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Original Research

Psychosocial and Cultural Barriers to Leisure-Time Physical Activity: Associations with Sedentary Behavior and Physiological Health Indicators Among Adults in Chaharmahal and Bakhtiari Province, Iran

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Abstract

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Background: Physical inactivity is a global health concern driven by complex social and environmental factors. This study investigated psychosocial and cultural barriers to physical activity and their associations with physical activity, sedentary behavior, and physiologic health indicators. Methods: This mixed-methods, exploratory sequential design study involved 298 adults from Chaharmahal and Bakhtiari province, Iran. Data included the Perceived Barriers to Leisure-Time Physical Activity Questionnaire and objective measurements of body mass index (BMI) and blood pressure, which were analyzed using multiple regression. Results: The average psychosocial barrier score showed a moderate negative relationship with physical activity levels ($r = -0.41$, representing an effect size of $R^2 = 0.17$, $p < 0.001$) and weak-to-moderate positive correlations with BMI ($r = 0.29$, $R^2 = 0.08$, $p < 0.01$) and systolic blood pressure (SBP) ($r = 0.21$, $R^2 = 0.04$, $p < 0.05$). Motivational barriers independently predicted higher BMI ($\beta = 0.35$, $p < 0.001$), while social barriers significantly predicted SBP ($\beta = 0.28$, $p = 0.015$). Conclusion: Contextual barriers, particularly motivational and social constraints, are key predictors of sedentary behaviors and adverse physiological outcomes. From a public health perspective, interventions must go beyond simple educational campaigns and explicitly target the multilevel socio-environmental and motivational constraints to effectively reduce cardiovascular and metabolic risks.

Keywords: Motivation, public health, social support, socio-economic status

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Introduction

Adequate and regular physical activity is a fundamental pillar of individual and public health and well-being. It plays a central role in the prevention and management of chronic noncommunicable diseases (NCDs), including cardiovascular disease, type 2 diabetes, and some cancers.[1-3] According to recommendations from global organizations such as the American College of Sports Medicine (ACSM), adults need at least 150 minutes of moderate-intensity aerobic physical activity per week to achieve maximum health benefits.[4] Despite increased awareness, the prevalence of physical inactivity remains a serious problem worldwide. Physical inactivity is recognized not only as a Sedentary lifestyle behavior but also directly affects vital physiological indicators, including weight control, body composition, and blood pressure regulation.[5-8] Failure to heed this advice can increase health risks to the extent that sedentary behaviors alone have been identified as an independent risk factor in many pathological models.[9]

The relationship between insufficient physical activity and adverse physiological health outcomes is a key area of interest in health research. Indicators such as body mass index (BMI) and blood pressure are objective and accepted measures for assessing metabolic and cardiovascular risks in different populations.[10,11] The increasing prevalence of overweight and obesity (high BMI) in many middle-income countries, including Iran, indicates an imbalance between energy intake and physical activity levels.[12] The importance of studying specific geographical regions, such as Chaharmahal and Bakhtiari province in Iran, is highlighted because environmental, climatic, and even occupational patterns may have different effects on physical activity levels and sedentary behaviors, ultimately leading to differences in regional physiological indicators[13,14]. Specifically, this province's high-altitude geography and its rapid transition from traditional, nomadic lifestyles to urbanized settings present unique socio-cultural challenges. The region's distinct cultural norms and gender expectations deeply shape physical activity behaviors, providing a unique landscape for studying how emerging cultural constraints restrict exercise compared to more developed central provinces. It was hypothesized that higher average psychosocial and cultural barriers would be significantly associated with elevated sedentary behavior and poorer physiological health indicators (BMI and SBP).

Achieving adequate levels of physical activity is not a purely volitional matter, but is strongly influenced by a complex interaction of contextual and individual factors. Psychosocial barriers are recognized as the strongest deterrents.[15] These barriers include a lack of motivation, low self-efficacy (a lack of confidence in one's ability to perform a behavior), and stress and anxiety resulting from a busy lifestyle.[16,17] Motivation is a critical predictor, especially in engaging in physical activity; individuals who report higher motivational barriers are less likely to initiate or maintain long-term exercise programs.[18] Additionally, a lack of social support from family or peers can contribute to the failure to maintain healthy habits, as social support is a crucial source of encouragement and commitment.[19] Beyond individual psychological factors, cultural and structural barriers also significantly influence participation in physical activity. In many societies, particularly in rural areas or small towns, social and cultural norms can restrict women's opportunities to engage in physical activity in public spaces.[20] Cultural barriers include inappropriate scheduling of activities, high costs, and limited access to safe, culturally appropriate exercise facilities.[21] In Iranian societies, sociocultural factors may include prioritizing family responsibilities over recreational activities or concerns about social stigma, all of which can lead to increased sedentary behavior and reduced physical activity.[22] Understanding these cultural and social layers is essential for interventions to be effective, not only at the individual but also at the community level.

