

# The Association of Physical Activity and Work Engagement Among Participants in an Employee Wellness Program

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**Abstract:** Work engagement has been linked with employee health and work performance outcomes making it an area of attention within the field of human resources management. However, work engagement among the US workforce has declined in recent years. Literature suggests physical activity may play a role in improving work engagement, which has raised interest among human resources and workplace health professionals. Employee wellness programs are uniquely situated to promote a physically active workforce. Therefore, the primary aim of this study was to examine the relationship between physical activity and work engagement among employee wellness program participants at a public university. A secondary aim was to examine the relationship between strength training exercise and work engagement. We analyzed data on work engagement, and physical activity from a survey completed by 6,923 employee wellness program participants at public university. We defined respondents as physically active (PA) if their combined moderate to vigorous exercise met or exceeded 30 minutes on at least three days per week. All others were defined as inactive (IA). Respondents were defined as strength trained (ST) if they reported muscle strengthening exercise on two or more days per week, while all others were defined as untrained (UT). Work engagement score was based on responses to the three-item Utrecht Work Engagement Scale (UWES-3). We performed two-tailed t-tests to determine differences in mean work engagement scores between the physically active (PA) and inactive (IA) groups and between the strength trained (ST) and untrained (UT) groups. Differences in work engagement scores were statistically significant ( $p < 0.0001$ ), with higher scores observed in the PA group (11.987) compared to the IA group (11.025). Differences in scores between the ST group and UT group were also statistically significant ( $p < 0.0001$ ), with higher scores observed in the ST group (12.132) compared to the UT group (11.446). The findings from this study support earlier research and suggest promotion of physical activity and strength training may be a potential strategy to improve work engagement. Workplace health promotion and human resources professionals should consider the information gleaned from this evaluation to help them optimize human capital and business outcomes.

**Keywords:** Work Engagement, Physical Activity, Strength Training, Employee Wellness

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## 1. Introduction

### 1.1. Work Engagement

Early conceptualization of work engagement originated with Kahn (1990) who posited that individuals draw on varying degrees of their physical, emotional and cognitive resources which has implications for their work performance and experience. Moreover, engaged employees will put forth greater effort towards their work because they are inherently,

more connected to it. In turn, greater engagement will ostensibly, produce positive outcomes for the individual and the employer [1].

Inspired by the original concept, the meaning of work engagement evolved to become more uniformly defined as a positive emotional and motivational state that consists of three dimensions: (a) vigor, which is characterized by “high levels of energy and mental resilience while working, the willingness to invest effort in one’s work, and persistence even in the face of difficulties”; (b) dedication, characterized by “feelings of a sense

of significance, enthusiasm, inspiration, pride, and challenge”; and (c) absorption, characterized by “being fully concentrated and deeply engrossed in one’s work, whereby time passes quickly, and one has difficulties with detaching oneself” [2].

According to the job demands-resource (JD-R) theory [3], maintaining an appropriate balance between the job demands placed on the individual and the resources he or she has to manage those demands may be critical to promoting better work engagement and performance. Job demands refers to the physical, social or organizational aspects of the job that require sustained mental and physical exertion. Whereas job resources refer to the physical, psychosocial and organizational aspects that a) facilitate goal achievement, b) reduce psychological and physiological effort, and c) promote personal growth and development. Consequently, job demands that continuously exceed the individual’s resources can manifest as exhaustion and disengagement from work [3].

Relatedly, work engagement has been described as a positive form of stress that can be enhanced by favorable work conditions (i. e., greater job autonomy, personal self-efficacy and appropriately challenging job demands). Conversely, work engagement declines when the work environment is overly demanding in relation to an individual’s available job and personal resources [4].

Research has linked work engagement with numerous benefits for employees and employers, including better employee health and well-being, quality of life and job satisfaction, greater work performance, and low turnover intentions [5, 6]. Furthermore, work engagement has been negatively associated with burnout, depression, and psychological distress [7] and positively linked with the provision of good service and better customer satisfaction [8] – making it an especially germane factor within the field of human resources management.

