

**Physical activity, motivational determinants, and selected health behaviors
among incarcerated men in Polish correctional facilities:
a cross-sectional study**

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Abstract

Background. Physical activity during incarceration may support physical and mental health. This study aimed to assess physical activity levels, motives for engaging in physical activity, and selected health behaviors among incarcerated individuals.

Material and methods. The study included 140 incarcerated men from a semi-open prison (n=90) and a closed prison (n=50). The analysis included 94 participants who reported physical activity during incarceration (58 and 36, respectively). Physical activity, health behaviors, and motivation were assessed using an author-designed questionnaire and the Inventory of Physical Activity Objectives (IPAO).

Results. Gym-based strength training was the most common activity (98.9%), followed by team sports (25.5%), running (20.2%), fitness activities (12.8%), and gymnastics (10.6%). Mean monthly physical activity duration was 23 h 25 min per participant. Daily family contact was more frequent in the semi-open prison (62.1% vs. 13.9%; $p<0.001$), whereas interpersonal conflicts and stress related to future prospects were more frequent in the closed prison ($p=0.001$ and $p=0.010$). No significant differences were found in the IPAO motivational dimensions (all $p>0.05$).

Conclusions. Gym-based strength training predominated, while health, physical fitness, and well-being were the main activity objectives. Prison type differentiated selected psychosocial and health-related factors but not the IPAO motivational dimensions. These findings may inform tailored health-promotion programs.

Keywords: health behaviors, prisoners, physical activity, motivation, mental health

Introduction

Correctional facilities constitute a system of institutions characterized by diverse organizational structures and operational arrangements. They are organized according to their level of security and the types of inmates they are meant to accommodate. Accordingly, correctional facilities are classified as closed, semi-open, or open institutions and may accommodate male or female inmates, as well as adult or juvenile offenders. These facilities differ in terms of security measures, inmates' freedom of movement, and the level of supervision to which they are subjected. Closed prisons are characterized by stricter security regimes, with inmates typically spending only approximately one hour per day outside their cells. This substantially limits opportunities for contact with the outside world, as well as participation in active forms of leisure. In contrast, semi-open and open facilities offer greater

freedom of movement and fewer security restrictions, allowing incarcerated individuals to engage in a wider range of activities [1,2]. Deprivation of liberty involves functioning within conditions governed by specific rules, routines, and daily schedules. Life in a correctional facility is organized around established obligations, such as meals, educational activities, work and other activities resulting from the institution's operational structure. Research indicates that the prison environment, due to spatial restrictions and fixed routines, influences both the level of physical activity and sedentary behaviors among incarcerated individuals. The time available to inmates is spent on various forms of leisure, including passive activities, such as watching television, as well as physical activities that support physical and psychological well-being [3].

According to the World Health Organization (WHO), the amount of physical activity required to maintain health and physical fitness in adults aged 18-64 is 150-300 minutes of moderate-intensity activity or 75-150 minutes of vigorous-intensity activity per week. In addition, resistance training is recommended at least twice per week [4]. The ability to meet these recommendations during incarceration depends on the type of correctional facility. In closed institutions, where freedom of movement is restricted, physical activity is performed primarily within prison cells and consists of bodyweight exercises such as push-ups, squats, and sit-ups. This activity can also be supplemented by walks, which, although brief, constitute an important component of daily movement. Semi-open and open facilities provide greater opportunities to engage in preferred forms of physical activity. Some institutions offer inmates access to sports fields, gyms, or even organized exercise classes, increasing the likelihood of meeting the WHO recommendations for weekly aerobic and strength-training activity [5].

Maintaining health during incarceration is challenging due to limited autonomy and restricted access to health-promoting resources. Limited access to healthcare professionals and diagnostic services means that prevention becomes the primary means of self-care. Physical activity is one of the fundamental components of a healthy lifestyle and plays an important role in maintaining both physical and mental health. It primarily affects the cardiovascular system by improving blood circulation, contributing to lower blood pressure and enhancing the heart's capacity to withstand physical exertion. As a result, it reduces the risk of cardiovascular events and improves overall physical fitness. In addition, physical activity has a positive effect on muscles and joints, alleviating pain by increasing the strength of these structures. Another important reason for maintaining an adequate level of physical activity is its beneficial effect on mental health, which is often one of the first areas adversely affected during incarceration. Physical activity is associated with improved psychological well-being and reduced symptoms of anxiety and depression. Moreover, physical activity creates opportunities for social

interaction, which can reduce feelings of isolation and improve psychological well-being. Physical activity supports both physical and mental health among incarcerated individuals and may facilitate the rehabilitation process [6].

Regardless of the type of correctional facility, the key factor is the inmate's level of engagement. Motivated individuals remain physically active even in limited spaces and without access to exercise equipment by exercising within their cells. In contrast, individuals who do not consider physical activity a priority may not take advantage of available opportunities for exercise, even when gyms or sports fields are accessible.

Aim of the work

The aim of this study was to evaluate the types, duration, and objectives of physical activity, as well as selected health behaviors, among physically active incarcerated men. In addition, the study compared these variables and the motivational dimensions assessed by the Inventory of Physical Activity Objectives (IPAO) between inmates housed in semi-open and closed prisons.

