Physical activity patterns in Jordanian and Hungarian women: a comparative study of physical activity domains & levels

Patrones de actividad física en mujeres jordanas y húngaras: un estudio comparativo de los ámbitos y niveles de actividad física

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Abstract

Introduction: Physical inactivity is a major global public health concern, with women consistently reporting lower activity levels than men. Beyond total activity volume, examining domains of activity—leisure, transportation, occupational, and domestic—is essential, as participation patterns are strongly shaped by socio-cultural influences.
Objective: This study was to compare total physical activity levels and domain-specific activity patterns among women in Jordan and Hungary.
Methodology: A cross-sectional comparative study was conducted involving 800 adult women aged 18–45 years (Jordan: n = 399; Hungary: n = 401) residing in Amman and Budapest. Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ). Total physical activity was expressed as MET-minutes/week and classified into low, moderate, or high levels. Non-parametric statistical tests (Mann–Whitney U and Chi-Square) were applied to examine differences in activity levels and domain-specific participation between groups.
Results: Hungarian women demonstrated significantly higher total physical activity than Jordanian women (median MET-minutes/week: 918.0 vs. 464.3; $p < .001$) and were more likely to meet health-enhancing physical activity (HEPA) recommendations. Nearly two-thirds of Jordanian women were classified as having low activity levels. Clear domain-specific differences were observed: Hungarian women accumulated activity mainly through leisure-time (91.8%) and active transportation (58.9%), whereas Jordanian women relied on occupational (69.9%) and domestic activities (30.3) ($p \leq .001$ for all comparisons).
Conclusions: Marked cross-cultural differences exist in both the level and domains of physical activity among women in Jordan and Hungary, highlighting the need for culturally and contextually tailored public health interventions rather than universal approaches.

Keywords

Cross-cultural comparison; Jordan and Hungary; physical activity domains; women's health.

Resumen

Introducción. La inactividad física representa un importante problema de salud pública a nivel mundial, y las mujeres presentan sistemáticamente niveles de actividad más bajos que los hombres. Más allá del volumen total de actividad física, es esencial analizar los dominios en los que esta se desarrolla —ocio, transporte, ocupacional y doméstico—, ya que los patrones de participación están fuertemente condicionados por factores socioculturales.
Objetivo. Comparar los niveles totales de actividad física y los patrones específicos por dominio entre mujeres adultas de Jordania y Hungría.
Metodología. Se realizó un estudio comparativo transversal con 800 mujeres de entre 18 y 45 años (Jordania: n = 399; Hungría: n = 401) residentes en Amán y Budapest. La actividad física se evaluó mediante el Cuestionario Internacional de Actividad Física (IPAQ). La actividad total se expresó en minutos MET por semana y se clasificó en niveles bajo, moderado y alto. Para el análisis de las diferencias entre grupos se utilizaron pruebas estadísticas no paramétricas (U de Mann-Whitney y Chi-cuadrado).
Resultados. Las mujeres húngaras mostraron niveles significativamente más altos de actividad física total que las mujeres jordanas (mediana de MET-min/semana: 918,0 vs. 464,3; $p < 0,001$) y una mayor adherencia a las recomendaciones de actividad física para la salud. Casi dos tercios de las mujeres jordanas se clasificaron en el nivel bajo de actividad. Se observaron diferencias claras por dominio: las mujeres húngaras acumularon actividad principalmente en el tiempo libre (91,8%) y el transporte activo (58,9%), mientras que las mujeres jordanas lo hicieron principalmente en los ámbitos ocupacional (69,9%) y doméstico (30,3) ($p \leq 0,001$).
Conclusiones. Existen diferencias interculturales significativas en los niveles y dominios de la actividad física entre mujeres de Jordania y Hungría, lo que resalta la necesidad de intervenciones de salud pública adaptadas al contexto sociocultural.

Palabras clave

Comparación intercultural; Jordania y Hungría; dominios de actividad física; salud de la mujer.

