Acta Kinesiologica 19 (2025) Issue.2
DOI. 10.51371/issn.1840-2976.2025.19.2.3

Original Investigation

The intensity of health behaviors and health satisfaction among physically active paramedics and professional firefighters

Małgorzata Paczyńska-Jędrycka[a,†], Maria Alicja Nowak[a,†], Ahmet Kurtoğlu[b], Michalina Kuska[c], Leonard Nowak[a], Katarzyna Kotarska[a]

[a]Department of Physical Culture and Health, University of Szczecin, Poland
[b]Department of Coaching, Faculty of Sport Science, Bandirma Onyedi Eylul University, Türkiye
[c]Kazimierz Wielki University in Bydgoszcz, Faculty of Health Sciences and Physical Culture, Bydgoszcz, Poland
[†] These authors contributed equally as first author

Purpose: Physical activity positively influences lifestyle changes in society. This study aimed to examine the relationship between the intensity of health behaviours, physical activity, and health satisfaction among paramedics and professional firefighters.
Methods: The study included 172 participants aged 19–50 years. Physically active paramedics (P1) comprised 32.6% of the sample, professional firefighters (F1) 31.4%, non-exercising paramedics (P2) 25%, and non-exercising firefighters (F2) 11%. The standardized Health Behaviour Inventory (HBI) questionnaire and a proprietary questionnaire were used. Both parametric and non-parametric statistical analyses were employed.
Results: Significant differences were found in the intensity of health behaviours (IHB) among the participants within the IHB point score, correct eating habits (CEH), preventive behaviours (PB), positive mental attitude (PMA), and health practices (HP) ($P< .001$ for the F-test in each case; $\omega^2= .65–.74$). The highest overall intensity of health behaviours (IHB) point score (82.54) was observed among physically active paramedics (P1), who also achieved better results in preventive behaviours (PB), positive mental attitude (PMA), and health practices (HP) compared to inactive firefighters (F2) ($P< .001$ for the t-test in each case; $d= .51–.59$). A significant overall variation was confirmed ($P< .001$ for the H-test; $E^2R= .11–.18$, strong effect) between the Health Behaviour Inventory (HBI) and its categories and participants' health satisfaction. The respondents with the highest IHB point scores, correct eating habits (CEH), preventive behaviours (PB), positive mental attitude (PMA), health practices (HP), were more satisfied with their health (D) compared to those with lower health behaviour scores (A, B, C) ($rg= -.40$ to $-.83$).
Conclusions: The demonstrated relationship between the intensity of health behaviours, physical activity and health satisfaction underscores the need to further promote these behaviours to enhance overall quality of life and improve safety in the professional practice of paramedics and firefighters.

Keywords: physical activity, paramedics, firefights, intensity of health behaviours, health satisfaction

Introduction

The primary duty of the state is to ensure the safety of its citizens. This responsibility is fulfilled by various services, including the police, fire department, border guard, military police, and emergency medical services.[1] Officers of the State Fire Service (SFS) and paramedics operate in high-risk environments, exposing themselves to potential harm and experiencing considerable stress.[2-3] According to current Polish legislation, the core professional responsibilities of firefighters (F) and paramedics (P) include identifying hazards, conducting a wide range of rescue operations (such as securing hazardous or accident sites), and providing assistance to victims.[4] To meet the demands of this profession, a holistic approach to health and well-being, including regular physical exercise, is recommended.[5] Higher-intensity exercise improves overall physical fitness and cardiovascular fitness. In this context, chronic exercises have been shown to enhance general health by improving both systolic and diastolic parameters, as well as the mechanical functions of the left atrium.[6]
According to the International Hazard Datasheets on Occupation, both groups are exposed to significant physical exertion (e.g., carrying individuals and rescue equipment), which may lead to musculoskeletal overload. The shift-based work system and extended hours during emergency situations contribute to increased fatigue and psychological stress. Current regulations require professional firefighters to participate in physical training organized by the SFS units. Paramedics, in turn, are obligated to perform their duties in accordance with up-to-date medical knowledge, maintained through continuous professional development.[4] According to the National Classification of Occupations and Specializations,[7] the motor fitness requirement is rated at 3.5 for paramedics[8], and 5.0 for firefighters (on a scale of 0–5).[9] Due to the nature of their rescue operations and the type of the assistance they provide, professional firefighters are expected to maintain a higher level of physical fitness than paramedics. Physical fitness and adequate endurance are fundamental competencies for both professions. The assessment

of physical fitness, as well as physical and psychological abilities, is a key criterion for recruitment into the SFS. According to regulations (if the job demands it), candidates for certain positions may also be required to undergo acrophobia and swimming tests.[10] Professional firefighters are subjected to an endurance test (Beep test) and a physical fitness test, which varies based on age and sex.[11] In contrast, paramedics are not required to participate in fitness or endurance evaluations. The only legal requirement for paramedics under Polish legislation pertains to their health status, confirming they are medically fit for duty. Research indicates that professional firefighters who participate in yoga programs exhibit improved core stability, which may help reduce the risk of injury.[12] A high level of physical fitness enhances firefighters' job performance.[13–14] Physical fitness should be developed regardless of a firefighter's professional status (volunteer or career firefighter).[15] A best practices report outlines key health behaviours for firefighters, including wearing protective clothing during rescue operations, properly donning and removing protective masks, safely storing and disposing of contaminated gear, avoiding eating while in protective clothing, and monitoring personal health.[16] For paramedics, health-related behaviours primarily focus on operating in environments with high exposure to bacteria, viruses, and fungi. Their work is accompanied by substantial stress and psychological tension,[17] which is further exacerbated by the risk of violence (from patients or bystanders). Factors negatively impacting paramedics' performance include high psychophysical strain, general fatigue, and decreased well-being.[18]

Due to the limited number of scientific studies addressing the health behaviours of paramedics and professional firefighters, the aim of our research was to examine the relationship between the intensity of health behaviours, physical activity, and health satisfaction within these professional groups. The following hypotheses were formulated:

Paramedics and professional firefighters who engage in physical activity exhibit a higher intensity of health behaviours.

