

ABSTRACT

Dillon E. Bond, HOW DIET AND EXERCISE RELATE TO WORK ENGAGEMENT, SELF-ESTEEM, SELF-EFFICACY, AND MOTIVATION (Under the direction of Dr. Mark Bowler) Department of Psychology, December 2022

This study investigated the interrelationships between diet, exercise, work engagement, self-esteem, self-efficacy, and motivation. Responses were gathered from 193 full time employees in the United States. Correlation, regression, and moderation analyses were conducted to ascertain the nature of the relationships. Overall, physical activity was found to be directly related to work engagement. Specifically, participants reporting higher levels of physical activity also reported higher levels of work engagement. Additionally, diet was significantly related to physical activity, self-esteem, and self-efficacy such that a healthier diet was associated with higher levels of all three of these variables. This research provides reasons for organizations to take greater interest in the wellbeing of employees.

Keywords: work engagement, diet, exercise, physical activity, self-esteem, self-efficacy, motivation

HOW DIET AND EXERCISE RELATE TO WORK ENGAGEMENT, SELF-ESTEEM,
SELF-EFFICACY, AND MOTIVATION

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HOW DIET AND EXERCISE RELATE TO WORK ENGAGEMENT, SELF-ESTEEM,
SELF-EFFICACY, AND MOTIVATION

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How Diet and Exercise Relate to Work Engagement, Self-Esteem, Self-Efficacy, and Motivation

Unhealthy diet and insufficient exercise contribute to 60% of American adults suffering from preventable chronic ailments (Centers for Disease Control and Prevention, 2019). Not surprisingly, in 2018, only 24% of Americans engaged in the recommended amount of daily physical activity (Office of Disease Prevention and Health Promotion, 2020). Taken together, poor nutrition and lack of physical activity have been shown to directly increase costs for employers in the United States (Wanjek, 2005). Unfortunately, it is not completely the fault of workers as many modern work environments are constructed in a manner that contribute to poor health. For example, most typical “desk jobs” facilitate a continual level of physical inactivity (Johns Hopkins Bloomberg School of Public Health, 2015). Similarly, the readily available food at or near many workplaces is often high in empty calories, such as fats and added sugars, which are associated with weight gain and lead to nutritional deficits (Onufrak et al., 2019). Moreover, work stress can lead to poor dietary choices, further exacerbating these noted health problems. Furthermore, lack of proper diet and exercise can lead to lower self-esteem, self-efficacy, and motivation (French et al., 1995; Schwarzer & Fuchs, 1996). These three factors are known correlates of work engagement, which has been repeatedly associated with work performance (Kortmann et al., 2014; Wollard & Shuck, 2011). Thus, it is reasonable to suspect that nutrition and physical activity may be affecting levels of work engagement.

A recent nationwide survey of the United States found that only 34% of all employees reported high work engagement (despite a slow increase over the years; Harter, 2020). Of greater concern is that 13% of employees reported that they are actively disengaged, twice as many as previous years. Engagement is critically important to organizations as it has been linked to

organizationally valued outcomes such as increased profits, lower turnover, and less absenteeism (Schaufeli, 2013). Thus, the slow growth of high work engagement and the increase of active disengagement explain, in part, the increasing number of organizations that are paying attention to work engagement (Harter, 2020).

Although the subject of substantial research, there are numerous potential correlates of engagement that have not been completely researched. One of the more prominent findings is the association between resources and work engagement (Schaufeli et al., 2008). These include individual differences such as motivation (Guest, 2014), self-esteem (Wollard & Shuck, 2011), and self-efficacy (Peccei, 2013). Although energy level – another individual resource – has been associated with engagement, its relationship with diet and exercise have not been directly examined (Guest, 2014; Salmela-Aro & Upadyaya, 2018). Thus, as physical activity has been shown to improve brain function, performance, and cognition (Hillman, Erickson, et al., 2014), investigating how diet and exercise potentially moderate other factors known related to engagement, such as motivation, self-esteem, and self-efficacy, may help further illuminate a holistic approach that companies can utilize to keep their employees healthy and engaged.

Subsequently, the present study sought to investigate if diet, exercise, self-esteem, self-efficacy, and motivation directly relate to work engagement. Additionally, the study sought to identify any interactions that diet and exercise may have with self-esteem, self-efficacy, and motivation in relation to engagement. This two-fold approach can shed new light on engagement and its relationship with employee diet and exercise.