Materials and methods

Study design and participant characteristics

This cross-sectional study was conducted in 2025 among individuals incarcerated in correctional facilities located in south-eastern Poland. The study was carried out in two penitentiary institutions: Dębica Prison (semi-open facility) and the Therapeutic Unit for Male Offenders with Substance Use Disorders (excluding alcohol dependence) at the Rzeszów Prison (closed prison).

A total of 140 incarcerated individuals were enrolled, including 90 inmates from Dębica Prison and 50 from Rzeszów Prison. The participants were recruited on a voluntary basis through announcements posted on notice boards in residential units and were subsequently enrolled after being informed about the study objectives and procedures. Individuals aged 21-49 years who were incarcerated and provided written informed consent to participate were eligible for inclusion in the study. Individuals who declined to participate, failed to complete all study questionnaires, or withdrew from the study before its completion were excluded from the analysis.

Statistical analysis

Statistical analyses were performed on the subgroup of 94 incarcerated men who reported engaging in physical activity, including 58 inmates from the semi-open prison and 36 from the closed prison. Categorical variables are presented as frequencies and percentages. Differences in the distribution of categorical variables between the groups were assessed using Pearson's χ^2 test. When at least one expected cell count was less than 5, Fisher's exact test (for 2×2 contingency tables) or the Fisher-Freeman-Halton exact test (for larger contingency tables) was applied. The strength of associations identified using the χ^2 test was quantified with Cramér's V. IPAO sten scores are presented as means and standard deviations (SD). Owing to the ordinal and discrete nature of the sten scale, comparisons between the two independent groups were performed using the Mann-Whitney U test, with the rank-biserial correlation coefficient reported as the measure of effect size. All statistical tests were two-tailed, and statistical significance was set at $p < 0.05$. All analyses were exploratory in nature.

In calculating the total monthly duration of physical activity, mandatory outdoor walking during prison-yard time was excluded because it could not be clearly classified as voluntary exercise.

Statistical analyses were performed using Statistica version 13.3.

Inventory of Physical Activity Objectives

The Inventory of Physical Activity Objectives (IPAO), developed by M. Lipowski and Z. Zaleski (2015), was used to assess motivational determinants of physical activity. This instrument is designed to evaluate the objectives of engaging in physical activity and their motivational function.

The questionnaire assesses the characteristics of physical activity (including its frequency, volume, and diversity of forms) and the importance assigned to 12 physical activity objectives, rated on a 5-point Likert scale, with higher scores indicating greater importance.

Based on factor analysis, the main dimensions of the motivational function of physical activity objectives were identified, including motivational value, time management, persistence in action, and motivational conflict. The questionnaire also allows for the assessment of the multidimensionality of physical activity objectives.

The obtained scores are converted into sten scores according to the scoring system developed by the authors of the instrument. The IPAQ demonstrates high reliability and good internal consistency (Cronbach's $\alpha=0.78$), confirming its usefulness in research on physical activity.

In the present study, the questionnaire was used to assess the importance of physical activity objectives and the motivational dimensions associated with engaging in physical activity among incarcerated individuals.

Sociodemographic characteristics

The sociodemographic and penitentiary characteristics were assessed using an author-designed questionnaire. The instrument included questions regarding basic demographic information, such as age, gender, height, body weight, educational level, and marital status.

The questionnaire also collected information on participants' life circumstances, including place of residence prior to incarceration, duration of imprisonment, and the type of correctional facility in which the sentence was being served.

In addition, the instrument included questions related to daily habits and functioning, including pre-sleep routines and the occurrence of stressful situations. The collected data were used to provide a general characterization of the study population.

Results

Tables 1-4 present the sociodemographic and penitentiary characteristics, as well as selected health behaviors assessed using the author-developed questionnaire, together with the results of statistical analyses comparing physically active inmates from the semi-open prison ($n=58$) and the closed prison ($n=36$). Table 5 summarizes the primary objectives of physical activity and the importance assigned to each objective by the participants. Table 6 presents the results for the five dimensions of the IPAQ, together with a comparative analysis between the two prison settings.

No significant differences were observed between the groups with respect to age, height, body weight, place of residence prior to incarceration, marital status, educational attainment, or duration of incarceration (all $p>0.05$). In both groups, the largest proportion of participants was aged 29-39 years. Participants with a height of 170-179 cm and those who had lived in urban areas before incarceration also predominated in both prison settings.

A statistically significant difference was observed in the frequency of family contact ($p<0.001$). Daily contact with family members was reported by 62.1% of inmates from the semi-open prison, compared with 13.9% of those from the closed prison. In contrast, inmates housed in the closed prison more frequently reported maintaining contact with their families several times per week, once per week, or several times per month.

The complete sociodemographic and penitentiary characteristics of the study participants are presented in Table 1.