There is a positive relationship between the intensity of health behaviours and health satisfaction among paramedics and firefighters.

Methods

Participants

The study included only paramedics licensed to provide emergency healthcare services in life-threatening situations. We excluded paramedics performing administrative and office work. The group of State Fire Service (SFS) consisted of professional firefighters, excluding members of Volunteer Fire Brigades. A power analysis conducted for this study, with α= .05, power (1-β)= .80, and an effect size of .27, indicated that a minimum of 171 participants should be included in the study (80.1% real power). The study included 172 participants: 99 paramedics (P) and 73 professional firefighters (F) from northwestern Poland. The majority of participants in both groups were men (77.9%). Participants' age ranged from 19 to 50 years (mean age of 36.30 ± 9.71 years). Most respondents were married (63.5%) and had children (65.5%). In this study, the cut-off point was defined as engaging in or refraining from leisure-time physical activity. A total of 110 participants declared engaging in physical activity, while 62 reported not participating in such activity. The classification of respondents into physically active and inactive (passive) groups was based also on the following information regarding physical exercise: whether the respondent engaged in physical activity during leisure time (yes, no); the type of physical activity (sports discipline, form of exercise); frequency of exercise during the week (daily, Monday to Friday, weekends only); and the duration of a single exercise session (in minutes). Based on the latter two variables, the weekly duration of exercise was calculated by multiplying the number of days per week by the duration of exercise on those days. These results were compared to the recommendations for moderate-intensity aerobic physical activity as outlined by the WHO (for adults at least 150-300 minutes per week).[19]

Written informed consent was obtained from each participant. The study was approved by the local ethics committee and conducted in accordance with the principles of the Declaration of Helsinki.

Data collection

A standardized questionnaire, the Health Behaviour Inventory (HBI),[20] and a proprietary lifestyle questionnaire were used in the study. The Health Behaviour Inventory (HBI) consists of 24 statements describing various health-related behaviours, rated on a 1–5 scale (1 – almost never; 2 – rarely; 3 – occasionally; 4 – frequently; 5 – very frequently). Based on the frequency of these behaviours, the overall intensity of health-promoting behaviours is determined, along with their intensity in four categories: correct eating habits (CEH), preventive behaviours (PB), positive mental attitude (PMA), and health practices (HP). Correct eating habits (CEH) category regards dietary habits and includes the consumption of vegetables, fruits, animal fats, sugars, salt, and whole grain bread. Preventive behaviours (PB) comprise adherence to medical recommendations, preventing colds, knowledge of emergency numbers, and regular medical check-ups. Positive mental attitude (PMA) relates to avoiding excessive emotions, depressive situations, stress, and tension. Health practices (HP) cover aspects such as rest, avoiding overwork, weight control, sleep, and refraining from smoking and excessive exertion. The summed numerical values create an overall intensity of health behaviours index (IHB point score), ranging from 24 to 120 points. Due to the underestimation of reliability by Cronbach's alpha,[20] we used McDonald's omega,[21] which yielded higher reliability coefficients across all categories: IHB (point score): .89; CEH: .84; PB: .68; PMA: .77; and HP: .68. The proprietary lifestyle questionnaire employed in the study (addressing values, motivations, and goals related to physical activity, as well as health-related behaviors) served a supplementary role in assessing the intensity of health behaviors (HBI) among paramedics and professional firefighters. The questionnaire included the respondents' socio-demographic characteristics, such as age, gender, marital status, place of residence, level of education, type of occupation, and financial situation. In addition, the questionnaire incorporated questions concerning health-related behaviors, including: tobacco use (yes/no; if applicable – number of cigarettes smoked per day), alcohol consumption (yes/no; frequency and type of alcoholic beverages consumed), participation in general and specialist medical examinations (whether for preventive purposes or due to necessity, and how frequently), and engagement in physical activity during leisure time (discussed further above). Respondents were also asked to rate their satisfaction with their physical fitness and overall health on a 5-point scale (1 – very dissatisfied; 2 – dissatisfied; 3 – neither satisfied nor dissatisfied; 4 – satisfied; 5 – very satisfied). Due to the small number of individuals who rated their health as 1 (n=4; 2.3% of respondents), the group of individuals who were very dissatisfied (1) and dissatisfied (2) (n=5.8%) was combined and denoted as group A (totaling 8.1%).

