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Health-Related Work Loss: Wellness Profiles of Information Technology Employees

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ABSTRACT

Understanding health-related work loss and creating a comprehensive approach requires the identification of lifestyle behavior patterns. An essential part of this process is the examination of different profiles within the target population to develop effective intervention strategies. This study explored the wellness profiles of information technology (IT) employees regarding lifestyle behaviors and health-related work loss. The cross-sectional study surveyed 405 employees (174 women and 231 men) in six cities in Türkiye to examine lifestyle behaviors (exercise, nutrition, stress management, health responsibility, mental development, and interpersonal relations) and health-related work loss (presenteeism and absenteeism). Data analysis was conducted using independent samples t-test, ANOVA, multiple linear regression, and two-step cluster analysis. Regression findings indicated that physical activity, nutrition, and stress management behaviors statistically predict work performance in IT employees ($p<0.05$). The two-step cluster analysis showed four behavioral motivation clusters, including avoidance (no intention to change), intention (has the intention but no action), participation (has recently started), and maintenance (has become a habit). Certain lifestyle behaviors and clusters appear to be essential factors in health-related work loss among IT employees; thus, organizations that offer workplace wellness programs should prioritize these two issues. Clusters defined in this study could be used to help improve the wellness of IT sector employees.

INTRODUCTION

As labor market trends in the information technology (IT) sector continue to evolve, there is a global increase in career opportunities for IT employees. This results in recruitment and retention challenges for organizations that employ skilled workers (Blatter et al., 2012). Specific sectors have offered alternatives to the traditional work structure regarding work organization and the nature of work (Mehta, 2022). Similarly, IT labor markets have quickly adapted to the changing skill needs and uncertain job situations. A workforce with digital skills can promptly adapt to novel situations, as the COVID-19 epidemic has demonstrated (Piroșcă et al., 2021). There has been a notable increase in the adoption of remote work among IT employees, with 50% reporting a shift towards flexible work arrangements (Franken et al., 2021).

Driven by the improvements in digital technologies, the evolving landscape of flexible organizational structures reshapes job dynamics. The flexible organizational structure requires low levels of hierarchy and new types of networking (Castells, 2014). In recent years, the rise of digital technologies has given way to innovative employment models such as crowd work and remote work facilitated by information and communication technology. This trend is viewed positively because it offers workers greater flexibility in where and when they work and presents job opportunities for individuals with caregiving responsibilities and disabilities (Rani & Gobel, 2022). In terms of income, IT employees earn higher salaries than other white-collar employees on average, according to the Coolever Life Turkey Report (Coolever, 2021). For these reasons, health-related work loss has more substantial economic impacts on employers.

Lack of engagement in healthy lifestyle behaviors causes a host of health issues, including lack of vitality, neck and shoulder pain, headaches, stomach problems, low back pain, mental issues, and sleeping problems (Ekpanyaskul & Padungtod, 2021). These are the most frequently reported symptoms resulting in work loss (Lee et al., 2021; van Den Heuvel et al., 2010). Health-related work loss refers to an employee's incapacity to execute job tasks due to health problems (Alavinia et al., 2009). It is classified into two main categories: failure of the employee to perform their tasks due to absence (i.e., absenteeism; Johns, 2008) and inability to fulfill their responsibilities fully or partially while at work (i.e., presenteeism; Johns, 2010).

While absenteeism is a well-known and easily quantifiable issue, presenteeism is a hazy and difficult-to-measure phenomenon. Whysall et al. (2018) demonstrated that sickness presenteeism and sickness absenteeism are positively correlated, indicating that employees tend to participate in both rather than replacing one with the other. To measure presenteeism, employers could assess factors such as reduced employee output, failure to maintain regular work standards, and mistakes in work (Ruhle et al., 2020). The cost of presenteeism and absenteeism has been measured in various studies. In a Dutch study of patients with rheumatoid arthritis, it was found that presenteeism accounted for 71% of the total costs (Braakman-Jansen et al., 2012). According to the UK Office for National Statistics, in 2016, 137.3 million working days were missed due to sickness and injury, and the average employee was estimated to be absent for 6.3 days per year (Kinman, 2019). Engaging in poor lifestyle behaviors resulted in chronic diseases, which are associated with higher levels of absenteeism and presenteeism.

