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Evaluation of the relationship between gastrointestinal symptoms, ultra-processed food consumption, acute stress, and reward-related eating behavior among shift-working healthcare professionals

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ABSTRACT

Aims: Shift-working healthcare professionals (SWHPs) are prone to gastrointestinal symptoms (GSs) due to irregular work schedules, unhealthy eating behavior, and psychological stress. This study examined the interrelationships among GSs, consumption of ultra-processed foods (UPF), acute stress, and reward-related eating (RRE) behavior in SWHPs.

Methods: This cross-sectional study included SWHPs. Socio-demographic data, body mass index (BMI), and eating habits were recorded. The Gastrointestinal Symptom Rating Scale (GSRS), Screening Questionnaire of Highly Processed Food Consumption (sQ-HPF), Self-applied Acute Stress Scale for Healthcare Providers (EASE), and RRE Scale were used to assess relationships among the variables.

Results: A total of 301 participants (mean age =32.9±8.1 years; 55.1% female) were included in the study. The mean BMI was 24.1±3.3 kg/m². GSRS total scores correlated positively with sQ-HPF (ρ=0.208, $p<0.001$), EASE (ρ=0.353, $p<0.001$), and RRE (ρ=0.313, $p<0.001$). The EASE score was also positively correlated with all GSRS subdimensions (ρ=0.202-0.370, all $p<0.001$). In multivariable regression analyses, sQ-HPF scores were predicted by age (β=-0.145, p=0.011) and EASE (β=0.136, p=0.017) (R^2=0.202). RRE scores were predicted by EASE (β=0.340, $p<0.001$) and BMI (β=0.227, $p<0.001$) (R^2=0.408). GSRS total score was predicted by gender (β=-0.210, $p<0.001$), sQ-HPF (β=0.137, p=0.008), RRE (β=0.233, $p<0.001$), and EASE (β=0.201, $p<0.001$) (R^2=0.485).

Conclusions: The findings indicate that GSs are significantly associated with UPF consumption, acute stress, and RRE among SWHPs. These results emphasize the importance of acute stress management in reducing unhealthy eating behaviors and related GSs in this population.

Introduction

Shift or on-call systems are implemented in healthcare units to ensure the smooth flow of services (1). Working in shift or on-call systems can cause physical and psychological health problems because it disrupts an individual's normal circadian rhythm. This is because the human organism is designed to be awake during the day and asleep at night (2). A study of shift and on-call workers demonstrated that shift work negatively affects their physiological and psychological health and social lives (1). In shift work systems, changes in circadian rhythms can lead to eating disorders, reduced sleep duration and quality, and reduced physical activity (3). In shift workers, sleep irregularities can lead to changes in energy intake and dietary patterns, which in turn can increase the risk of various chronic diseases, primarily obesity (2). Shift work causes both increased stress and decreased stress-coping skills among workers (4). A study showed that, as stress levels increased, individuals tended to consume foods that rapidly raise blood glucose levels, particularly ultra-processed foods (UPFs) that are high in saturated fats, salt, and sugar, and high-calorie snacks, rather than main meals. This leads to the development of unhealthy eating habits (5). Another study of shift workers revealed that a significant proportion experienced unbalanced dietary habits, physical and mental fatigue, and sleep disturbances. Furthermore, most participants reported that their working hours negatively affected their physical health (6). It has been suggested that changes in eating habits associated with shift work may be linked to gastrointestinal symptoms (GSs). It has been found that the amount of food consumed during night shifts is lower than that consumed at other meals, and this can lead to various stomach disorders (7). Additionally, it has been noted that the number of snacks consumed during night shifts is greater than the number of main meals consumed, leading to an increased preference for foods high in carbohydrates, sugars, and fats (8). Shift workers who feel the need for quick consumption to obtain rapid energy tend to consume foods low in protein and high in refined sugars and processed carbohydrates. In this context, an association between an unhealthy diet and obesity has been demonstrated among shift workers. It has been recommended that foods high in carbohydrates, sugars, and fats be limited and that individuals be encouraged to consume protein-rich foods (9). Protein-rich foods increase alertness, whereas fatty foods decrease it (8). UPFs are low in micronutrients and fiber, while being high in fat and sodium. The consumption of UPFs, along with increased intake of simple sugars and fats and decreased fiber intake, can increase intestinal permeability and lead to systemic inflammation. As a result, negative changes in the composition and function of the gut microbiota may occur (10). Recently, eating behavior has been conceptualized as a coping or reward mechanism in response to negative situations or emotions. Among these, positive emotions (happiness, joy, celebratory feelings) and negative emotions (stress, anxiety) can trigger reward-related food cravings (11). In hedonic hunger, defined as the desire to consume food for pleasure in the absence of physiological hunger, individuals often prefer UPFs that contain high amounts of fat, sugar, or salt, or combinations thereof (12). These foods are often low in nutritional value due to their inadequate nutrient profiles (high salt, added sugars, saturated fatty acids, and low dietary fiber) and processing that alters their physical and textural properties, removes water, and uses flavor enhancers, colorings, and other additives. Furthermore, the additives in these foods may be addictive in some individuals (13).

