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RESEARCH

Physical Activity Climate and Health Beliefs Are Associated with Workplace Physical Activity Program Participation of Older Employees of a Public University

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Objective: Physical activity and work ability are increasingly important topics due to aging of the modern workforce. Workplace physical activity programs can help attenuate the decline in physical resources that typically transpires with age yet, older employees are less likely to participate. The study's primary aim was to understand how perceived benefits and barriers and physical activity climate are related to older employees' participation in workplace physical activity programs.

Methods: The inquiry design was a needs assessment utilizing an 18-item survey. Respondents consisted of 862 older employees (>55 years) of a public university in the southeastern United States. Differences in total subscale scores between sexes, program participation status, occupational category and physical activity were compared and contrasted.

Results: Differences in perceived benefit and barrier scores between workplace physical activity program participants (N = 474) and non-participants (N = 388) were significant with a p-value 0.001. Physical activity climate scores were significantly different as well with a p-value of 0.003. All three subscale scores (benefits, barriers, climate) were also significantly different between physically active and inactive employees with a p value 0.001.

Conclusions: The findings from this investigation suggest that employees' participation in workplace physical activity programs is influenced by their individual beliefs and perceptions of social and organizational norms. Physical activity climate should be a primary consideration to promote workplace physical activity program participation among older employees. Additional recommendations to improve participation among older employees are discussed.

Keywords: work ability; workplace; aging, wellness

Introduction

The demographics of the labor force are rapidly changing. The U.S. Bureau of Labor Statistics reports that about 40 percent of people ages 55 and older were working or actively looking for work, and that number is expected to increase in the coming years. Consequently, more than one in four workers is projected to be over the age of 55 by 2024 (Toossi & Torpey, 2017). This metaphorical "graying" of the workforce presents a number of health and economic challenges for employers and society.

Aging is associated with an inevitable and progressive deterioration of sensory abilities (i.e. hearing and vision) and physical fitness qualities such as aerobic capacity, muscular strength and endurance, flexibility, body composition and balance (Kenny, 2016). Physical decline becomes markedly pronounced after the age of 50 years and thus, older working adults typically display a higher prevalence of age-related disorders that result in reduced mobility and quality of life, in addition to greater health care utilization and reliance

on pharmacological interventions (Poscia, 2016). Consequently, employees over the age of 55 years have been correlated with greater absenteeism and deterioration of work ability (Ilmarinen, 1997; Kenny 2016). Therefore, it is increasingly important for employers to devise strategies that preserve health and mitigate the downward trajectory of physical resources among the growing proportion of older workers.

Recognizing that regular physical activity is a promising countermeasure to declining health and work ability, many employers sponsor workplace physical activity programs. The positive impact of workplace physical activity programs has been realized in a variety of occupational settings (Jakobsen, 2015; Lidegaard, 2018; Zavanela, 2012). In addition, workplace physical activity programs also offer employees greater accessibility and convenience in addition to providing them social support if they participate with their colleagues. But despite having a wide range of benefits, many of these programs are under-utilized by older employees. While numerous researchers have investigated the factors that influence physical activity participation among older adults, fewer have studied the factors that influence participation within occupational settings.

Several authors have described a positive relationship between older employees' health beliefs and their participation in workplace physical activity programs (Alexy, 1991; Linnan, 2001; Kenny, 2008). Additionally, the physical activity climate of the workplace – which is comprised of employees' perceptions of support, organizational norms, and environmental conditions has been shown to influence participation in physical activity (Lemon, 2009). A better understanding of these factors will guide practitioners to promote and improve workplace physical activity participation among older employees.

Thus, the primary aim of this study is to understand differences of perceived benefits, barriers, and climate between program participants and non-participants. The secondary aim is to investigate the differences of perceived benefits, barriers, and climate among demographic and occupational characteristics.

Methods

Design and Instrument

The inquiry design was a needs assessment utilizing surveys among older employees (>55 years) of a public university in the southeastern United States. The instrument had an 18-item composite survey comprised of four sections. Three prequalifying questions preceded the survey to confirm each respondent was a) over 55 years of age, b) employed by the University, and c) a member of the University's health plan.