Food in the Workplace

In North America, obesity and cardiovascular disease are well-known ailments that are strongly associated with poor diet and not enough exercise (Wanjenk, 2005). Poor diet, in

particular, is a large factor in the development of numerous chronic diseases. Moreover, several leading causes of death (e.g., heart disease, cancer, diabetes) are associated with diets that have too many calories, as well as high levels of sodium, saturated fats, and sugars (CDC, 2019). Obese workers can cost employers between \$54 and \$506 annually per worker; whereas organizational weight loss programs can save between \$1.44 to \$4.16 for every pound of weight lost (Johns Hopkins Bloomberg School of Public Health, 2015). Moreover, research shows that obesity has been linked with lower job productivity (Weissman, 2012; Pawaskar et al., 2017).

Not only do Americans not eat well, they are typically unaware of how much they eat. As noted by Mertz et al. (1991), only 11% of participants accurately estimated their actual food consumption – even after participants were trained in calorie counting by professional dietitians. Moreover, eight percent of participants overestimated their food intake and 81% underestimated caloric intake by an average of 18%, or 700 calories, +/- 379 calories per person. Thus, many individuals are clearly unaware of the fact that they are not meeting nutritional guidelines.

A national review of food and beverages obtained at work found that almost 25% of participants consumed food that was obtained while at work (Onufrak et al., 2019). Moreover, it was noted that food that is readily available at or nearby workplaces is often high in empty calories and lacking in healthy nutrients and generally do not meet USDA dietary guideline standards in that they are high in added sugars, saturated fats, and sodium. On average, the nutritional quality of workplace foods was estimated to be almost equivalent to the nutritional quality of national fast-food chain restaurants (Hearst et al., 2013). Thus, most food obtained away from home, be it supplied by the workplace itself or by vendors around the workplace, tends to be higher in empty calories, sugar, and salt, while lower in whole grains, fruits, and vegetables (Lin & Guthrie, 2012; Todd, et al., 2010). Onufrak et al. (2018) noted that only 20%

of workplaces that supplied food had healthy eating options. Furthermore, over half of the participants in this study reported that vending machines and onsite cafeterias were a regular choice for acquiring food during working hours. Thus, it can be inferred that many organizations may be subtly sabotaging their employees by making unhealthy food choices an easy option.

Poor employee health can dramatically increase costs for organizations (Wanjenk, 2005). For example, obese and overweight employees are less productive, more frequently absent from work, and more likely to take short-term disability benefits, which can add up to an estimated cost between \$54 and \$506 per employee annually (Dor et al., 2010). In contrast, physically active employees have lower health care costs than inactive employees, as physical inactivity has been associated with 11.1% of all health care expenses (Carlson et al., 2015). Thus, individual employee health factors – good and bad – are important for organizations to consider when trying to minimize costs.

Physical Activity and Working

There is a general assumption that employees who are physically fit will be more productive and miss work less than employees that are not as active (Shepard, 1992). In addition, work engagement has been associated with organizational performance. Therefore, having engaged employees is considered a competitive edge. Allowing employees time to exercise during the workday is a bottom-up strategy and proactive approach used by modern organizations to increase levels of work engagement (Bakker, 2017).

Improving fitness has been shown to improve job-related variables such as job satisfaction, absenteeism, and productivity (Johns Hopkins Bloomberg School of Public Health, 2015). Similarly, participants who had higher levels of cardiovascular endurance were found to experience less fatigue and feel more satisfied with their work quality. Companies with fitness

programs have seen improved satisfaction and lower turnover. Moreover, having physically fit employees has been associated with reductions in both injury rates and healthcare costs (Wattles & Harris, 2003).

Leisure activities, including physical activity, are associated with increases in work engagement the following day (Brummelhuis & Bakker, 2012). Moreover, it was noted that activities outside of work, such as household chores, were associated with decreases in work engagement because they do not allow for psychological detachment and relaxation. Those aspects of activity are necessary for recovery which in turn allows individuals to replenish their personal resources for future workdays (Meijman & Mulder, 1998). This serves to explain that individuals with physically active jobs may not see a boost in work engagement as a result of their job-related physical activity. It is only physical activity that is leisure-oriented that provides a benefit.

Factors associated with lifestyle, such as body mass index, physical exercise, sleep hygiene, and alcohol consumption are associated with scores on the Work Ability Index (WAI), which in turn has been associated with engagement (Tomietto et al., 2019). Additionally, frequent exercise was noted as a key factor for maintaining a good work ability, along with proper sleep, not smoking, low job demands, high job resources, and a low physical workload. The same study found that creating a motivational and positive state of engagement in employees is important for work ability (Airila et al., 2012).