Table 1. Sociodemographic and penitentiary characteristics of physically active inmates according to prison type

Variable	Category	Semi-open prison (n=58), n (%)	Closed prison (n=36), n (%)	Test	<i>p</i>	Cramér's V
Gender	Male	58 (100.0)	36 (100.0)	-	-	-
Age	21-29 years	15 (25.9)	9 (25.0)	$\chi^2=0.075$	0.963	0.028
	29-39 years	29 (50.0)	19 (52.8)			
	39-49 years	14 (24.1)	8 (22.2)			
Height	150-159 cm	0 (0.0)	1 (2.8)	Fisher-Freeman-Halton exact test	0.567	-
	160-169 cm	5 (8.6)	3 (8.3)			
	170-179 cm	26 (44.8)	18 (50.0)			
	180-189 cm	22 (37.9)	13 (36.1)			
	≥190 cm	5 (8.6)	1 (2.8)			
Body weight	60-69 kg	4 (6.9)	8 (22.2)	Fisher-Freeman-Halton exact test	0.109	-
	70-79 kg	16 (27.6)	12 (33.3)			
	80-89 kg	22 (37.9)	9 (25.0)			
	≥90 kg	16 (27.6)	7 (19.4)			
Place of residence	Urban area	44 (75.9)	29 (80.6)	$\chi^2=0.282$	0.595	0.055
	Rural area	14 (24.1)	7 (19.4)			
Marital status	Single	43 (74.1)	24 (66.7)	Fisher-Freeman-Halton exact test	0.503	-
	Married	7 (12.1)	8 (22.2)			
	Separated	2 (3.4)	3 (8.3)			
	Divorced	5 (8.6)	0 (0.0)			
	Widowed	1 (1.7)	1 (2.8)			
Education level	Primary Education	6 (10.3)	7 (19.4)	Fisher-Freeman-Halton exact test	0.364	-
	Lower secondary education	19 (32.8)	6 (16.7)			
	Vocational education	15 (25.9)	13 (36.1)			
	Secondary or incomplete secondary education	14 (24.1)	10 (27.8)			
	Bachelor's degree	2 (3.4)	0 (0.0)			
	Master's degree	2 (3.4)	0 (0.0)			

	or incomplete higher education					
Duration of incarceration	Less than 6 months	7 (12.1)	1 (2.8)	Fisher-Freeman-Halton exact test	0.083	-
	6 months-1 year	12 (20.7)	3 (8.3)			
	1-3 years	17 (29.3)	12 (33.3)			
	3-5 years	10 (17.2)	10 (27.8)			
	5-10 years	7 (12.1)	8 (22.2)			
	More than 10 years	5 (8.6)	2 (5.6)			
Family contact	Daily	36 (62.1)	5 (13.9)	Fisher-Freeman-Halton exact test	<0.001	-
	Several times a week	15 (25.9)	16 (44.4)			
	Once a week	0 (0.0)	6 (16.7)			
	Several times a month	3 (5.2)	6 (16.7)			
	Less than once a month	3 (5.2)	3 (8.3)			
	No contact	1 (1.7)	0 (0.0)			

Notes: χ^2 – Pearson's chi-square test; p – statistical significance level; V – Cramér's V; Fisher-Freeman-Halton exact test – exact test for contingency tables larger than 2×2 ; n – number of participants; % – percentage within the study group. No statistical analysis was performed for gender because all the study participants were male.

No statistically significant differences were observed between the groups with respect to cigarette smoking, coffee or tea consumption, or the use of pharmacological treatment. Cigarette smoking was reported by 69.0% of inmates from the semi-open prison and 55.6% of those from the closed prison ($\chi^2=1.730$; $p=0.188$).

Coffee or tea consumption was reported by the vast majority of participants in both groups, including 96.6% of inmates from the semi-open prison and 86.1% of those from the closed prison. The difference was not statistically significant ($p=0.102$). Pharmacological treatment was used by 19.0% of participants from the semi-open prison and 33.3% of those from the closed prison; however, this difference also did not reach statistical significance ($\chi^2=2.481$; $p=0.115$).

Detailed data on health behaviors and lifestyle characteristics are presented in Table 2.

Table 2. Health behaviors and lifestyle characteristics of physically active incarcerated men according to prison type

Variable	Response	Semi-open prison (n=58), n (%)	Closed prison (n=36), n (%)	Test	p	Cramér's V
Smoking cigarettes	No	18 (31.0)	16 (44.4)	$\chi^2=1.730$	0.188	0.136
	Yes	40 (69.0)	20 (55.6)			

Coffee or tea consumption	No	2 (3.4)	5 (13.9)	Fisher's exact test	0.102	-
	Yes	56 (96.6)	31 (86.1)			
Pharmacological treatment	No	47 (81.0)	24 (66.7)	$\chi^2=2.481$	0.115	0.162
	Yes	11 (19.0)	12 (33.3)			

Notes: χ^2 – Pearson's chi-square test; p – statistical significance level; V – Cramér's V ; Fisher's exact test (2×2); n – number of participants; % – percentage within the study group. Owing to the small number of participants who did not consume coffee or tea, Fisher's exact test was used to analyze this variable.

The most commonly reported bedtime routine in both groups was ventilating the room, which was reported by 67.2% of inmates from the semi-open prison and 58.3% of those from the closed prison. Avoiding caffeine- and theine-containing beverages before bedtime was reported by 50.0% and 55.6% of participants, respectively. No statistically significant differences between the groups were observed for these behaviors.

Compared with inmates from the semi-open prison, those housed in the closed prison were significantly more likely to report avoiding vigorous physical activity before bedtime (36.1% vs. 13.8%, respectively; $\chi^2=6.377$; $p=0.012$; $V=0.260$). Avoiding television viewing before bedtime was reported more frequently by inmates from the closed prison than by those from the semi-open prison (33.3% vs. 12.1%, respectively; $\chi^2=6.228$; $p=0.013$; $V=0.257$).