Statistical analysis

Depending on the normality of the distribution, both parametric and non-parametric statistics were applied. The one-way analysis of variance (*F*-test) for independent groups (ANOVA) and Student's *t*-test were used. The effect size in ANOVA was expressed using ω^2. For the Student's *t*-test, we used Cohen's *d*, measure of effect size. After examining the normality of distribution (deviating from normal), the Kruskal-Wallis test (*H*) was applied for comparing several independent samples. In the case of determining statistical significance of differences for the comparison of two independent samples, the Mann Whitney (*U*) test was employed. The effect size was calculated for each test: E_2R for the Kruskal-Wallis *H* test, Glass rank biserial correlation (*rg*) for the Mann Whitney *U* test. In qualitative analyses, trait frequency and the chi-square test of independence were used, along with Cramér's V (*CV*) for the χ^2 test. Differences were considered statistically significant at $P< .05$. Statistical calculations were performed using Statistica 13.3 (TIBCO Software INC. 2017), Krakov, Poland.

Results

Physical activity of paramedics and professional firefighters

Four groups were identified: 56 physically active paramedics (P1), accounting for 32.6% of the sample, 54 professional firefighters (F1) comprising 31.4%, 43 physically inactive paramedics (P2), making up 25%, and 19 physically inactive firefighters (F2), representing 11%. In total, 56.6% of paramedics (P1) and 74% of firefighters (F1) engaged in physical activity. The respondents exercised: daily (8.1%); once a week (12.8%); twice a week, and only on Saturdays and Sundays (21.0%); three times a week (13.4%); four times a week (8.7%). In terms of exercise duration, 14.5% exercised for less than 60 minutes per session, 18.6% for 61 to 149 minutes, and 30.8% engaged in physical activity for 150 minutes or more per week. Individuals who do not engage in physical activity constituted 36% of the sample. The preferred forms of physical activity included team sports (32.7%), running (25.5%), fitness workouts (17.3%), cycling (13.6%), swimming (10%), Nordic walking or walking (10%), and combat sports (5.5%). The majority of physically active respondents (P1, F1) were 40 years old or younger, (75% and 74%, respectively) ($P< .01$ for χ^2). Most participants lived in urban areas (70%), whereas physically active firefighters (F1) were more likely to reside in rural areas (46.8%) ($P< .01$ for χ^2). Married individuals were less likely to engage in physical activity ($P< .001$ for χ^2). The majority of respondents had an education level above secondary school (74.4%) ($P< .05$ for χ^2). A slightly higher proportion of firefighters combined their professional work with studying ($P< .001$ for χ^2). Most participants perceived their financial situation as good (55.8%), while over 30% of firefighters and 25.6% of paramedics described it as sufficient ($P< .05$ for χ^2; $CV = .19–.26$).

The intensity of health behaviours in specific categories

The highest mean values for the analysed health behaviours were observed among paramedics who engaged in physical activity (P1) (Figure 1). Better eating habits (CEH) were characteristic of

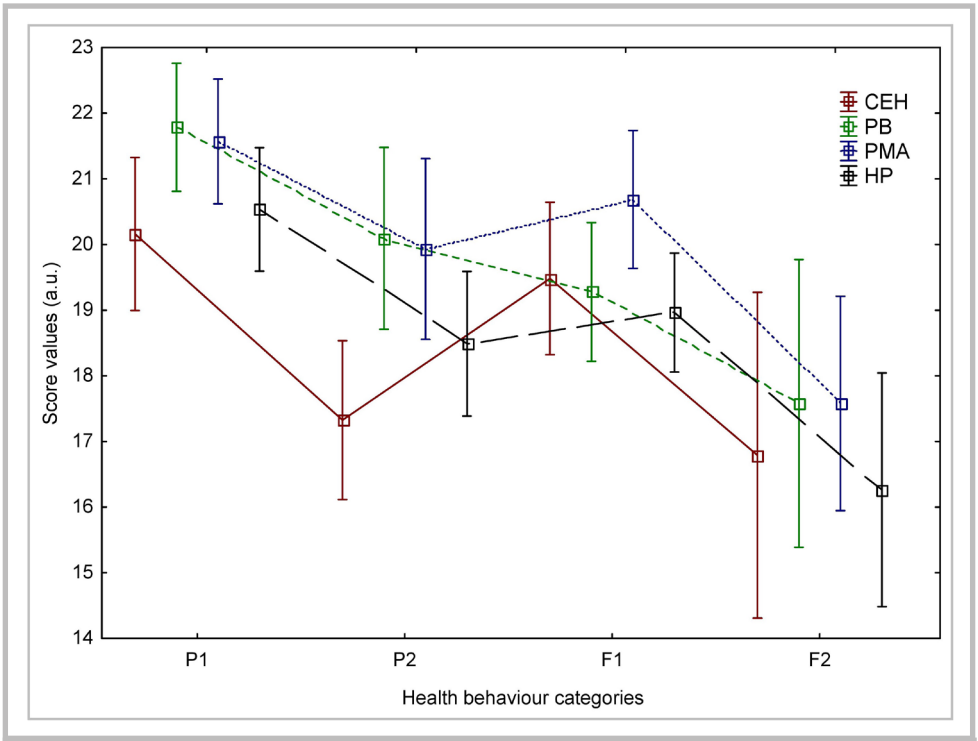

Figure 1. Mean values for the four categories of health behaviours among respondents based on their physical activity.

physically active paramedics (P1) and firefighters (F1) compared to their physically inactive counterparts (P2, F2). In terms of preventive behaviours (PB), physically active paramedics (P1) had the highest mean score (20.16) followed by physically inactive paramedics (P2) (20.09), and both physically active (F1) and inactive firefighters (F2) (19.27 and 17.57, respectively). Higher mean values in positive mental attitude (PMA) and health practices (HP) were recorded among physically active paramedics (P1) compared to active firefighters (F1), who, in turn, had higher mean scores than inactive paramedics and firefighters (P2, F2).

