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ORIGINAL ARTICLE

The impact of healthy lifestyle behaviors on productivity at work: A factory example

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Abstract

Objectives: This study aimed to investigate the impact of healthy lifestyle behaviors, such as regular physical activity, adequate and balanced nutrition, and non-tobacco use, on employee productivity in the workplace. Additionally, the study sought to explore the association between various factors influencing healthy lifestyle behaviors and productivity among workers.

Methods: The study adopted a cross-sectional design and involved 227 workers from a factory. Data collection was carried out using a socio-demographic characteristics form, the "Healthy Lifestyle Behaviors Scale-II," and the "Endikot Work Productivity Scale." The participation rate was 90%.

Results: The majority of the participants (33.5%) fell within the age group of 26-35 years. Additionally, 52% were male, and 52.9% held a Bachelor's Degree. The mean score for the Healthy Lifestyle Behaviors Scale was 127.0±18.0, while the mean score for the Endikot Work Productivity Scale was 23.3±15.1. A negative and weak correlation was observed between healthy lifestyle behaviors and work productivity. Moreover, female workers demonstrated higher productivity scores (25.38±13.96) compared to their male counterparts ($p<0.05$).

Conclusion: The findings of this study suggest that improved healthy lifestyle behaviors among employees lead to increased productivity in the workplace. Furthermore, married individuals and men exhibited higher productivity levels, while women displayed lower productivity

Keywords: Healthy Lifestyle Behavior, Worker, Work Productivity

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INTRODUCTION

Health has been defined differently for many years. Before it was defined only as the state of physical integrity and well-being, now it is expressed as the state of being well in all aspects, such as physically, socially, biologically and psychologically.[1] Lifestyle is a way of life in which individuals have control over the decisions they make. Healthy lifestyle is expressed as individuals acting by regulating behaviors that affect their health such as regular exercise, consuming five servings of fruits and vegetables per day.[2] Individuals with a healthy lifestyle can increase their immunity levels and cope with stress appropriately.[3] There is a wealth of studies relating lifestyle health risk factors to worker productivity, as well as evaluations of interventions to improve certain health risks among workers.[4,5] The compromised performance and absenteeism of employees that have unhealthy habits and that were addicted to tobacco and alcohol lead to overall loss of productivity at the workplace.[6] Productivity loss at the workplace represents an additional impact measure of healthy behaviors among employees. Such as physical inactivity, poor nutrition, extensive alcohol consumption and smoking have been cited as factors impacting employee productivity at the workplaces. World Health Organization (WHO) declared that the cause of 70-80% of deaths in developed countries and 40-50% in underdeveloped countries were diseases that occur due to lifestyle.[7] Relatively benign and self-limited conditions like cold or influenza may also impair on-the-job productivity. Along with all this, having a healthy lifestyle has much benefits. Increased work efficiency and working with high motivation are also positive outcomes of adopting a healthy lifestyle.[6]

The concept of occupational health is to protect the health of employees by adopting healthy lifestyle behaviors and to keep them away from workplace risks and hazards.[8] The International Labor Organization (ILO) and the WHO had expressed the sensitivity about protecting the health of employees', reducing exposure to chemicals, and working in suitable conditions for their psychosocial and psychological health.[9] Nowadays, for many health professionals, the primary focus of worker health improvement efforts has been on direct health care costs to a company or society, including inpatient hospitalizations, outpatient medical care, and the costs of medications to treat acute and chronic medical conditions. Instead of that; eating healthy foods, having a regular exercise programme, not using tobacco increase social adaptation and interpersonal relationships while ensuring job compliance and satisfaction. With this increase, productivity related with the job increases as well. These outcomes are called health promotion. And it is a process which changes lifestyles and increases control of employees over their health. Indicators of this process are defined as health responsibility, physical activity, nutrition, spiritual development, interpersonal relationships and stress management in literature.[10] As well as working hours, psychosocial factors, physical and chemical risks lead to chronic illnesses and can become barriers to a healthy life.[11] Improvements in stress and mental and emotional well-being are also valuable for improving employee satisfaction, productivity, and overall vitality[12]. As health risk factors are modified, worker productivity has been found to increase or decrease accordingly. The first

prerequisite of health promotion is a healthy lifestyle and healthy workplace.[13] Lifestyle behaviors and workplace wellness initiatives have the same underlying philosophy, that many physical and mental conditions can be prevented or treated through healthy lifestyle changes.