As no studies to date have examined the relationships among UPF consumption, GSs, acute stress, and reward-related eating (RRE) among Shift-working healthcare professionals (SWHPs) in Türkiye, this study aims to investigate these relationships.

Methods

Study design and participants

This cross-sectional study was conducted face-to-face between December 2024 and May 2025 among volunteer SWHPs residing in Ankara. Inclusion criteria: adults aged 18-65 years who signed the informed consent section at the beginning of the questionnaire, completed the survey in full, and were SWHPs. Exclusion criteria: individuals who did not agree to participate, had incomplete questionnaire data, were younger than 18 or older than 65 years, or were not SWHPs. The study was approved by the Gülhane Scientific Research Ethics Committee (approval number: 2024-531, dated 05.11.2024).

Data collection

The general characteristics of the individuals (gender, age, education level, marital status, and income level) and anthropometric measurements (body weight and height) were assessed using a questionnaire. SWHPs' consumption of UPFs was assessed via a dedicated questionnaire, GSs were evaluated using the GSRS, acute stress was assessed using the EASE scale for healthcare professionals, and eating behaviors were evaluated using the RRE scale.

The high-processed food consumption short screening questionnaire (sQ-HPF)

Martinez-Perez et al. (14) originally developed this brief screening instrument in 2024, and Erdoğan Gövez et al. (15) subsequently adapted it into Turkish. The instrument uses an 11-point scoring system to evaluate the frequency of UPF consumption, with scores ≥6 indicating high consumption levels.

The Gastrointestinal Symptom Rating Scale (GSRS)

The GSRS was developed by Revicki et al. (16) to evaluate the severity of GSs based on clinical insights and symptom patterns. Its Turkish adaptation was validated by Turan et al. (17). The scale consists of 15 items scored on a 7-point Likert scale. The scale is composed of five subdimensions: reflux, indigestion, diarrhea, constipation, and abdominal pain. Conversely, higher total scores are indicative of more pronounced symptom severity.

The Self-administered Acute Stress Scale (EASE)

The EASE scale, developed by Mira et al. (18) in 2021, is a 10-item instrument designed to assess acute emotional stress in healthcare providers. These items are rated on a 4-point Likert scale, with higher scores indicating greater stress. The Turkish version was adapted by Şimşek et al. (19). The total score ranges from 0 to 30, with cut-off values denoting varying levels of emotional burden: scores ranging from 0 to 9 indicate adequate regulation, while scores between 10 and 14 suggest distress, 15 to 24 indicate an excessive emotional load, and scores of 25 and above signify acute stress

The Reward-related Eating Scale (RRE)

The RRE scale, a 13-item instrument developed by Mason et al. (20) in 2017, utilizes a 5-point Likert scale to evaluate reward-driven eating behaviors. Saruhan and Konuşkan (21) conducted their Turkish adaptation. The scale is composed of three subscales: satiety impairment, food-related cognitive preoccupation, and loss of control in eating. The attainment of elevated scores indicates increased craving, particularly for sweet or palatable foods.