Relaxation techniques were used by 38.9% of inmates from the closed prison and 12.1% of those from the semi-open prison. This difference was statistically significant ($\chi^2=9.209$; $p=0.002$; $V=0.313$) and corresponded to a moderate effect size. No statistically significant differences were observed for the remaining bedtime routines.

Detailed data on bedtime routines and activities before sleep are presented in Table 3.

Table 3. Bedtime routines and activities among physically active incarcerated men according to prison type

Variable	Semi-open prison (n=58), n (%)	Closed prison (n=36), n (%)	Test	p	Cramér's V
Avoid consuming caffeine and theine (coffee and tea)	29 (50.0)	20 (55.6)	$\chi^2=0.275$	0.600	0.054
Avoid smoking cigarettes	22 (37.9)	14 (38.9)	$\chi^2=0.009$	0.926	0.010
Limit food intake	16 (27.6)	16 (44.4)	$\chi^2=2.812$	0.094	0.173
Avoid vigorous physical activity	8 (13.8)	13 (36.1)	$\chi^2=6.377$	0.012	0.260
Avoid watching television	7 (12.1)	12 (33.3)	$\chi^2=6.228$	0.013	0.257

Ventilate the cell	39 (67.2)	21 (58.3)	$\chi^2=0.763$	0.382	0.090
Use relaxation techniques (e.g., meditation, reading)	7 (12.1)	14 (38.9)	$\chi^2=9.209$	0.002	0.313
Use natural calming remedies (e.g. lemon balm)	4 (6.9)	7 (19.4)	Fisher's exact test	0.098	-
Other	5 (8.6)	1 (2.8)	Fisher's exact test	0.401	-

Notes: χ^2 – Pearson's chi-square test; p – statistical significance level; V – Cramér's V ; Fisher's exact test (2×2); n – number of participants; % – percentage within the study group. The question regarding bedtime routines allowed multiple responses; therefore, each response was analyzed as a separate dichotomous variable (selected vs. not selected).

The most frequently reported stressor in both groups was social isolation associated with incarceration. This factor was reported by 60.3% of inmates from the semi-open prison and 72.2% of those from the closed prison. However, the difference was not statistically significant ($\chi^2=1.375$; $p=0.241$). Lack of privacy was reported by 51.7% and 66.7% of the participants, respectively, whereas family-related issues were reported by 46.6% and 58.3%; neither difference reached statistical significance.

Inmates from the closed prison were significantly more likely to identify interpersonal conflicts as a stressor affecting sleep quality than those from the semi-open prison. This factor was reported by 36.1% of the participants from the closed prison compared with 8.6% of those from the semi-open prison ($\chi^2=10.843$; $p=0.001$; $V=0.340$), indicating a moderate strength of association.

Stress related to future prospects was reported by 50.0% of inmates from the closed prison and 24.1% of those from the semi-open prison. This difference was statistically significant ($\chi^2=6.617$; $p=0.010$; $V=0.265$). Higher proportions of inmates from the closed prison also reported procedural matters and adherence to a structured daily routine as stressors affecting sleep quality; however, these differences did not reach statistical significance.

Detailed data on stressors affecting sleep quality are presented in Table 4.

Table 4. Stressors affecting sleep quality among physically active incarcerated men according to prison type

Variable	Semi-open prison (n=58), n (%)	Closed prison (n=36), n (%)	Test	p	Cramér's V
Social isolation/imprisonment	35 (60.3)	26 (72.2)	$\chi^2=1.375$	0.241	0.121
Legal proceedings	17 (29.3)	17 (47.2)	$\chi^2=3.087$	0.079	0.181

Lack of privacy	30 (51.7)	24 (66.7)	$\chi^2=2.029$	0.154	0.147
Adherence to a fixed daily routine	5 (8.6)	8 (22.2)	Fisher's exact test	0.074	-
Family-related issues	27 (46.6)	21 (58.3)	$\chi^2=1.234$	0.267	0.115
Interpersonal conflicts	5 (8.6)	13 (36.1)	$\chi^2=10.843$	0.001	0.340
Stress related to future prospects	14 (24.1)	18 (50.0)	$\chi^2=6.617$	0.010	0.265
Other	3 (5.2)	4 (11.1)	Fisher's exact test	0.422	-

Notes: χ^2 – Pearson's chi-square test; p – statistical significance level; V – Cramér's V; Fisher's exact test (2×2); n – number of participants; % – percentage within the study group. The question regarding stressors affecting sleep quality allowed multiple responses; therefore, each response was analyzed as a separate dichotomous variable (selected vs. not selected).

The most frequently reported form of physical activity was gym-based strength training, which was undertaken by 93 participants (98.9%). Team sports were reported by 24 inmates (25.5%), running by 19 (20.2%), fitness activities by 12 (12.8%), and gymnastics by 10 (10.6%). Other forms of physical activity were reported by one participant (1.1%).

The distribution of physical activity types, based on the number of responses provided by the participants, is presented in Figure 1.