Work engagement has been trending downward in recent years. A Gallup poll based on self-administered web surveys of more than 67,000 US employees in 2022 found that only 32% of full and part-time employees were engaged. This was down from 36% in 2020 and 34% in 2021. Reduced engagement was especially pronounced among younger workers and women [9].

Due to the significant impacts on human capital and the potential for organizations to realize a competitive advantage, strategies to better understand and foster greater work engagement across the workforce have stimulated growing interest among business leaders and scholars [10].

### 1.2. Benefits of Physical Activity

The benefits of regular participation in physical activity for overall health are well-documented and profound. In addition to mitigating or delaying the onset of many chronic diseases, physical activity can improve quality of life among healthy individuals [11]. The Physical Activity Guidelines for American’s recommends adults accumulate at least 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of

vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity to obtain substantial benefits. It is also recommended that adults perform muscle-strengthening activities of moderate or greater intensity for all major muscle groups on two or more days a week, to gain additional health benefits [11].

In a comprehensive review, Giandonato (2021) expounded the extensive and positive immunological and neurophysiological effects of physical activity, including improved cognition and executive functioning, two especially salient factors for working populations. In addition, physical activity may bolster positive mental health and serve as a countermeasure to work-related stress and burnout, and symptoms of depression and anxiety [12, 13]. On top of the many health-related benefits for employees, a physically active workforce can also confer numerous economic advantages for employers, including lower healthcare utilization and medical costs, fewer work absences, injuries, and disability costs, and better productivity and work ability [14-16].

## 2. Aims

Although many studies have examined the relationship of physical activity with work-related outcomes, research examining the association of physical activity and work engagement has been sparse and conflicting [17-19]. Additional research examining the association of physical activity and work engagement may provide practical implications for human resources professionals, workplace health practitioners, and business leaders. Therefore, the primary aim of the present evaluation is to investigate the relationship of physical activity and work engagement. A secondary aim is to evaluate the relationship of muscle strengthening exercise and work engagement. We hypothesize that physical activity and muscle strengthening exercise are associated with increased work engagement.

## 3. Methods

### 3.1. Design and Instrumentation

We analyzed data extrapolated from employee Health Assessments (HA) which were part of a voluntary employee wellness program. Between January and November 2022, 6,923 employees of a public university completed a HA which included 79 items related to physical activity and other health behaviors (tobacco and alcohol use, dietary and sleep habits, influenza immunization, and preventive medical care), stress, and self-rated health status. Additionally, the HA contained four supplementary items concerned with work-related measures– including the three-item Utrecht Work Engagement Scale (UWES-3). The Utrecht Work Engagement Scale (UWES) is the most widely used instrument to measure work engagement in academic studies [20, 21]. The UWES-3 is a shortened version that was shown to be a reliable and valid indicator of work engagement that can be used as practical alternative for longer versions of the UWES [4, 22].

For the purpose of this study, physically active (PA) employees were defined as those whose combined moderate to vigorous exercise met or exceeded 30 minutes on three or more days per week. This threshold of physical activity has been used in previous research and has been associated with improvements in other work-related measures [16, 23]. All other employees were defined as inactive (IA).

To conduct a separate, secondary analysis, we defined those who reported performing strength exercises on two or more days per week as strength trained (ST), while employees who reported less than two days per week were defined as untrained (UT). Demographic information (race and sex) was also selected for analysis. Table 1 summarizes the items selected for analysis.

**Table 1.** Items Selected for Analysis.

	Statement	Responses
Physical Activity	I exercise moderately this many days per week:	0, 1, 2, 3, 4, 5, 6, 7
	On the days I exercise moderately I do it for this long:	15 min, 30 min, 45, min, 60 min or more
	I exercise vigorously this many days per week:	0, 1, 2, 3, 4, 5, 6, 7
	On the days I exercise vigorously I do it for this long:	15 min, 30 min, 45, min, 60 min or more
Strength Exercise	I do strength exercises this many days per week:	0, 1, 2, 3, 4, 5, 6, 7
Work Engagement (UWES-3)	At my work, I feel bursting with energy	Never, Almost Never, Rarely, Sometimes, Often, Very often, Always
	I am enthusiastic about my job	Never, Almost Never, Rarely, Sometimes, Often, Very often, Always
	I am immersed in my work	Never, Almost Never, Rarely, Sometimes, Often, Very often, Always