The intensity of health behaviours depending on physical activity

The applied analysis of variance confirmed differences in the intensity of health behaviours based on the presence or absence of physical activity among paramedics (P) and professional

Table 1. Intensity of Health Behaviors Among Paramedics and Firefighters (*F*-test, Student's *t*-test, Cohen's *d*)

HBI and Categories	Physical activity P, F	*P* for the *t*-test			Cohen's *d*			Arithmetic Means
		P2	F1	F2	P2	F1	F2	
IHB (point score) F= 6.94 P< .000 ω^2= .72	P1	.003	.098	<.000	.31	.16	.51	82.54
	P2	-	.082	.137	-	-.18	.21	73.91
	F1	-	-	.003	-	-	.40	78.41
	F2	-	-	-	-	-	-	68.21
CEH F= 5.33 P=. 002 ω^2= .65	P1	.001	.410	.007	.34	.08	.35	20.16
	P2	-	.012	.655	-	-.26	.06	17.32
	F1	-	-	.028	-	-	.29	19.48
	F2	-	-	-	-	-	-	16.78
PB F= 6.44 P< .000 ω^2= .70	P1	.041	.001	<.000	.20	.33	.51	21.78
	P2	-	.340	.048	-	.10	.28	20.09
	F1	-	-	.121	-	-	.20	19.27
	F2	-	-	-	-	-	-	17.57
PMA F= 5.35 P= .002 ω^2= .65	P1	.044	.212	<.000	.20	.12	.57	21.57
	P2	-	.374	.045	-	-.09	.30	19.93
	F1	-	-	.003	-	-	.43	20.68
	F2	-	-	-	-	-	-	17.58
HP F= 7.80 P< .000 ω^2= .74	P1	.005	.018	<.000	.28	.23	.59	20.53
	P2	-	.501	.029	-	-.07	.31	18.48
	F1	-	-	.004	-	-	.38	18.96
	F2	-	-	-	-	-	-	16.26

Explanations of abbreviations: P1 – physically active paramedics, P2 – physically inactive paramedics, F1 – physically active firefighters, F2 – physically inactive firefighters; IHB (point score) – intensity of health behaviors, CEH – correct eating habits, PB – preventive behaviors, PMA – positive mental attitude, HP – health practices.

firefighters (*F*) (Table 1). These differences were observed in the intensity of health behaviours (IHB) point score (F= 6.94; P< .000), correct eating habits (CEH) (F= 5.33; P= *.002*), preventive behaviours (PB) (F= 6.44; P< .000), positive mental attitude (PMA) (F= 5.35; P= .002), and health practices (HP) (F= 7.80; P< .000). The effect size (ω^2) for the *F*-test was very strong (.65–.74). In the overall intensity of health behaviours (IHB) index and its categories, the highest mean values were observed among physically active paramedics (P1). Physically active firefighters (F1) had higher mean scores compared to their physically inactive colleagues (F2). Compared to physically inactive paramedics (P2), physically active firefighters (F1) had higher mean values across all categories except for preventive behaviours.

The overall IHB (point score) was highest for physically active paramedics (P1) and amounted to 82.54 points compared to physically inactive individuals (P2, F2) (P= .003 for *t*-test, d= .31; P< .000 for *t*-test, d= .51, respectively). Similarly, physically active firefighters (F1) had a higher overall score (78.41 points) than physically inactive firefighters (F2) (P= .003 for *t*-test, d= .40). The effect size ranged from moderate to large. Moreover, physically active paramedics (P1) showed more favourable behaviours in the correct eating habits category (CEH) as compared to inactive individuals (P2, F2) (P= .001 for *t*-test; P= .007 for *t*-test, respectively). Smaller differences were observed between groups P2 and F1 (P= .012 for *t*-test), as well as between F1 and F2 (P= .028 for *t*-test). In the preventive behaviours (PB) category, physically active paramedics (P1) scored the highest compared to inactive firefighters (F2) (P< .000 for *t*-test, d= .51). These differences were also found between P1 and F1, as well as P2 and F2, however, with a small effect size. In the positive mental attitude (PMA) category, the highest scores were achieved by physically active individuals (P1, F1). The largest differences were observed between P1 and F2 (P< .000 for *t*-test, d= .57), with smaller differences between P2 and F2 (P= .045) and F1 and F2 (P= .003 for *t*-test), indicating a large to moderate effect size. Regarding the health practices (HP) category, physically active paramedics (P1) scored higher than inactive firefighters (F2) (P< .000 for *t*-test, d= .59), and firefighters from group F1 scored higher than F2 (P= .004). Interestingly, physically inactive paramedics (P2) exhibited slightly more favourable behaviours in HP compared to inactive firefighters (F2) (P= .029 for *t*-test).