Introduction

The role of physical activity in the prevention and management of noncommunicable diseases (NCDs) is clearly established in the literature, prompting global health organizations such as the World Health Organization (WHO) to recommend targets aimed at reducing physical inactivity worldwide (WHO, 2020; WHO, 2014; Lee et al., 2012). Despite these initiatives, global progress in reducing sedentary lifestyles has been limited, with recent estimates indicating that nearly one-quarter of the world's adult population remains insufficiently active (Sallis et al., 2016).

Additionally, national variations in inactivity prevalence complicate the global picture and appear paradoxically linked to economic development. Multi-country studies consistently report higher rates of physical inactivity in high-income nations compared to low-income regions (Dumith et al., 2011; Sallis et al., 2016). However, broad-level associations may obscure the more complex underlying relationships.

A persistent gender gap also remains evident, with women more physically inactive than men in most countries regardless of income level (Brown et al., 2016; Dumith et al., 2011; Sallis et al., 2016). This disparity suggests that women experience shared barriers to achieving recommended activity levels, establishing them as a key target group for health interventions.

Recent regional studies have shown that contemporary physical activity trends—particularly among women—have been shaped by post-pandemic lifestyle changes, social constraints, and motivational factors. For example, Durán-Agüero et al. (2022) reported notable shifts in physical activity behaviors during and after COVID-19. Similarly, Junaidi et al. (2025) demonstrated that psychological needs and motivational climates play important roles in shaping women's intentions to engage in regular activity.

Psychosocial influences also remain critical in understanding inactivity patterns. Tsitskari et al. (2023) reported strong associations between body-image concerns and activity participation among women in fitness environments, suggesting that societal expectations influence women's leisure-time activity levels. Such insights are relevant to interpreting potential differences between Jordanian and Hungarian women.

Extensive evidence links physical activity to improved health outcomes (Kyu et al., 2016; Piercy et al., 2018). Although benefits are dose-dependent—meaning more activity results in greater reductions in major NCD risk—the positive effects extend across cardiovascular, musculoskeletal, immunological, and hormonal systems (Abdin et al., 2018; Abell et al., 2017; Albalawi et al., 2017; Anderson et al., 2014). Most international guidelines recommend at least 150 minutes of moderate-intensity aerobic activity per week (Warburton & Bredin, 2017).

However, metrics of time and intensity alone provide an incomplete picture. To develop more effective interventions, it is essential to understand the domains in which activity occurs: occupational, transport, domestic, and leisure-time. Cultural, environmental, and economic factors shape how activity is accumulated, influencing the feasibility of public health strategies.

For meaningful cross-cultural comparisons, standardized measurement tools are essential. The International Physical Activity Questionnaire (IPAQ) and the Global Physical Activity Questionnaire (GPAQ) are widely used instruments for large epidemiological studies (Shephard, 2003). These tools capture domain-specific activities and allow for internationally comparable data on health-enhancing physical activity (Hagströmer et al., 2006; Kim et al., 2013).

Research using these instruments has revealed diverse physical activity patterns across socio-cultural contexts. Studies in Central and Eastern Europe have documented domain-specific patterns in students (Bába et al., 2022), while others (e.g., in Brazil) have reported unusually high levels of household and occupational activity (Sebastião et al., 2012). Without direct cross-cultural comparisons, such contextual differences cannot be fully understood.

Building on this need, the present study compares women in Jordan and Hungary—two distinct sociocultural contexts. Women in the Arab region are at higher risk of inactivity due to social constraints, limited facilities, and family responsibilities (Saqib et al., 2020; Abdelghaffar et al., 2019; Allison et al., 1999). Additional internal barriers such as low self-confidence and body-image concerns also influence

women's participation (Rosselli et al., 2020). Conversely, Hungarian women may have different determinants shaped by socioeconomic transition, urbanization, and greater workforce participation (Sharara et al., 2018).

Therefore, the principal objective of this study is to address this knowledge gap by: (1) comparing total physical activity levels between adult women in urban Jordan and Hungary, and (2) identifying and contrasting the primary activity domains contributing to health-enhancing physical activity (HEPA) in each population.