### 3.2. Data Analysis

Work engagement was scored based on responses to the three statements from the UWES-3: (a) “At my work, I feel bursting with energy” (vigor); (b) “I am enthusiastic about my job” (dedication); (c) “I am immersed in my work” (absorption). Each response was scored on a seven-point Likert scale ranging from “Never” to “Always”. Responses were converted to numerical values where Never=0 to Always=6. Work engagement score was calculated as the sum of the responses to the three items with possible scores ranging from zero to 18. A higher score signifies more favorable work engagement.

Descriptive statistics were summarized for the overall cohort of survey respondents. Frequencies and percentages were calculated for categorical variables and presented in Table 2. Differences in work engagement scores between groups were determined by performing two-tailed t-tests. Work engagement scores are presented as means and standard deviations (Tables 3-5). Data analysis was performed using SAS software, Version 9.4 of the SAS System for Windows. Copyright © 2016 SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks of SAS Institute Inc., Cary, NC, USA. All data was de-identified.

## 4. Results

There were 8,045 employees who responded to the HA however, 1,122 respondents were disqualified due to incomplete responses to the selected assessment items. The remaining 6,923 respondents were categorized into the PA group ( $n = 5,307$ ) if their combined moderate and vigorous exercise met or exceeded 30 minutes for at least three days per

week. All other respondents ( $n = 1,616$ ) were categorized into the IA group. For the secondary analysis, the respondents were categorized into the ST group ( $n = 3,194$ ) if they reported performing muscle strengthening exercise two or more days per week. All other respondents ( $n = 3,729$ ) were categorized into the UT group.

**Table 2.** Population Characteristics  $N=6,923$ .

	N (%)
Sex	
Male	2,210 (31.92)
Female	4,713 (68.08)
Physical Activity Level	
Physically Active	5,307 (76.70)
Inactive	1,616 (23.30)
Strength Exercise	
Strength Trained	3,194 (46.14)
Untrained	3,729 (53.86)
Race	
Asian	594 (8.58)
Black	659 (9.52)
Hispanic Latina or Latino	145 (2.09)
White	5,225 (75.47)
Other	82 (1.18)
Undisclosed	218 (3.15)

### 4.1. Differences in Mean Work Engagement Scores Between Groups

Table 3 lists the mean work engagement scores of the PA and IA groups. Differences in mean scores were statistically significant ( $p < 0.0001$ ), with higher work engagement scores for the active group (11.987) compared to the inactive group (11.025).

**Table 3.** Differences in Work Engagement Between Active and Inactive Groups.

	Active ( $n = 5,307$ )	Inactive ( $n = 1,616$ )	Overall ( $n = 6,923$ )	p-value
Work Engagement				
Mean	11.987	11.025	11.763	$< 0.0001^*$
SD	2.925	2.983	2.967	

\* Denotes the mean difference is significant at the 0.05 level.

Table 4 lists the mean work engagement scores between ST and UT groups. The differences in mean scores between ST and UT groups were statistically significant ( $p < 0.0001$ ),

with higher work engagement scores among the ST group (12.132) compared to the UT group (11.446).

**Table 4.** Differences in Work Engagement Between Strength Trained and Untrained Groups.

	Strength Trained ( $n = 3,194$ )	Untrained ( $n = 3,729$ )	Overall ( $n = 6,923$ )	$p$ -value
Work Engagement				$< 0.0001^*$
Mean	12.132	11.446	11.763	
SD	2.958	2.937	2.967	

\* Denotes the mean difference is significant at the 0.05 level.

#### 4.2. Post Hoc Analysis

Post hoc analysis was performed using the Tukey HSD test to compare and contrast work engagement scores of respondents who were both physically active and strength trained (B) with those who were strength trained only (STO), physically active only (PAO) and neither active nor trained (N).