The first survey section was comprised of questions to gather basic demographic and job characteristics. Question 4 was a single-item physical activity questionnaire (Milton, 2011) regarding the amount of exercise in which individuals participate. This question was worded as follows: "On average, how many days per week do you perform a total of 30 minutes or more of physical activity, which is enough to raise your breathing rate? This may include sport, exercise and brisk walking or cycling for recreation or to get to and from places but should not include housework or physical activity that may be part of your job". When compared with accelerometry, the single item question was shown to produce correlation coefficients of 0.46–0.57 ($p < 0.001$), which outperforms other previously validated short tools (Milton, 2011). As such, several researchers have used the single question to assess physical activity behaviors (Brailovskaia, 2018; Velten, 2014). Responses were rated on a 5-point Likert scale ranging from 0 (none) to 4 or more times per week. Subjects were defined as "physically active" if they responded 3 or more times per week, whereas "physically inactive" subjects were defined as those who responded 2 or less days per week. Question 5 asked the participant whether they enrolled in a physical activity program sponsored by the employee wellness program (i.e. onsite exercise classes, or physical activity challenges) within the last 12 months. "Program participants" were defined as individuals who responded, "yes" while "program non-participants" were defined as those who responded "no".

The second survey section contained 8 questions to assess individual's perceived benefits and barriers to workplace physical activity programs. These items were derived and adapted from earlier research (Leone, 2013). Responses were calculated by assessing the extent to which respondents agreed or disagreed with statements regarding benefits (items 6–9) and barriers (items 10–13) of engaging in physical activity. Responses to items 6–9 were based on a five-point Likert scale where 1 = is not a benefit to 5 = very much a benefit. Responses to items 10–13 were a five-point Likert scale where 1 = not a barrier to 5 = very much a barrier. Responses were totaled and averaged across the 4 items for a potential benefit or barrier score ranging from 4–20.

Survey section three contained 4 items which originated from the Worksite Health Climate Scales (Ribisl & Reischl, 1993). These items were selected as they assess the extent to which employees perceive peer

and organizational norms and support for engagement in physical activity. Similarly, Lemon (2009) used subscales of the WHCS to measure employee perceptions of eating and physical activity behaviors of coworkers. Statements associated with job flexibility for physical activity (items 14–15) were rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), while statements associated with normative behavior for physical activity (items 15–16) were rated on a 5-point Likert scale where 1 = almost no people to 5 = almost all people. Scores were totaled and averaged across the 4-items for a potential score ranging from 4 to 20.

Setting and Population

The setting of this inquiry was a public university with an accompanying academic medical center. Almost 30% of the employees covered by the University health plan are 55 years or older. These employees can be found in a variety of occupational settings – including faculty, health care or administration in addition to more physically-demanding trade occupations such as construction and facility maintenance.

Data Collection

To collect survey data, emails were used of employees who were a) over 55 years of age and b) members of the University health plan. There were 4900 older employees who met these criteria. In addition to an email distribution, the survey was promoted in a university-wide newsletter and advertised in a highly utilized employee wellness portal. Volunteers participated by a selecting a hyperlink to the survey which was facilitated by Qualtrics software (Qualtrics, Provo, UT). This study was exempt from institutional review board review.

Data Analysis

Descriptive statistics were reported for the overall cohort of survey respondents as well as stratified by sex. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were reported for numeric variables.

Differences in perceived benefits, barriers, and climate scores between program participation, sex, physical activity, and occupation group were determined with the Kruskal-Wallis test since the scores were non-normally distributed. Additionally the Kruskal-Wallis test is an extension of the Wilcoxon Rank Sum test which allows comparisons of two or more groups. For significant differences of benefit, barrier, and climate scores among the four occupation groups, we conducted a post hoc Wilcoxon pairwise test to determine which occupation groups were significantly different among themselves. P values were adjusted for the multiple comparisons using Bonferroni's method. Differences in perceived scores among age groups were not pursued due to the inclusion criteria limited participants to 55 years of age or older. The choice of surveying employees aged 55 years or older allowed the analysis to control for age in the employee population and focus on this cohort of interest by design.