Anthropometric measurements

Participants self-reported their body weight and height following standardized guidance. Anthropometric indices were calculated based on self-reported height and weight. BMI was determined and categorized according to World Health Organization criteria (22).

Statistical Analysis

An a priori power analysis for sQ-HPF and GSRS was conducted using G*Power. At a two-tailed $\alpha=0.05$ level, assuming an expected correlation of $r=0.25$, the required sample size to achieve 95% power was calculated to be 210. All analyses were conducted using the Statistical Package for the Social Sciences software, version 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including medians, frequencies, and percentages, were used to summarize the data. Data distribution was assessed using histograms, descriptive statistics (coefficient of variation, skewness, and kurtosis), and the Kolmogorov–Smirnov test. Multiple linear regression analyses were performed to identify predictors of sQ-HPF, RRE, and GSRS scores. For the multiple regression analyses, we employed a backward elimination method. All potential predictor variables were initially included in the model, and non-significant variables were sequentially removed based on their p-values. The final models presented in Tables 3 and 4 include only the statistically significant predictors. Statistical significance was set at $p<0.05$, and results were interpreted at the 95% confidence level.

Results

Descriptive characteristics of the participants

A total of 301 participants (mean age 32.9±8.1 years; 55.1% female) were included. The mean body mass index (BMI) was 24.1±3.3 kg/m². Most participants held a university degree (78.4%), master's or doctoral degrees, and 5.6% had completed high school. By BMI category, 1.7% were underweight, 65.1% were normal weight, 28.6% were overweight, and 4.7% were obese. Regarding income, 23.3% reported income above expenses, 45.8% reported income equal to expenses, and 30.9% reported income below expenses. High UPF consumption was observed in 68.1% of participants, compared with low consumption in 31.9%. Acute stress classification showed that 68.4% had good emotional adjustment, 24.9% had emotional distress, 6.3% had emotional overload, and 0.3% had extreme acute stress (Table 1).

Correlations among GSRS, sQ-HPF, EASE, and RRE scores

There were significant positive correlations between GSRS total score and sQ-HPF ($\rho=0.208$, $p<0.001$), EASE ($\rho=0.353$, $p<0.001$), and RRE ($\rho=0.313$, $p<0.001$) (Table 2). The EASE scale correlated positively with all GSRS subdimensions ($\rho=0.202$-0.370, all $p<0.001$).

Predictors of sQ-HPF and RRE scores

In multivariable linear regression (Table 3), the model predicting sQ-HPF scores was statistically significant ($R^2=0.202$, $p<0.001$); within this model, age emerged as a significant negative predictor ($\beta=-0.145$, $p=0.011$), whereas the EASE score was a significant positive predictor ($\beta=0.136$, $p=0.017$). Likewise, the regression model for RRE total scores was significant ($R^2=0.408$, $p<0.001$), with both EASE score ($\beta=0.340$, $p<0.001$) and BMI ($\beta=0.227$, $p<0.001$) acting as significant positive predictors.

Predictors of Gastrointestinal Symptoms (GSRS)

The regression model predicting GSRS total score (Table 4) was statistically significant ($R^2=0.485$, $p<0.001$), with gender emerging as a negative predictor ($\beta=-0.210$, $p<0.001$) and sQ-HPF ($\beta=0.137$, $p=0.008$), RRE ($\beta=0.233$, $p<0.001$), and EASE ($\beta=0.201$, $p<0.001$) emerging as positive predictors.