Method

This research utilized a cross-sectional comparative design to evaluate and contrast physical activity patterns between two separate populations of adult women. Data were gathered at a single point in time from participants in Amman, Jordan, and Budapest, Hungary, using a convenience sampling approach. The structure of this study follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines(von Elm et al., 2008).

Participants

Data collection took place from July 2024 to February 2025 in the capital cities of Jordan (Amman) and Hungary (Budapest). The respondents were adult Jordanian and Hungarian women aged 18 to 45 years living in these cities. A convenience sampling method was used to recruit participants. The online survey was sent out through social media and university channels.

Procedure

Eligibility criteria:

(a) Inclusion criteria:

- Only women.

- Aged between 18 and 45.

- Live in either Amman or Budapest and identified as Jordanian or Hungarian.

- Giving informed consent.

(b) Exclusion criteria:

- Pregnant women.

- Have a medical condition that limits their participation.

- Refused to participate.

Variables

The main outcome variables were total physical activity, which was measured in MET-minutes per week, and physical activity level, which was a categorical variable (Low, Moderate, High). The primary exposure variable was nationality (Jordanian versus Hungarian). The main predictor variables were the main type of physical activity, which could be occupation-related, transportation-related, household, or leisure-time. Sociodemographic variables, including age, marital status, education level, and employment status, were gathered as potential confounders and descriptive characteristics. We also assessed the daily sitting time as an indicator of sedentary behaviour.

Instrument

Data was collected through a self-administered online questionnaire from a larger research project. For the analysis in this paper, only the sections on socio-demographics, anthropometrics and physical activity were used. The questionnaire was made available in bilingual format (English/Arabic for Jordan; English/Hungarian for Hungary) and underwent a stringent and systematic translation and back-translation process by native-speaking academics, to ensure conceptual equivalence across languages. All data from the participants were self-reported.

Physical activity (PA) was measured using the IPAQ long format, which provided a validated measure of PA (Craig et al., 2003). We used the daily setting hours variable to assess the sedentary behaviour. Categorical responses such as (4 – 8) were coded into continuous variable which is the midpoint of each interval per hour in day. Participants, including university students, were instructed to consider their primary daily occupation whether paid employment or academic studies when responding to questions in the work/occupational domain. The participant's weekly MET-minutes were estimated for vigorous intesity, moderate intensity, and walking activities using the official IPAQ scoring template outlined to sum to one continuous variable for total weekly physical activity (Total METs). Participants were then assigned a category of activity (Low, Moderate, or High) as determined by the World Health Organization guidelines (WHO, 2020.) based on the frequency, duration, and intensity of the physical activities undertaken. The main domains of PA (occupational, transport-related, domestic, and leisure time) were determined by asking participants to select the environment(s) where they are most active from a multiple-choice question.

Study Size and Bias

The target sample size for this project was determined to be around 400 respondents per city. This was based on formulas found for calculating sample sizes for large populations assuming a confidence level of 95% and a level of precision of ±5% (Israel, 2003.). In total, the target population for adult women ages 18-45 was estimated to be around 748,800 in Amman and 302,000 in Budapest (Jordan Statistical Yearbook 2024 - Department of Statistics, 2024.; Population - Department of Statistics, 2024.). Since these two populations were both far above 100,000 the proposed sample size of 400 for each city was appropriate. The final sample size was 401 in Hungary and 399 in Jordan. To address any potential selection bias due to the use of a convenience sample, the online questionnaire was advertised across multiple platforms to avoid exclusively on one site for recruitment purposes. The anonymity of the survey was also emphasized to reduce social desirability bias in self-reported responses.

Data analysis

All data were analyzed using IBM SPSS Statistics, Version 29.0. The analytical strategy involved both descriptive and inferential statistics to address the study objectives.

First, descriptive statistics were created to compare and summarize the individual characteristics of the Jordanian and Hungarian samples. For categorical variables, such as sociodemographics and physical activity levels (PA_Level), frequencies (n) and percentages (%) were computed. For all continuous variables that were not normally distributed, the median and interquartile range (IQR) were provided as indicators of central tendency and dispersion, respectively. The Shapiro-Wilk test was performed to formally check the assumption of normality for each national group separately for all important continuous variables (like Total_METs and Age). The test showed that these variables were not normally distributed ($p < .05$), so non-parametric tests were used for all the inferential analyses to make sure the results were statistically strong.