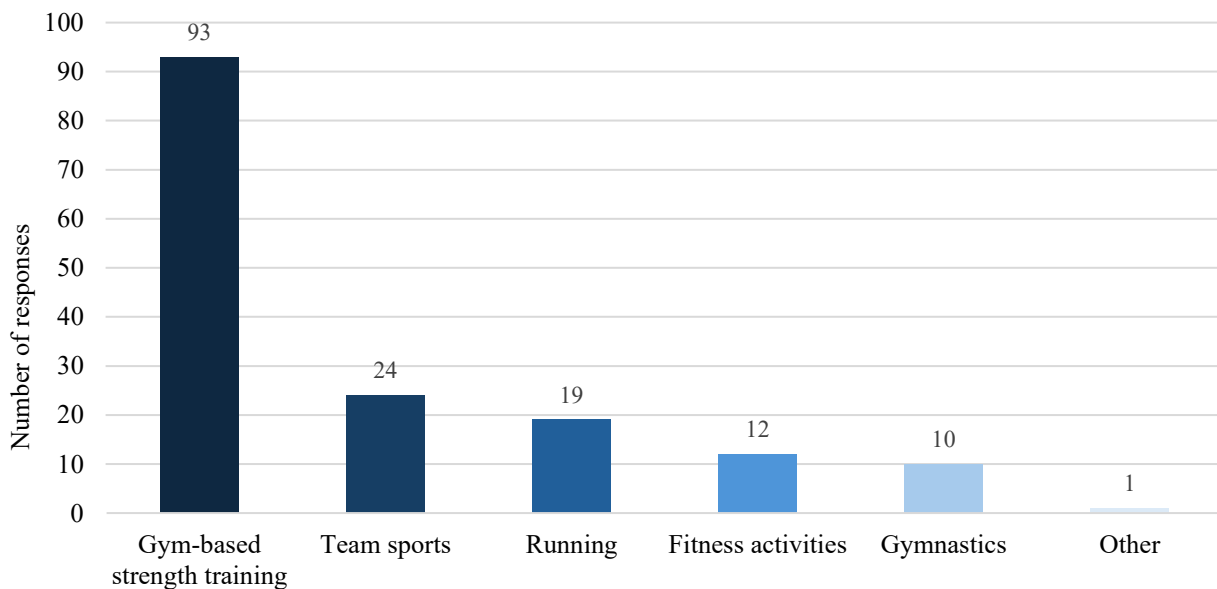


Figure 1. Types of physical activity performed by the participants during the previous month

Among physically active participants, the mean monthly duration of physical activity was 23 hours and 25 minutes per person. Among participants who engaged in specific types of physical activity, the greatest amount of time was devoted to gym-based strength training,

with a mean monthly duration of 13 hours and 39 minutes. The mean monthly duration of running and team sports was 9 hours and 16 minutes and 9 hours and 14 minutes, respectively. Participants who engaged in fitness activities devoted a mean of 6 hours and 45 minutes per month to this form of physical activity, whereas those performing gymnastics spent an average of 7 hours and 9 minutes per month.

The mean monthly duration of each type of physical activity among participants who reported engaging in that activity is presented in Figure 2.

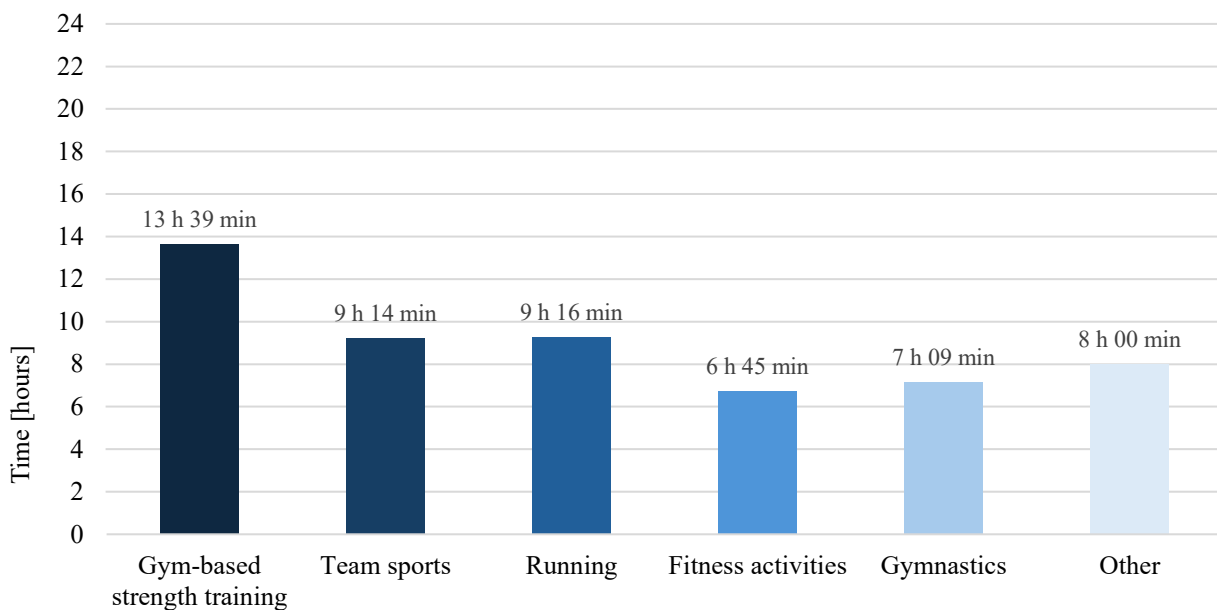


Figure 2. Mean monthly duration of each type of physical activity among participants who reported engaging in that activity

The most frequently indicated objective of physical activity among the 94 participants was health (maintaining normal blood pressure, cholesterol levels, etc.), which was selected by 26 individuals. The objective that was not selected by any participant was promoting physical activity through setting an example by one's own behavior.