The Transtheoretical Model (TTM) of behavior change, which is also known as the stages of change model, was first introduced by Prochaska and DiClemente (1983) and has since been widely used in health behavior research. The TTM proposes that behavior change occurs in a series of stages, including pre-contemplation (no intention to change), contemplation (has the intention but no action), preparation (has recently started), action (has made changes and is actively engaged in the behavior), and maintenance (has become a habit). The present study used the TTM to explain the identified clusters among IT employees. The TTM allows researchers to tailor workplace wellness programs to the specific needs of different groups of employees. Employees in the avoidance cluster may require other interventions than those in the maintenance cluster. These employees may benefit from educational interventions to increase awareness of the benefits of healthy behaviors. The study by Whysall et al. (2006) highlights the importance of targeting interventions based on stages of change. Their findings suggest that stage-matched interventions effectively increase the proportion of workers in the action and maintenance stages and reduce musculoskeletal pain. This finding is relevant to the present study in that it emphasizes the need for personalized interventions considering employees' wellness profiles. Tülin and İmamoğlu (2020) found that differences in nutrition levels are observed based on the stage of exercise behavior, indicating a need for nutrition education and lifestyle interventions to improve eating habits and physical activity levels. By referring to the clusters of employees based on their lifestyle behaviors, organizations and specialists can tailor their interventions to target the specific needs of each cluster. This may lead to more effective interventions and better outcomes in reducing health-related work loss.

Using the TTM to elucidate the identified clusters among IT employees is a strategic choice grounded in its theoretical robustness and applicability to health behavior research. While alternative frameworks exist in the literature, the versatility and comprehensive nature of the TTM make it particularly suitable for the present study, which focuses on IT employees and their lifestyle behaviors. This strategic selection enhances the theoretical foundation of the research, providing a framework that not only explains identified clusters but also offers practical implications for personalized interventions aimed at the IT sector.

Identifying clusters based on people's lifestyle behaviors helps to understand the patterns of behavior associated with health-related work loss. Organizations can design more effective employee wellness programs tailored to population needs by selecting the various clusters of employees with distinct motivation levels in order to change their behavior. Since wellness is a holistic concept, employee wellness programs should address employees' physical, emotional, social, spiritual, financial, and intellectual wellness (Silcox, 2016). Similarly, "wellness profiles" denote distinct clusters of IT employees based on their lifestyle behaviors. These profiles serve as a framework to tailor interventions effectively, recognizing that different groups may require varied approaches to enhance their health and wellness within the workplace. However, focusing on multiple lifestyle behaviors in interventions could result in economic and time loss. Therefore, determining lifestyle behaviors and tailoring are crucial for health-related work loss interventions. In light of this, the first objective of the present study is to examine the relationship between lifestyle behaviors and health-related work loss among IT employees. The second objective involves the identification of the wellness profiles of IT employees working in technoparks. To this end, the following research questions have been determined.

- *Research Question 1*: Is there a relationship between IT employees' lifestyle behaviors and health-related work loss?
- *Research Question 2:* Are there any statistically observed clusters regarding the lifestyle behaviors of IT employees? If yes, do the clusters statistically differ from the groups explored by exercise stages of change?

METHODS

Participants

After the Institutional Human Research Ethics Board approved (08/02/2017, 2107-EGT-014) the study, six Turkish cities (Ankara, İstanbul, Bursa, İzmir, Eskişehir, and Bolu), all home to technoparks that primarily employ IT employees, were identified. The selection of these cities aimed to capture a diverse representation of the IT sector within different regions of Türkiye. Then, the technopark webpages were accessed to collect the contact information of 650 companies and 5220 employees. The primary objective was to identify companies within these technoparks that primarily employed IT professionals. The information sought included the names and contact details of the companies and, by extension, their employees.

The employees were invited to participate in the study via e-mail. In total, 427 full-time IT employees volunteered to participate. Envelopes containing the paper-based surveys and consent forms were sent to employees who declared to participate in the study. They were also sent empty envelopes, and after completing the survey, the participants returned the survey and the form in sealed envelopes. This was done to protect private information.

It is important to note that all personal information collected during the study, including contact details and survey responses, was treated with the utmost confidentiality. Data were securely stored and accessible only to the research team, and any publication or presentation of findings, including personally identifiable information, was avoided.

The criteria for inclusion in the study were being employed full-time at a high-tech company located in a technopark and holding a university degree. Part-time employees were excluded from the study because they had a more flexible working schedule and might have had less workload, which could have led to bias in lifestyle behaviors.

Initial screening of the returned surveys indicated that the surveys of 405 employees (174 women and 231 men) were complete; only these employees were included in the study. The mean age of the women was 31.44±5.83 (min=22, max=48) years, and the men, 32.90±7.41 (min=23, max=52) years. The mean BMI was 22.44±3.39 in women and 25.39±3.05 in men.

