



Psychosocial Determinants of Women's Physical Activity and Body Mass Index: A Cross-Cultural Mediation Analysis in Amman and Budapest

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ABSTRACT

Background: Physical activity (PA) is a key determinant of health and body weight, yet participation among women is influenced by psychosocial and sociocultural factors that may vary across cultural settings. This study examined the associations between psychosocial determinants, PA, and body mass index (BMI) among women residing in Amman (Jordan) and Budapest (Hungary), and investigated whether PA mediates the associations between social support, cultural support for women's PA, perceived social safety, and BMI.

Methods: A cross-sectional comparative design was employed. A total of 800 women aged 18–45 years (Amman = 399; Budapest = 401) completed measures of social support for PA, perceived cultural support, perceived social safety, and PA using the International Physical Activity Questionnaire-Short Form (IPAQ-SF). BMI was calculated from self-reported height and weight. Nonparametric analyses were conducted to examine cross-cultural differences and associations among study variables. Bootstrapped mediation analyses (5,000 resamples) were performed to assess indirect associations between psychosocial determinants and BMI through PA.

Results: Women in Budapest reported significantly higher PA levels, lower BMI, greater perceived social support, stronger cultural support for women's PA, and higher perceptions of social safety than women in Amman (all $p < .001$). Social support, cultural support, and perceived social safety were positively associated with PA participation, while PA was negatively associated with BMI ($r = -0.35$, $p < .001$). PA partially mediated the associations between social support and BMI and between cultural support and BMI. No significant indirect association was observed between perceived social safety and BMI through PA.

Conclusion: Psychosocial and sociocultural environments were significantly associated with women's PA and BMI across two culturally distinct populations. PA may represent an important behavioural pathway linking supportive social environments to healthier weight-related outcomes. Interventions that strengthen social support and culturally supportive environments may contribute to increased PA participation among women.

Keywords: Physical activity, body mass index, social support, social environment, women's health

1. INTRODUCTION

Physical inactivity remains a major public health concern worldwide and is recognised as a significant contributor to obesity and other non-communicable diseases, including

cardiovascular disease, type 2 diabetes, and certain cancers (World Health Organization, 2025). Although the health benefits of regular physical activity (PA) are well established, a substantial



proportion of adults fail to achieve recommended activity levels, with women consistently reporting lower participation rates than men across many regions of the world (Bauman et al., 2012; Sharara et al., 2018). Understanding the factors associated with women's PA has therefore become an important public health priority.

PA is increasingly understood as a behaviour shaped not only by individual motivation but also by broader social and environmental conditions (Eriksson et al., 2025). Ecological Models of Health Behaviour propose that PA is influenced by multiple interacting levels of determinants, including interpersonal relationships, cultural norms, and environmental contexts (Sallis & Owen, 2015). Similarly, the Social Determinants of Health (SDOH) framework emphasises that health behaviours and outcomes are associated with the social conditions in which individuals live, work, and interact (World Health Organization, n.d.). Within these frameworks, psychosocial factors such as social support, cultural norms, and perceptions of safety may facilitate or constrain opportunities for PA participation (Courneya et al., 2000).

Among these factors, social support has consistently emerged as one of the strongest correlates of PA (Wang et al., 2014). Supportive relationships may encourage participation through emotional encouragement, practical assistance, and shared engagement in exercise (Moreno-Murcia et al., 2017; Sallis et al., 1987). Women who perceive greater support from family members, friends, or peers generally report higher levels of PA and greater adherence to health-promoting behaviours (Abraido-Lanza et al., 2017; O'Brien Cousins, 1995; Prince et al., 2014). However, findings are not entirely consistent across populations. While many studies report positive associations between social support and PA (Gao et al., 2025), others suggest that the magnitude of these relationships may vary according to cultural context, age, and social expectations (Bauman et al., 2012).

Cultural norms may also shape women's engagement in PA and sport participation (Coackly, 2015). In some societies, PA is viewed as a socially acceptable and encouraged behaviour for women (BenNETTER et al., 2023), whereas in others, gender expectations, social roles, and normative restrictions may limit opportunities for participation. Previous research conducted in Middle Eastern populations has highlighted the influence of cultural expectations and gender norms on women's PA behaviour (Almaqawi, 2022; Obeisat & Gharaibeh, 2012).

Nevertheless, cultural influences remain complex and context-dependent, and relatively few studies have examined how perceptions of cultural support relate to PA and health outcomes across different sociocultural settings.

Perceived safety represents another factor frequently associated with PA participation. Women who perceive public spaces as safe may be more willing to engage in outdoor recreation, active transportation, and leisure-time exercise (Lovasi et al., 2014). Conversely, concerns regarding harassment, social judgment, unwanted attention, or personal security may discourage participation in outdoor PA (Alageel et al., 2023; Amin et al., 2012). However, evidence regarding the relationship between safety perceptions and PA remains mixed. While some studies report significant associations between safety and activity participation, others suggest that safety may influence specific forms of activity as a result from a mix of built and social environment factors (Bracy et al., 2014), highlighting the need for further investigation.

PA is also closely associated with body weight regulation and metabolic health. Higher levels of PA contribute to increased energy expenditure and are generally associated with healthier body weight profiles and lower body mass index (BMI) values (Warburton & Bredin, 2017; Westerterp, 2013). However, obesity is increasingly recognised as a multifactorial condition influenced by behavioural, social, environmental, and biological factors. Consequently, psychosocial influences may not be associated with BMI directly but rather through behavioural pathways such as PA (Kiernan et al., 2012; Wang et al., 2014). Examining PA as a potential mediator may therefore provide a more comprehensive understanding of how social and cultural environments are associated with weight-related outcomes.

Although previous studies have examined psychosocial determinants of PA and obesity, several important gaps remain. First, much of the literature has focused on direct associations between psychosocial factors and PA or BMI, with relatively few studies investigating whether PA functions as a mediating mechanism linking psychosocial environments to weight status. Second, women are often treated as a homogeneous population despite evidence that social norms, gender expectations, and environmental opportunities differ substantially across cultures. Third, cross-cultural mediation studies comparing women from Middle Eastern and European contexts remain limited.

Addressing these gaps is important because interventions designed to promote women's PA may not operate similarly across different sociocultural contexts. While previous cross-cultural studies have primarily compared PA levels or participation patterns, less is known about whether the psychosocial pathways linking social environments, PA, and BMI are consistent across cultures. Although BMI is influenced by multiple behavioural and contextual factors, including dietary practices and other lifestyle behaviours, PA remains a central and modifiable determinant of health. Understanding whether PA functions as a common behavioural pathway across distinct social and cultural settings may help inform the development of more effective, culturally responsive public health strategies for women.