We calculated differences in program participation and reported physical activity by sex using the Pearson's Chi squared test. A p value < 0.05 was considered statistically significant. All statistical analyses utilized R (R Foundation for Statistical Computing, Vienna, Austria https://www.R-project.org).

Results

There were 1,157 (24%) responses, however 281 respondents were disqualified due to not meeting all the inclusion criteria (over 55 years of age, employed by the University, and a member of the University's health plan). Of the 876 remaining respondents, 14 (1.6%) were disqualified due to incomplete responses.

The remaining 862 respondents encompassed varying demographic characteristics and occupational categories (**Table 1**). Survey respondents included a good balance of workplace physical activity program "participants" (55%) and workplace physical activity program "non-participants" (45%). Females comprised 79% (compared to 61% of the workforce), while males comprised 21% (compared to 39% of the workforce). More than half (51.3%) of respondents reported 4 or more days of physical activity per week while 21.3%, reported 3 days 13.2% reported 2 days and 14.2% reported 0–1 days.

Survey respondents were subsequently segmented by sex (**Table 2**). There were 182 male respondents. Almost two-thirds (64.3%) reported 4 or more days of physical activity per week, while 18.7% reported 3 days per week, 7.7% reported 2 days per week and 9.3% reported 0–1 days per week. Workplace physical activity program participation among males was balanced, with slightly more than half (51.1%) indicating they had participated in the previous 12 months, compared with 48.9% who indicated they were non-participants.

Table 1: Descriptive statistics population characteristics N = 862.

Sex	
Male	182 (21%)
Female	680 (79%)
Program Participation	
No	474 (55%)
Yes	388 (45%)
Physical Activity/Week	
0–1 days	122 (14.2%)
2 days	114 (13.2%
3 days	184 (21.3%)
4 or more days	442 (51.3%)

Table 2: Descriptive statistics population characteristics by sex N = 862.

	Female (N = 680)	Male (N = 182)	p value
Program Participation			0.235[1]
No	299 (44.0%)	89 (48.9%)	
Yes	381 (56.0%)	93 (51.1%)	
Physical Activity/Week			0.001[1]
0–1 days	105 (15.4%)	17 (9.3%)	
2 days	100 (14.7%)	14 (7.7%)	
3 days	150 (22.1%)	34 (18.7%)	
4 or more days	325 (47.8%)	117 (64.3%)	

[1] Pearson's Chi-squared test shows association with a p-value < 0.05.

There were 680 female respondents. The proportion of females reporting 4 or more days per week of physical activity was 47.8% while, 22.1% reported 3 days per week, 14.7% reported 2 days per week and 15.4% reported 0–1 days per week. The proportion that participated in a workplace physical activity program within the previous 12 months was 44% while 56% indicated they did not participate.

Mean composite scores were calculated for perceived benefits, perceived barriers, and climate for physical activity among 682 respondents (**Table 3**). Scores were totaled and averaged across 4 items associated with each subscale for a potential score ranging from 4 to 20, with higher scores suggestive of a greater propensity towards a benefit, barrier, or positive climate for physical activity. Relative to the scoring range, the mean score for perceived benefits was high (17.485) while the mean barriers (9.696) and climate scores (9.396) were moderate.

Scores were also segmented among male (N = 182) and female (N = 680) respondents (**Table 3**). Among males, the mean benefits and barriers scores were 17.692 and 8.615 respectively, and the mean climate score was 9.967. Among females, benefits and barriers scores were 17.429 and 9.985 respectively, while the mean climate score was 9.243. There was a significant difference between females and males for the barrier and climate scores with p-values of 0.001 and 0.002 respectively. The benefit scores were not significantly different with a p-value of 0.146.