Health professionals at the workplace can play a key role in the health and productivity of workers by aiding employees' health risk reduction. It is essential to know risk factors to protect occupational health. In our study, it was aimed to determine the impact of healthy lifestyle behaviors on productivity of workers and to investigate the association between effective factors on healthy lifestyle behaviors and productivity.

METHODS

Type, Population and Sample of the Study

This was a cross-sectional study. It was carried out between March and April 2022. Participants were 227 employees working in a public factory in a province of Turkiye, only those who understood the study purpose and voluntarily participated in the study were invited. They were informed about the study, and their informed consents were obtained online. There was a total of 250 workers and 23 of them were the part that were not at work at the time of the research or did not want to participate. No sampling method was used in the study; it was planned to reach all of the workers. The participation rate was 90%. The factory that present study was conducted is in the dangerous class within the scope of occupational safety and that the laws and regulations regarding occupational health and safety are regularly implemented and that the data of the employees are archived and followed up regularly in this context. Factory has many sections such as electronic, mechanical, welding, forge and carpentry. Although these employees all worked at similar workstation settings, their duties varied, depending on the department in which they worked. All employees in the workplace have fixed working hours, such as 7.30 in the morning and 5.30 in the evening in the week. No one works at the weekend or on other parts of the day. It is common for employees to work frequently within the same hours.

Data Collection

Socio-demographic Characteristics Form

Form consisted of age, gender, marital status, education, chronic diseases, smoking, working experience at the workplace, information about applying to any health institution within the last 6 months, consulting unit on health-related issues.

Healthy Lifestyle Behaviors Scale-II (HLSBS-II)

The scale was formed by Walker et al. (1996) [14] and adapted to Turkish by Bahar et al. (2008).[15] It is composed of 52 items in 6 sub-groups including health responsibility, physical activity, nutrition, spiritual development, interpersonal relationships and stress management (Table.1). The Cronbach's Alpha coefficient of the original scale, varied between .92 and .64-.80 for six sub-factors. All items of the scale were affirmative statements. It is a four-point Likert scale ranging from 1 to 4 (1 corresponds to never, 2 sometimes, 3 usually and 4 regularly). High scores indicate high level of health behaviors.

Table-1 HLSBS-II Scale and Sub-Dimensions

S. N.	HLSBS-II Sub-dimensions	Substance Numbers
1	Health Responsibility	3,9,15,21,27,33,39,45,51
2	Physical Activity	4,10,16,22,28,34,40,46
3	Nutrition	2,8,14,20,26,32,38,44,50
4	Spiritual Development	6,12,18,24,30,36,42,48,52
5	Interpersonal Relationships	1,7,13,19,25,31,37,43,49
6	Stress Management	5,11,17,23,29,35,41,47

Endicott Work Productivity Scale (EWPS)

The scale formed by Endicott and Nee (1997)[16] and adapted to Turkish by Inanc et al. (2004).[17] It measures the productivity of employees. Also, responses to the questions in the scale are used to calculate productivity impairment, absenteeism, presenteeism and overall work impairment because of health. It is a five-point Likert scale ranging from 0 to 4 "Never (0), Rarely (1), Sometimes (2), Often (3), Almost Always (4). The lowest scores obtained from the scale is 0, and the highest score is 100. Higher scores indicate low work efficiency.

Data Analyses

SPSS (Statistics Program for Social Sciences) Windows Version 20.00 package program was used to evaluate the data. As a result of the obtained KS(z) analysis, data showed normal distribution (p=0.000). Cronbach's Alpha reliability and Kolmogorov Smirnov normality tests, Independent t test, one-way Anova Test and Pearson correlation analyzes were performed. The mean scores of the scales, total scores and sub-dimensions were examined. Analyses have not been conducted by separating the workers according to the workplaces.The dependent variable of the study was the productivity of workers.

RESULTS

Sociodemographic Characteristics of the Respondents

The study population can be described as women (48%) and men (%52) with an average age group of 26-35 years (33.5%). 54.6% were married, and 52.9% had Bachelor's Degree. 62.6% had a chronic disease and 48.9% did not use tobacco. Results indicated that employees who applied to any health institution within the last 6 months was 52%, the family physician was the choice on the rate 55.9% for consulting on health-related issues. Data on socio-demographic characteristics were presented in Table-2.