Therefore, the present study examined women residing in Amman (Jordan) and Budapest (Hungary), two urban settings characterised by distinct sociocultural contexts. Specifically, the study investigated whether perceived social support, cultural support for women's PA, and perceived social safety were associated with PA and BMI, and whether PA mediated the associations between these psychosocial determinants and BMI. Based on Ecological and Social DOH frameworks, it was hypothesised that: (H1) women in Budapest would report more favourable psychosocial environments, higher PA levels, and lower BMI than women in Amman; (H2) social support, cultural support, and perceived social safety would be positively associated with PA; (H3) PA would be negatively associated with BMI; and (H4) PA would mediate the associations between psychosocial determinants and BMI. By testing these relationships within a comparative cross-cultural framework, this study seeks to contribute evidence regarding the behavioural pathways linking psychosocial environments, PA, and BMI among women.

Literature review and theoretical background

Building on the SDOH framework, health behaviours and outcomes can be understood as products of the broader social and environmental conditions in which individuals live rather than solely as consequences of individual choice (Frank et al., 2020; World Health Organization, n.d.). Within this framework, determinants such as education, economic stability, healthcare access, neighbourhood characteristics, and social context collectively

shape opportunities and constraints for engaging in health-promoting behaviours. Research has consistently demonstrated that these broader contextual conditions are associated with PA participation and obesity-related outcomes through their influence on daily living circumstances, resource availability, and access to health-promoting opportunities (Baheiraei et al., 2015; Prince et al., 2014).

Within the SDOH framework, determinants differ in their proximity to health behaviours and outcomes (Frakt, 2019). Structural determinants, including education, economic stability, healthcare access, and broader social policies, shape the conditions in which individuals live and make health-related decisions. However, these influences are often expressed through more immediate social and environmental conditions that directly affect daily opportunities and constraints for behaviour. Consequently, social and environmental factors are frequently conceptualised as intermediary or mid-stream determinants, positioned between broader structural conditions and downstream health outcomes (Pietromonaco & Collins, 2017). Because these determinants directly influence access, perceived opportunities, social norms, and behavioural choices, they may play a particularly important role in shaping PA and related health outcomes among women (Walker et al., 2023).

The present study is further informed by Ecological Models of Health Behaviour, which conceptualise health outcomes as emerging from interactions among structural conditions, social environments, and individual behaviours (Kilanowski, 2017; Sallis & Owen, 2015). From this perspective, PA is not viewed solely as an individual choice but as a behaviour shaped by multiple levels of influence operating simultaneously. Consistent with these frameworks, social support, cultural support for women's PA, and perceived social safety are conceptualised as psychosocial determinants situated within broader social and environmental contexts. PA is examined as a potential behavioural pathway through which these determinants may be associated with BMI among women in Jordan and Hungary. By focusing on these intermediary influences, the study seeks to advance understanding of whether similar psychosocial-behavioural associations can be observed across two culturally distinct populations.

2. METHODS

Design

A cross-sectional comparative research design was employed to examine associations between perceived social–environmental determinants, PA, and BMI among adult women in Amman (Jordan) and Budapest (Hungary). Data were collected using an anonymous online survey platform.

Participants and procedure

The age range of 18–45 years was selected to focus on adult women within a relatively comparable physiological and reproductive life stage (Fomčenko et al., 2025; Muhammad, 2025). Restricting the sample to this age range reduced potential variability associated with menopausal transition, age-related metabolic changes, and declines in PA that may independently influence BMI and PA behaviour. In addition, the study focused specifically on participants residing in the capital cities of Amman and Budapest to enhance comparability between study populations. Restricting recruitment to major urban centres reduced potential variability associated with urban–rural differences in PA opportunities, transportation infrastructure, access to recreational facilities, and neighbourhood environments. This approach allowed the study to focus more directly on sociocultural and psychosocial influences while minimising geographic and environmental heterogeneity.

Accordingly, participants were women aged 18–45 years residing in Amman or Budapest who self-identified as Jordanian or Hungarian, respectively. Inclusion criteria were:

- (a) female gender;
- (b) age between 18 and 45 years;
- (c) residency in one of the two target cities;
- (d) provision of informed consent.

Exclusion criteria included pregnancy, medical conditions restricting PA, or incomplete questionnaire responses. Data collection occurred between July 2024 and February 2025. Recruitment was conducted through social media platforms, workplace networks, and university distribution channels using a convenience sampling approach. A total of 812 responses were received. Twelve respondents were excluded due to missing data exceeding 20% of questionnaire items, resulting in a final analytic sample of 800 participants (Budapest = 401; Amman = 399).

Translation and cultural adaptation

The survey instrument was developed in

English and subsequently translated into Arabic and Hungarian following standard cross-cultural adaptation procedures. Independent bilingual translators conducted forward translations into the target languages. The translated versions were then reviewed for conceptual equivalence and cultural appropriateness. Where discrepancies arose, consensus discussions were conducted among the research team and translators to ensure semantic consistency across language versions. Prior to data collection, the questionnaire was pilot tested with a small group of women from both cultural contexts to assess clarity, comprehension, and cultural relevance. Minor wording adjustments were made based on participant feedback. These procedures were implemented to enhance cross-cultural comparability and reduce measurement bias between study populations.

Sampling clarification

Recruitment was conducted through social media platforms (e.g. Facebook and WhatsApp groups), workplace networks (e.g. administrative and service sectors), and university distribution channels (e.g. The University of Jordan and University of Petra in Jordan; Hungarian University of Sports Science and Eötvös Loránd University in Hungary) using a convenience sampling approach. The final sample size ($N = 800$) exceeded the minimum required sample determined through power analysis, ensuring sufficient statistical power for detecting small-to-moderate effects.

Measures

Sociodemographic variables

Participants reported age, marital status, education level, employment status, parental status, religious affiliation, and perceived financial situation. These variables were collected to characterise the study populations and provide contextual information regarding broader social determinants of health. Consistent with the study's theoretical focus on psychosocial determinants of PA, these variables were used descriptively to characterise the samples rather than as primary explanatory variables in the mediation analyses.

Social support for physical activity

Perceived social support was assessed using five items adapted from the Social Support for Exercise Scale (Sallis et al., 1987). Items measured frequency of encouragement, discussion, reminders, shared participation, and joint engagement in PA. Responses were rated on a five-point Likert

scale (1 = 'almost never' to 5 = 'almost always'). A mean composite score was calculated, with higher scores indicating greater perceived support. Internal consistency reliability was good (Budapest $\alpha = .88$; Amman $\alpha = .85$).

Cultural support for physical activity

Perceived cultural support was assessed using a single-item measure: "In my society, it is socially acceptable for women to engage in regular PA." Responses were recorded on a five-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'. This indicator was selected to capture participants' overall perception of normative acceptance of women's PA within their cultural environment. Single-item measures have been used in population-based studies when assessing specific and easily understood perceptions (Bergkvist & Rossiter, 2007; Bowling, 2005). However, the measure may not fully capture the multidimensional nature of cultural norms and should therefore be interpreted cautiously.