To evaluate the hypothesis that physical activity levels varied between the two groups (H1), two tests were performed. We used the Mann-Whitney U test to compare the median total physical activity (Total_METs) of the Jordanian and Hungarian participants. Also, the Pearson Chi-Square (χ^2) test of independence was used to investigate the relationship between nationality and the categorical PA_Level variable (Low, Moderate, High).

A series of Pearson Chi-Square (χ^2) tests were performed to evaluate the hypothesis that prevalence for physical activity domains varied between groups (H2). Each test evaluated the correlation between nationality and an identified binary domain variable (Domain Transport, Domain Home, Domain Occupation, and Domain LTPA).

A two-tailed p-value of less than 0.05 was used as the cutoff for statistical significance in all analyses. The problem of missing data was very small, making up less than 1% of the most important variables. The listwise deletion method, which excludes cases with any missing data on the variables involved in a particular analysis, was used to handle cases with missing data.

Ethical Considerations

The study was performed according to the Declaration of Helsinki. The ethical committee of the Hungarian University of Sports Science gave their approval (Approval No: MTSE-KEB/No14/2024). Everyone who participated took in the study got all information about its goals and methods. Their identities remained secret and they could leave the survey at any time. All participants gave their informed consent electronically before they were included in the study.

Results

The final sample analyzed included 800 adult women, divided between Hungary (n=401) and Jordan (n=399). Table 1 shows the sociodemographic and health-related characteristics of each national cohort. The median age was almost similar for both groups (28.0 years for Hungarians and 27.0 years for Jordanians). A notable difference was observed in daily sedentary time, with Jordanian participants reporting a significantly higher median sitting time compared to their Hungarian counterparts (10 hours/day vs. 6 hours/day, respectively). A significantly higher percentage of Hungarian women were working (89.0%) compared to Jordanian women (67.2%). On the other hand, a larger percentage of Jordanian women (74.2% vs. 65.6%) reported that their highest level of education was a university Bachelor's degree. The religious background of the two groups was also very different, with the Hungarian sample being mostly Christian (86.3%) and the Jordanian sample mostly Muslim (91.7%).

Table 1. Sociodemographic Characteristics of the Study Participants by Nationality

Characteristic	Category	Hungary (n=401) n (%)	Jordan (n=399) n (%)
Age (years), Median (IQR)	-	28.00 (10)	27.00 (9)
Setting Time	-	6.00 (4)	10.00 (4)
Religion			
	Christian	346 (86.3)	30 (7.5)
	Muslim	2 (0.5)	366 (91.7)
	None	53 (13.2)	3 (0.8)
Marital Status			
	Married	136 (34.0)	113 (28.3)
	Single	264 (66.0)	286 (71.7)
Children			
	Yes	68 (17.0)	61 (15.3)
	No	333 (83.0)	337 (84.7)
Education Level			
	Secondary School	51 (12.7)	13 (3.3)
	University (Bachelor)	263 (65.6)	296 (74.2)
	Master's degree	80 (20.0)	82 (20.6)
	PhD	7 (1.7)	8 (2.0)
Employment Status			
	Employed	356 (89.0)	268 (67.2)
	Unemployed	44 (11.0)	131 (32.8)
Financial Status			
	Poor / Below Average	21 (5.2)	23 (5.8)
	Average	277 (69.1)	246 (61.8)
	Quite Good / Excellent	103 (25.6)	129 (32.4)
Health Check-up Frequency			
	Regular (3-6 months/Yearly)	287 (71.6)	230 (57.8)
	Only when needed / Never	114 (28.4)	168 (42.2)
Health Insurance			
	Yes	374 (93.3)	323 (81.2)
	No	27 (6.7)	75 (18.8)

Note. For presentation purposes, some categories for 'Financial Status' and 'Health Check-up Frequency' were combined. 'Poor / Below Average' includes "Poor" and "Below average". 'Quite Good / Excellent' includes "Quite good" and "Excellent". 'Regular' health check-ups include "Once every three months", "Once every six months", and "Once a year". 'Only when needed / Never' includes "Only when needed" and "Never".