Research regarding the relationship between physical activity and work factors has had mixed results. For example, Strijk et al. (2013) noted that due to low compliance, there were no overall significant increases in work engagement as a result of a “six-month worksite lifestyle intervention” which included two guided activity sessions and one self-paced aerobic session per

week, and three individual life coach visits. Similarly, Low, Gramlich, and Engram (2007) found that a three month long self-paced exercise program did not produce significant increases in productivity, though the exercise program helped to lower blood pressure and improve weight loss.

In contrast, Holtermann and colleagues (2011) found that, although not all physical activity was beneficial, some activity is related to work performance. Specifically, health-related absenteeism was found to be greater in participants that had higher levels of occupational physical activity, whereas those with more leisure physical activity had lower levels of health-related absenteeism. Leisurely or recreational physical activity is more beneficial than work-related physical activity. Similarly, Brummelhuis and Bakker (2012) noted that levels of vigor and general engagement were reported as higher the day after engaging in leisure activities. Moreover, Wattles and Harris (2003) found that physical exercise is associated with increases in both productivity and job satisfaction, and decreases in health-related absenteeism, when properly implemented (i.e., on a regular and recurring basis).

Work Engagement

Work engagement is generally considered to be a state of being in which a worker is pleasantly engrossed in and committed to their job or current task (Schaufeli et al., 2002). It is typically measured continuously, ranging from engaged to disengaged. High levels of engagement have been shown to be associated with productivity, performance, commitment, and OCBs (Christian et al., 2011). Similarly, having engaged employees has been linked to higher outputs and more business success (Schaufeli, 2013). Engagement has also been shown to be related to increased growth and revenue (Xanthopoulou et al., 2012), with workplaces that have a healthy, supportive culture and emotionally positive climate have seeing increases in engagement

(Dollard & Bakker, 2010; Shuck et al., 2011). Whereas engagement happens at an individual level, some common correlates have been identified.

Engagement contains an attitudinal component that affects a behavioral component. It is generally thought to be broken up into three subfactors: absorption, dedication, and vigor.

Absorption refers to the level of engrossment and participation. Dedication refers to commitment, pride, and sense of purpose and reward from the job. Vigor reflects resiliency and effort given towards the task and company (Schaufeli, 2013).

Correlates of Engagement

Nutrition and physical activity have been associated with self-efficacy, self-esteem, and motivation, which have been correlated with engagement (Wollard & Shuck, 2011). However, diet and exercise are missing in engagement research (Peccei, 2013). Green, Finkel, Fitzsimons, and Gino (2017) have put forth a needs-based theory of work engagement that considers positive emotional states and feelings of energy as two pillars of engagement. They refer to energy coming from attitude but do not account for the potential of physical energy that is gained from eating or being active. As it is well known that eating healthy boosts energy levels (Harvard Medical School, 2020), it is reasonable to assume that exercising and eating healthy foods can affect work engagement.

Self-esteem, a subjective evaluation of self-worth, is a recognized personal resource that correlates with work engagement (Xanthopoulou et al., 2012) which can lead to many positive outcomes such as achievement in work (Fox, 2000; Wouters et al., 2010). Low levels of self-esteem are often related to mental health issues. Engaging in physical activity has been associated with higher levels of self-esteem. In many cases obesity has been linked with lower self-esteem (French et al., 1995). Thus, it is reasonable to assume that an individual's self-esteem

could be related to their diet and amount of exercise which could in turn have affect work engagement.

Self-efficacy, the belief that you can complete the behaviors necessary to achieve a goal, is strongly correlated with engagement, $r = .59$ (Peccei, 2013). Ouweneel et al. (2013) found that an online intervention that focused on positive psychology and self-efficacy was able to boost work engagement. Another way that it can be improved is through regular exercise; improvements in self-efficacy also help individuals maintain motivation for exercise routines (Imayama et al., 2013; Kwan & Bryan, 2010). High levels of self-efficacy are related to increased achievement, social adeptness, and better health. Low levels of self-efficacy are often related with poor mental health. Self-efficacy is a key part of implementing behavioral changes and is associated with exercising and healthful eating habits (Schwarzer & Fuchs, 1996). Because self-efficacy has been associated with engagement, and is related to successful diet and exercise regimens, it is reasonable to assume there may be an interaction among these factors.