Perceived social safety

Perceived social safety was assessed using a single item: "I feel safe from verbal harassment when engaging in outdoor PA." Responses were rated on a five-point Likert scale and reverse-coded so that higher scores indicated greater perceived safety. The item was designed to assess a concrete and contextually relevant aspect of women's experiences during outdoor PA. Nevertheless, perceived safety is a multidimensional construct, and future research should employ validated multi-item scales to capture broader dimensions of environmental and social safety.

Physical activity

PA was measured using the International Physical Activity Questionnaire-Short Form (IPAQ-SF) (Craig et al., 2003). Participants reported frequency and duration of walking, moderate- and vigorous-intensity activity over the previous seven days. Total PA was expressed as metabolic equivalent (MET) minutes per week according to standardised scoring protocols (World Health Organization, 2020). Both continuous MET values and categorical PA levels (low, moderate, high) were used in analyses.

Body mass index

BMI was calculated using self-reported height and weight (kg/m^2). Continuous BMI values were used in mediation analyses. BMI categories were classified according to WHO standards (World Health Organization, 2025).

Statistical analysis

All analyses were conducted using IBM SPSS Statistics (Version 29).

Given evidence of non-normality (Shapiro–Wilk tests $p < .05$), nonparametric tests were applied. Mann–Whitney U tests examined country differences in psychosocial variables and continuous outcomes. Chi-square tests assessed differences in categorical variables. Spearman's rank correlation evaluated associations among study variables.

To test the hypothesised mediation model, bootstrapped simple mediation analyses were conducted to examine whether PA (total MET minutes) mediated the relationship between psychosocial determinants and BMI. Indirect effects were considered statistically significant when the 95% confidence interval did not include zero.

Bootstrapping was selected due to its robustness in estimating indirect effects under non-normal sampling distributions. Statistical significance of indirect effects was evaluated using 95% bias-corrected bootstrap confidence intervals. In addition to significance testing, standardised effect sizes were reported to facilitate interpretation of the magnitude of mediation effects. Reporting both statistical significance and effect sizes aligns with contemporary quantitative reporting standards (Appelbaum et al., 2018).

Power analysis justification

An *a priori* statistical power analysis was conducted using G*Power 3.1 to determine the minimum required sample size for detecting small-to-moderate effects in correlation and mediation analyses. Assuming a small-to-moderate effect size ($\rho = .15$), $\alpha = .05$, and desired statistical power $(1 - \beta) = .95$, the required sample size ranged from approximately 346 to 650 participants for two-tailed correlation analyses. For mediation models using bootstrapping procedures, simulation research indicates that samples exceeding $N = 500$ provide stable estimation of indirect effects, particularly when effect sizes are small and indirect pathways are modest in magnitude. Given the final analytic sample of $N = 800$ (Jordan = 399; Hungary = 401), the study was adequately powered to detect small indirect effects and between-group differences in primary study variables. *Post hoc* sensitivity analyses indicated that with $N = 800$, the study had greater than 99% power to detect small correlation effects ($r \geq .12$) and small between-group effects ($r \geq .10$) at $\alpha = .05$. Thus, the final sample size exceeded conventional recommendations for mediation and nonparametric group comparisons, enhancing statistical precision and reducing the risk of Type II error.

Covariate considerations

The mediation analyses were conducted without adjustment for demographic covariates. This decision was guided by the study's theoretical framework and sampling design. First, the study deliberately restricted participation to women aged 18–45 years to reduce age-related physiological variability associated with hormonal transitions, metabolic changes, and age-related declines in PA that become more pronounced in later adulthood. Restricting the sample to this age range increased comparability across participants and reduced potential confounding attributable to life-stage differences.

Second, the study was grounded in Ecological and Social DOH frameworks, which distinguish between upstream structural determinants and more proximal social–environmental influences on behaviour. While variables such as education, employment status, and financial situation are recognised as important contextual determinants of health, the present study focused specifically on psychosocial factors hypothesised to influence BMI indirectly through PA. Preliminary descriptive analyses indicated broadly comparable demographic distributions between the Jordanian and Hungarian samples, and socioeconomic indicators did not constitute the primary explanatory variables of interest.

Accordingly, the mediation models were designed to evaluate theoretically specified psychosocial pathways rather than to develop fully adjusted predictive models of BMI. Nevertheless, residual confounding by demographic and socioeconomic factors cannot be excluded and should be considered when interpreting the findings.

Construct validity

Measures were selected based on theoretical alignment with Ecological and Gender-Informed frameworks. The Social Support for Exercise Scale demonstrated established factorial validity and predictive validity across diverse populations. Internal consistency reliability in both national samples was satisfactory ($\alpha = .85-.88$), supporting scale reliability across cultural contexts. To ensure linguistic accuracy and cultural appropriateness, questionnaire translation and adaptation procedures were complemented by formal content validity assessment. Consistent with established Content Validity Index procedures (Lynn, 1986; Mohajan, 2017), independent expert panels consisting of three Arabic-speaking and three Hungarian-speaking specialists evaluated all translated items for clarity, relevance,

comprehensibility, and cultural appropriateness. Item-level and scale-level content validity indices demonstrated satisfactory content validity, supporting the suitability of the translated instruments for use in both cultural contexts.

The IPAQ-SF, although subject to self-report limitations, remains one of the most widely validated international instruments for population-level PA surveillance and has demonstrated acceptable reliability across European and Middle Eastern populations. Although standard translation and cultural adaptation procedures were implemented, formal measurement invariance testing was not conducted. Therefore, it cannot be completely excluded that some constructs were interpreted differently across cultural contexts, and future research should evaluate measurement equivalence more directly.

Single-item indicators assessing cultural support and perceived social safety were conceptually precise and theoretically grounded; however, they may capture narrower dimensions of broader psychosocial constructs. Nevertheless, single-item measures are considered acceptable when assessing clearly defined and unambiguous perceptions. Future studies should employ multi-item validated scales to improve construct depth and measurement reliability.

3. RESULTS

Descriptive outcomes

Participant characteristics

Sociodemographic characteristics are presented in Table 1. Median age was comparable between Hungary (28 years) and Jordan (27 years). Chi-square tests of independence were conducted to examine differences in socioeconomic indicators between participants in Budapest and Amman. The analysis showed a notable difference in education level ($\chi^2 = 24.60, p < .001$), indicating variation in the distribution of educational attainment between the two groups. Employment status also differed significantly ($\chi^2 = 55.30, p < .001$), with a higher proportion of employed participants in Budapest compared to Amman. In contrast, no significant difference was observed in financial status ($\chi^2 = 6.76, p = .149$), suggesting a comparable perceived economic standing across the two groups.