Comparison of Physical Activity Levels (Hypothesis 1)

To evaluate the hypothesis that levels of physical activity were different between the two populations, we undertook non-parametric analyses because the data were not normally distributed. A Mann-Whitney U test was conducted to compare the median total physical activity (MET-minutes per week). There was a large and significant difference in physical activity between the two groups (U=45840.0, z=-10.46, p<.001). As shown in Table 2, the median total weekly physical activity for Hungarian participants

(918.00 MET-minutes/week) was nearly double that of Jordanian participants (464.25 MET-minutes/week).

Table 2. Comparison of Total Physical Activity between Hungarian and Jordanian Participants

Group	N	Median MET-minutes/week (IQR)	Mean Rank	U	p
Hungarian	401	918.00 (687.38)	485.69	45840.0	< .001
Jordanian	399	464.25 (686.25)	314.89		

Note. IQR = Interquartile Range. Statistics derived from the Mann-Whitney U test.

This quantitative result was also confirmed by the analysis of categorical levels of activity. A Pearson Chi-Square test indicated a significant difference between nationality and compliance with health enhancing physical activity (HEPA) guidelines ($\chi^2(2, N=800) = 66.30, p < .001$). The distribution of participants by level shows a stark contrast in how many participants were classified into which levels in Table 3. Two-thirds of the Jordanian sample (66.4%) were classified as 'Low', below the minimum recommended levels. In stark contrast, the majority of Hungarian women were classified as physically active with 48.9% being classified as 'Moderate' and 13.5% being classified as 'High'. All these results support this hypothesis.

Table 3. Distribution of Physical Activity Levels by Nationality

Physical Activity Level	Jordan (n=399) n (%)	Hungary (n=401) n (%)	Total (N=800) n (%)
Low	265 (66.4)	151 (37.7)	416 (52.0)
Moderate	106 (26.6)	196 (48.9)	302 (37.8)
High	28 (7.0)	54 (13.5)	82 (10.3)
Chi-Square Statistic		χ^2 (2) = 66.30, p < .001	

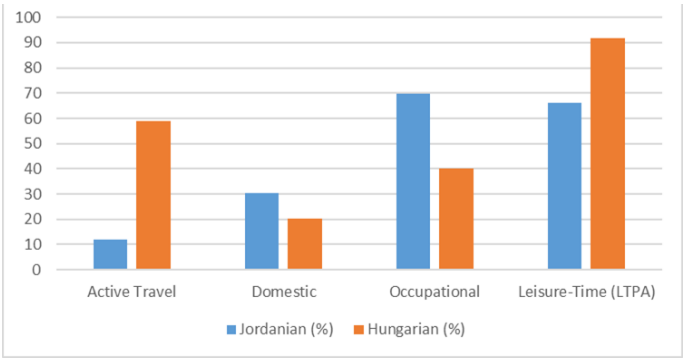
Note. Percentages represent the proportion of participants within each nationality.

Comparison of Physical Activity Domains (Hypothesis 2)

To explore the sources of the difference, Chi-Square tests were carried out investigating the tendency to participate in specific physical activity domains. There were significant differences across all four domains between the Jordanian and Hungarian sample (p ≤.001 across all tests).

As seen in Figure 1, there were clear and opposite patterns of physical activity participation by the two populations. Hungarian women reported significantly more engagement in domains traditionally linked to individual choice and recreation. Almost all Hungarian women participated in Leisure-Time Physical Activity (LTPA) (91.8% of the subsample), and just over half of the women utilized Active Travel (58.9% of the subsample). Conversely, the physical activity patterns were predominantly non-leisure domain based for the Jordanian women.

Figure 1. Percentage of participants engaging in physical activity domains by nationality.