Table 5 describes differences in mean work engagement

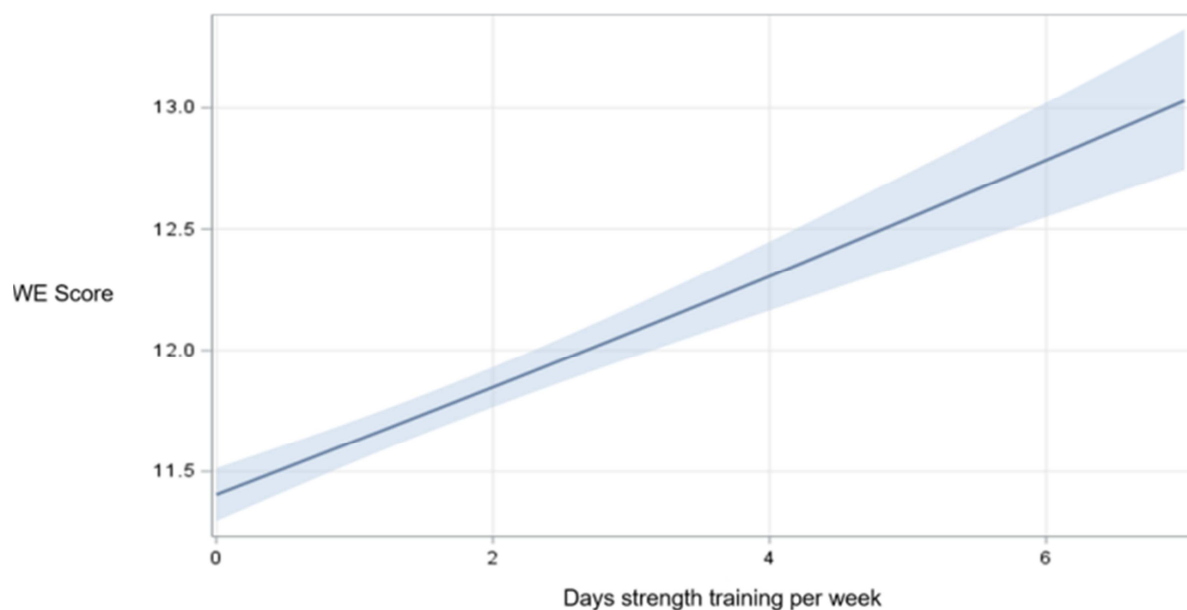
scores according to each mode of activity. Those who were both strength-trained and active had significantly higher mean work engagement scores (12.16) when compared to those who were active only (11.74), strength trained only (11.14), or neither (11.02). We also found the PAO group (11.74) had significantly higher scores when compared to the N group (11.02) but not compared to the STO group (11.14). Likewise, differences between the STO group (11.14) and the N group (11.02) were not statistically significant.

**Table 5.** Differences in Work Engagement Score According to Modes of Activity.

Mode of Activity	N (%)	Mean $\pm$ SD	Comparisons	Mean Difference (95% CI)	$p$ -value
Physically Active and Strength Trained (B)	3,104 (44.8)	12.16 $\pm$ 2.95	B vs. PAO	0.42 (0.21 – 0.63) *	$<.001$
			B vs. STO	1.02 (0.21 – 1.82) *	0.007
			B vs. N	1.14 (0.91 – 1.38) *	$<.0001$
Physically Active Only (PAO)	2,203 (31.8)	11.74 $\pm$ 2.88	PAO vs. B	-0.42 (-0.63 – -0.21) *	$<.0001$
			PAO vs. STO	0.60 (-0.21 – 1.41)	0.229
			PAO vs. N	0.73 (0.47 – 0.98) *	$<.0001$
Strength Trained Only (STO)	90 (1.3)	11.14 $\pm$ 3.23	STO vs. B	-1.02 (-1.82 – -0.21) *	0.007
			STO vs. PAO	-0.60 (-1.41 – 0.21)	0.229
			STO vs. N	0.13 (-0.69 – 0.95)	0.979
Neither Active nor Strength Trained (N)	1,526 (22.0)	11.02 $\pm$ 2.97	N vs. B	-1.14 (-1.38 – -0.91) *	$<.0001$
			N vs. PAO	-0.73 (-0.98 – -0.47) *	$<.0001$
			N vs. STO	-0.13 (-0.94 – 0.69)	0.979

All scores are presented as mean and standard deviations (mean  $\pm$  sd).