Table 1. Sociodemographic characteristics by nationality ($N = 800$)

Characteristic	Category	Budapest ($n = 401$)	Amman ($n = 399$)
Age (years)	Median (IQR)	28 (24–34)	27 (23–32)
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%)	112 (28.3%)
	Single	265 (66.0%)	287 (71.7%)
Children	Yes	68 (17.0%)	62 (15.5%)
	No	333 (83.0%)	337 (84.7%)
Education	Postgraduate	87 (21.7%)	90 (22.6%)
	Bachelor	263 (65.6%)	296 (74.2%)
	Secondary or less	51 (12.7%)	13 (3.3%)
Employment	Employed	357 (89.0%)	268 (67.2%)
	Unemployed	44 (11.0%)	131 (32.8%)
Financial status	Poor/below average	21 (5.2%)	23 (5.3%)
	Average	277 (69.1%)	247 (61.9%)
	Quite good/excellent	103 (25.7%)	129 (32.3%)

Behavioural and health characteristics

Table 2 presents the behavioural and health characteristics of participants by nationality. Women in Budapest reported substantially higher levels of PA than women in Amman, with a median total PA of 918 MET-minutes/week (IQR = 524–1,188) compared with 464.25 MET-minutes/week (IQR = 198–884). In contrast, participants in Amman reported greater sedentary behaviour, with a median sitting time of 10 hours/day (IQR = 4) compared with 6 hours/day (IQR = 4) among participants in Budapest. Median BMI was also higher among women in Amman (23.31 kg/m², IQR = 21.53–25.37) than

among women in Budapest (21.48 kg/m², IQR = 20.32–22.66).

Differences were also evident in PA classification. The majority of women in Amman were categorised as having low PA levels (66.4%), whereas women in Budapest were more frequently classified as moderately active (48.9%). Furthermore, overweight and obesity were more prevalent among participants in Amman (27.6%) than among those in Budapest (8.0%), while a greater proportion of women in Budapest were classified as having normal weight (87.7% vs. 68.9%).

Table 2. Behavioural and health characteristics by nationality ($N = 800$)

Variable	Budapest ($n = 401$) Median (IQR)	Amman ($n = 399$) Median (IQR)
Sitting time (hours/day)	6 (4)	10 (4)
Total MET minutes/week	918 (524–1,188)	464.25 (198–884)
BMI (kg/m ²)	21.48 (20.32–22.66)	23.31 (21.53–25.37)
Category	Hungary n (%)	Jordan n (%)
<i>PA level</i>		
High	54 (13.5%)	28 (7.0%)
Moderate	196 (48.9%)	106 (26.6%)
Low	151 (37.7%)	265 (66.4%)
<i>BMI</i>		
Overweight/obese	32 (8.0%)	110 (27.6%)
Normal	351 (87.7%)	275 (68.9%)
Underweight	18 (4.5%)	14 (3.5%)

Correlations among study variables

Descriptive statistics and bivariate associations among study variables are presented in Table 3. All psychosocial predictors were positively associated with total MET minutes (all $p < .001$). Total MET minutes demonstrated a moderate inverse correlation with BMI ($r = -.350, p < .001$). Social support and cultural support were negatively associated with BMI (both $p < .001$), while perceived social safety

showed a smaller but statistically significant inverse association ($r = -.136, p < .001$). Correlation magnitudes ranged from small to moderate, consistent with multifactorial behavioural determinants.

Consistent with H3, total PA demonstrated a moderate negative association with BMI ($r = -.350, p < .001$), indicating that participants reporting higher levels of PA tended to have lower BMI values.

Table 3. Spearman correlations, means, and standard deviations among study variables ($N = 800$)

Variable	M	SD	1	2	3	4	5
1. Social support	2.78	0.63	—				
2. Cultural support	3.22	0.99	.442***	—			
3. Social safety	3.54	0.79	.231***	.556***	—		
4. Total MET minutes	691.68	689.78	.346***	.274***	.223***	—	
5. BMI	22.39	3.33	-.302***	-.230***	-.136***	-.350***	—

Note: *** $p < .001$.

Primary comparisons

Between-country differences in psychosocial predictors are presented in Table 4. Women in Budapest reported significantly higher levels of perceived social support, cultural support for PA, and perceived social safety than women in Amman (all

$p < .001$). Effect sizes ranged from moderate to large ($r = .42-.66$), indicating that these differences were not only statistically significant but also practically meaningful. The largest cross-cultural difference was observed for perceived cultural support ($r = .66$), followed by perceived social safety ($r = .56$).

Table 4. Cross-cultural differences in psychosocial determinants

Variable	Budapest Median (IQR)	Amman Median (IQR)	U	p	Effect Size (r)
Social support	3.2 (2.4–3.4)	2.2 (2.0–3.0)	46,599.5	<.001	.42
Cultural support	4.0 (4.0–4.0)	2.0 (2.0–3.0)	26,834.5	<.001	.66
Social safety	4.0 (4.0–4.0)	3.0 (3.0–4.0)	35,000.5	<.001	.56

Note: Data are presented as median (IQR). Group differences were assessed using Mann–Whitney U tests. Effect sizes (r) are reported.

Associations across physical activity levels (H2)

Participants with higher PA levels reported more favourable psychosocial environments (Table 5). Significant differences were observed across PA categories for perceived social support, cultural support, and perceived social safety (all $p < .001$).

Women classified as moderately or highly active generally reported higher levels of social support, greater cultural acceptance of women's PA, and stronger perceptions of social safety than women in the low PA category. These findings support the hypothesis that psychosocial determinants are positively associated with PA participation.

Table 5. Psychosocial determinants across physical activity levels (H2)

Variable	Low PA Median	Moderate PA Median	High PA Median	H	p
Social support	2.4	3.0	2.8	40.69	<.001
Cultural support	3.0	4.0	4.0	47.46	<.001
Social safety	3.0	4.0	4.0	29.26	<.001

Note: Values are presented as median scores. Group differences were assessed using the Kruskal–Wallis H Test. Statistical significance was set at $p < .05$.

Mediation analyses

Bootstrapped mediation analyses using 5,000 resamples were conducted to examine whether PA mediated the relationship between psychosocial determinants and BMI. Significant indirect effects were observed for social support (indirect effect = -0.09 , 95% CI $[-0.16, -0.02]$, $p = .01$) and cultural support (indirect effect = -0.04 , 95% CI $[-0.09, -0.01]$, $p = .01$). These findings indicate that women reporting greater social support and stronger cultural acceptance of women's PA tended to engage in higher levels of PA, which in turn were associated with lower BMI values. The indirect effect was stronger for social support than for cultural support,

suggesting that interpersonal support may represent a particularly important psychosocial correlate of women's PA and weight status. In contrast, the indirect effect for perceived social safety was not statistically significant (indirect effect = -0.04 , 95% CI $[-0.09, 0.01]$, $p = .09$), as the confidence interval included zero. Therefore, the findings support PA as a significant behavioural pathway linking social support and cultural support to BMI, whereas evidence for mediation through perceived social safety was not observed. Overall, the results support partial mediation for social support and cultural support, but not for perceived social safety.