Table-2. Sociodemographic Characteristics of the Respondents

Age	**n**	**%**
18-25	22	9.7
26-35	76	33.5
36-45	73	32.2
46 and up	56	24.7
Gender		
Female	109	48
Male	118	52
Marital Status		
Married	124	54.6
Single	103	45.4
Education		
High School	36	15.9
Bachelor's Degree	120	52.9
Post Graduate	71	31.3
Work experience		
1-5 years	78	34.4
6-10 years	73	32.2
11 years and up	76	33.5
Chronic Disease		
Yes	85	37.4
No	142	62.6
Tobacco Use		
Yes	116	51.1
No	111	48.9
Applying to any health institution within the last 6 months		
Yes	118	52.0
No	109	48.0
Consulting on health-related issues		
Internet/Social Media	58	25.6
Close Friends	42	18.5
Family Psychian/ Health Employee	127	55.9
Total	**227**	**100.0**

Analyses of HLSBS-II and EWPS

In the study the highest score was ''Spiritual Development'' (23.7±4.0) and the lowest was ''Physical Activity'' (15.0±3.7). The total score of the HLSBS-II was 127.0±18.0, the Cronbach's Alpha coefficient of 52 items was found as 0.91. The mean score of the EWPS was 23.3±15.0. Accordingly, the workers had high productivity. The Cronbach's Alpha coefficient of the EWPS was found as 0.94.

Findings Regarding the Comparison of HLSBS-II and EWPS with Effective Factors

A statistically significant difference was found between "Spiritual Development" and age ($p<0.05$). As age increased, the score of spiritual development dimension increased too. A statistically significant difference was also found between chronic disease, the status of applying to a health institution within the last 6 months, the duration of work at the workplace and application in health-related issues ($p<0.05$). There was no significant difference between gender, marital status, education, tobacco use and HLSBS-II ($p>0.05$).

A statistically significant difference was found between gender, marital status, chronic disease, tobacco use and EWPS ($p<0.05$). Results from analyses were presented in Table-3.

