectively model changes over time between physical activity and presenteeism.

The aim of this study was to use existing health assessment data with latent growth curve (LGC) modeling to evaluate the longitudinal relation between self-reported physical activity and presenteeism (measured by work limitations) in a large group of employees from a public university system. LGC models allow for simultaneous testing of multiple elements of the relation between physical activity and presenteeism including: 1) the relation between estimated baseline values of physical activity and work limitations; 2) how baseline physical activity values predict changes in work limitations; and 3) whether changes in physical activity over time relate to changes in work limitations. We hypothesize there will be a significant inverse relation between baseline values, that baseline physical activity will significantly predict changes in work limitations, and that changes in physical activity will be associated with changes in work limitations.

2. Methods

2.1. Design

A retrospective longitudinal study design was used to examine research questions. The Office of Employee Benefits at a large university system provided secondary de-identified data collected from health assessment surveys. Health assessments were a feature of a system-wide wellness initiative used to inform individual employees about their health risk behaviors and institutions about health trends within their respective populations. The health assessments were administered to employees on an annual basis during the 2013–2015 plan years. Employees were allowed to complete one health assessment during each respective plan year. The institutional ethics review board approved all study procedures.

2.2. Participants

Benefits eligible employees (part- and full-time) from any member institution who completed at least two health assessments (during distinct plan years) were included in analyses. At the time of study, the university system consisted of 16 different institutions: 9 academic, 6 medical, and 1 administrative. Between 2013 and 2015, there were about 75,000–85,000 active employees within the system each respective year. About 62% worked at a medical institution, 37% at an academic institution, and 1% at the administrative institution. Employees at least 18 years of age and on the system's insurance plan were sent emails directing them to a website to complete a voluntary, self-reported health assessment. In 2015, over 99% of employees were ≥18 years of age resulting in few employees ineligible to complete the health assessment due to age. Employees who completed the health assessment and also attended a wellness or preventive exam visit (during the same plan year) received a $25 gift card. Participants were informed that health assessment data were collected by a third party and that individual-level data would not be shared with employers.

2.3. Measures

2.3.1. Health-related work limitations

The 8-item Work Limitations Questionnaire (WLQ) was used to measure health-related work limitations. The 8-item WLQ, which is commonly used in health assessments (Grossmeier, 2016), is a reduced version of the 25-item WLQ that was developed to measure on-the-job impact of chronic conditions on an employee's ability to meet work demands (Lerner et al., 2001) The 8-item WLQ includes questions from four domains captured by the original 25-item version: time management, physical work tasks, mental/interpersonal tasks, and output tasks. Extensive testing revealed the 8-item WLQ has good reliability and validity for capturing one factor for health-related work limitations (Walker et al., 2016). The 8-item WLQ uses two root questions: 1) "How much time did physical health or emotional problems make it difficult for you to…?" and 2) "How much time were you able to…?" Both root questions use the same response options: "all of the time (100%)," "most of the time," "some of the time (about 50%)," "a slight bit of the time," and "none of the time (0%)." There is also a response option: "does not apply to my job" used to indicate relevance of questions to the employee population. If <15% of responses for the entire sample were "does not apply to my job" for a respective question, then the question was deemed relevant to the study population and it remained in the study with those values set to missing. However, if an employee answered "does not apply to my job" to ≥3 questions, then the scale score was set to missing and these employees were excluded from analyses since ≥3 questions were not relevant to their jobs. A total score for health-related work limitations was created by converting responses to percentages and taking an average. Items from the second root question were reverse coded for the scoring process. Zero represented an employee limited none of the time while a score of 100 represented an employee limited all of the time.

2.3.2. Physical activity

Physical activity was assessed using the following question from the health assessment: "How many days per week do you participate in at least 20-30 minutes of physical activity?" There were eight response options that included: "None," "1 day of moderate exercise," "2 days of moderate exercise," "3 days of moderate OR 1 day of vigorous exercise", "4 days of moderate OR 2 days of vigorous exercise," "5 days of moderate OR 3 days of vigorous exercise," "6 days of moderate OR 4 days of vigorous exercise," or "7 days of moderate OR more than 4 days of vigorous exercise." The physical activity variable was treated as a continuous variable with scores ranging from 0 to 7.

2.3.3. Control variables

Age, gender, institution type (medical vs. non-medical), number of chronic conditions (related to physical health), presence of depression/anxiety (yes/no), and number of risk factors were included in models. Health assessments included questions asking respondents if they have, or have been told they have any of the following conditions: stroke, asthma, diabetes, arthritis, back pain, osteoporosis, cancer, high blood pressure, chronic bronchitis, angina, heartburn, headaches, allergies, depression, and anxiety. Questions from the health assessment also covered the following health risks: smoking (current smoker), chewing tobacco (current user), frequency of fruit and vegetable consumption

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