Instruments

Healthy Lifestyle Behavior Scale-II (HLBS-II): The Healthy Lifestyle Behavior Scale-II (HLBS-II) measures lifestyle behaviors under six subscales. It is a 52-item questionnaire comprising health responsibility, physical activity, nutritional habits, stress management, mental development, and interpersonal relations (Walker & Hill-Polerecky, 1996). The reliability coefficients of the Turkish version of the HLBS-II are .77 for health responsibility, .79 for physical activity, .68 for nutrition, .79 for mental development, .80 for interpersonal relationships, and .64 for stress management (Bahar et al., 2008). The lowest and highest scores on the scale are 52 and 208, respectively. The stress management component of the scale has moderate internal consistency, as indicated by its Cronbach's alpha coefficient of 0.64. Typically, values of Cronbach's alpha above 0.7 are considered good, indicating strong internal consistency. However, values between 0.6 and 0.7 are still acceptable, suggesting moderate internal consistency (Taber, 2018). On the other hand, the overall scale has a higher Cronbach's alpha coefficient of 0.92, indicating strong internal consistency across all items in the scale. This suggests that the scale is a reliable measure of stress management. Higher total scores on the scale indicate better engagement in healthy lifestyle behaviors.

Exercise Stages of Change Questionnaire: The Exercise Stages of Change questionnaire examines a person's motivation to engage in physical activity (Marcus & Owen, 1992). Four questions are posed to explore the exercise stages of change on a binary scale (yes/no). The participants are categorized into five stages based on their responses: pre-contemplation (does not engage in regular physical activity and has no plans to do so in the future), contemplation (does not engage in regular physical activity but plans to do so in the future), preparation (has just begun to engage in regular physical activity), action (has not engaged in regular physical activity for more than one month but has engaged in it for less than six months), and maintenance (has participated in regular physical activity for longer than six months). The original instrument was validated by Haas and Nigg (2009). The validity and reliability study of the Turkish version was conducted by Cengiz et al. (2009). The analyses were conducted to test the criterion validity of the questionnaire. The test-retest internal consistency of the Turkish version was 0.80.

WHO Health and Work Performance Questionnaire: The World Health Organization Health and Work Performance Questionnaire (HPQW) is a self-administered instrument proposed to estimate the workplace costs of health problems in terms of work loss (presenteeism) and sickness absence (absenteeism). Participants rate their and their colleagues' performance in the presenteeism subscale. The sickness absenteeism subscale asks participants to report missing days that resulted in health problems in the last 30 days (Kessler et al., 2003). Kuru and Balkan (2019) adapted and validated the Turkish version of the questionnaire. The internal consistency of the Turkish version was found to be .82.

Data Analysis

All data were entered into SPSS (IBM SPSS Statistics 24). All participants with z-scores ±3 *SD* above or below the mean for one or more lifestyle behaviors were identified as the outlier group ($n = 4$) and removed. The lifestyle behaviors included in this assessment were health responsibility, physical activity, nutritional habits, stress management, mental development, and interpersonal relations. To address the first research question, multiple linear regression was used to examine the relationship between participants' healthy lifestyle behaviors and health-related work loss.

A two-step cluster analysis was used to address the second research question. Two-step cluster analysis is a statistical procedure to identify distinct sub-groups in the sample, and it involves two stages. In the first step, cases are grouped by constructing a cluster features tree. In the second step, the standard hierarchical clustering algorithm on the clusters is used (Norusis, 2011). Forming clusters hierarchically allows the researcher to explore a range of solutions with different numbers of clusters. This produces a range of solutions, which is then reduced to the best number of clusters based on Schwarz's Bayesian information criterion (BIC). The BIC is considered one of the most valuable and objective selection criteria, as it avoids the arbitrariness of traditional clustering techniques. When determining which variables to remove from the analysis, the one with the lowest BIC is preferred (Norusis, 2011). In the present study, sex (categorical), physical activity (continuous), nutrition (continuous), and stress management (continuous) were used in the first step of the analysis. In the second step, the sex variable with the lowest BIC was removed, and the analysis was conducted again. The results indicated four clusters.

To validate the cluster structure, a one-way ANOVA was conducted to assess the differences among the identified clusters. The one-way ANOVA aligns with the study objectives by providing a statistical test to evaluate whether the identified clusters exhibit distinct patterns in lifestyle behaviors. This approach enhances the robustness of the cluster analysis and contributes to the overall validity and reliability of the findings.