Table 6. Bootstrapped indirect effects (5,000 resamples)

Predictor	Indirect Effect	95% CI	p
Social support	-0.09	$[-0.16, -0.02]$	.01
Cultural support	-0.04	$[-0.09, -0.01]$	.01
Social safety	-0.04	$[-0.09, 0.01]$	.09

Note: Indirect effects for social support and cultural support were significant, indicating partial mediation via PA.

4. DISCUSSION

Interpretation of cross-cultural differences

The present study identified significant cross-cultural differences in PA, sedentary behaviour, BMI, and psychosocial determinants between women residing in Budapest and Amman. Women in Budapest reported higher PA levels, lower BMI, greater perceived social support, stronger cultural support for women's PA, and higher perceptions of social safety compared with women in Amman. These findings are consistent with previous research indicating that women's PA participation is strongly shaped by social and cultural contexts, particularly in settings where gender norms influence opportunities for recreational and leisure-time PA (Chaabane et al., 2020; Saadeh et al., 2022).

One possible explanation for these differences

is that women in Budapest may experience a more supportive psychosocial environment for engaging in PA. Higher levels of perceived social support may provide encouragement, companionship, and reinforcement for participation, while stronger cultural support may increase the social acceptability of women's involvement in PA. In contrast, women in Amman may face greater sociocultural constraints, including traditional gender expectations and competing family responsibilities, which have been identified as barriers to PA participation among women in several Middle Eastern contexts (Alageel et al., 2023; Amin et al., 2012; Obeisat & Gharaibeh, 2012).

The findings further suggest that differences in BMI may reflect broader behavioural and social influences beyond PA alone. Participants in Amman reported substantially higher sitting time than participants in Budapest, indicating that sedentary

behaviour may represent an additional contributor to weight-related outcomes. Previous research has shown that prolonged sedentary behaviour is associated with adverse metabolic outcomes independently of PA participation (Ekelund et al., 2016; Keadle et al., 2017). Moreover, social and cultural environments may influence dietary practices, meal patterns, stress-related eating behaviours, and other lifestyle factors that contribute to BMI (Al-Hazzaa et al., 2011). Consequently, the observed cross-cultural differences in BMI are likely shaped by multiple interacting psychosocial and behavioural pathways rather than PA alone.

Besides, although environmental characteristics such as walkability, transportation systems, and access to recreational facilities may also contribute to differences in PA between settings, these factors were not directly measured in the present study. Therefore, the current findings primarily highlight the importance of psychosocial and sociocultural environments in understanding cross-cultural variation in women's PA and BMI.

Psychosocial determinants of physical activity

The present findings demonstrated that perceived social support, cultural support for women's PA, and perceived social safety were all positively associated with PA participation. These results are consistent with Ecological Models of Health Behaviour, which propose that PA is influenced by interpersonal, social, and environmental contexts (Abraído-Lanza et al., 2017; Hernandez et al., 2006). In the present study, women who reported more favourable psychosocial environments also reported higher levels of PA, highlighting the importance of social influences on health-related behaviours.

Among the psychosocial determinants examined, social support demonstrated the strongest association with PA. This finding is consistent with previous research identifying social support as one of the most robust correlates of PA participation among women. Supportive family members, friends, and peers may encourage participation through emotional encouragement, companionship, accountability, and practical assistance, thereby facilitating more active lifestyles (BenNETTER et al., 2023; Kouvonen et al., 2012). Such support may be particularly important for women, whose opportunities for PA are often shaped by family responsibilities and social expectations.

Cultural support was also positively associated with PA, suggesting that broader social norms and

cultural attitudes may influence women's willingness and ability to engage in active lifestyles. When PA is perceived as socially acceptable and valued within a community, women may encounter fewer social barriers to participation and greater encouragement from family and peers. This finding aligns with previous studies demonstrating that cultural norms can either facilitate or constrain women's participation in PA, particularly in settings where gender roles strongly influence leisure-time behaviours (Perrin et al., 2016; Sharara et al., 2018; Shuval et al., 2008).

Perceived social safety was likewise positively associated with PA, indicating that women who felt safer within their social environments tended to report higher levels of activity. This finding is consistent with research suggesting that concerns related to personal safety, harassment, or social discomfort may discourage participation in outdoor or community-based PA (Mertala & Palsa, 2024; Roper, 2016). However, the magnitude of this association was weaker than that observed for social support, suggesting that interpersonal and cultural influences may play a more central role in shaping PA behaviour among women in the present sample.

Physical activity as a behavioural pathway linking psychosocial determinants and BMI

The mediation analyses indicated that PA plays an important behavioural pathway through which psychosocial environments may be associated with BMI. Specifically, PA partially mediated the associations between social support and BMI and between cultural support and BMI. Females reporting greater social support and stronger cultural acceptance of women's PA tended to engage in higher levels of PA, which in turn were associated with lower BMI values. These findings are in line with ecological and social epidemiological perspectives, which propose that social environments influence health outcomes indirectly through their associations with health-related behaviours (Chaput et al., 2010; Esquivel, 2021; Kiernan et al., 2012).

Although PA emerged as a significant pathway, the findings also suggest that psychosocial environments may influence BMI through mechanisms beyond PA alone. As mentioned before, body weight is determined by a complex interaction of behavioural, social, and environmental factors. Dietary habits, culturally shaped eating practices, food availability, sleep quality, stress-related eating, and sedentary behaviour may all contribute to weight-related outcomes. Social and cultural environments may

influence several of these behaviours simultaneously, affecting both energy expenditure and energy intake (Reddy & van Dam, 2020; Yildirim & Baskan, 2026). Consequently, supportive psychosocial environments may be associated with healthier weight status through multiple interconnected pathways rather than exclusively through PA.

In contrast, perceived social safety did not demonstrate a significant indirect association with BMI through PA. Several explanations may account for this finding. First, women who perceive lower levels of safety may adapt by engaging in indoor, home-based, or organised forms of PA that are less dependent on neighbourhood conditions. Second, perceptions of safety may influence specific domains of activity, such as outdoor recreation or active transportation, rather than total PA levels captured by the IPAQ-SF. Third, perceived safety may influence health outcomes through psychological pathways, including stress, anxiety, and wellbeing, which were not assessed in the present study. These explanations remain speculative and should be examined in future longitudinal research.

Public health implications

The findings of this study have several implications for public health policy and intervention design aimed at increasing PA and improving weight-related outcomes among women. The results suggest that effective interventions should move beyond individual-level behaviour change approaches and address the broader social, cultural, and environmental contexts that shape opportunities for PA. Programmes designed to increase PA participation among women should therefore adopt a multilevel approach that simultaneously targets social support systems, cultural norms, and access to supportive environments.