Table 4 lists the mean scores among physical activity program participants and program non-participants. Among program participants, the mean benefits, barriers, and climate scores were 17.873, 9.049 and 9.684, respectively. Among program non-participants, the mean benefits score was 17.010, while the mean barriers and climate scores were 10.487 and 9.044, respectively. Differences in benefit and barrier scores between participants and non-participants were significant with a p-value 0.001. Climate scores were significantly

Table 3: Differences in Benefits, Barriers, and Climate Scores by Sex.

	Female (N = 680)	Male (N = 182)	Overall (N = 862)	p value
Benefits				0.146
Mean	17.429	17.692	17.85	
SD	2.453	2.468	2.457	
Barriers				0.001*
Mean	9.985	8.615	9.696	
SD	3.343	2.910	3.302	
Climate				0.002*
Mean	9.243	9.967	9.396	
SD	3.053	2.902	3.034	

* The p-value of the Kruskal-Wallis rank sum test has reached statistical significance.

Table 4: Differences in scores by program participation status.

	No (N = 388)	Yes (N = 474)	p value
Benefits			0.001[1]
Mean	17.010	17.873	
SD	2.457	2.390	
Barriers			0.001[1]
Mean	10.487	9.049	
SD	3.406	3.071	
Climate			0.003[1]
Mean	9.044	9.684	
SD	2.971	3.058	

[1] Kruskal-Wallis rank sum test.

Table 5: Differences in scores by physical activity.

	Active (N = 626)	Inactive (N = 236)	p value
Benefits			0.001[1]
Mean	17.893	16.403	
SD	2.396	2.287	
Barriers			0.001[1]
Mean	8.842	11.962	
SD	3.053	2.841	
Climate			0.001[1]
Mean	9.752	8.448	
SD	3.038	2.821	

[1] Kruskal-Wallis rank sum test.

different as well with a p-value of 0.003. Of note, while there was significance, the effect sizes appeared to be small.

Table 5 lists the mean composite scores based on physical activity status. Physically active employees had mean scores of 17.893, 8.842 and 9.752 respectively for benefits barriers and climate. Whereas inactive

Table 6: Comparisons of scores by occupational category.

	Acad. Faculty (N = 64)	Acad. Staff (N = 385)	Med. Faculty (N = 58)	Med. Staff (N = 355)	Total (N = 862)	p value
Benefits						0.108[1]
Mean	18.109	17.496	17.517	17.355	17.485	
SD	2.205	2.316	2.494	2.628	2.457	
Barriers						0.313[1]
Mean	9.078	9.748	10.414	9.634	9.696	
SD	2.940	3.267	3.574	3.346	3.302	
Climate						0.001[1]
Mean	9.906	10.418	8.069	8.411	9.396	
SD	3.201	2.622	2.931	3.048	3.034	

[1] Kruskal-Wallis rank sum test.

employees had benefits, barriers, and climate scores of 16.403, 11.962 and 8.442. All three subscale scores were significantly better for active employees with a p value 0.001.

Benefits, barriers, and climate scores were also stratified by occupational category (**Table 6**). Only the climate scores were significantly different across occupational categories (p value 0.001). The academic groups (faculty and staff) showed significantly different climate scores compared to both medical groups, however the medical groups were not different between themselves.

Discussion

Older employees' perceived benefits and barriers were associated with employees' individual beliefs as well as their perceptions of social and organizational norms. The employees who participated in workplace physical activity programs had more positive perceptions of the benefits of physical activity, perceived fewer barriers and held more positive views of the workplace physical activity climate when compared to non-participants. These findings are consistent with Linnan (2001) who found employees who placed a higher value on the benefits of physical activity were more likely to participate in workplace physical activity programs, while those who perceived higher barriers were significantly less likely to participate (Linnan, 2001). Likewise, physically active employees had significantly higher perceived benefits, perceive a more positive climate and less barriers compared to inactive employees.