Table 1. **Distribution according to the general characteristics of individuals**

Characteristics	Value
Gender, n (%)	
Female	166 (55.1)
Male	135 (44.9)
Education level, n (%)	
High school	17 (5.6)
University	236 (78.4)
Master's degree/doctorate	48 (15.9)
BMI classification, n (%)	
Underweight (<18.50 kg/m²)	5 (1.7)
Normal (18.50-24.99 kg/m²)	196 (65.1)
Overweight (25.00-29.99 kg/m²)	86 (28.6)
Obese (≥30.0 kg/m²)	14 (4.7)
Marital status, n (%)	
Married	141 (46.8)
Unmarried	160 (53.2)
Income status, n (%)	
Income exceeds expenses	70 (23.3)
Income equals expenses	138 (45.8)
Income is less than expenses	93 (30.9)
Highly processed food consumption, n (%)	
High consumption	205 (68.1)
Low consumption	96 (31.9)
Acute stress classification, n (%)	
Good emotional adjustment	206 (68.4)
Emotional distress	75 (24.9)
Emotional overload	19 (6.3)
Extreme acute stress	1 (0.3)
Age (years), mean ± SD	32.9±8.1
BMI (kg/m²), mean ± SD	24.1±3.3
GSRS total score, mean ± SD	33.8±15.0
GSRS score subdimensions, mean ± SD	
Abdominal pain	7.0±3.7
Reflux	4.6±3.0
Diarrhea	5.1±3.0
Indigestion	10.8±5.6
Constipation	6.2±3.7
sQ-HPF score	6.7±2.5
EASE scale score	7.4±4.5
RRE scale total score, mean ± SD	31.8±10.6
RRE scale score subdimesions, mean ± SD	
Loss of control over eating	17.0±5.5
Lack of satiety	7.9±3.9
Preoccupation with food	6.8±2.8

BMI: Body mass index, SD: Standard deviation, GSRS: Gastrointestinal Symptom Rating Scale, sQ-HPF: Screening Questionnaire of Highly Processed Food Consumption, EASE: Self-applied Acute Stress, RRE: Reward-related Eating

Table 2. Correlation coefficients between scale scores

		1	2	3	4	5	6	7	8	9	10	11	12
1. GSRS-total score	ρ	-											
	p												
2. Abdominal pain	ρ	0.846***	-										
	p	<0.001											
3. Reflux	ρ	0.739***	0.718***	-									
	p	<0.001	<0.001										
4. Diarrhea	ρ	0.542***	0.347***	0.297***	-								
	p	<0.001	<0.001	<0.001									
5. Indigestion	ρ	0.879***	0.723***	0.549***	0.327***	-							
	p	<0.001	<0.001	<0.001	<0.001								
6. Constipation	ρ	0.688***	0.390***	0.372***	0.539***	0.481***	-						
	p	<0.001	<0.001	<0.001	<0.001	<0.001							
7. sQ-HPF score	ρ	0.208***	0.244***	0.142*	0.072	0.202***	0.050	-					
	p	<0.001	<0.001	0.014	0.212	<0.001	0.391						
8. EASE scale score	ρ	0.353***	0.302***	0.202***	0.325***	0.231***	0.370***	0.140*	-				
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.015					
9. RRE scale total score	ρ	0.313***	0.265***	0.176***	0.156**	0.342***	0.233***	0.110	0.335**	-			
	p	<0.001	<0.001	0.004	0.007	<0.001	<0.001	0.056	<0.001				
10. Loss of control over	ρ	0.324***	0.283***	0.188***	0.077	0.374***	0.196***	0.196***	0.258***	0.881***	-		
	p	<0.001	<0.001	0.001	0.185	<0.001	0.001	0.001	<0.001	<0.001			
11. Lack of satiety eating	ρ	0.232***	0.170**	0.119*	0.237***	0.206***	0.254***	0.011	0.354***	0.799***	0.480***	-	
	p	<0.001	0.003	0.039	<0.001	<0.001	<0.001	0.851	<0.001*	<0.001	<0.001		
12. Preoccupation with food	ρ	0.188*	0.177**	0.097	0.115*	0.208***	0.150**	0.009	0.251***	0.841***	0.592***	0.747***	-
	p	0.001	0.002	0.092	0.047	<0.001	0.009	0.882	<0.001	<0.001	<0.001	<0.001	