RESULTS

Research Question 1: Health-related work loss was treated as a single variable covering presenteeism and absenteeism as subfactors. The calculation of the work loss variable was done in line with the procedure provided by the instrument developers. Health-related work loss, encompassing both presenteeism and absenteeism as subfactors, was treated as a unified variable. The reason for merging these subfactors into a single variable was to provide a comprehensive measure of the impact of health-related work loss; the procedure was conducted according to the developers' instructions of the original instrument.

The presenteeism scores for women (19.97%±2.51) and men (17.96%±2.25) were not significantly different, $t(380) = -1.52$, $p = 0.13$. The average number of days per year for sickness absenteeism was 10.44 days for women and 7.28 days for men and significantly differed, $t = 1.767$, $p < .001$. Multiple linear regression results indicated that physical activity, nutrition, and stress management statistically predicted health-related work loss, F (6, 335) = 4.019, p < .005, R^2 = .67. Specifically, IT employees with better physical activity performance (B = ,037, SE = .229, p = .001), nutrition (B = ,039, SE =.146, p = .024), and stress management (B = ,034, SE = .121, p = .048) showed less health-related work loss at work (see Table I).

Table 1
Multiple Linear Regression Model for Predicting Health-Related Work Loss

Variables	*B*	Beta	*SE*	*p*-value	95% confidence interval for *B*	
					Lower Bound	Upper Bound
Constant	7.500			.001*	6.32	8.68
Physical Activity	0.037	0.213	.229	.001*	0.015	0.059
Nutrition	0.039	0.167	.146	.024*	0.005	0.072
Stress Management	0.034	0.121	.048	.028*	0.072	0.004
Mental Development	-0.010	-0.046	-.048	.547	-0.045	0.024
Interpersonal Rel.	0.019	0.068	.170	.300	-0.017	0.055
Health Res.	0.025	0.116	.107	.107	-0.005	0.055
Model significance	F (6, 335) = 4.019, p =0.001, *Adj.* R^2 = .59					