Sex differences were also elucidated as male employees perceived less barriers to participation and a more favorable climate compared to their female counterparts. Also, although a greater proportion of males were physically active compared to females – a pattern that is aligned with previous research (Mielke, 2018), males had disproportionately low participation in workplace physical activity programs compared to their female colleagues. This was an interesting finding as it suggests males may prefer physical activity separate from the workplace, which may be partially attributable to males' preference to be private about issues connected to their personal health or displaying healthy lifestyle behaviors – a key theme identified in earlier research (Verdonk, 2010).

Physical activity climate appeared to influence participation, as poor perceptions of workplace physical activity climate were associated with lower program participation, while positive perceptions were associated with high participation. This is consistent with earlier research which suggested that supportive work environments–including social influence and easy access to resources are needed to improve physical activity behavior among employees (Linnan, 2001).

Limitations

First, the wellness program's web portal served as a primary recruitment tool and may have contributed to a selection bias. By virtue of recruitment through the portal, survey respondents were more likely comprised of a high proportion of wellness program participants – who are often healthier, more physically active, and more engaged employees. Other researchers have noted this tendency (Alexy, 1991; Kenny, 2008) which appeared to be the case in the current study as a significant portion (72.6%) of the sample population was

physically active 3 or more days per week. Therefore, less healthy, and less active employees may not have been equally represented in the survey.

Second, although all subjects were over 55 years of age, the study did not elucidate differences that may exist among age bands within the sample population. An age variation among older adults could be a potential factor. For example, it is possible that the composition of the sample population may have been comprised of "younger" older adults, who may be in the earlier stages of physiological decline and less representative of those in their 6th decade of life and beyond.

Despite these limitations, the findings provided meaningful, translatable data for workplace physical activity promotion for older employees.

Recommendations

In terms of recommendations, physical activity climate should be a primary consideration in workplace physical activity promotion since the findings here indicate positive associations between physical activity climate and workplace physical activity participation. Moreover, employees within an organization can have varying perceptions of health-related behaviors and some groups can be more affected by the physical activity climate than others. For example, employees' perceptions can be influenced by their job characteristics or their supervisors (Schulz, 2017). Therefore, understanding the impact of physical activity climate among older employees within specific business units and departments could illuminate vital information to improve social and environmental conditions and help practitioners formulate targeted approaches to influence participation in workplace physical activity programs.

Practitioners should consider assessing the physical activity climate of departments within their organization and recognizing those that demonstrate a positive climate by awarding special distinction and/or financial support for future programing. A scoring strategy that recognizes how departments are performing could be formulated to create a system of "soft monitoring" and to encourage manager and departmental accountability.

Physical activity participation among supervisors and organizational leaders should also be highlighted in an effort to demonstrate leader role modeling and bolster cultural relevance. Lemon (2009) found this type of visible support from leadership and management to have a positive effect on employees' health behaviors and perceptions of support. Collectively, recognition, monitoring, and financial reward aim to engender a healthier environment and to establish positive physical activity norms and social support by inducing supervisors and department leaders. At the same time, identifying departments within the organization that exhibit an unfavorable climate will enable practitioners to understand where other areas of opportunity exist and strategize to make improvements.

Additionally, recruitment of older employees with experience and particular expertise in physical activity to champion and/or lead workplace physical activity programs should be considered. It has been shown that physical activity participation under supervision and with people of similar age and background are preferences of older adults (Franco, 2015). Moreover, this type of relationship building is characteristic of successful workplace programs (Linnan, 2001) and a notable cue to action for inactive older adults to initiate physical activity participation (Costello, 2011).

Conclusion

This study showed that older employees who participated in workplace physical activity programs perceived more benefits and less barriers compared to non-participants. Additionally, the study found that a favorable physical activity climate was associated with greater participation in workplace physical activity programs – lending further credence to the belief that employee participation in such programs is influenced by perceptions of organizational norms and support. The information gained from the study can be leveraged by workplace health promotion professionals to address the needs of the aging workforce and improve participation among older employees.

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Competing Interests

The authors have no competing interests to declare.

Author Contributions

VT conceived the idea and study design, and led the manuscript writing. CA analyzed the data and assisted with interpreting the data. Both authors contributed to reviewing and editing the manuscript prior to submission.

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