Sedentary behavior is defined as any waking behavior characterized by an energy expenditure ≤1.5 metabolic equivalents (METs) while in a sitting, reclining, or lying posture. Based on current research literature, accumulating more than 8 hours of sedentary time per day is classified as an unhealthy range, significantly increasing the risk of metabolic and cardiovascular diseases[48].

Theoretical Pathways Linking Barriers to Health Outcomes

The relationship between perceived barriers and adverse health outcomes can be understood through two primary theoretical pathways: behavioral and physiological. Behaviorally, frameworks such as the Social-Ecological Model and Self-Determination Theory suggest that motivational constraints (e.g., a lack of intrinsic drive) and social barriers (e.g., a lack of support or resources) directly reduce energy expenditure by promoting physical inactivity. Over time, this disruption in caloric balance naturally leads to an elevated Body Mass Index (BMI). Physiologically, the Psychosocial Stress Theory posits that chronic exposure to cultural and social barriers—such as environmental restrictions or lack of community support—acts as a persistent environmental stressor. This chronic psychosocial stress can trigger the hyperactivation of the hypothalamic-pituitary-adrenal (HPA) axis, leading to increased systemic inflammation and, ultimately, elevated blood pressure, independent of baseline physical activity.

Despite a general understanding of physical activity barriers, most studies have either focused on Western populations or have examined only one dimension of the barriers (e.g., individual barriers)[23]. A significant research gap exists in the lack of simultaneous examination of psychosocial and cultural barriers in relation to both behavioral variables (inactivity) and objective physiological outcomes (BMI and blood pressure) within a specific regional context.[24] The present study uses a mixed exploratory (qualitative-quantitative) approach to first identify the local and cultural dimensions of barriers and then use quantitative data to test the predictive power of these barriers on health indicators. This mixed method ensures that the identified barriers are culturally valid and relevant to the study population.[25] Focusing on Chaharmahal and Bakhtiari Province, which has distinct demographic and geographical characteristics, adds a new and localized perspective to the global literature.

Given the limitations outlined in previous research, the primary objective of this study was to determine the association between psychosocial and cultural barriers and physical activity levels, sedentary behaviors, and key physiological health indicators (BMI and blood pressure) among adults residing in Chaharmahal and Bakhtiari Province, Iran. Outcomes would guide local, multifaceted interventions that directly address the unique motivational, social, and cultural barriers faced by this population, ultimately improving the region's overall health.

Methods

Participants

This research employed a mixed-methods, exploratory sequential design study.[26] Themes from the qualitative phase directly informed item generation for the quantitative phase; no items were removed after pilot testing. The quantitative phase was conducted with a cross-sectional approach on the adult population of Chaharmahal and Bakhtiari Province, Iran.

To ensure fair representation of social and geographic groups, sampling was conducted using a multistage cluster method. Iran's national census data were used to classify urban and rural areas and to support the sampling frame. Within each cluster, neighborhoods and residential blocks

were randomly selected. Subsequently, households were randomly selected through face-to-face visits. To reduce potential clustering bias, only one eligible adult per household was randomly selected for participation. This process resulted in data collection from a final sample of 298 eligible adults.

The target sample size was determined a priori through a power calculation using G*Power software. For a multiple linear regression test with five predictors, an expected medium effect size ($f^2 = 0.15$), an alpha level of 0.05, and a statistical power of 0.80, a minimum of 92 participants was required. The final sample size (N=298) exceeded the desired sample size determined using the a priori power calculation. To collect demographic data, including gender, questions were asked in a self-report format, with full respect for participants' individual identities. They were collected solely for demographic analyses and related to the study objectives.

All research procedures were conducted with full approval from the relevant university research ethics committee (ethics code: IR.SKU.REC.1404.4755) and in accordance with the principles outlined in the Declaration of Helsinki. This research was conducted in full accordance with the ethical standards of the International Journal of Exercise Science.[27] Written informed consent was obtained from all participants before data collection. This study was conducted in full compliance with ethical standards. Detailed descriptive characteristics of the study participants are presented in Table 3. Full details of the sampling steps, initial screening, number of exclusions, and the process of reaching the final sample size (N=298) are presented in Figure 1 as a flowchart.