A substantially greater percentage indicated participation in Occupational physical activity (69.9% compared to 40.1% for Hungarians) and Domestic physical activity (30.3% versus 20.2% for Hungarians). These results strongly support H2, showing that the main areas that make up total physical activity are very different for the two groups. Hungarians rely more on leisure-time and active travel, while Jordanians rely more on occupational and domestic activities. Appendix Table A1 shows all the numbers for these comparisons in detail.

Discussion

Summary of Principal Findings

The current study presents a new, direct cross-cultural comparison of levels and types of physical activity patterns of adult women in two very urban contexts, Amman, Jordan, and Budapest, Hungary. The major findings provide a complex picture of physical activity. First, there is a large quantity difference in total activity levels between the two populations. Hungarian women had significantly higher total weekly MET-minutes, as well as a significantly greater likelihood of being classified as fulfilling the criteria for health-enhancing physical activity (HEPA), whereas the majority of the Jordanian women were inactive. Second, and perhaps more insightful, the qualitative pattern in which this physical activity is accumulated is extremely different between the two populations. Overall Hungarian women have a physical activity profile characterized by high levels of volitional physical activity, primarily in the leisure-time and active transport domains. In comparison, the active profile of Jordanian women is largely characterized by mandatory, non-recreational domains (occupational and domestic). Taken together, these results suggest that there are not only salient quantitative differences in physical activity, but there are also deep-seated cultural differences that reflect the nature, context, and probably the motivation of women's participation in physical activity in these two societies. Differences in leisure-time physical activity between Jordanian and Hungarian women may also reflect psychosocial determinants such as body satisfaction, motivation, and contextual influences. Santana et al. (2024) reported significant associations between body dissatisfaction, mental-health indicators, and activity participation, particularly among women. These findings align with the present study's observation that Hungarian women, who generally report higher leisure-time participation, may benefit from more supportive psychosocial environments.

Furthermore, recent research underscores the importance of motivational drivers in explaining cross-cultural variability. Junaidi et al. (2025) found that fulfilment of psychological needs (autonomy, competence, relatedness) strongly predicts women's intentions to engage in physical activity, which may help explain the higher leisure-time engagement observed in Hungary.

Pandemic-related disruptions may also play a role in shaping current activity levels. Durán-Agüero et al. (2022) demonstrated significant shifts in PA distribution across domains due to changes in daily mobility, work routines, and health-related restrictions, suggesting that recent cohorts may still exhibit residual effects in their habitual PA patterns.

Comparison with Existing Literature and Interpretation of Findings

The observation that Hungarian women demonstrate a greater level of total physical activity is consistent with global trends identified in multi-country studies, which have previously demonstrated that men and women in the Arab region tend to be more inactive than many European countries (Dumith et al., 2011; Sharara et al., 2018). Our findings are directly consistent with the results of the survey conducted in Hungary which reported that only a small portion (11.7%) of the adult population classified as inactive (Bácsné Bába et al., 2020). However, there is a crucial point of departure when looking at each domain of physical activity. The survey in Hungary reported that physical activity for the adult population was mostly related to work or house work, whereas our sample had a predominance of leisure-related and transports-related activity for the younger urban Hungarian women. This crosses to a more critical difference between the types of activity being recorded and highlights the extent of an ongoing social change, as younger urban cohorts compared to older rural people in Hungary may have not only more access to recreational and active commuting opportunities, but also differing cultural access. That said, this research suggests that if public health surveillance is being undertaken in Hungary,

it is important these surveys especially collect data about age and urbanicity in order to better account for these ongoing patterns of change.