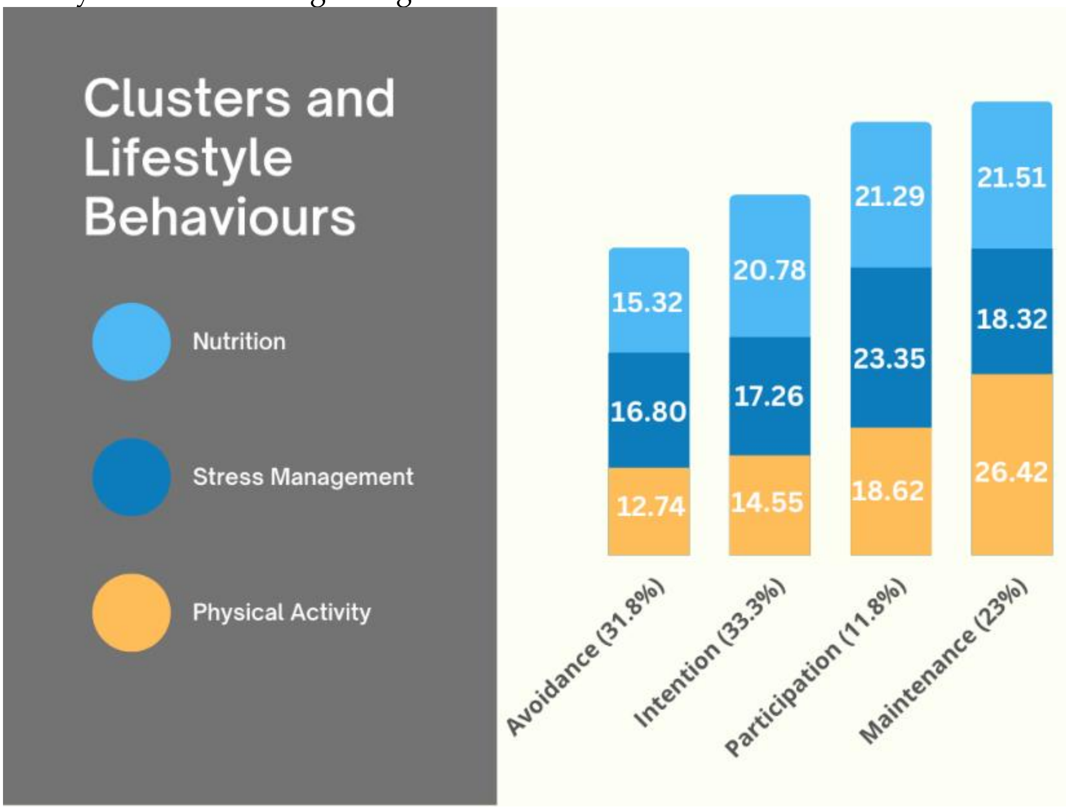
Note. * shows significant association

Research Question 2: The two-step cluster analysis identified four distinct cluster groups with a silhouette coefficient of 0.7. The silhouette coefficient, a widely recognized metric, was crucial in determining the optimal number of clusters. A higher silhouette coefficient indicates that the object is well-matched to its cluster and poorly matched to neighboring clusters. In the present study, the four clusters exhibited a silhouette coefficient of 0.7, indicating a high level of cohesion within each cluster and clear separation between clusters. This approach enhances the reliability and validity of the cluster analysis, ensuring that the identified clusters are distinct and meaningful in the context of IT employees' lifestyle behaviors.

The predictor importance of the variables was 1.0 for physical activity, 0.83 for nutrition, and 0.58 for stress management. Higher predictor importance indicates a more substantial contribution of the variable to the formation of clusters. In the analysis, physical activity had the highest importance (1.0), signifying its predominant role in distinguishing the identified clusters. Nutrition and stress management also held substantial importance (0.83 and 0.58, respectively), highlighting their relevance in differentiating lifestyle behaviors among the participants.

Of the 405 participants, 31.8% (n = 129) were classified as avoidance profile, 33.3% (n = 135) as intention profile, 11.8% (n = 48) as participation profile, and 23% (n = 93) as maintenance profile. A one-way ANOVA was conducted to validate the cluster structure. The one-way ANOVA results showed a statistically significant difference between groups [F (3, 371) = 224.35, p = .000]. A Tukey post hoc test revealed that physical activity behavior in the avoidance profile (12.75 ± 3.31) was significantly lower than that of the intention profile (14.55 ± 3.23, p = 0.003). Physical activity in the intention profile was significantly lower than the participation profile (18.62 ± 4.35, p < 0.001), and the participation profile was significantly lower than the maintenance profile (26.42 ± 3.23, p < 0.001; see Figure 1).

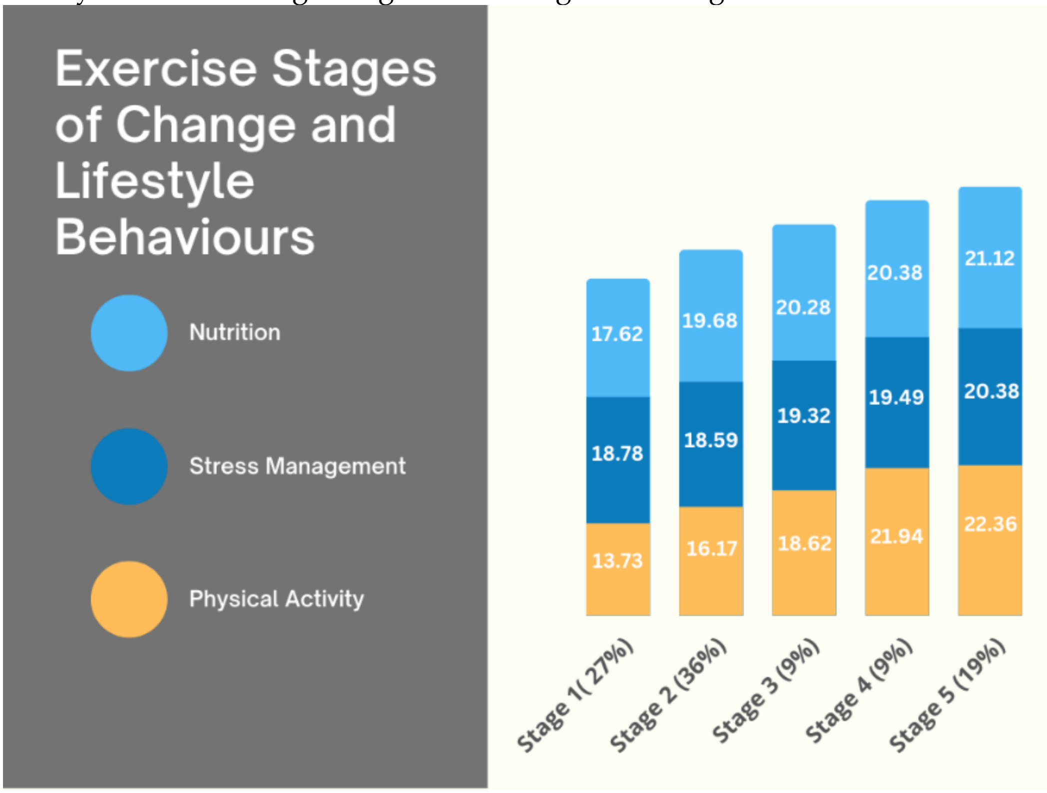
Figure 1
Lifestyle Behaviours Regarding Defined Clusters