Given the significant role of social support observed in this study, interventions should incorporate family- and peer-based strategies that encourage active lifestyles and recognise the influence of close social networks on women's health behaviours. Community-based programmes, women-only exercise initiatives, family-inclusive activities, and socially supported walking groups may provide both opportunities for PA and mechanisms for strengthening social relationships. Such approaches may increase motivation, reinforce social support, and contribute to the long-term sustainability of active behaviours.

The findings also highlight the importance of culturally sensitive approaches to PA promotion.

Public health initiatives should consider how cultural expectations, community attitudes, and social norms influence women's participation in PA. Strategies that increase the visibility and social acceptance of physically active women, promote positive community attitudes, and provide culturally appropriate opportunities for exercise may help reduce barriers to participation and support healthier lifestyles.

In addition, the results suggest that creating accessible and socially acceptable opportunities for PA within everyday environments may be particularly beneficial in such urban settings. Beyond traditional recreational facilities, public spaces such as shopping malls and other indoor community environments may be utilised as safe and comfortable settings for PA through designated walking routes, distance-marked pathways, organised walking programmes, and activity-promoting signage. Similarly, the installation of free-access outdoor fitness equipment and women-friendly recreational spaces may further increase opportunities for regular PA, particularly in urban settings where structured exercise facilities may be less accessible.

Urban planning and public health policies may also benefit from incorporating active design principles that encourage movement as part of daily routines. Improving pedestrian connectivity, ensuring safe and continuous walking routes, enhancing perceived safety, and designing environments that facilitate incidental PA can help integrate movement into everyday life. Such strategies may be particularly relevant in car-dependent settings where opportunities for active transportation are limited.

Finally, the findings reinforce the need for comprehensive health promotion strategies that recognise PA as one component of a broader lifestyle framework. Because BMI is influenced by multiple behavioural and environmental factors, interventions should integrate PA promotion with efforts to reduce sedentary behaviour, encourage healthy dietary habits, and strengthen supportive social environments. Such multidimensional approaches may be more effective in promoting sustainable improvements in women's health and wellbeing.

Strengths and limitations

This study has several strengths. The cross-cultural design enabled the examination of psychosocial determinants of PA and BMI among women living in two distinct sociocultural contexts. The relatively large sample size enhanced statistical precision and provided adequate power for mediation analyses. Furthermore, the use of a theoretically informed

framework allowed for the simultaneous examination of social support, cultural support, perceived social safety, PA, and BMI within a single analytical model.

Several limitations should be acknowledged. First, the cross-sectional design precludes conclusions regarding causality or temporal ordering. Although mediation analyses were conducted, the observed relationships should be interpreted as statistical associations rather than causal pathways. Longitudinal and prospective studies are needed to establish whether psychosocial determinants precede changes in PA and BMI over time.

Second, participants were recruited through convenience sampling using social media platforms and university networks. Consequently, the sample may not be fully representative of the broader female populations of Jordan or Hungary, particularly women with lower educational attainment, limited internet access, or differing socioeconomic backgrounds. Therefore, caution is warranted when generalising the findings beyond the study sample.

Third, cultural support and perceived social safety were assessed using single-item indicators. Although these measures were selected based on theoretical relevance, underwent expert evaluation using Mohajan's content validity approach, and demonstrated satisfactory content validity indices, single-item measures may not fully capture the multidimensional nature of these constructs. Future research should employ comprehensive multi-item instruments to improve construct depth and measurement reliability.

Fourth, all variables were self-reported, introducing the possibility of recall bias, reporting bias, and social desirability bias. In particular, self-reported PA and anthropometric measures may differ from objectively assessed values.

Finally, the mediation analyses did not adjust for several potentially relevant factors, including dietary behaviours, sleep quality, psychosocial stress, occupational demands, educational attainment, and other lifestyle characteristics that may influence BMI. These unmeasured factors may have contributed to the observed associations. Future studies should incorporate a broader range of behavioural and contextual variables to better understand the complex pathways linking psychosocial environments, PA, and weight-related outcomes among women.

5. CONCLUSIONS

This study contributes to the growing body of evidence highlighting the importance of

psychosocial and sociocultural environments in shaping women's PA behaviours and weight-related outcomes. Across two distinct cultural settings, social support, cultural support for women's PA, and perceived social safety were positively associated with PA participation. Furthermore, PA partially mediated the associations between social support and BMI and between cultural support and BMI, suggesting that active lifestyles may represent one pathway through which supportive psychosocial environments are linked to healthier weight status.

The findings underscore the need to move beyond individual-focused approaches to PA promotion and consider the broader social and cultural contexts in which women live. Interventions that strengthen supportive social networks, enhance cultural acceptance of women's participation in PA, and create accessible opportunities for active lifestyles may contribute to improved health outcomes among women.

Given the cross-sectional nature of the study, the observed relationships should be interpreted as associations rather than causal effects. Future longitudinal research incorporating additional behavioural and contextual factors, including dietary practices, sedentary behaviour, sleep, and psychosocial stress, is needed to further clarify the complex pathways linking.

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REFERENCES

Abraído-Lanza, A. F., Shelton, R. C., Martins, M. C., & Crookes, D. M. (2017). Social norms, acculturation, and

physical activity among Latina women. *Journal of Immigrant and Minority Health*, 19(2), 285–293. <https://doi.org/10.1007/s10903-016-0519-7>

Alageel, S., Alhujaili, M., Altwaijri, Y., Bilal, L., & Al-sukait, R. (2023). Barriers and facilitators to adopting healthier lifestyle among low-income women in Saudi Arabia: A qualitative study. *Health Expectations: An International Journal of Public Participation in Health Care and Health Policy*, 26(3), 1202–1212. <https://doi.org/10.1111/HEX.13735>

Al-Hazaa, H. M., Abahussain, N. A., Al-Sobayel, H. I., Qahwaji, D. M., & Musaiger, A. O. (2011). Physical activity, sedentary behaviors and dietary habits among Saudi adolescents relative to age, gender and region. *International Journal of Behavioral Nutrition and Physical Activity*, 8(1), Article 140. <https://doi.org/10.1186/1479-5868-8-140>

Almaqhawi, A. (2022). Perceived barriers and facilitators of physical activity among Saudi Arabian females living in the East Midlands. *Journal of Taibah University Medical Sciences*, 17(3), 384–391. <https://doi.org/10.1016/j.jtumed.2021.11.002>

Amin, T. T., Al Khoudair, A. S., Al Harbi, M. A., & Al Ali, A. R. (2012). Leisure time physical activity in Saudi Arabia: Prevalence, pattern and determining factors. *Asian Pacific Journal of Cancer Prevention: APJCP*, 13(1), 351–360. <https://doi.org/10.7314/APJCP.2012.13.1.351>

Appelbaum, M., Cooper, H., Kline, R. B., Mayo-Wilson, E., Nezu, A. M., & Rao, S. M. (2018). Journal article reporting standards for quantitative research in psychology: The APA Publications and Communications Board task force report. *American Psychologist*, 73(1), 3–25. <https://doi.org/10.1037/AMP0000191>

Baheiraei, A., Bakouei, F., Mohammadi, E., Montazeri, A., & Hosseini, M. (2015). The social determinants of health in association with women's health status of reproductive age: A population-based study. *Iran Journal of Public Health*, 44(1), 119–129.

Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J. F., Martin, B. W., & Lancet Physical Activity Series Working Group. (2012). Correlates of physical activity: Why are some people physically active and others not? *Lancet*, 380(9838), 258–271. [https://doi.org/10.1016/S0140-6736\(12\)60735-1](https://doi.org/10.1016/S0140-6736(12)60735-1)

Bennetter, K. E., Richardsen, K. R., Vøllestad, N. K., Jensen, A. K., Robinson, H. S., Mdala, I., & Waage, C. W. (2023). Associations between social support and physical activity in postpartum: A Norwegian multi-ethnic cohort study. *BMC Public Health*, 23(1), Article 702. <https://doi.org/10.1186/S12889-023-15507-Z>

Bergkvist, L., & Rossiter, J. R. (2007). The predictive validity of multiple-item versus single-item measures of the same constructs. *Journal of Marketing Research*, 44(2), 175–184. <https://doi.org/10.1509/jmkr.44.2.175>

Bowling, A. (2005). Just one question: If one question works, why ask several? *Journal of Epidemiology and Community Health*, 59(5), 342–345. <https://doi.org/10.1136/JECH.2004.021204>

Bracy, N. L., Millstein, R. A., Carlson, J. A., Conway, T. L., Sallis, J. F., Saelens, B. E., Kerr, J., Cain, K. L., Frank, L. D., & King, A. C. (2014). Is the relationship between the built environment and physical activity moderated by perceptions of crime and safety? *International Journal of Behavioral Nutrition and Physical Activity*, 11(1), Article 24. <https://doi.org/10.1186/1479-5868-11-24>

Chaabane, S., Chaabna, K., Abraham, A., Mamtani, R., & Cheema, S. (2020). Physical activity and sedentary behaviour in the Middle East and North Africa: An overview of systematic reviews and meta-analysis. *Scientific Reports*, 10, Article 9363. <https://doi.org/10.1038/S41598-020-66163-X>

Chaput, J.-P., Klingenberg, L., Rosenkilde, M., Gilbert, J.-A., Tremblay, A., & Sjödin, A. (2010). Physical activity plays an important role in body weight regulation. *Journal of Obesity*, 2011, Article 360257. <https://doi.org/10.1155/2011/360257>

Coackly, J. (2015). *Sports in society. Issues and controversies* (2nd ed., pp. 170–210). McGraw Hill Education.

Courneya, K. S., Plotnikoff, R. C., Hotz, S. B., & Birkett, N. J. (2000). Social support and the theory of planned behavior in the exercise domain. *American Journal of Health Behavior*, 24(4), 300–308(9). <https://doi.org/10.5993/AJHB.24.4.6>

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., Pratt, M., Ekelund, U., Yngve, A., Sallis, J. F., & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise*, 35(8), 1381–1395. <https://doi.org/10.1249/01.MSS.0000078924.61453.FB>

Ekelund, U., Steene-Johannessen, J., Brown, W. J., Fagerland, M. W., Owen, N., Powell, K. E., Bauman, A., Lee, I., Lancet Physical Activity Series 2 Executive Committee, & Lancet Sedentary Behaviour Working Group. (2016). Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women. *Lancet*, 388(10051), 1302–1310. [https://doi.org/10.1016/S0140-6736\(16\)30370-1](https://doi.org/10.1016/S0140-6736(16)30370-1)

Eriksson, M., Sundberg, L. R., Santosa, A., Lindgren, H., Ng, N., & Lindvall, K. (2025). Health behavioural change – The influence of social-ecological factors and health identity. *International Journal of Qualitative Studies on Health and Well-Being*, 20(1), Article 2458309. <https://doi.org/10.1080/17482631.2025.2458309>

Esquivel, M. K. (2021). Energy balance dynamics: Exercise, appetite, diet, and weight control. *American Journal of Lifestyle Medicine*, 15(3), 220–223. <https://doi.org/10.1177/1559827621989285>

Fomčenko, I., Bikulčienė, I., Karčiauskaitė, D., Urbonas, M., Alekna, V., & Šapoka, V. (2025). Age-related variations in body composition and metabolic health: A cross-sectional study in adults. *Medicina*, 61(11), Article 1951. <https://doi.org/10.3390/MEDICINA61111951>

Frakt, A. (2019, September 4). *The Proximal/Distal Paradigm* | Harvard Global Health Institute. Harvard

Global Health Institute. <https://globalhealth.harvard.edu/the-proximal-distal-paradigm/>

Frank, J., Abel, T., Campostrini, S., Cook, S., Lin, V. K., & McQueen, D. V. (2020). The social determinants of health: Time to re-think? *International Journal of Environmental Research and Public Health*, 17(16), Article 5856. <https://doi.org/10.3390/IJERPH17165856>

Gao, Z., Chee, C. S., Omar Dev, R. D., Liu, Y., Gao, J., Li, R., Li, F., Liu, X., & Wang, T. (2025). Social capital and physical activity: A literature review up to March 2024. *Frontiers in Public Health*, 13, Article 1467571. <https://doi.org/10.3389/FPUBH.2025.1467571>

Hernandez, L. M., Blazer, D. G., & Institute of Medicine (US) Committee on Assessing Interactions Among Social, Behavioral, and Genetic Factors. (2006). *The impact of social and cultural environment on health*. National Academies Press. <https://www.ncbi.nlm.nih.gov/books/NBK19924/>

Keadle, S. K., Conroy, D. E., Buman, M. P., Dunstan, D. W., & Matthews, C. E. (2017). Targeting reductions in sitting time to increase physical activity and improve health. *Medicine and Science in Sports and Exercise*, 49(8), 1572–1582. <https://doi.org/10.1249/MSS.0000000000001257>

Kiernan, M., Moore, S. D., Schoffman, D. E., Lee, K., King, A. C., Taylor, C. B., Kiernan, N. E., & Perri, M. G. (2012). Social support for healthy behaviors: Scale psychometrics and prediction of weight loss among women in a behavioral program. *Obesity*, 20(4), 756–764. <https://doi.org/10.1038/oby.2011.293>