*p<0.05, **p<0.01, ***p<0.001, Spearman's correlation analysis was used to calculate the p-value
GSRS: Gastrointestinal Symptom Rating Scale, sQ-HPF: Screening Questionnaire of Highly Processed Food Consumption, EASE: Self-Applied Acute Stress, RRE: Reward-Related Eating

Table 3. Linear regression model for screening questionnaire of highly processed food consumption and reward-related eating prediction

Model	Standardized beta	t	p-value	95% confidence interval	
Screening Questionnaire of Highly Processed Food Consumption Score					
				Lower	Upper
Age (years)	-0.145	-2.553	**0.011**	-0.081	-0.011
EASE scale score	0.136	2.402	**0.017**	0.014	0.140
R^2=0.202; **p<0.001***					
Reward-related Eating Scale Total Score					
Model	**Standardized beta**	**t**	**p-value**		
EASE scale score	0.340	6.424	**<0.001**	0.550	1.036
BMI (kg/m^2)	0.227	4.284	**<0.001**	0.395	1.066
R^2=0.408; **p<0.001***					

*Significant at p-value <0.05
EASE: Self-applied Acute Stress, BMI: Body mass index

Table 4. Linear regression model for gastrointestinal symptoms prediction

Model	Standardized beta	t	p-value	95% confidence interval	
Gastrointestinal Symptom Rating Scale Total score					
				Lower	Upper
Gender	-0.210	-4.005	**<0.001**	-9.451	-3.223
sQ-HPF	0.137	2.654	**0.008**	0.206	1.388
RRE scale score	0.233	4.297	**<0.001**	0.178	0.480
EASE scale score	0.201	3.607	**<0.001**	0.302	1.026
R^2=0.485; **p<0.001***					

*Significant at p-value <0.05, Variables: Gender (0: female, 1: male)
sQ-HPF: Screening Questionnaire of Highly Processed Food Consumption, RRE: Reward-Related Eating, EASE: Self-Applied Acute Stress

Discussion

This study investigated the associations between UPF consumption, GSs, acute stress, and eating behaviors among SWHPs. The findings indicated that participants exhibited high UPF consumption. Moreover, greater UPF intake was associated with increased GSs, increased acute stress levels, and increased RRE. Shift work disrupts an individual's normal biological rhythms, leading to sleep disorders, increased stress, changes in eating habits, and physical or psychological disorders (23,24).

When examining the relationship between UPF consumption and gastrointestinal findings, evidence indicates that the types and amounts of food consumed, especially during night shifts, may cause stomach discomfort, and that increased consumption of simple sugars and fats, along with decreased fiber intake associated with UPF consumption, may increase intestinal permeability. Consequently, increased inflammation affects the gut microbiota and leads to gastrointestinal disorders (GDs) (25). A study examining the relationship between UPF consumption and GDs found that high UPF consumption increases the risk of irritable bowel syndrome (IBS) and, consequently, of dyspepsia (26).

In this study, consistent with the findings reported by Haghighatdoost et al. (27), a positive correlation was observed between UPF consumption and the total GSRS score. Furthermore, increased UPF consumption was associated with greater GSs such as indigestion, abdominal pain, constipation, diarrhea, and reflux. A substantial body of evidence has emerged linking diets rich in UPFs to the development of various intestinal diseases, including inflammatory bowel disease (IBD), IBS, diarrhea, and constipation. A diet rich in saturated or trans fats, meat proteins, reduced sugars, and salt but deficient in fiber has been shown to trigger dysbiosis by altering the microbiota. Microbial dysbiosis is thought to play a role in the development and exacerbation of GDs.