The mean scores of the motivational clusters for physical activity, stress management, and nutrition showed an increase from the avoidance profile to the maintenance profile. The descriptive results revealed parallelism between the clusters and the exercise stages of change, with the scores of the variables increasing in both.

To determine whether the identified clusters statistically differed from the exercise stages of change, the latter were analyzed first. A statistically significant difference between the groups was determined by the one-way ANOVA [$F(4,373)$ = 40.64, p < 0.001]. A Tukey post hoc test revealed that Stage 2 (16.18±5.21) and Stage 3 (18.62±4.50) were not significantly different (see Figure 2). The comparisons indicated that Stage 1 (13.73±5.41) and Stage 2 (p = 0.02) were significantly different than Stage 3 (p<0.001), Stage 4 (21.94±2.86, p<0.001), and Stage 5 (22.36±5.20, p<0.001).

Figure 2
Lifestyle Behaviors Regarding Exercise Stages of Change



The results of the ANOVA indicated a non-significant difference between Stage 2 and Stage 3. The analysis revealed four statistically different groups by exercise stages of change—the same number as clusters. To understand whether the clusters and the exercise stages of change groups statistically differed, a dependent samples t-test was conducted with Cluster 1 and Stage 1, Cluster 2 and Stages 2-3, Cluster 3 and Stage 4, and Cluster 4 and Stage 5. The results of the analyses indicated that Cluster 3 and Stage 4; t (34) = -7.36, p = .000 and Cluster 4 and Stage 5; t (76) = 5.11, p = .000 were significantly different from each other. However, Cluster 1 and Stage 1; t (97) = -1.85, p = .067 and Cluster 2 and Stages 2-3; t (101) = -.909, p = .37 were not significantly different from each other. As a result, the following matching clusters and stages emerged: Cluster 1 and Stage 1, Cluster 2 and Stages 2-3 (see Table II).

Table 2
The Means and Standard Deviations of Statistically Matched Clusters and Stages

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Physical Activity	12.74±3.31	14.55±3.23	18.62±4.18*	26.42±3.23*
	Stage1	**Stage 2-3**	**Stage 4**	**Stage 5**
	13.73±5.41	15.00+3.79	21.94±2.86*	22.36±5.20*

*Indicates significant difference (p<0.05)

DISCUSSION

Research Question 1: The results showed that physical activity, nutrition, and stress management statistically predicted health-related work loss in IT employees.

The first predictor of health-related work loss is physical activity. According to studies, physically active people have higher health-related fitness levels and lower health risk profiles (Klemm et al., 2021; Ruiz et al., 2009; Sassen et al., 2010). Furthermore, they have a healthy body composition and a biomarker profile protecting them from cardiovascular disease and type 2 diabetes (Bassuk & Manson, 2005). Evidence shows that such individuals also have better sleep quality and health-related quality of life (Semplonius & Willoughby, 2018). Studies suggest that physical exercise has a beneficial impact on decreasing health-related work loss from the presenteeism perspective (Santos & Miragaia, 2023; Walker et al., 2017). Fitness programs reduce absenteeism and low physical activity levels positively impact sick leave (Proper & van Mechelen, 2008). Furthermore, poor physical activity and cardiorespiratory fitness increase medical care expenditure, a significant cost from the employers' standpoint (Pronk & Kottke, 2009).

The results of the present study reveal that there is a significant relationship between nutrition behavior and health-related work loss. Unhealthy eating habits have been found to cause a considerable economic burden regarding work loss arising from absenteeism and presenteeism (Grimani et al., 2019; Schultz et al., 2009). Previous research on workplace nutrition interventions involving counseling, education, and on-site group activities has shown that the interventions generally result in significant changes in employee nutrition behavior, improve physical and mental health, and lead to a positive return on investment by lowering healthcare costs and absenteeism (Grimani et al., 2019; Van Dongen et al., 2011). These findings are in parallel with the present study findings. Self-perceived health, self-reported absenteeism, work productivity, and job capacity have been mentioned as intervention outcomes in evaluating 21 workplace treatments (Rongen et al., 2013). The recognized advantages of contemporary workplace treatments are greater alertness and cognitive functioning, higher mental performance, and improved well-being (Drewnowski, 2020).