Motivation to engage in healthy behaviors can be increased through exercise (Song, Lee, Lam, Bae, 2007). Regular exercise was shown to increase autonomous motivation in children (Saavedra et al., 2014). Motivation is a key factor of intentions for dieting and exercising (Hagger et al., 2006). The Motivation at Work Scale, based on the Self-Determination Theory (Deci & Ryan, 2008), divides motivation into two sections, each with two subsections, to account for different sources of work-related motivation. Autonomous and controlled motivation. External regulation is on the low end of controlled motivation and concerns and refers to factors like punishments and rewards that can direct behavior. Introjected regulation is also a form of controlled motivation, this refers to internally adopted regulating factors like guilt or ego. Identified regulation is a form of autonomous motivation which stems from personal value

congruence, such as engaging in a behavior because you agree with the meaning and have accepted it as your own. Intrinsic motivation is the highest form of autonomous motivation and refers to engaging in behaviors for the intrinsic pleasure it provides (Gagné & Deci, 2005). Understanding how the different forms of motivation interact with other workplace factors is a critical step that can help organizations focus their motivational efforts for employees.

The Present Study

The Job Demands-Resources model (JD-R) provides a framework for examining how job characteristics can affect workers' wellbeing, including engagement (Bakker & Demerouti, 2007). Job demands refer to factors like workload, timelines, role ambiguity, and emotional demands. Resources are divided into job and personal categories. Job resources refer to aspects like autonomy, supervisor feedback, and social support. Personal resources such as self-esteem and self-efficacy have been included in the JD-R model (Xanthopoulou et al., 2012). Job resources were associated with engagement at all career stages (Salmela-Aro & Upadaya, 2018).

Wollard and Shuck (2011) divide antecedents to employee engagement into two categories, individual and organizational. In the individual category, levels of diet and exercise conceivably affect motivation, self-esteem, and self-efficacy. In the organizational category, levels of diet and exercise could be related to authentic corporate culture, positive workplace climate, and rewards. Companies that have wellness programs, exercise facilities, or offer food for employees may see benefits on multiple levels. Guest (2014) suggests that the work engagement subfactors of vigor and absorption may be dependent on energy. Thus, Hypothesis 1 states that self-esteem, self-efficacy, motivation, diet, and physical activity will have direct and positive associations with work engagement.

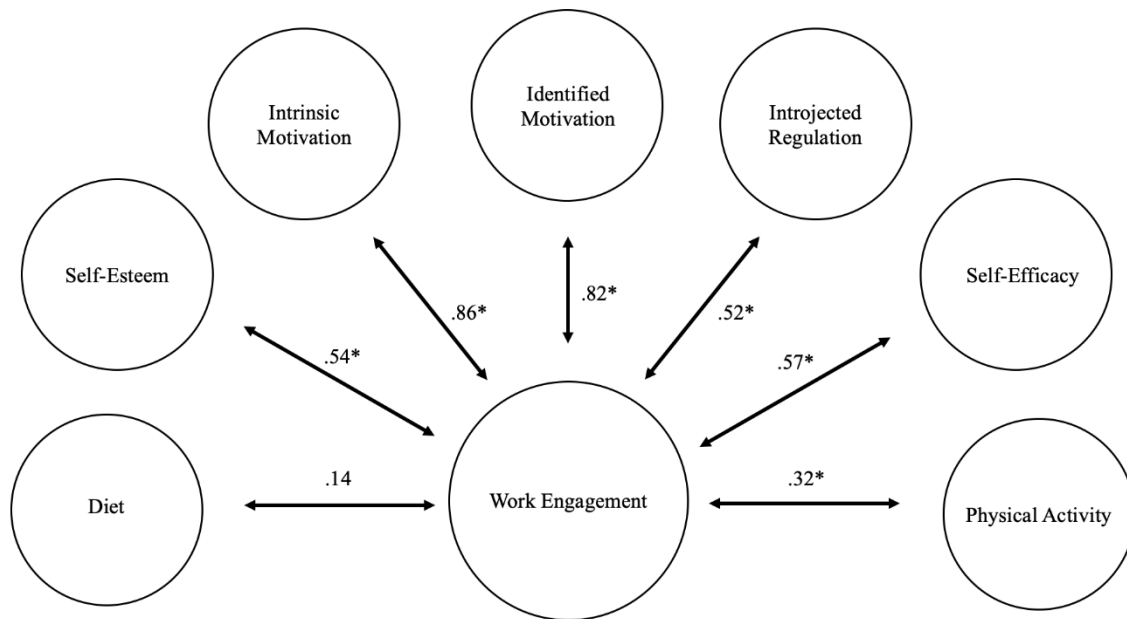
Nutrition and levels of physical activity are two variables often ignored in terms of work factors research and deserve closer attention. Diet and exercise have been shown to be related to self-efficacy, self-esteem, and motivation, and those three factors are antecedents of work engagement (French et al., 1995; Imayama et al., 2013; Song et al., 2007). Therefore, food choice and exercise may be key moderators of factors related to work engagement. Hypothesis 2 states that diet will have a moderating effect on the relationship between work engagement and self-esteem, self-efficacy, and motivation, such that a healthier diet will increase the magnitude of the relationship between engagement and self-esteem, self-efficacy, and motivation. Hypothesis 3 states that physical activity will have a moderating effect on the relationship between work engagement and self-esteem, self-efficacy, and motivation, such that higher levels of physical activity will increase the magnitude of the relationship between engagement and self-esteem, self-efficacy, and motivation.