Table-3. Comparison of HLSBS-II and EWPS with Effective Factors

Effective Factor	Health Responsibility ort±ss	Physical Activity ort±ss	Nutrition ort±ss	Spiritual Development ort±ss	Interpersonal Relationships ort±ss	Stress Management ort±ss	Mean Score of HLSBS ort±ss	Mean Score of EWPC ort±ss
Age								
18-25	18.7±3.7	14.7±3.0	17.0±2.8	**23.0±3.6**	23.0±3.0	17.2±2.0	124.3±10.8	22.5±12.4
26-35	18.7±4.0	14.8±3.7	17.7±3.3	**22.8±4.1**	21.8±4.1	17.0±4.1	124.4±20.0	16.4±1.8
36-45	19.0±3.5	14.6±4.3	18.5±3.7	**24.0±4.2**	23.0±3.5	17.4±3.5	127.5±19.2	15.1±1.7
46 and up	20.3±3.7	15.8±3.1	18.3±2.7	**25.0±3.2**	23.2±3.0	18.2±2.6	132.5±14.8	14.1±1.8
F	2.246	1.166	1.754	**3.284**	1.984	-1.286	2.462	0.225
p	0.084	0.324	0.157	**0.022***	0.117	0.280	0.063	0.879
Gender								
Female	19.5±3.6	14.7±3.7	18.3±3.5	23.5±4.0	22.8±3.4	17.2±3.3	127.4±17.5	**25.3±14.0**
Male	18.8±4.0	15.2±3.7	17.8±3.1	23.8±4.0	22.5±3.7	17.7±3.5	127.3±18.5	**21.4±15.8**
t	1.365	-1.145	1.145	-0.611	0.589	-1.169	1.977	**1.977**
p	0.173	0.253	0.253	0.542	0.556	0.244	0.957	**0.049***
Marital Status								
Married	18.8±4.1	15.0±4.2	18.1±3.6	24.0±4.2	23.0±4.0	17.5±3.7	127.8±20.2	**20.8±15.3**
Single	19.5±3.3	15.0±3.0	18.0±3.0	23.3±3.5	22.3±3.2	17.3±3.0	126.8±15.0	**26.2±14.1**
t	-1.313	-0.145	0.499	1.225	1.249	0.430	0.416	**-2.714**
p	0.191	0.885	0.618	0.222	0.213	0.668	0.678	**0.007***
Education								
High School	18.4±3.3	14.2±3.1	17.3±2.5	24.5±4.2	22.5±4.4	17.4±3.4	126.0±16.4	19.7±15.0
Bachelor's Degree	19.1±3.0	15.4±3.8	18.0±3.3	23.3±3.9	22.5±3.6	17.8±3.2	127.6±18.6	23.8±15.4
Post graduate	19.5±4.0	14.6±3.8	18.7±3.5	24.0±4.0	23.0±3.2	16.8±3.7	127.6±17.8	24.3±14.4
F	1.092	1.680	2.271	1.400	0.277	1.782	0.138	1.216
p	0.332	0.189	0.106	0.249	0.758	0.171	0.871	0.298
Work experience								
1-5 years	**18.1±3.7**	**14.0±3.7**	**17.1±3.3**	**22.2±4.4**	**21.7±4.0**	16.8±3.8	**121.2±19.5**	24.2±16.5
6-10 years	**20.0±3.2**	**15.7±2.8**	**18.5±3.0**	**24.4±3.0**	**23.0±2.7**	17.7±2.8	**130.6±13.2**	24.6±13.8
11year and up	**19.4±4.1**	**15.3±4.3**	**18.6±3.4**	**24.5±4.0**	**23.1±3.8**	18.0±3.5	**130.6±18.8**	21.1±14.5
F	**4.729**	**4.641**	**5.046**	**8.196**	**3.550**	2.519	**7.399**	1.232
p	**0.010***	**0.011***	**0.007***	**0.000***	**0.030***	0.083	**0.001***	0.294
Chronic Disease								
Yes	**20.0±3.1**	14.8±2.5	18.2±2.5	23.8±3.0	22.8±3.1	17.5±2.3	128.7±12.2	**27.2±13.2**
No	**18.6±4.0**	15.1±4.3	18.0±3.7	23.6±4.4	22.5±3.9	17.4±3.9	126.5±20.7	**21.0±15.6**
t	**2.715**	-0.631	0.688	0.394	0.524	0.066	0.994	**3.054**
p	**0.007***	0.529	0.492	0.694	0.601	0.948	0.321	**0.003***
Tobacco Use								
Yes	19.3±3.6	15.0±3.4	17.8±3.1	23.7±3.8	22.9±3.5	17.3±3.1	127.3±16.5	**25.2±15.1**
No	19.0±4.0	15.0±4.1	18.2±3.5	23.7±4.1	22.4±3.7	17.6±3.7	127.4±19.5	**21.3±14.7**
t	0.592	-0.156	-0.943	0.010	1.027	-0.663	-0.072	**1.925**
p	0.555	0.876	0.347	0.992	0.306	0.508	0.943	**0.050***
Applied to any health institution in last 6 months								
Yes	19.0±4.0	**14.5±4.0**	17.9±3.7	23.6±4.4	22.5±4.0	**17.0±3.6**	125.7±20.0	23.2±14.6
No	19.3±3.5	**15.5±3.4**	18.2±2.8	23.8±3.5	22.8±3.2	**18.0±3.1**	129.2±15.5	23.3±15.5
t	-0.747	**-2.164**	-0.732	3.152	-0.670	**-2.271**	-1.489	-0.056
p	0.456	**0.032***	0.465	0.077	0.504	**0.024***	0.138	0.955
Consulting unit on health-related issues								
Internet/Social Media	**18.7±3.2**	14.3±3.3	17.9±2.8	23.0±3.7	22.0±2.7	16.9±2.7	124.1±13.9	**26.4±14.7**
Close Friends	**20.5±3.6**	15.3±3.2	18.0±2.8	24.3±2.9	23.2±3.2	17.6±2.8	130.6±15.0	**27.3±14.4**
FamilyPsychi./ HealthEmp.	**19.0±4.0**	15.2±4.1	18.1±3.7	23.8±4.3	22.7±4.2	17.7±3.8	127.8±20.3	**20.5±14.9**
F	**3.333**	1.369	0.028	1.331	1.404	1.103	1.655	**5.010**
p	**0.037***	0.256	0.972	0.266	0.248	0.334	0.193	**0.007***

F:One Way Anova Test,t:Independent t test,*p <.05 statistical significance.