In addition to identifying a single primary objective of physical activity, all participants also rated the importance of each physical activity objective using a five-point Likert scale, with a score of 5 indicating the highest level of importance. In this part of the analysis, the highest number of maximum ratings (score = 5) was assigned to well-being (52 participants), followed by stress relief (46 participants), physical fitness and good physical condition, and escape from everyday life (42 participants each). By comparison, the objective of maintaining health received the highest rating from 36 participants.

It should be noted that selecting a single primary objective of physical activity and rating the importance of all objectives represent two distinct approaches to assessing motivation; therefore, the resulting rankings of physical activity objectives are not necessarily expected to be identical.

Selection of the primary physical activity objective and importance ratings assigned to individual objectives are presented in Table 5.

Table 5. Selection of the primary physical activity objective and importance ratings assigned to individual objectives

No.	Physical activity objectives	Primary objective (n)	5	4	3	2	1
1	Health (normal blood pressure, cholesterol levels, etc.)	26	36	35	18	3	2
2	Physical fitness and good physical condition	24	42	31	17	3	1
3	Social interaction	2	15	22	32	13	12
4	Attractive physique (appearance, body shape, and muscle tone)	4	29	28	28	4	5
5	Well-being	19	52	26	14	1	1
6	Being physically active ("fit") in line with current trends	5	14	14	36	13	17
7	Enhancing self-esteem and gaining recognition from others	2	11	11	35	19	18
8	Enjoyment of physical activity	7	38	32	18	4	2
9	Escape from everyday life	3	42	20	24	3	5
10	Stress relief	1	46	27	14	4	3
11	Satisfying the need for movement	1	35	29	24	4	2
12	Promoting physical activity by setting an example through one's own behavior	0	16	22	32	14	10
13	Other:	0	0	0	0	0	0

Raw scores derived from participants' responses to Questions 15 and 16 of the questionnaire were converted into sten scores and interpreted according to the normative values established for the IPAO.

No statistically significant differences were observed between physically active inmates from the semi-open and closed prisons in any of the five IPAO dimensions. Mean scores for the

motivational value dimension were comparable between the groups, reaching 4.66 ± 1.70 sten in the semi-open prison and 4.89 ± 1.53 sten in the closed prison ($U=959.5$; $p=0.506$; $r_{rb}=-0.081$).

Similarly, nearly identical results were observed for the time management and persistence dimensions. The largest between-group difference was found for motivational conflict, with a higher mean score among inmates from the semi-open prison than among those from the closed prison (5.79 ± 2.06 vs. 5.19 ± 1.83 sten, respectively). However, this difference did not reach statistical significance ($U=1221.0$; $p=0.162$; $r_{rb}=0.170$).

Across the entire study sample, the highest mean scores were observed for multidimensionality of objectives (5.57 ± 1.86 sten) and motivational conflict (5.56 ± 1.99 sten), whereas the lowest mean score was recorded for persistence (3.29 ± 1.81 sten). These findings indicate that prison type did not significantly differentiate the motivational dimensions of physical activity among inmates who reported engaging in physical activity.

The sten scores for the individual IPAO dimensions and the results of the comparative analyses between the semi-open and closed prisons are presented in Table 6.

Table 6. Comparison of IPAO sten scores between physically active incarcerated men from semi-open and closed prisons

Objective dimension	Entire study sample (n=94), M $\pm$ SD	Semi-open prison (n=58), M $\pm$ SD	Closed prison (n=36), M $\pm$ SD	U	p	r _{rb}
Motivational value	4.74 $\pm$ 1.63	4.66 $\pm$ 1.70	4.89 $\pm$ 1.53	959.5	0.506	-0.081
Time management	3.94 $\pm$ 1.54	3.95 $\pm$ 1.63	3.92 $\pm$ 1.42	1063.5	0.880	0.019
Persistence in action	3.29 $\pm$ 1.81	3.28 $\pm$ 1.87	3.31 $\pm$ 1.74	1040.0	0.978	-0.004
Motivational conflict	5.56 $\pm$ 1.99	5.79 $\pm$ 2.06	5.19 $\pm$ 1.83	1221.0	0.162	0.170
Multidimensionality of objectives	5.57 $\pm$ 1.86	5.45 $\pm$ 1.75	5.78 $\pm$ 2.03	921.0	0.334	-0.118

Notes: IPAO – Inventory of Physical Activity Objectives; M – arithmetic mean; SD – standard deviation; U – Mann-Whitney U test statistic; r_{rb} – rank-biserial correlation coefficient (effect size measure). Individual sten scores were used in the analyses. Owing to the ordinal and discrete nature of the sten scale, differences between the two independent groups were assessed using the two-sided Mann-Whitney U test.

Discussion

The placement of an offender in a correctional facility is intended not only to impose a penalty for committed offences but, above all, to facilitate the rehabilitation process aimed at modifying individual attitudes and behaviors. The essence of penitentiary interventions is to create conditions that encourage reflection on past actions and promote the constructive use of time spent in incarceration to support social reintegration.