Hypothesis 1: Self-esteem, self-efficacy, motivation, diet, and physical activity will have direct and positive associations with work engagement.

Hypothesis 2: Diet will have a moderating effect on the relationship between work engagement and its measured antecedents (self-esteem, self-efficacy, motivation), such that a healthier diet will increase the magnitude of the relationship between engagement and self-esteem, self-efficacy, and motivation.

Hypothesis 3: Physical activity will have a moderating effect on the relationship between work engagement and self-esteem, self-efficacy, and motivation, such that higher levels of physical activity will increase the magnitude of the relationship between engagement and self-esteem, self-efficacy, and motivation.

Figure 1. Direct Associations of Personal Resources with Work Engagement



Method

Participants & Procedure

One hundred ninety-three participants were recruited online through Amazon MTurk. Participation was voluntary and a small monetary reward was given for completing the survey that was commensurate with minimum wage. Participants were required to be fully employed and working 35+ hours a week. One hundred sixty-four surveys were used in the analysis, 29 surveys did not pass validity checks or were incomplete. Ninety-nine participants identified as being male, with 64 identifying female, and one participant identified as other. Participant age ranged from 24-73 years old ($M = 38.38$, $SD = 7.91$). Respondents were 84% Caucasian, 9% Black or African American, and 5.5% Native American, with 1.4% other. Two and a half percent of participants were of Hispanic, Latino, or Spanish ethnicity.

Measures

Physical Activity

Physical activity was measured via the International Physical Activity Questionnaire (IPAQ). Specifically, the short form consists of 7 unique items designed to assess an average weeks' worth of physical activity (Craig et al., 2003). Internal consistency is not important for this scale. It addresses vigorous and casual physical activity, walking, and time spent sitting. Time spent on each activity is recorded in days or hours and minutes. Scores are summed based on time spent walking and engaging in moderate and/or vigorous physical activity, and then classified as one of three categories. This variable is treated as categorical for simple and meaningful interpretation. Category 1 reflects the lowest level of physical activity, category 2 represents moderate activity, and category 3 indicates the highest level of activeness.

Diet

Diet was measured via the Healthy Eating Assessment (HEA) which is comprised of 10 items designed to assess the quality of an individual's diet (Paxton et al., 2011). Due to the nature of this scale, internal consistency for this measure cannot be calculated as the items are all independent of one another and measured using different response scales (e.g. fruits versus meats). This measure is scored continuously and treated as interval data. A guide is also given for post-analysis interpretation: needs improvement (1), fair (2), good (3), or excellent (4).

Work Engagement

Engagement was measured via the shortened Utrecht Work Engagement Scale (UWES) (Schaufeli et al., 2002). This is a 9-item self-report measure designed to assess general work engagement in employees. McDonald's Omega for the UWES was .95 in this sample.

Self-Esteem

Self-esteem was measured via the 10-item Rosenberg Self Esteem Scale (Rosenberg, 1965). It contains items that appraise self-image and feelings of self-worth. McDonald's Omega for the RSES was .94 in this study.

Self-Efficacy

Self-efficacy was measured via the 10-item General Self-Efficacy Scale (GSE) (Schwarzer & Jerusalem, 1995). It is designed to assess one's coping skills in regard to daily life. McDonald's Omega for the GSE was .94 in this sample.

Motivation

Motivation was assessed via the Motivation at Work Scale (MAWS), which contains 12 items designed to assess four separate facets of motivation (Gagné et al., 2010). Specifically, it divides motivation into the subcategories of intrinsic motivation, identified regulation,

introjected regulation, and external regulation. McDonald's Omega was acceptable for intrinsic motivation (.96), identified motivation (.92), and introjected regulation (.84); however, it was not acceptable for external motivation (.67), which was subsequently not included in further analyses.

Demographic Items

Several items were added to assess individual demographics such as age, race, ethnicity, gender, and occupation. An additional item was added that identified any work changes due to the COVID-19 outbreak. The options were: continue to work as normal (away from home), always work at home, or switched to working from home due to the pandemic.

Results

Due to low category responses from minorities in race and only one respondent listing “other” for gender, the data were adjusted accordingly. Race compares the differences between the Caucasian majority and all other minorities. Gender compares only male and female.