Findings Regarding the Comparison of HLSBS-II and EWPS

In the current study, a negative and weak correlation was found between healthy lifestyle behaviors and productivity of workers (r=-0.208;p=0.002). As the scores of healthy lifestyle behaviors increased, the scores of the productivity decreased. The high scores from the productivity scale indicated low work efficiency; in present study as healthy lifestyle behaviors increased, workers' productivity at work increased too. The findings between two scales and sub-dimensions were presented in Table-4. A statistically negative and weak correlation was found between productivity and the Physical Activity, Spiritual Development, Interpersonal Relationships and Stress Management (p<0.05).

Table-4. Findings Related to the Correlation Between HLSBS-II Sub-Dimensions and the EWPS

HLSBS-II Sub-dimensions	**The Mean Score of EWPS**	
	r	**p**
Health Responsibility	0,786	-0,018
Physical Activity	**-0.176**	**0.008***
Nutrition	-0.087	0.191
Spiritual Development	**-0.291**	**0.000***
Interpersonal Relationships	**-0.155**	**0.019***
Stress Managements	**-0.249**	**0.000***
Mean Score of HLSBS-II	**-0.208**	**0.002***

*p<0.05 Pearson Correlation Analysis

DISCUSSION

Healthy nutrition, regular physical activity, harmonious relationships with the social environment, anger control and stress management, staying away from harmful chemicals are the basis of healthy lifestyle behaviors. Promoting healthy lifestyle at the workplace by discouraging sugar-sweetened beverages, encouraging conscious calorie reduction, promoting physical activities: such as walking, using stairs, taking active breaks, reducing tobacco addiction even making a tobacco-free hiring policy, learning simple de-stressing (relaxation) exercises and developing channels for venting emotions and sharing feelings at home/with friends are the global recommendations of WHO[18]. Such behaviors provide positive improvement for individuals. These also increase work performance in as well. [18] In our study the impact of healthy lifestyle behaviors on productivity of workers were evaluated. As seen in the statistics above; there was a negative and weak correlation between healthy lifestyle behaviors and productivity. Even if it is a weak correlation, we evaluated that healthy behaviors of employees affected work productivity. In the literature there are sample studies with the outcome that while healthy lifestyle behaviors of workers increase their productivity increase as well, also number of work related accidents decrease.[19,20] There are studies supporting our findings that regular physical activity affect work performance positively.[21] As stated in a study that occupational accidents/injuries arise from both accidents and diseases[22]. And diseases arise from unhealthy habits.[22] Current occupational health approach is a wide-scaled discipline including healthy lifestyle, worker safety and job satisfaction.[23] Such finding which is consistent with the literature may be explained with the high motivation of employees to work physically

and mentally.

Workers had the highest score of spiritual development followed by interpersonal relationships and health responsibility which is consistent with the findings reported by Simsekoglu and Mayda (2016), Ozkan and Yilmaz (2008).[1,24] It can be noted that individuals' spiritual beliefs, personal relationships, behaviors and attitudes towards taking responsibility for health are effective on healthy behaviors.

The physical activity scores of the participants were low which was consistent with the findings reported by Ozkan&Yilmaz (2008), French et al. (2007), Fleming et al.(2007), Artazcoz et al.(2007).[24-27] Contrary to these findings, Bolton et al. (2009) and Prodaniuk et al. (2004) found that physical activity was at a good level in both working and voluntarily retired individuals.[28,29] Being physically active for a lifetime has benefits such as preventing chronic diseases and inflammation, reducing the mechanical load on the body, and relieving pain.[30] It is also stated that moderate-intensity exercise for 45 minutes a day, excluding daily work is effective on preventing obesity.[31] It can be explained that long working hours and poor working conditions have a negative impact on healthy lifestyle behaviors.

In present study, increasing age was found to be accounting for high spiritual development scores. This finding was consistent with the findings reported by Esin and Aktas (2012).[5] Contrary to this, Kauvonen et al. (2006) found that age had a negative impact on health behaviors.[32] It can be explained that as age progresses, the tendency to acquire conscious health behaviors increase.

In our study; the working experiences affected health behaviors. Behaviors of taking health responsibilities and physical activity of those who worked at the workplace for 6-10 years were higher than the others. The nutrition, spiritual development and interpersonal relations scores of those worked for 11 years and over were higher than the others. Accordingly, workers experienced 11 years in factory or have a healthier diet, had higher spiritual beliefs and better interpersonal relationships. This finding was supported in part by findings linking worker experience to healthy behaviors.[8] It could be attributed to self-confidence and work experience in the same workplace for many years.