Individuals who come into conflict with the law have often experienced numerous adverse social circumstances throughout their lives, including violence, neglect, poverty, and other forms of trauma. In addition, criminal proceedings and imprisonment constitute significant sources of psychological stress and contribute to social isolation and reduced individual autonomy [7,8].

Many incarcerated individuals come from environments characterized by limited social and emotional support, which increases the risk of mental health problems. Conditions within correctional facilities can further reinforce or exacerbate the effects of previous traumatic experiences [7,9]. A study conducted by Ansah et al. [10] demonstrated that the specific conditions of high-security prisons are associated with higher levels of stress among inmates. The authors also noted that prisoners employ various coping strategies to manage stress, including physical exercise and social interactions with fellow inmates and family members [10].

Sleep-related problems are a common physiological response to stress [11]. Prisoners are exposed to multiple environmental and psychological factors associated with poor sleep quality. Research conducted in correctional settings indicates that insomnia and other sleep disorders are common health problems among incarcerated individuals. Sleep difficulties may result from both environmental conditions within correctional facilities, such as noise, lighting, and inadequate living conditions, as well as psychological factors related to isolation, stress, and concerns about personal safety [12,13].

Prison conditions are generally not conducive to good sleep hygiene. Rest periods in correctional facilities are regulated by fixed wake-up and lights-out schedules that do not reflect inmates' individual sleep preferences, thereby contributing to fatigue. Moreover, overcrowding and noise commonly observed in correctional settings impair sleep quality and negatively affect recovery and daytime functioning [14].

Comparative analyses revealed significant differences in the psychosocial conditions of incarcerated individuals. Daily contact with family members was reported considerably more

often by inmates housed in the semi-open prison than by those in the closed prison. Stronger family ties may constitute an important protective factor that facilitates adaptation to the conditions of incarceration and helps reduce perceived stress. Previous research has demonstrated that maintaining family relationships is associated with better psychological functioning and may reduce the risk of reoffending following release from prison [15]. In contrast, inmates from the closed prison more frequently identified interpersonal conflicts and concerns about their future as factors adversely affecting sleep quality. These findings may reflect the greater psychosocial burden associated with functioning in a more restrictive correctional environment. However, given the cross-sectional design of the present study, no causal inferences can be drawn.

The findings of the present study indicate that the main factors reported by the participants as negatively affecting sleep quality were isolation, lack of privacy, and difficult family circumstances. An important factor directly influencing sleep is the evening routine. Survey results showed that more than 90% of the participants consumed beverages containing caffeine or theine during the day, whereas only 52% avoided consuming them before bedtime, which may have a significant impact on sleep quality. Evidence from literature suggests that caffeine should ideally be consumed 8-13 hours before sleep, depending on the dose [16].

In the present study, gym-based strength training was the most frequently reported form of physical activity, indicated by 93 of the 94 participants. A similar importance of informal forms of physical activity, including strength training, was highlighted by Hilpisch et al., who noted that, due to their accessibility in correctional settings, such activities are important for maintaining the health and well-being of incarcerated individuals [17]. The predominance of gym-based strength training may be attributed to its easy accessibility within the prison environment, minimal equipment requirements, and the possibility of performing exercises in prison cells, as well as during outdoor recreation periods or in prison gym facilities.

Systematic reviews indicate that regular physical activity undertaken during incarceration is associated with improvements in physical fitness, mental health, and quality of life among incarcerated individuals. Beneficial effects have been reported following both structured exercise programs and regular recreational physical activity [18]. In the present study, the mean total duration of physical activity was 23 hours and 25 minutes per month, corresponding to approximately 47 minutes per day. This value was lower than that reported by Camplain et al., who, based on time-use diaries, estimated the average daily duration of physical activity among incarcerated individuals to be approximately 139 minutes [19]. However, direct comparison of these findings should be interpreted with caution because of differences in the

definition of physical activity, the characteristics of the correctional facilities, and the methods used to collect the data. In the present study, the duration of physical activity was assessed by self-report, which may have been subject to recall bias and inaccuracies in estimating activity time.

The most frequently reported objective for engaging in physical activity was health (maintaining normal blood pressure, cholesterol levels, etc.), which was indicated by 26 participants. This finding is consistent with the results reported by Hilpisch et al. [17], who demonstrated that regular physical activity among incarcerated individuals is associated with better physical, mental, and social health. These findings suggest that the health-related dimension of physical activity remains one of its most important aspects in correctional settings [17].

When interpreting the results of the IPAO, it is worth comparing them with findings obtained in other social groups. Using the same research instrument among physiotherapy and law students, Jankowska et al. found no significant differences between the groups in terms of motivational value (3.84 ± 4 vs. 3.57 ± 4 ; $p=0.18$), time management (3.00 ± 3 vs. 2.87 ± 3 ; $p=0.35$), persistence in action (2.56 ± 3 vs. 2.52 ± 2 ; $p=0.65$), or motivational conflict (3.30 ± 3 vs. 3.25 ± 3 ; $p=0.77$) [20].