The relationship between the intensity of health behaviours

and health satisfaction

A general variation was observed between the intensity of health behaviours, individual categories, and respondents' health satisfaction ($P< .000$ for the H test in each case) (Table 2). The effect size for the H test (E^2R) was strong to very strong (.11-.18). The best results across all Health Behaviour Inventory (HBI) categories were achieved by individuals who were very satisfied (D) or satisfied (C) with their health. The respondents with the highest intensity of health behaviours (IHB) point scores (U test) reported greater health satisfaction (D) compared to those with lower health behaviours who were dissatisfied with their health (A), those who were neither satisfied nor dissatisfied (B), and those who were satisfied (C) ($P< .000$, $rg= -.83$; $P< .000$, $rg= -.74$; $P= .001$, $rg= -.50$, respectively). The effect size was strong to very strong. Individuals satisfied with their health (C), who had better overall intensity of health behaviours (IHB) point scores, exhibited a higher level of satisfaction compared to groups A and B ($P= .007$, $rg= -.44$; $P= .002$, $rg= -.32$, respectively) (moderate effect). The best results in correct eating habits category (CEH) were achieved by individuals most satisfied with their health (D), compared to those who were dissatisfied (A), moderately satisfied (B), or satisfied (C). These differences (U test) were confirmed by strong and moderate effect sizes ($P< .000$, $rg= -.73$; $P< .000$, $rg= -.62$; $P= .012$, $rg= -.38$, respectively). Participants in group C also had better CEH scores compared to groups A and B ($P= .001$, $rg= -.53$; $P= .001$, $rg= -.34$, respectively). Individuals with the highest preventive behaviours (PB) scores were the most satisfied with their health (D) compared to groups A, B, and C ($P= .001$, $rg= -.67$; $P< .000$, $rg= -.64$; $P= .003$, $rg= -.45$, respectively). Participants in group D, who achieved higher positive mental attitude (PMA) scores, reported greater health satisfaction compared to groups A and B ($P= .008$, $rg= -.56$, $P= .001$, $rg= -.52$, respectively). Additionally, group C demonstrated a higher level of health satisfaction than groups A and B ($P= .044$, $rg= -.33$; $P= .001$, $rg= -.33$, respectively). Regarding health practices (HP), the highest health satisfaction was observed in group D compared to groups A, B, and C ($P= .001$, $rg= -.69$; $P< .000$, $rg= -.63$; $P= .008$, $rg= -.40$). The effect size confirmed these differences, with the strongest effects observed between groups A and D, as well as B and D. A moderate effect size was found for the differences between groups A and C, as well as C and B.

Table 2. Intensity of health behaviors and health satisfaction among paramedics and firefighters (H test, E^2R, U test, rg)

HBI and Categories	Health Satisfaction	*P*-value for the *U* test			Glass rank biserial correlation (*rg*)			Mean rank
		Level of satisfaction			Level of satisfaction			
		B	C	D	B	C	D	
IHB (point score) $H(3,172)= 30.73$ $P< .000$ $E^2R= .18$	**A**	.358	.007	<.000	-.16	-.44	-.83	54.39
	B		.002	<.000	-	-.32	-.74	65.66
	C			<.001	-	-	-.50	92.87
	D	-	-	-	-	-	-	133.71
CEH $H(3,172)= 28.10$ $P< .000$ $E^2R= .16$	**A**	.120	.001	<.000	-.27	-.53	-.73	48.32
	B		.001	<.000	-	-.34	-.62	66.70
	C			.012	-	-	-.38	94.99
	D	-	-	-	-	-	-	124.09
PB $H(3,172)= 18.69$ $P< .000$ $E^2R= .109$	**A**	.724	.111	.001	-.06	-.26	-.67	66.75
	B		.039	<.000	-	-.21	-.64	71.28
	C			.003	-	-	-.45	89.38
	D				-	-	-	127.85
PMA $H(3,172)= 18.17$ $P< .000$ $E^2R= .10$	**A**	.979	.044	.008	-.00	-.33	-.56	65.64
	B		.001	.001	-	-.33	-.52	66.17
	C			.084	-	-	-.26	94.30
	D				-	-	-	115.09
HP $H(3,172)= 23.52$ $P< .000$ $E^2R= .13$	**A**	.316	.016	.001	-.17	-.39	-.69	57.61
	B		.003	<.000	-	-.31	-.63	67.45
	C			.008	-	-	-.40	93.07
	D				-	-	-	125.15

Explanations of abbreviations (level of health satisfaction): A - dissatisfied; B - neither satisfied nor dissatisfied; C - satisfied; D - very satisfied

Health satisfaction in relation to physical activity

There was a general variation (H test) in health satisfaction between physically active and inactive individuals [$H(3, N= 172) =19.07$; $E^2_R= .11$, $P< .000$]. Among all respondents, 8.1% were very dissatisfied or dissatisfied with their health (including 4 individuals who were very dissatisfied), 26.8% were neither

satisfied nor dissatisfied, and 65.1% were satisfied or very satisfied. The most satisfied with their health were physically active paramedics (P1) and firefighters (F1), with no differences between these two groups. However, physically active paramedics (P1) reported significantly higher health satisfaction compared to inactive paramedics (P2) and firefighters (F2) (P= .002 for U test, respectively), with a moderate effect size (rg= -.40 to -.42). Other differences showed a weak size effect. Comparisons of health satisfaction and physical activity revealed that a higher proportion of satisfied and very satisfied individuals was found among physically active participants (P1, F1) (40.2%, 33.0%) compared to physically inactive individuals (P2, F2) (17%; 8.9%) (P= .001 for $\chi 2$ test, VC= .27).