Stress management is the last predictor of health-related work loss identified in the present study. Stress management is vital in preventing health-related work loss because chronic stress can lead to various physical and mental health problems (Shea et al., 2021; Wickrama et al., 2021). When an individual experiences chronic stress, their body responds with a fight-or-flight response, leading to increased heart rate, blood pressure, and cortisol levels (Chu et al., 2021). Over time, these physiological responses can contribute to various health problems, including heart disease, diabetes, and depression (Dar et al., 2019; Moran et al., 2019). Past research has determined a link between stress and performance decline, unhappiness, a lack of motivation and dedication, and increased absenteeism and turnover (Ekienabor, 2016). Effective stress management strategies can help individuals to manage their stress levels and prevent burnout. Some examples of stress management strategies include exercise, mindfulness meditation, deep breathing, and time management techniques (Crivelli et al., 2019; Marais et al., 2020; Toussaint et al., 2021). By proactively managing stress, individuals can improve their physical and mental health, reduce their risk of burnout, and maintain their productivity and engagement in the workplace.

Research Question 2: The results of the two-step cluster analysis indicated four clusters for the sample regarding physical activity, nutrition, and stress management. The four motivational clusters were the avoidance profile, the intention profile, the participation profile, and the maintenance profile. The mean scores of the motivational clusters for physical activity, stress management, and nutrition showed an increase from the avoidance profile to the maintenance profile. The descriptive results revealed parallelism between clusters and exercise stages of change, with the scores of the variables increasing in both. Since the most critical predictor in the cluster analysis was physical activity, further statistical tests were conducted on physical activity behavior. Finally, the following statistically matching clusters and stages emerged: the avoidance profile and Exercise Stage of Change 1 and the intention profile and Exercise Stages of Change 2-3.

Research on effective interventions often involves identifying clusters of lifestyle behaviors. Poortinga (2007) and Schuit et al. (2002) found similar results in their studies on English and Dutch individuals, identifying four lifestyle risk behaviors: alcohol consumption, smoking, physical inactivity, and poor nutrition. Meanwhile, de Vries et al. (2008) discovered three distinct clusters in the Dutch population: healthy, unhealthy, and poor nutrition. More recently, He et al. (2021) conducted a lifestyle behaviors cluster study on adolescents in China, classifying them into low-risk, moderate-risk, and high-risk groups based on their behaviors. These clustering studies provide valuable insights for designing interventions that target specific groups with personalized approaches.

The stages of change model, also known as the transtheoretical model (TTM), provides a helpful framework for understanding behavior change and developing interventions tailored to individuals' needs at different stages of the change process. The significance of the stages of change model in this study is that it provides a theoretical framework for understanding the different levels of behavioral motivation among information technology employees and tailoring interventions to the specific needs of each group. For instance, employees in the avoidance cluster might benefit from treatments that raise awareness of the advantages of changing one's behavior. On the other hand, interventions that assist and motivate the individuals in the participation cluster to maintain their new behaviors may be beneficial. Adoption of lifestyle behaviors is correlated, and the desire to practice one behavior might influence the desire to practice others. According to earlier studies, progress in the exercise stages of change is linked to favorable changes in other health-promoting behaviors like exercise, proper diet, and stress reduction (McKee et al., 2007). The present study showed a motivation shift from physical activity to nutrition and stress management among the four participant clusters.

Thanks to the TTM, workplace wellness initiatives can be more successfully created and adapted to meet the unique requirements of various employee demographics. The TTM offers a valuable framework for comprehending behavior modification and creating interventions. Employers can create more effective workplace wellness programs tailored to the requirements of various employee groups by combining this model with the four behavioral motivation clusters described in the current study. This will improve employee health outcomes and decrease work loss related to illness.

According to the findings, the Exercise Stages of Change Questionnaire can be a helpful tool for defining subgroups of populations when researching physical activity, nutrition, and stress management among IT employees. This approach can be less burdensome than extensive surveys assessing multiple health behaviors, as the questionnaire focuses specifically on exercise behavior and can quickly identify individuals. By using this questionnaire to identify potential participants from the population, researchers can save time and resources that would otherwise be spent on conducting extensive screenings related to physical activity, nutrition, and stress management behaviors. This can be particularly useful when recruiting large samples for studies.