Another study showed that UPF consumption was positively associated with higher total energy intake and that inflammatory gastrointestinal diseases and low fruit and vegetable consumption were positively associated with specific fecal microbiota taxa (28). A study found that increased UPF intake was positively correlated with IBD onset. The study found that consumption of processed foods (e.g., carbonated beverages, refined sugar, and other sugary foods) was associated with an increased risk of adverse health outcomes. The study found a correlation between IBD and higher risk ratios associated with various UPF subtypes, including processed meat and poultry (29). In this study, a significant and positive correlation was found between the GSRS and sQ-HPF total scores. The SQ-HPF score correlated significantly with abdominal pain, gastroesophageal reflux, and indigestion.

Examination of the relationship between UPF consumption and health problems reveals that obesity is also a significant issue. One study examined the relationship between UPF consumption and weight gain over nine years. The study found that individuals with the highest UPF consumption were 26% more likely to become overweight or obese than those in the lowest quartile of consumption (30). In another study, individuals in the top fifth of UPF consumption had a 32% higher likelihood of obesity than those in the bottom fifth. Furthermore, shift workers may be more prone to obesity due to imbalances in the secretion of hormones, such as leptin and ghrelin, which are associated with sleep irregularities, dietary changes, and altered meal timing (31). Although previous studies have linked UPF consumption to weight gain and obesity, participants in this study had BMI values within the normal range. This likely reflects the relatively young and health-conscious profiles of healthcare workers rather than an absence of risks associated with UPF consumption.

Increased UPF consumption may cause functional abnormalities in the intestinal microbiota that affect neurological development and contribute to adverse mental health outcomes, such as stress and depression (32). A meta-analysis has revealed a positive correlation between excessive UPF consumption and an increase in stress and anxiety symptoms. Furthermore, studies have shown that individuals who work rotating shifts experience a decline in sleep quality and symptoms of psychological distress, including stress and anxiety (33). In this study, consistent with findings in the literature, participants experienced emotional distress, emotional overload, and excessive acute stress. Studies have shown that the main mechanisms linking UPF consumption to mental health include inflammation, oxidative stress, and alterations in the gut microbiota. However, mental illness prevalence is associated with increased consumption of UPFs (34).

It is also emphasized that stressed individuals may turn to unhealthy eating as a coping mechanism. One study found that individuals with higher UPF intake were significantly more likely to report mentally unhealthy and anxious days. It has been suggested that UPFs may affect cognitive function and mental health by altering the gut-brain axis (35). In this study, the linear regression model predicting sQ-HPF scores was statistically significant, and the EASE score was identified as a significant positive predictor.

RRE tendency is defined as an individual's desire to overconsume palatable foods and to derive intense pleasure from eating these foods. Positive emotions, such as happiness and celebration (positive reinforcement), and negative emotions, such as stress or anxiety (negative reinforcement), can trigger RRE, thereby enhancing or reducing an individual's emotional state (36). Furthermore, it has been suggested that the activation of the hypothalamic-pituitary-adrenal axis in chronic stress and the resulting excessive glucocorticoid exposure may play a role in the development of excessive food intake. It has been proposed that cortisol levels associated with stress and reward circuits may promote the intake of calorie-dense foods (37).

This study found that high scores on the RRE scale were associated with increased appetite and cravings for sweets. It was emphasized that consumption of UPFs, which are energy-dense and typically contain simple sugars, was positively correlated with RRE scale scores (20). Additionally, another study highlighted that stress-related RRE behavior increases the consumption of highly processed foods, and this situation increases susceptibility to infections by disrupting the gut microbiota (38). Furthermore, another study suggested that psychological stress and reward-seeking eating behavior affect gastrointestinal motility in acute or short-term stress responses by inhibiting gastric emptying and stimulating colonic transit (39). In this study, the linear regression model predicting total RRE scores was also statistically significant. In this model, the EASE scale score and BMI were significantly positively associated with RRE.