Among the five IPAO dimensions, the highest mean scores were observed for multidimensionality of objectives (5.57 ± 1.86) and motivational conflict (5.56 ± 1.99). However, according to the interpretation of the sten scale, both scores fell within the average range. The score for multidimensionality of objectives suggests that physical activity among incarcerated individuals serves multiple functions and extends beyond health-related purposes. It may also represent a strategy for coping with psychological burden, facilitate adaptation to the conditions of incarceration, and help satisfy social and emotional needs. At the same time, the score for motivational conflict may indicate that the pursuit of physical activity-related objectives is partially constrained by competing responsibilities, institutional restrictions, or other goals associated with functioning within the correctional setting.

The lowest mean sten scores were observed for persistence (3.29 ± 1.81) and time management (3.94 ± 1.54). These findings may reflect difficulties in maintaining regular physical activity and incorporating it as a consistent component of daily life. The motivational value dimension reached a mean score of 4.74 ± 1.63 , indicating a moderate level of motivational significance of physical activity in the study population. Overall, the findings suggest that although participants recognized the benefits of physical activity, regular engagement may be limited by organizational constraints and the presence of motivational conflicts.

The absence of significant differences between prison types suggests that the motivational significance of physical activity may be relatively independent of the security level of the correctional facility. Despite differences in organizational conditions, inmates exhibited similar motivational profiles, indicating that engagement in physical activity may be driven primarily by individual health-related and psychological needs rather than by institutional characteristics.

Unlike previous studies, the present study examined the motivational determinants of physical activity among incarcerated individuals. The use of the IPAQ enabled a multidimensional assessment of the importance assigned to different physical activity objectives, thereby providing valuable complementary evidence to previous research, which has focused primarily on the level of physical activity or its effects on health.

Camplain et al. demonstrated that the daily functioning of incarcerated individuals is characterized by a predominance of sedentary behavior, while opportunities for engaging in physical activity are limited and dependent on institutional organization [19]. These findings are consistent with those of the present study, in which physical activity was undertaken by the majority of incarcerated individuals but was not always performed in a planned and regular manner. Furthermore, the results may suggest that implementing more structured physical activity programs within correctional settings may provide additional benefits. However, the effectiveness of such interventions should be confirmed in future intervention studies.

Conditions of incarceration contribute to reduced levels of daily movement and increased sedentary behavior. However, studies conducted among incarcerated populations indicate that the implementation of structured sports programs can increase participation in moderate- and vigorous-intensity physical activity during organized sessions. This emphasizes the importance of providing regular opportunities for physical activity within correctional facilities [21]. The present findings also have important practical implications. They suggest that the planning and development of physical activity programs in correctional facilities should take into account not only the provision of adequate sports infrastructure but also interventions aimed at strengthening intrinsic motivation, promoting regular participation, and improving health education. One potential approach may involve implementing programs delivered by qualified exercise instructors or physiotherapists. However, the effectiveness of such interventions should be confirmed in future intervention studies [18].

The present findings provide a foundation for future research on the psychosocial determinants of physical activity among incarcerated individuals, including studies conducted across different types of correctional facilities and incorporating longer follow-up periods.

Study limitations

This study has several limitations. It was based on a non-random sample of volunteers and included only participants who reported engaging in physical activity; therefore, the findings cannot be generalized to all incarcerated individuals. Physical activity was assessed using self-reported measures, which may be subject to recall and social desirability bias. Furthermore, only two correctional facilities were included, and prison type was confounded with study site. Participants from the closed prison were recruited from a therapeutic unit for male offenders with substance use disorders other than alcohol dependence. Consequently, the observed differences cannot be attributed solely to prison security level and should be interpreted cautiously. Future studies should include more diverse prison populations and use longitudinal designs and objective measures of physical activity.

Despite these limitations, this study is one of the few Polish studies to have employed the standardized IPAQ in a population of incarcerated individuals.

Practical implications of the study

The findings highlight the important role of physical activity in the functioning of incarcerated individuals and provide a basis for the development of programs supporting health promotion and rehabilitation in correctional settings. Increasing access to organized forms of physical activity tailored to inmates' preferences may be considered in correctional settings.

The results suggest that educational and motivational programs aimed at improving the regularity and planning of physical activity may be beneficial and warrant evaluation in future intervention studies. Furthermore, stress reduction and improved well-being were among the most important objectives associated with physical activity.

The integration of physical activity into rehabilitation programs may represent a promising direction for future research and practical application. However, the effectiveness of this approach should be established through intervention studies.

Conclusions

1. Among incarcerated individuals who engaged in physical activity, the most common forms were gym-based strength training (98.9%), team sports (25.5%), and running (20.2%).
2. Among the 94 physically active participants, the mean total duration of physical activity was 23 hours and 25 minutes per person per month.
3. The primary objectives of physical activity reported by the participants were maintaining health, maintaining physical fitness, and enhancing well-being.
4. Inmates from the semi-open prison more frequently reported daily contact with their families, whereas those from the closed prison more often identified interpersonal conflicts and concerns about their future as factors affecting sleep quality.
5. Prison type was not significantly associated with motivational value, time management, persistence, motivational conflict, or multidimensionality of physical activity objectives.
6. The findings may support the development of structured physical activity programs in correctional facilities. However, their effectiveness should be evaluated in future intervention studies.

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Artificial intelligence (AI) was not used in the creation of the manuscript.

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