While the Exercise Stages of Change Questionnaire is a practical tool for identifying subgroups based on physical activity, the instrument's limitations and potential biases should also be acknowledged. Although the questionnaire efficiently identifies individuals' exercise behavior, its scope may not fully capture the intricate and multifaceted nature of behaviors related to nutrition and stress management. Addressing the limitations of the instrument ensures a more nuanced understanding of lifestyle behaviors among IT employees, fostering robust research outcomes and the development of tailored interventions.

The present study carries some limitations as well, which should be acknowledged. Firstly, the cross-sectional study limits the ability to establish causality between lifestyle behaviors and health-related work loss. The cross-sectional design highlights the importance of caution in attributing causal relationships between lifestyle behaviors and health-related work loss. The inherent limitations of a cross-sectional approach restrict the ability to establish definite causality. While the findings reveal significant associations, interpreting these as causal should be approached judiciously, considering the inherent constraints of correlation-based evidence.

Secondly, it is unclear whether the sample of employees who responded to the invitation to participate in the study represents all IT employees working in technoparks in the six cities or whether they represent the broader population of IT employees in Türkiye. To enhance the generalizability of the findings, future studies should adopt more robust sampling strategies and delineate the target population.

Additionally, the response rate of 8.2% (427 out of 5220) raises concerns about the potential for non-response bias, where individuals who chose not to participate in the study may differ systematically from those who did participate. Potential factors contributing to disparities between respondents and non-respondents in assessing external validity could include demographic variables, motivational factors, and the mode of data collection. Further investigation may provide insights into the nuanced dynamics affecting participation rates and help refine the research methodology.

In addition, the study relied on self-reported data, which may be subject to social desirability bias and may not reflect the participants' actual behaviors. While self-reported data was used in the present study, it is imperative to delve deeper into the potential impact of social desirability bias on the results. To address this concern, rigorous measures were implemented during data collection to minimize bias. Participants were assured of the confidentiality and anonymity of their responses, fostering an environment conducive to honest reporting. Explicit instructions emphasized the importance of candid and accurate answers, aiming to mitigate the potential influence of social desirability bias on the obtained data.

Finally, the study was conducted in Türkiye, and the results may not be generalizable to other populations or contexts. Acknowledging that cultural and contextual factors may significantly shape health-related behaviors is essential. To address this, future research should explore potential cultural nuances and contextual variations that could impact the applicability of the study's conclusions beyond the Turkish setting. Recognizing the importance of cultural sensitivity in health-related research is paramount, and further investigations in diverse cultural and contextual settings will contribute to a more comprehensive understanding of the relationships explored in this study.

CONCLUSION

The findings of this study have several implications for researchers who intend to design employee wellness programs. Researchers should prioritize physical activity, nutrition, and stress management behaviors in their wellness programs, as these seem to be the most significant predictors of health-related work loss. They should tailor their wellness programs to the specific needs of different behavioral motivation clusters. This personalized approach could increase the engagement and effectiveness of wellness programs. Additionally, researchers should conduct regular evaluations to assess the impact of such programs on health-related work loss and make necessary adjustments. Furthermore, it is crucial to customize these programs according to the distinct needs of various groups of employees.

While emphasizing the potential benefits, it is crucial to acknowledge the challenges associated with conducting longitudinal studies and incorporating objective measurement instruments. Longitudinal studies demand substantial time and resources, and participant attrition can pose a significant challenge. Additionally, using objective measurement instruments such as fitness trackers requires careful consideration of participant adherence, data privacy, and potential biases introduced by the technology. These challenges should be factored into the design and execution of future research efforts. Future research could supplement self-reported data with objective measurement instruments like fitness trackers. Finally, similar studies could be conducted in other populations and contexts to expand our understanding of the impact of workplace wellness programs on health-related work loss.

PRACTICAL IMPLICATIONS

To increase the effectiveness of employee wellness programs and minimize health-related work loss, organizations should prioritize integrating components centered on physical activity, nutrition, and stress management, as these factors heavily influence workplace absenteeism and presenteeism. Secondly, a personalized approach tailored to different motivational clusters is recommended for enhancing engagement and effectiveness of wellness programs. Customizing interventions based on individual needs can provide more targeted and impactful outcomes. Lastly, researchers and practitioners should incorporate periodic evaluations into wellness programs. Continuous assessment allows for dynamic adjustments of interventions and ensures sustained positive impacts on employee health and productivity over time.

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Authors' contributions

All authors revised the manuscript and contributed to the interpretation of the results. All authors have read and approved the final version of the manuscript.

Declaration of conflict of interest

The authors declare that there is no conflict of interest.

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