Consequently, the changes mentioned above may be associated with an increased frequency of dyspepsia and other GSs in patients with stress-related functional GDs, potentially due to underlying pathophysiological processes (40). In this study, consistent with these findings, significant positive correlations were observed between GSs and the subdimensions of the RRE scale. Additionally, the total RRE score was significantly associated with all gastrointestinal subdimensions; the strongest correlations were observed for indigestion, constipation, abdominal pain, reflux, and diarrhea. Furthermore, the EASE score showed positive correlations with all gastrointestinal subdimensions. The sQ-HPF score, RRE score, and EASE score were identified as positive predictors of the GSRS.

Study Limitations

A number of limitations should be acknowledged in the context of this study. Moreover, the cross-sectional nature of this study limits the possibility of drawing definitive conclusions regarding causality. The study's findings reveal a homogeneous distribution, with a predominance of individuals with a high level of education. This phenomenon has been linked to the adoption of healthier eating habits, although the findings are not widely generalizable.

Additionally, the present study has several strengths. As far as we are aware, this is the first investigation to explore the association between UPF consumption and stress, RRE behavior, and GSs among healthcare workers. The data obtained from this study will underscore the impact of stress and eating habits on gastrointestinal well-being in SWHPs and their ramifications for the individual. The current findings are likely to guide further inquiry in this area.

In future research, the implementation of dietary guidelines, including food processing, should be supported by long-term and clinical studies, which will facilitate examination of causal relationships. Furthermore, the execution of analogous studies across diverse age groups will be possible. In addition, structural equation modeling or path analysis could be employed to examine the potential mediating role of acute stress in the associations among UPF consumption, stress, and BMI outcomes.

In clinical nutrition practice, screening of healthcare professionals' eating behaviors could also include the evaluation of factors such as UPF consumption, acute stress, and RRE patterns.

Conclusion

This study found significant positive associations among UPF consumption, GSs, acute stress, and RRE in SWHPs. This study demonstrates that SWHPs can lead to disruptions in physiological balance, hormonal changes, unhealthy eating behaviors, and stress. These changes can lead to increased consumption of UPFs and the development of RRE behaviors as a coping mechanism. Higher UPF consumption increases intake of refined sugar, salt, and saturated fat and decreases intake of protein, fiber, vitamins, and minerals. This can lead to various negative health outcomes, particularly GDs.

In response to the growing food industry, countries need to develop national policies that promote healthy eating, facilitate access to unprocessed foods, and encourage balanced eating habits. Furthermore, screening for UPF consumption, acute stress, and GDs during clinical dietitian assessments of groups with high stress levels, such as healthcare workers, can facilitate early risk detection.

Developing effective intervention programs targeting UPF consumption, acute stress, and GSs can help improve both health outcomes and quality of life. Strategies developed for shift workers should include practices that both enhance work performance and support quality of life. Addressing issues such as UPF consumption, acute stress, GSs, and RRE behaviors is expected to enhance work performance, improve quality of life, and reduce chronic disease risks.

Ethics

Ethics Committee Approval: The study received approval from the Gülhane Scientific Research Ethics Committee of the University of Health Sciences, Türkiye (approval number: 2024-531, dated: 05.11.2024).

Informed Consent: Informed consent was obtained from all participants prior to data collection.

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Footnotes

Authorship Contributions

Concept: F.E.E., B.G.A, Ö.M.Ç., Design: F.E.E., B.G.A, Ö.M.Ç., Data Collection or Processing: F.E.E., Analysis or Interpretation: Ö.M.Ç., Literature Search: F.E.E., B.G.A, Writing: F.E.E., B.G.A, Ö.M.Ç.

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