On the other hand, the 66.4% prevalence of low levels of activity among the Jordanian women in our study is an alarming finding highlighting an obvious public health issue. This is further compounded by our finding about the higher daily sitting times between Jordanian women. These findings also substantiate the broader findings of a systematic review by Sharara et al. (Sharara et al., 2018), which found that women in Arab countries appeared to be at higher risk of inactivity as a result of a complex interplay between cultural and environmental challenges. It is important to view the high levels of occupational physical activity in the Jordanian sample with a specific focus on the characteristics of the participants. A large number of the sample consisted of university students, who were specifically asked to report activity around their university studies (e.g., walking across campus, checking their watch to see which lecture was starting to walk towards) in the occupational behaviour. For this reason, it is reasonable to assume much of this "occupational" physical activity is incidental in nature and light-to-moderate in intensity as opposed to planned and vigorous work. This context reinforces the notion that, for many of these women, physical activity is defined by this embedded aspect of their daily responsibilities rather than a planned behaviour with health in mind. Because a considerable portion of the Jordanian sample consisted of university students, it is important to note that student populations often report disproportionately higher incidental or occupational physical activity through campus mobility. Recent findings from de Freitas Rodrigues et al. (2025) demonstrate that student groups display unique PA patterns driven by institutional routines, which may elevate occupational or transport-related domain scores without reflecting structured exercise behavior. This context supports the interpretation of high occupational PA values among Jordanian participants.

Despite our findings seeming to contrast with some sub-national studies conducted in Jordan noting lower inactivity rates (Alnjadat et al., 2024), it is likely that this is due to significant methodological differences. For example, the study by Alnjadat et al. only included menopausal females and used a different assessment tool that may not directly relate to the IPAQ used in our study with a younger adult population. Thus, the significant level of inactivity recorded may give a more contemporary and sobering reflection of Jordan's young to middle-aged adult female population.

The most salient finding from our study is the marked difference in domain-specific activity patterns, which illuminates the socio-environmental contexts of each cohort. The significant role of occupational and domestic domains for Jordanian women has been noted throughout the Arab world (Sharara et al., 2018). This pattern suggests that for many women in this context, physical activity is not a decision made for health-related reasons, rather, it is an incidental outcome of daily responsibilities. This finding is corroborated by studies that report various regionally-specific barriers that exist, such as lack of social support, which was determined to be an important contributing barrier for women in a neighboring Omani study (Alghafri et al., 2017), and placing a higher priority on academic or domestic responsibilities than their own well-being. Its also found that sedentary lifestyles were common among the adult Omani women studied (Habsi & Kilani, 2015).

In contrast, the dominance of LTPA (91.8%) and active travel (58.9%) among Hungarian women is characteristic of patterns seen in many high-income, European settings, where recreational activity is a more normalized and accessible part of life. This finding, however, is not without its nuances. It differs from a cross-cultural comparison between Canadian and English youth, where differences in total activity were not clearly explained by specific domains (Voss et al., 2014). This suggests that the sharp, domain-specific patterns we identified may become more pronounced in adulthood as life roles and environmental interactions solidify. Furthermore, a study comparing rural and non-rural US adults found that rural individuals engaged in more moderate and vigorous activity, likely from occupational sources (McCormack et al., 2018). This reinforces a central conclusion of our research: the living environment is a powerful determinant of not just how much, but, more importantly, how individuals are active. The urban settings of both Amman and Budapest are therefore critical contexts for interpreting these results.

Strengths and Limitations

This study has several important strengths, adding to the literature. It is one of the few studies to make a direct cross-cultural comparison of physical activity patterns between women in the Middle East and Eastern Europe - two areas that often receive little comparative global health research attention. The

fact that the two countries used the same validated and standardized instrument (the IPAQ) allows us to make comparisons and strengthens the internal validity of our findings. Further, our very large sample size (N=800) provides adequate statistical power, allowing for confidence in the meaningful differences observed. Finally, our study does more than just identify total activity in each sample. We also examine the domain related patterns, providing insight into how daily life, and the cultural rules that govern it, influence health-related behaviours.

Despite these strengths, several limitations must be acknowledged. First, the use of a non-probability convenience means the samples may not be fully representative of all adult women in Amman and Budapest, thus limiting the generalizability of our findings. Participants recruited through online and university networks may be more educated or health-conscious than the general population. Second, the reliance on self-reported data is a significant limitation. Self-report questionnaires like the IPAQ are subject to recall and social desirability bias, which can lead to an overestimation of physical activity. While IPAQ is a validated measure, objective measures would yield more accurate data. Third, the cross-sectional design prevents causal inference from being made. We can only report associations; we cannot determine whether living in one environment promotes certain activity patterns, or whether individuals who already have activity preferences decide to live in environments that support them.