Physical activity was unrelated to gender, $\chi^2(2, N = 163) = .24, p = .89$, ethnicity, $\chi^2(2, N = 164) = 2.72, p = .26$, or COVID-19 work changes, $\chi^2(4, N = 164) = 7.60, p = .11$. Physical activity was significantly related to age, $r = -.24, p = .002$, and race, $\chi^2(1, N = 164) = 6.78, p = .03$. Subsequently, these were included in regression analyses. Levels of physical activity decreased with age. Minorities were more likely to have low physical activity levels and less likely to have medium physical activity levels when compared to the majority race.

Diet was unrelated to gender, $F(1, 161) = .34, p = .56$, age, $r = -.13, p = .11$, race, $F(1, 162) = .94, p = .33$ or ethnicity, $F(1, 162) = 1.03, p = .31$. Diet was significantly related to COVID-19 work changes, $F(2, 161) = 6.70, p = .002$, such that people who were working regularly or those that had transitioned to remote work scored significantly higher on the HEA than individuals who always work at home. Subsequently, it was included in regression analyses.

Work engagement was unrelated to gender, $F(1, 161) = .27, p = .60$, age, $r = -.02, p = .81$, race, $F(1, 162) = 0.00, p = .94$, ethnicity, $F(1, 162) = .91, p = .34$, or COVID-19 work changes, $F(2, 161) = 1.14, p = .32$.

Self-esteem was unrelated to gender, $F(1, 161) = .11, p = .74$, age, $F(2, 161) = .175, p = .84$, race, $F(1, 162) = 1.36, p = .25$ or ethnicity, $F(1, 162) = 3.18, p = .08$. Self-esteem was significantly related to COVID-19 work changes, $F(2, 161) = 6.65, p = .002$, such that respondents who were working regularly or those that had transitioned to remote work scored significantly higher on the RSES than individuals who always work at home.

Self-efficacy was unrelated to gender, $F(1, 161) = 1.84, p = .18$, age, $r = -.07, p = .36$, race, $F(1, 162) = .63, p = .43$ or ethnicity, $F(1, 162) = .69, p = .41$. Self-efficacy was significantly related to COVID-19 work changes, $F(2, 161) = 4.18, p = .02$, such that respondents who were working regularly or those that had transitioned to remote work scored significantly higher on the GSE than individuals who always work at home.

Gender was unrelated to intrinsic motivation, $F(1, 161) = .05, p = .82$, unrelated to identified motivation, $F(1, 161) = .16, p = .69$, and introjected regulation, $F(1, 161) = .42, p = .52$. Age was unrelated to intrinsic motivation, $r = -.03, p = .67$, unrelated to identified motivation, $r = -.07, p = .38$, and unrelated to introjected regulation, $r = -.02, p = .75$. Race was unrelated to intrinsic motivation, $F(1, 162) = 0.00, p = .94$, unrelated to identified motivation, $F(1, 162) = 1.13, p = .29$, and unrelated to introjected regulation, $F(1, 162) = .01, p = .92$. Ethnicity was unrelated to intrinsic motivation, $F(1, 162) = 3.14, p = .08$, unrelated to identified motivation, $F(1, 162) = .28, p = .59$, and unrelated to introjected regulation, $F(1, 162) = .04, p = .85$. COVID work changes were unrelated to intrinsic motivation, $F(2, 161) = .60, p = .55$, unrelated to identified motivation, $F(2, 161) = 2.75, p = .07$, and unrelated to introjected regulation, $F(2, 161) = .43, p = .65$.

Hypothesis 1 was partially supported (see Table 1) as all predictors were significantly related to work engagement, except for diet which fell just short of significance. The variables with a large correlation to work engagement were intrinsic motivation, $r = .86, p < .001$, and identified regulation, $r = .82, p < .001$, self-efficacy, $r = .57, p < .001$, self-esteem, $r = .54, p < .001$, and introjected regulation, $r = .52, p < .001$. Interestingly, diet was not significantly correlated with work engagement, $r = .14, p = .07$.

Table 1. Means, Standard Deviations, and Zero-Order Correlations

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Engagement	4.13	1.09	1.00						
2. Diet	34.82	3.82	.14	1.00					
3. Self-eff.	32.40	5.73	.57**	.21**	1.00				
4. Self-est.	32.12	6.42	.54**	.21**	.79**	1.00			
5. Intrinsic	10.96	5.41	.86**	.02	.44**	.45**	1.00		
6. Identified	12.32	5.40	.82**	.10	.49**	.54**	.81**	1.00	
7. Introjected	8.72	4.84	.52**	-.02	.24**	.27**	.57**	.61**	1.00

* Significant at the .05 level, two-tailed. ** Significant at the .01 level, two-tailed.