Kilanowski, J. F. (2017). Breadth of the socio-ecological model. *Journal of Agromedicine*, 22(4), 295–297. <https://doi.org/10.1080/1059924X.2017.1358971>

Kouvonen, A., De Vogli, R., Stafford, M., Shipley, M. J., Marmot, M. G., Cox, T., Vahtera, J., Väänänen, A., Heponiemi, T., Singh-Manoux, A., & Kivimäki, M. (2012). Social support and the likelihood of maintaining and improving levels of physical activity: The Whitehall II Study. *European Journal of Public Health*, 22(4), 514–518. <https://doi.org/10.1093/eurpub/ckr091>

Lovasi, G. S., Goh, C. E., Pearson, A. L., & Breetzke, G. (2014). The independent associations of recorded crime and perceived safety with physical health in a nationally representative cross-sectional survey of men and women in New Zealand. *BMJ Open*, 4(3), Article e004058. <https://doi.org/10.1136/bmjopen-2013-004058>

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, 35(6), 382–386. <https://doi.org/10.1097/00006199-198611000-00017>

Mertala, P., & Palsa, L. (2024). Running free: Recreational runners' reasons for non-use of digital sports technology. *Sport in Society*, 27(3), 329–345. <https://doi.org/10.1080/17430437.2023.2246408>

Mohajan, H. (2017). Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University*, 17(4), 56–82.

Moreno-Murcia, J. A., Belando, N., Huéscar, E., & Torres, M. D. (2017). Social support, physical exercise and

life satisfaction in women. *Revista Latinoamericana de Psicología*, 49(3), 194–202. <https://doi.org/10.1016/j.rlp.2016.08.002>

Muhammad, Y. A. (2025). Reproductive aging in biological females: Mechanisms and immediate consequences. *Frontiers in Endocrinology*, 16, Article 1658592. <https://doi.org/10.3389/FENDO.2025.1658592>

O'Brien Cousins, S. (1995). Social support for exercise among elderly women in Canada. *Health Promotion International*, 10(4), 273–282. <https://www.jstor.org/stable/45152268>

Obeisat, S., & Gharaibeh, H. (2012). Physical activity behaviour of Jordanian adolescents and its associated factors. *European Journal of Scientific Research*, 67(3), 433–443. <https://www.researchgate.net/publication/289768598>

Perrin, A. J., Caren, N., Skinner, A. C., Odulana, A., & Perrin, E. M. (2016). The unbuilt environment: Culture moderates the built environment for physical activity. *BMC Public Health*, 16(1), Article 1227. <https://doi.org/10.1186/s12889-016-3866-3>

Pietromonaco, P. R., & Collins, N. L. (2017). Interpersonal mechanisms linking close relationships to health. *The American Psychologist*, 72(6), 531–542. <https://doi.org/10.1037/AMP0000129>

Prince, S. A., Reed, J. L., Nerenberg, K. A., Kristjansson, E. A., Hiremath, S., Adamo, K. B., Tulloch, H. E., Mullen, K.-A., Fodor, J. G., Wright, E., & Reid, R. D. (2014). Intrapersonal, social and physical environmental determinants of moderate-to-vigorous physical activity in working-age women: A systematic review protocol. *Systematic Reviews*, 3, Article 132. <https://doi.org/10.1186/2046-4053-3-132>

Reddy, G., & van Dam, R. M. (2020). Food, culture, and identity in multicultural societies: Insights from Singapore. *Appetite*, 149, Article 104633. <https://doi.org/10.1016/j.appet.2020.104633>

Roper, E. A. (2016). Concerns for personal safety among female recreational runners. *Women in Sport and Physical Activity Journal*, 24(2), 91–98. <https://doi.org/10.1123/wspaj.2015-0013>

Saadeh, R., Obaidat, A., & Allouh, M. Z. (2022). The perceived built environment and general physical activity: An exploratory study in Jordan. *Frontiers in Sustainable Cities*, 4, Article 962919. <https://doi.org/10.3389/FRSC.2022.962919>

Sallis, J. F., & Owen, N. (2015). Ecological models of health behavior. In K. Glanz, B. K. Rimer, & K. "V." Viswanath (Eds.), *Health behavior: Theory, research, and practice* (5th ed., pp. 43–64). Jossey-Bass/Wiley.

Sallis, J. F., Grossman, R. M., Pinski, R. B., Patterson, T. L., & Nader, P. R. (1987). The development of scales to measure social support for diet and exercise behaviors. *Preventive Medicine*, 16(6), 825–836. [https://doi.org/10.1016/0091-7435\(87\)90022-3](https://doi.org/10.1016/0091-7435(87)90022-3)

Sharara, E., Akik, C., Ghattas, H., & Makhoul Obermeyer, C. (2018). Physical inactivity, gender and culture in Arab countries: A systematic assessment of the litera-

ture. *BMC Public Health*, 18(1), Article 639. <https://doi.org/10.1186/s12889-018-5472-z>

Shuval, K., Weissblueth, E., Araida, A., Brezis, M., Fari-di, Z., Ali, A., & Katz, D. L. (2008). The role of culture, environment, and religion in the promotion of physical activity among Arab Israelis. *Preventing Chronic Disease*, 5(3), Article 88. http://www.cdc.gov/pcd/issues/2008/jul/07_0104.htm

Walker, I., Tapp, A., & Davis, A. (2023). Motonormativity: How social norms hide a major public health hazard. *International Journal of Environment and Health*, 11(1), 21–33. <https://doi.org/10.1504/IJENVH.2023.135446>

Wang, M. L., Pbert, L., & Lemon, S. C. (2014). Influence of family, friend and coworker social support and social undermining on weight gain prevention among adults. *Obesity*, 22(9), 1973–1980. <https://doi.org/10.1002/oby.20814>

Warburton, D. E. R., & Bredin, S. S. D. (2017). Health benefits of physical activity: A systematic review of current systematic reviews. *Current Opinion in Cardiology*, 32(5), 541–556. <https://doi.org/10.1097/HCO.0000000000000437>

Westerterp, K. R. (2013). Physical activity and physical activity induced energy expenditure in humans: Measurement, determinants, and effects. *Frontiers in Physiology*, 4, Article 90. <https://doi.org/10.3389/FPHYS.2013.00090>

World Health Organization. (2020, November 25). *WHO Guidelines on physical activity and sedentary behaviour*. <https://www.who.int/publications/item/9789240015128>

World Health Organization. (2025, December 8). *Obesity and overweight*. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>

World Health Organization. (n.d.). *Social determinants of health*. https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1

Yildirim, G., & Baskan, K. (2026). Cultural food consumption differences and food waste: Restaurant professionals' perspectives on Middle Eastern tourist dining practices in Ayder Tourism Center. *International Journal of Gastronomy and Food Science*, 44, Article 101491. <https://doi.org/10.1016/j.ijgfs.2026.101491>

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