In our study, health responsibility scores of employees with chronic diseases were high. In other words, workers with chronic diseases could easily undertake their own health responsibilities. It was considered as an expected finding that individuals with chronic diseases should take responsibility for their own health in order to prevent the progression of their diseases and avoid further complications by following the recommendations of the physician, and to have a high level of knowledge, attitudes and behaviors in this regard. Among the workers included in the study, those who did not apply to a health institution within 6 months engage in more physical activity and manage stress better than others. In this case, it could be interpreted that regular physical activity was effective in preventing acute or chronic diseases. And it could be stated that employees with low stress levels and high levels of coping with stress didn't need to apply to a health institution frequently. These findings are unique to our study.

Employees whose first unit of consulting on

health issues was the internet had the lowest health responsibility scores. Accordingly, those who got information from the internet instead of consulting a physician on health issues did not take on their self health responsibilities. No existing literature has explored on this issue. So this finding is also considered unique to our study.

The healthy behaviors affected workers' productivity. As stated in the ILO Occupational Health and Safety Regulation, employees were obliged to support the work of the workplace health unit, participate in health examinations, information and training programs and cooperate when necessary[9]. It is a fact that balanced nutrition, exercise and not using tobacco increase health and well-being. The more employees adapt to this reality, the easier their activities and adaptation to work would be, and their job satisfaction and productivity would increase at the same rate.[33] In our study, gender, marital status, chronic disease and smoking, and consulting unit on health issues affected productivity at work. Accordingly, female workers experienced more productivity loss than their male counterparts. Also single ones, those with chronic diseases, smokers had low productivity. Overall, studies varied in terms of content. The study of Ozdemir and Ozdemir (2021), in which male and married one's productivity were high, was in line with our findings.[34] Also, workers who had high physical activity scores, spiritual development and good interpersonal relationships had high productivity. This finding of our study was consistent with the findings reported by Katz et al. (2014)[12]. And it can be explained that females working in factory needed more support on job satisfaction. Additionally, in our study the productivity of the employees were not evaluated as specific to the department they work as in some other studies in literature.[8,35] This situation prevented us from making an assessment according to the risk class and productivity of workers who present healthy lifestyle behaviors and work in different departments. In terms of occupational health, it is important to evaluate worker productivity according to the department and risk class, which creates a limitation in our study. This limitation stemmed from the restricted permission that we received from the management of the factory. They did not let us to further evaluate individual departments.

CONCLUSION

In our study; age, working time, presence of chronic disease, status of applying to a health institution within 6 months, and the place of consulting on health issues impacted healthy lifestyle behaviors. Also gender, marital status, presence of chronic disease, tobacco use and consultancy unit on health issues affected the productivity. In addition, as the healthy lifestyle behaviors of the employees increased, their productivity increased. Given that the results of this investigation indicate a significant association between health behaviors and productivity outcomes, continued research that examines the impact of innovative interventions that affect health behaviors and consider productivity indicators as primary outcomes seems needed. And to carry out correlational studies evaluating the relationships with different factors that may be effective. Also, interventional studies to be carried out in line with such factors were recommended. Such as explaining the importance of having healthy behaviors with case examples to the young

ages and the ones that did not have chronic diseases and training on the awareness of tobacco use, embracing the importance to get help from the professionals when there is a health concern to the ones whose first unit of consulting on health issues was the internet. In addition, in the lights of the findings, it is recommended to carry out studies with different sample groups in which productivity at work is evaluated according to gender.

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Ethical Declaration: Approval was obtained from Atatürk University Faculty of Medicine Clinical Research Ethics Committee. (31/3/22 date and number: 65). The aim and concept of the study were explained to the participants and data were collected from those that voluntarily agreed to participate. After selecting "I agree" on the consent form was it possible to participate in the study. Also permission from the factory management and the authors who formed the scales (Bahar et al. and Inanc et al.) were obtained to conduct the study.

Author Contrubition: Fikir: ES, EY, DO, Tasarım: ES, EY, DO, Araç, gereç: ES, EY, Veri toplama ve İşleme: ES, Gözetim: ES, EY, DO, Analiz ve Yorumlama: ES, EY, Yazma: ES, Eleştirel İnceleme: ES, EY, DO.

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