Discussion

The aim of the study was to examine the relationship between the intensity of health behaviours and health satisfaction among physically active paramedics and professional firefighters. The majority of respondents reported engaging in physical activity. Notably, 30.8% exercised for more than 150 minutes per week, thereby meeting the World Health Organization (WHO) recommendations, which state that adults aged 18–64 should engage in at least 150–300 minutes of moderate-intensity aerobic physical activity to improve health.[19] Increasing physical activity may have a beneficial impact on preventing coexisting anxiety and depression,[22] and physical fitness levels can improve through movement-based activation during professional training for emergency responders[23]. Owing to their education, paramedics typically possess greater knowledge about health behaviours and strategies to maintain good psychophysical condition. Nevertheless, approximately 50% fail to meet physical activity guidelines and frequently report the occurrence of metabolic disorders and injuries. Non-adherence to physical activity recommendations is associated with several modifiable barriers (lack of willpower, lack of time, social influences, and limited financial resources).[24] Additionally, the shift-based work system of paramedics does not favour regular physical activity.[25] In recent years, there has been a growing number of incidents of aggression toward healthcare professionals. A fatal attack on a paramedic prompted public and professional demands (addressed to the government) for systemic changes in paramedic training. In response, the Regulation of the Minister of Health of August 18, 2023, on the continuing professional development of paramedics,[26] introduced courses aimed at acquiring or enhancing skills in self-defence techniques and the use of physical coercion in threatening situations. Meanwhile, professional firefighters are required to undergo an annual physical fitness assessment until the age of 55.[11] This requirement may serve as an additional motivator to maintain a higher level of physical activity, which was reflected in the greater activity levels observed among firefighters in this study compared to paramedics.

The hypothesis that paramedics and professional firefighters who engage in physical activity demonstrate a higher intensity of health behaviours was partially confirmed. The highest overall intensity of health behaviours (IHB) point score was recorded among physically active paramedics (82.54 points). In previous studies on paramedics, the IHB point score was lower (78.73 points), although those studies did not examine physical activity.[17] In our study, physically active professional firefighters exhibited a lower level of intensity of health behaviours (IHB point score – 78.41 points) compared to paramedics. Within the correct eating habits (CEH) category, physically active paramedics demonstrated slightly more favourable behaviours than their inactive counterparts and firefighters, although these differences were minor. Studies on athletes with 4 to 8 years or more of training experience and who trained daily showed higher levels in both the correct eating habits and health practices categories.[27] Individuals who engaged in physical activity generally paid more attention to proper and regular nutrition and tend to avoid stimulants and drugs.[28] However, challenges related to maintaining proper nutrition among paramedics due to shift work schedules had been previously observed.[29] In the preventive behaviours (PB), positive mental attitude (PMA), and health practices (HP) categories, physically active paramedics predominated, particularly in comparison to physically inactive firefighters.

The hypothesis regarding the relationship between health behaviours and health satisfaction was confirmed. This difference was most evident between individuals who were very satisfied with their health as well as those who were dissatisfied. The highest scores in the overall IHB index, as well as in the correct eating habits, preventive behaviours, positive mental attitude, and health practices categories, were achieved by individuals who were very satisfied or satisfied with their health compared to those with weaker health behaviours and those dissatisfied with their health. Self-assessment of health is influenced by laboratory test results, medical consultations, and feedback from close relatives or caregivers. Engaging in health behaviours contributes to well-being and health satisfaction. Scientific studies indicate that paramedics often demonstrate lower levels of physical activity and poorer health status than the general population, despite the physically demanding nature of their work. [24,29-30]

Practical applications

Paramedics demonstrated a higher intensity of health behaviours, but lower physical activity levels compared to professional firefighters. The intensity of health behaviours was also associated with greater physical activity and health satisfaction among the respondents. Both groups faced the greatest challenge in adhering to proper nutritional guidelines. Physical fitness and endurance are key factors in improving the ability of paramedics and firefighters to perform their duties. Paramedics, who are frequently exposed to aggressive behaviour from patients, particularly support the chance to participate in self-defence training during professional education. Physical fitness levels can be improved through appropriate counselling, movement-based activation programs, and strategies that build motivation. Improving the overall quality of life, promoting positive health behaviours, and increasing physical activity among paramedics and firefighters requires further research, considering factors such as gender, place of residence, family situation, access to sports infrastructure, and the psychophysical demands of their profession.

Conclusions

The results of this study indicate that the majority of paramedics and professional firefighters engaged in physical activity that varied in terms of exercise frequency and duration. However, fewer than one-third of the participants met the World Health Organization's recommended threshold that requires 150 minutes and more of physical activity per week.

Physically active paramedics achieved the highest overall intensity of health behaviours (IHB) point score (82.54 points)

and had better results compared to inactive firefighters in terms of preventive behaviours, positive mental attitude, and health practices. The differences regarding correct eating habits were minimal.

There is a strong relationship between the intensity of health behaviours and the health satisfaction of respondents. Individuals with the highest levels of health behaviours (intensity of health behaviours point score (IHB), correct eating habits (CEH), preventive behaviours (PB), positive mental attitude (PMA), and health practices (HP)) were more likely to indicate that they were very satisfied or satisfied with their health. Physically active paramedics and professional firefighters achieved the highest levels of health satisfaction.