3 = Self-efficacy

4 = Self-esteem

5 = Intrinsic Motivation

6 = Identified Motivation

7 = Introjected Regulation

Hypothesis 2, referenced in Table 2, proposed that diet would have a moderating effect on the relationships between self-esteem, self-efficacy, and motivation. This was not supported. Multiple regression was employed to predict work engagement from diet, self-esteem, self-efficacy, intrinsic motivation, identified motivation, and introjected motivation. The model R^2 (.815) was significantly greater than zero, $F(6, 157) = 115.64, p < .001$. As shown in Table 2, self-efficacy, intrinsic motivation, and identified motivation all had significant positive unique associations with work engagement.

Table 2.
Multiple Regression Predicting Work Engagement

Predictor	Zero-order <i>r</i>	β	<i>sr</i>	<i>p</i>
Diet	.14	.06	.06	.07
Self-esteem	.54*	-.01	-.01	.83
Self-efficacy	.57*	.18*	.11	<.001
Intrinsic Motivation	.86*	.57*	.33	<.001
Identified Motivation	.82*	.27*	.14	<.001
Introjected Regulation	.52*	-.02	-.01	.68

Note. Exact *p* values are for the unique effects of the predictors.
**p* < .05

In the second step of the sequential analysis interaction terms were added, as a block, for the possible moderating effects of diet. The resulting increase in the R^2 was quite small (.006) and fell well short of statistical significance, $F(5, 152) = 0.980, p = .43$. There was no evidence of any moderating effect of diet.

Hypothesis 3, referenced in Table 3, stated that physical activity would have a moderating effect on the relationships between self-esteem, self-efficacy, and motivation. This was not supported by the data. Multiple regression was employed to predict work engagement from physical activity, self-esteem, self-efficacy, intrinsic motivation, identified motivation, and introjected motivation. The model R^2 (.814) was significantly greater than zero, $F(7, 156) = 97.724, p < .001$. As shown in Table 3, self-efficacy, intrinsic motivation, and identified motivation all had significant positive unique associations with work engagement. However,

physical activity was still significantly related to all other variables. Zero-order correlations in this research support findings from previous studies.

Table 3.
Multiple Regression Predicting Work Engagement

Predictor	Zero-order			
	<i>r</i>	β	<i>sr</i>	<i>p</i>
PA1vs2	-.22	-.02	-.02	.65
PA1vs3	.32*	.04	.03	.41
Self-esteem	.54*	.00	.00	.97
Self-efficacy	.57*	.18*	.11	<.001
Intrinsic Motivation	.86*	.57*	.33	<.001
Identified Motivation	.82*	.27*	.14	<.001
Introjected Regulation	.52*	-.03	-.02	.55

Note. Exact *p* values are for the unique effects of the predictors.

**p* < .05

In the second step of the sequential analysis interaction terms were added, as a block, for the possible moderating effects of physical activity. The resulting increase in the R^2 was quite small (.007) and fell well short of statistical significance, $F(10, 146) = 0.592, p = .82$. There was no evidence of any moderating effect of physical activity.

Correlates of Physical Activity

Physical activity significantly affected work engagement, $F(2, 161) = 9.010, p < .001, \omega^2 = .089, 95\% \text{ CI } [.013, .177]$. Pairwise comparisons with Fisher's procedure showed that mean

engagement in the high activity group ($M = 4.57$, $SD = 1.16$) was significantly greater than in the medium activity group ($M = 3.85$, $SD = 1.02$) and the low activity group ($M = 3.89$, $SD = 1.16$).

Three one-way ANOVAs were conducted to examine the association of physical activity with the three types of motivation. There was a significant difference in intrinsic motivation between categories of physical activity, $F(2, 161) = 5.496$, $p = .005$, $\omega^2 = .052$. A significant difference in identified regulation was found between categories of physical activity, $F(2, 161) = 8.364$, $p < .001$, $\omega^2 = .082$. There was also a significant difference found in introjected regulation between the three categories of physical activity, $F(2, 161) = 3.917$, $p = .02$, $\omega^2 = .034$. Post hoc comparisons were made with Fisher's procedure. For intrinsic motivation, the high physical activity category ($M = 12.72$, $SD = 5.56$) was significantly higher than the moderate physical activity category ($M = 9.79$, $SD = 4.86$) and the low physical activity category ($M = 10.14$, $SD = 5.50$). For identified motivation, those with high physical activity scored significantly higher ($M = 14.46$, $SD = 5.23$) than those with moderate ($M = 11.00$, $SD = 4.97$) or low physical activity ($M = 11.14$, $SD = 5.43$). For introjected regulation, those high in physical activity scored significantly higher ($M = 10.07$, $SD = 4.99$) than those with moderate ($M = 7.85$, $SD = 4.43$) or low physical activity ($M = 8.06$, $SD = 4.94$).