\* Denotes the mean difference is significant at the 0.05 level.



**Figure 1.** Work Engagement Score Based on Days Strength Training.

As a further observation, we used the Proc Genmod procedure to run a Poisson regression model to calculate work engagement scores based on the number of days per week strength training. Our results demonstrated a dose-response relationship as overall, work engagement improved as the number of days strength training increased (Figure 1). This finding was statistically significant, ( $p$ -value  $< 0.0001$ ).

## 5. Discussion

The aim of this evaluation was to explore the relationship of physical activity with work engagement. Our analysis of almost 7,000 survey respondents showed an association between physical activity and higher work engagement. Our results were consistent with our hypothesis and support previous research [18, 19]. Nishi (2017) reported that one hour per day or more of walking or similar forms of exercise was associated with higher total work engagement scores. More recently, Kiema-Junes (2022) found that physical activity was linked to higher work engagement and its subdimensions, and suggested promoting physical activity may positively impact work engagement [18].

Conversely, our findings conflict with van Berkel (2013) which showed no associations between moderate to vigorous physical activity and work engagement. The discrepancy between findings may be related to the sample sizes, as our investigation examined thousands of responses, while van Berkel (2013) relied on a sample of just over 100 participants. The authors also noted that participants in their study may not have accumulated enough physical activity to realize improvements in work engagement scores and suggested a threshold of activity may be required for positive effects to materialize. Similarly, Lidegaard (2018) found employee work ability had not improved after four months of twice weekly aerobic exercise, yet a period of 12 months appeared to be sufficient to impact work ability [24]. These findings support the notion that consistency of physical activity over time may be an important consideration when examining its relationship to work-related outcomes.

We also observed a clear, positive link between strength training exercise and work engagement. To our knowledge, ours was the first study to identify this connection – adding a new contribution to the existing work engagement literature and the established body of research which has elucidated numerous benefits of strength training on work-related outcomes [12, 25, 26]. Moreover, we found a dose-response relationship between participation in strength training and work engagement, with more days of strength training leading to greater probability of better work engagement. This lends support to earlier studies that suggest additional exercise may lead to further improvements in work engagement or other work-related outcomes [12, 24, 27].

Similarly, we found significantly higher work engagement scores among respondents who were both physically active and strength trained compared to those who engaged in either moderate to vigorous physical activity or strength training

alone. This was a particularly interesting finding as it suggests physical activity and strength training in combination may confer an amplified effect on work engagement.

## 6. Strengths and Limitations

The strengths of this study included the large sample size of 6,923 participants – which was larger than previous studies [17-19]. An additional strength was the use of the UWES-3, which is a well-validated measure of work engagement.

However, this study had several limitations. First, we relied on self-reported measures of physical activity which have been shown to be overestimated [28]. Moreover, the questions related to moderate and vigorous physical activity were defined by categorical variables of fifteen-minute increments and required us to combine responses to calculate total weekly physical activity minutes for each participant. This limited our ability to pinpoint the exact amount of physical activity of each participant. It is also worth noting, the effect size for each association was small and therefore, these results should be interpreted with a modicum of caution. More research is needed to determine the effects of physical activity on work engagement. Lastly, we discovered the majority of participants who were strength trained were also physically active, making it difficult to isolate how each mode of activity may impact work engagement.

## 7. Conclusion

Our study revealed that physically active employees had better work engagement compared to inactive employees. We also found better work engagement scores among strength-trained employees. Moreover, employees who engaged in two or more days per week of strength training exercise in addition to physical activity had the highest work engagement. Therefore, promoting physical activity as a standalone or in combination with strength training exercise, may be a potential strategy to improve work engagement. These findings provide important implications for workplace health practitioners, and human resources and business leaders, as they are uniquely positioned to engender a physically active workforce.

## Competing Interests

The authors have no competing interests to declare.

## Author Contributions

VT conceived the idea and study design and led the manuscript writing. CAK, RS and MH analyzed the data and assisted with interpreting the data.

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