The potential for broad generalizations is somewhat limited by the non-random sample selection. The physical activity of the studied population was assessed using an original questionnaire on lifestyle (values, motives, and goals of physical activity during leisure time, selected health behaviors). In this study, a division was made between physically active and inactive paramedics and professional firefighters, using respondents' declarations regarding participation in physical exercises or lack thereof, specifying the type or form of physical activity, and providing the frequency and duration of exercises per week. These data allowed for the determination of physical activity during leisure time, which is important in the context of lifestyle choices. However, the obtained information does not define the intensity of physical effort undertaken during work by paramedics and professional firefighters. In future studies, it would be advisable to use standardized questionnaires that would enable a comprehensive assessment of physical activity levels, especially considering the physical effort during work undertaken by these professional groups. Future research should focus on examining the relationship between shift work schedules, weekly working hours, the number of shifts, and the ability to engage in physical activity, maintain proper nutrition, health satisfaction, and quality of life. Analysing these factors would provide a broader research perspective.

Acknowledgments

The authors gratefully thank the paramedics and professional firefighters for their cooperation during the study.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Ethical Committee approval

KB 14/21 Institute of Psychology Ethical Committee for Research Projects of the University of Szczecin

ORCID

Małgorzata Paczyńska-Jędrycka ID https://orcid.org/0000-0002-3570-6121
Maria Alicja Nowak ID https://orcid.org/0000-0003-4682-7356
Ahmet Kurtoğlu ID https://orcid.org/0000-0002-9292-5419
Michalina Kuska ID https://orcid.org/0000-0003-3534-2142
Leonard Nowak ID https://orcid.org/0000-0001-8435-2668
Katarzyna Kotarska ID https://orcid.org/0000-0001-5679-3466

Topic

Sport Science

Conflicts of interest

The authors have no conflicts of interest to declare.

Funding

No funding was received for this investigation.

Author-s contribution

Conceptualization, M.A.N. and K.K.; methodology, M.A.N. and M.P-J.; software, M.K.; validation, K.K. and M.K.; formal analysis, M.K. and A.K; investigation, M.P-J. and L.N.; resources, M.P-J., and L.N.; data curation, M.A.N. and A.K.; writing—original draft preparation, M.A.N. and M.P-J.; writing—review and editing, K.K. and A.K.; visualization, M.A.N.; supervision, L.N. and K.K.; project administration, K.K. All authors have read and agreed to the published version of the manuscript.

References

1. Paplicki M, Godziński J. Medical Rescue in the Internal Security System of the State. In: Kocowski T, Raduła M. ed: *General Civil Protection. National Rescue System. Volunteer Fire Brigades.* Wrocław: WUW, 2023:66-81. doi:10.19195/978-83-229-3802-7.5
2. Ogunkoya JO, Imishue OT, Ladele EA, et al. Health Related Quality of Life (HRQoL) among Firefighters in Ogun State, southwest Nigeria. *IOSR-JDMS*. 2021;20(8):24-32. doi: 10.9790/0853-2008042432
3. Armoon B, Hosseini Koukamari P, Rouhani MR, Gharegozloo L, Karimy M, Coetzer-Liversage A. Comparison of Quality of Life and Coping Strategies among Firefighters and Emergency Medical Services Personnel in Saveh, Iran. *New Solut.* 2024;34(2):120-132. doi: 10.1177/10482911241258256
4. The Act of December 1, 2022, on the Profession of Paramedic and the Self-Government of Paramedics. *J. Law.* 2022, item 2705. Accessed January 20, 2025. https://isap.sejm.gov.pl/ 2022
5. Toczko M, Fyock-Martin M, McCrory S, Martin J. Effects of fitness on self-reported physical and mental quality of life in professional firefighters: An exploratory study. *Work*. 2023;76(4):1589-1596. doi: 10.3233/WOR-220673
6. Akgümüş A, Kurtoğlu A, Aydın E, et al. The insufficiency of recreational exercises in improving cardiovascular fitness: An investigation of ventricular systolic and diastolic parameters and left atrial mechanical functions. *BMC Cardiovasc. Disord.* 2023(4);23(1):486. doi: 10.1186/s12872-023-03508-0
7. International Hazard Datasheet on Occupations. Accessed February 16, 2025. http://www.bhportal.pl/10862.html
8. Information on the Paramedic Profession (325601): PROJECT NO: POWR.02.04.00-00-0060/16-00. Warsaw: Ministry of Family, Labour and Social Policy, Department of Labour Market; 2018. Accessed January 23, 2025. http://archiwum.mz.gov.pl ratownik medyczny 325601
9. Information on the Firefighter Profession (541101): PROJECT NO: POWR.02.04.00-00-0060/16-00. Warsaw:

Ministry of Family, Labour and Social Policy, Department of Labour Market; 2018. Accessed January 19, 2025. http://archiwum.mz.gov.pl zawód strażaka 541101
10. Act of August 24, 1991, on the State Fire Service, *J. Law.* 2024, item 1443. Accessed February 6, 2025. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20240000127
11. Regulation of the Minister of the Interior and Administration of March 9, 2018, amending the regulation on the scope, procedure, and frequency of periodic preventive medical examinations and periodic physical fitness assessment of a State Fire Service firefighter: Warsaw, April 5, 2018, *J. Law.* 2018, item 673. Accessed February 19, 2025. https://archiwumbip.mswia.gov.pl/bip/rozporzadzenia-ministr/2018/25728,Dz-U-z-2018-r-poz-673.html
12. Floyd E, Rackelmann S, McQuaide S, Hartogensis W, Mehling W. Yoga for firefighters: Evaluation of a quality improvement program in California fire departments. *J Bodyw Mov Ther.* 2022;32:7-12. doi: 10.1016/j.jbmt.2022.05.019
13. Nayak VR, Babu A, Unnikrishnan R, Babu AS, Krishna HM. Influence of Physical Activity of the Rescuer on Chest Compression Duration and its Effects on Hemodynamics and Fatigue Levels of the Rescuer: A Simulation-based Study. *Indian J Crit Care Med*. 2020;24(6):409-413. doi: 10.5005/jp-journals-10071-23457
14. Ras J, Soteriades ES, Smith DL, Kengne AP, Leach L. Association between physical fitness and musculoskeletal health in firefighters. *Front Physiol*. 2023;14:1210107. doi: 10.3389/fphys.2023.1210107
15. Morris CE, Arnett SW, Winchester LJ. Comparing Physical Fitness in Career vs. Volunteer Firefighters. *J Strength Cond Res*. 2022;36(5):1304-1309. doi: 10.1519/JSC.0000000000003650
16. Minimizing Firefighters' Exposure to Toxic Fire Products. Periodic Best Practices Report. Accessed January 2, 2025. https://iwop.wp.mil.pl/u/articles/atts/2023/4/b
17. Piotrowski A, Makarowski R, Predoiu R, Predoiu A, Boe O. Resilience and Subjectively Experienced Stress Among Paramedics Prior to and During the COVID-19 Pandemic. *Front. Psychol.* 2021;12:664540. doi: 10.3389/fpsyg.2021.664540
18. Hutchinson L, Forshaw MJ, Poole H. Health Behaviours in Ambulance Workers. *JPP*. 2020;12(9):367-375. doi: 10.12968/jpar.2020.12.9.367
19. WHO guidelines on physical activity and sedentary behaviour: Geneva: WHO; 2020. Accessed February 20, 2025. https://www.who.int/publications/i/item/9789240015128
20. Juczyński Z. *Measurement tools in health promotion and psychology.* Laboratory of Psychological Tests. Warsaw: Poland, 2012. Accessed January 13, 2025 https://www.researchgate.net/publication/282417001
21. Raykov T. Estimation of Composite Reliability for Congeneric Measures. *Appl. Psych. Meas*. 1997;21:173–184. doi: 10.1177/01466216970212006
22. Ma R, Romano E, Vancampfort D, Firth J, Stubbs B, Koyanagi A. Association between physical activity and comorbid anxiety/depression in 46 low- and middle-income countries. *J Affect Disord*. 2023;320:544-551. doi: 10.1016/j.jad.2022.10.002
23. Paakkonen H, Ring J, Kettunen J. Physical fitness of paramedic students during vocational training - a follow-up study. *IJP.* 2018;3(1). doi:10.32378/ijp.v3i1.49
24. Supples MW, Rivard MK, Cash RE, Chrzan K, Panchal AR, McGinnis HD. Barriers to Physical Activity Among Emergency Medical Services Professionals. *J Phys Act Health*. 2021,1;18(3):304-309. doi: 10.1123/jpah.2020-0305
25. Meadley B, Perraton L, Smith K, Bonham MP, Bowles KA. Assessment of Cardiometabolic Health, Diet and Physical Activity in Helicopter Rescue Paramedics. *PHEM*. 2021:*26*(3):380–390. doi: 10.1080/10903127.2021.1907492
26. Regulation of the Minister of Health of August 18, 2023, on the continuing professional development of paramedics, *J. Law.* 2023, item 1800. Accessed February 5, 2025. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20230001800
27. Kotarska K, Nowak L, Szark-Eckardt M, Nowak MA. Intensity of Health Behaviors in People Who Practice Combat Sports and Martial Arts. *Int J Environ Res Public Health*. 2019;16(14):2463. doi: 10.3390/ijerph16142463
28. Delisle TT, Werch CE, Wong AH, Bian H, Weiler R. Relationship between frequency and intensity of physical activity and health behaviors of adolescents. *J Sch Health*. 2010;80(3):134-40. doi: 10.1111/j.1746-1561.2009.00477.x
29. Mansouri T, Hostler D, Temple JL, Clemency BM. Eating and Physical Activity Patterns in Day and Night Shift EMS Clinicians. *Prehosp Emerg Care*. 2022;26(5):700-707. doi: 10.1080/10903127.2021.1996662
30. Marszałek A. Ways of maintaining fitness by firefighters – original research results. *Occup Saf Sci Pract*. 2018;(5):8-10. doi: 10.5604/01.3001.0012.0409

Corresponding information:
Received: 23.04.2025.
Accepted: 26.04.2025.
Correspondence to: Prof. Katarzyna Kotarska PhD
University: Department of Physical Culture and Health, University of Szczecin, Al. Piastów 40 B, bud. 6, 71-065 Szczecin, Poland
E-mail: katarzyna.kotarska@usz.edu.pl