Eating healthy was strongly and significantly associated with physical activity, $F(2, 161) = 22.799$, $p < .001$, $\omega^2 = .21$. Pairwise comparisons showed that those with low physical activity were significantly lower on healthy eating ($M = 31.49$, $SD = 3.78$) than were those with moderate ($M = 35.24$, $SD = 3.24$) or high physical activity ($M = 36.28$, $SD = 3.38$).

Discussion

Hypothesis 1 stated that all predictors would be directly related to work engagement, this was partially supported. The data show that every predictor except for diet was directly related to engagement. Intrinsic motivation and identified regulation were the two sub factors that displayed the strongest associations with engagement, compared with the moderate association of introjected regulation and engagement. According to the JD-R theory, intrinsic motivation and identified regulation are forms of autonomous motivation, whereas introjected and external regulation are forms of controlled motivation. Organizations that want to see an increase in engagement would do well to design their jobs to be intrinsically motivating and help employees to identify with their jobs. Identification may be accomplished by making sure a job aligns with an employee's career plans, personal values, and life goals.

This may be the first example of research that has shown physical activity to be directly related to work engagement. Physical activity was directly related to all other variables. The negative correlation between age and physical activity is to be expected, as individuals tend to be less active as they age (Milanovic et al., 2013). Participants who were the most physically active also reported the highest levels of work engagement, motivation, self-esteem, and self-efficacy. Individuals in the lowest category of physical activity scored significantly lower on the Healthy Eating Assessment than individuals in the medium and high physical activity categories.

Hypothesis 2, which proposed that diet would have a moderating effect on the relationships between self-esteem, self-efficacy, and motivation, was not supported. However, the zero-order correlations in this research corroborate evidence found in previous studies. Eating healthy is positively associated with being physically active, and to a lesser degree is positively associated with self-esteem and self-efficacy. Diet's lack of association with

motivation in this case may stem from the MAWS scale pertaining solely to work and does not include any items that examine motivation to eat healthy.

Hypothesis 3 stated that physical activity would moderate the relationship between self-esteem, self-efficacy, motivation, and engagement. This was not supported by the data. Physical activity has significant zero-order correlations with all the variables in this study, but it does not moderate any of them.

Implications

These results imply that physically active individuals will be more motivated and engaged at work. Furthermore, it demonstrates the potential benefits of having a healthy workforce, which implies that employee wellbeing programs could be a worthwhile investment for any organization. Small and inexpensive options, such as incorporating physical activity into daily routines (e.g. walking meetings or standing desks) or putting healthy snacks in vending machines, can make real differences in an organization's profits (Johns Hopkins Bloomberg School of Public Health, 2015). In addition to focusing on physical health, boosting employees' self-esteem and self-efficacy could help them to become more engaged.

Limitations

Time was a limiting factor in this study and necessitated that sampling be cut short. Previous research shows that accurately estimating one's diet can be difficult for the vast majority of Americans (Mertz et al., 1991). Because of this difficulty, self-report measures involving food may be subject to unintended biases, such as a tendency to under-report calories consumed. All of the data were collected with self-report measures which may be limited by common method variance. Additionally, the external regulation subscale was unreliable which forced the removal of an interesting section of analysis. The last item, "I do this job for the

paycheck” was found to bring the reliability of the scale down. Directionality cannot be assumed from this data, so it is possible for any of these variables to be a driving force in these interconnected relationships.

Conclusion

The primary takeaway from this study is that organizations would benefit from taking an interest in what its members are eating and how much physical activity they are getting for reasons beyond lower health care costs. Encouraging and assisting employees to spend more time being active is likely an effective way to increase engagement, motivation, self-efficacy, and self-esteem. Being able to identify with their work and find intrinsic pleasure in their tasks will enhance employee engagement. Controlled forms of motivation, such as guilt or financial incentives, are not as closely related to work engagement as autonomous (intrinsic and identified) forms of motivation.

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APPENDIX A: IRB DOCUMENTATION



EAST CAROLINA UNIVERSITY
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Notification of Exempt Certification

From: Social/Behavioral IRB
To: [Mark Bowler](#)
CC:

Date: 9/30/2019
Re: [UMCIRB 19-002428](#)
Work Eating

I am pleased to inform you that your research submission has been certified as exempt on 9/30/2019. This study is eligible for Exempt Certification under category #2ab.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