Implications and Directions for Future Research

The outcomes of this research have unique and important implications for public health policy and interventions in both areas. The differences in activity areas clearly indicate that a global approach to creating physical activity through universally applicable policies will not work. In Jordan, where activity typically occurs in a compulsory and non-recreational context, the interventions must address the social/cultural and environmental barriers that ultimately limit women's experience of leisure time physical activity. This may involve advocating for more safe, affordable, and culturally appropriate women-only spaces for activity; promoting community walking groups; and launching public awareness campaigns to normalize recreational activity as an important and valid activity for women's health.

The situation in Hungary represents another public health challenge. While it is great to have high levels of leisure as well as transport activity, these are only the areas most susceptible to change in times of socioeconomic transition resulting in positive shifts towards motorized transport and sedentary screen based leisure. Therefore, as this area further develops with policy and strategic thinking, it is paramount that Hungary protects and preserves its current stock of active transport and recreation infrastructure and cultural experience. This means investing in safe cycling infrastructure, pedestrian-friendly urban design, accessible public parks, sporting facilities which makes it easier for future generations to adopt these healthy behaviors.

Future research should expand upon these results, creating opportunities for new research directions. There is an urgent need for longitudinal studies to assess how patterns of physical activity change across women's lifecourses in these regions and in response to policy or environmental interventions. It is essential to employ objective measures of physical activity, such as combined accelerometers and GPS, which will enhance the ability to understand the volume and context of physical activity. Future research should also explore the relationship between these distinct physical activity domain patterns and health outcomes, such as the prevalence of overweight and obesity, which were not examined in the present study. Finally, there is an urgent need for qualitative research to examine the lived experiences of women in both countries. In-depth interviews and/or focus groups have the potential to illuminate the many motivations, perceptions, and social context driving the different patterns that were revealed in this study, and be informative to the development of effective and culturally competent health promotion initiatives. The present findings highlight opportunities for targeted interventions to increase women's activity levels in both countries. Evidence from controlled programs, such as the SPARK intervention examined by Abd Rahman et al. (2024), shows that structured, school- or community-based programs can significantly boost daily physical activity and reduce sedentary time. Additionally, recent systematic evidence from Masfi et al. (2025) emphasizes the importance of integrated educational and behavioral strategies for improving physical-activity participation, including technology-assisted and curriculum-based approaches. Applying similar models could support the development of culturally adapted interventions in Jordan and sustain already positive trends among Hungarian women.

Conclusions

To conclude, this investigation goes beyond simply measuring patterns of physical activity even showing profoundly distinct patterns of activity between women living in Jordan and Hungary. While women living in Hungary demonstrate higher overall activity levels than their counterparts in Jordan, this activity is largely volitional activity that occurs during leisure and transport. On the other hand, women in Jordan demonstrate obligatory physical activity linked to their occupations and their roles in the home. These distinctions are not simply differences in volitional choice but are most likely reflections of the structural influences of the socio-cultural and built environment that shape women's health behaviours. This study's findings indicate the necessity to adopt context-dependent and domain-specific public health approaches to develop and enhance effective approaches to the global challenge of physical inactivity.

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Appendix

Appendix Table A1: Detailed Crosstabulation and Chi-Square Test Results for Physical Activity Domains by Nationality

Domain	Nationality	Engaged n (%)	Did Not Engage n (%)	Total N	χ^2	df	p
Active Travel	Jordanian	48 (12.0)	351 (88.0)	399	191.49	1	< .001
	Hungarian	236 (58.9)	165 (41.1)	401			
Domestic	Jordanian	121 (30.3)	278 (69.7)	399	10.87	1	.001
	Hungarian	81 (20.2)	320 (79.8)	401			
Occupational	Jordanian	279 (69.9)	120 (30.1)	399	71.64	1	< .001
	Hungarian	161 (40.1)	240 (59.9)	401			
Leisure Time (LTPA)	Jordanian	264 (66.2)	135 (33.8)	399	79.04	1	< .001
	Hungarian	368 (91.8)	33 (8.2)	401			