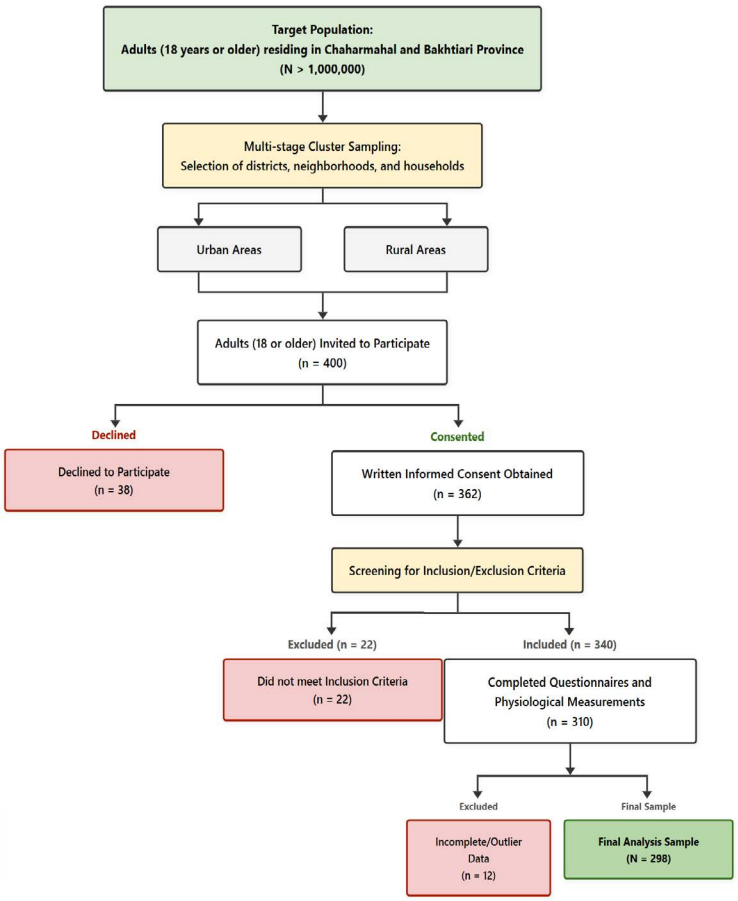


Figure 1. Flow Diagram of participant sampling and inclusion process.

Measures and Data Collection

Objective Physiological Measures.

Measures included subjects' weight, height, and body mass index (BMI). Participants' weight was measured using a calibrated digital scale (accuracy 0.1 kg) while wearing light clothing and without shoes. Height was measured using a stationary stadiometer, accurate to the nearest 0.5 cm. Body mass index (BMI) was calculated using the standard formula [weight (kg) divided by height squared (m)]. To ensure measurement accuracy, all measurements were performed twice by a trained exercise physiologist, and the average of the two was recorded.

Blood Pressure.

Participants' systolic and diastolic blood pressures were measured using an automated digital sphygmomanometer (Omron M3 (HEM-7131-E); Omron Healthcare, Kyoto, Japan). Participants were seated and relaxed for 10 minutes before the measurement. Blood pressure was measured on the left arm, after ensuring that the cuff was correctly positioned at the level of the heart. Blood pressure was measured three times at one-minute intervals, and the average of the last two readings was recorded as the final value.

Self-Report Instruments

Perceived Psychosocial and Cultural Barriers.

To measure perceived barriers, a questionnaire was developed during the qualitative and initial phase of this study. The questionnaire was pilot tested for readability and clear understanding among a sample of the target population[28]. The composite measure, renamed as the "Average Psychosocial Barrier Score," was calculated by averaging all item responses to represent the overall severity of perceived constraints. Furthermore, the women-specific barrier subscale was applied only to participants who identified as women. While exploratory factor analysis (EFA) was initially considered, it was not conducted in this phase, which is acknowledged as a limitation. The initial phase involved semi-structured interviews with 15 key informants and experts from the local community to identify culturally relevant and unique themes that serve as barriers to access. The 43 final items and the subsequent dimensions (motivational, social, cultural, and women-specific barriers) were extracted and validated from this qualitative process. Responses were rated on a 5-point Likert scale (ranging from "strongly disagree" to "strongly agree"). The final 43-item instrument was validated, comprising four key dimensions: motivational, social, cultural, and women-specific barriers. Responses were rated on a 5-point Likert scale (from "strongly disagree" to "strongly agree"). The questionnaire's internal consistency was confirmed using Cronbach's alpha. As detailed in Table 1, the reliability for the total scale was high (α = 0.87), and all subscales demonstrated acceptable to good reliability: motivational barriers (α = 0.79), social barriers (α = 0.83), cultural barriers (α = 0.78), and women-specific barriers (α = 0.85).

The questionnaire was developed through a thematic analysis of 15 expert interviews. Content validity was established via expert panel consensus. The tool consists of four dimensions: Motivational, Social, Cultural, and Women-specific barriers.[28]

Table 1. Structure and Reliability of the Psychosocial and Cultural Barriers Questionnaire (N = 298).

Dimension	Definition (Operational Definition)	Number of Items (n)	Sample Item (Example)	Reliability (Cronbach's α)
Motivational Barriers	Measures internal factors like lack of willpower, Motivational constraints, and procrastination.	14	"I often feel unmotivated to start exercising."	0.79
Social Barriers	Evaluates external factors such as economic issues and lack of social support.	12	"I am unable to exercise due to economic problems."	0.83
Cultural Barriers	Assesses societal attitudes, such as fear of mockery or seeing exercise as a luxury.	8	"Negative attitudes of others toward exercise discourage me."	0.78
Women-Specific Barriers	Focuses on gender-related barriers, such as housework and childcare.	9	"Domestic responsibilities prevent me from physical activity."	0.85
Total Questionnaire		43	—	0.87

Note: The Psychological Barriers dimension included motivational constraints and cognitive barriers, while the Social Barriers dimension included lack of support, financial constraints, and facility access issues. The reliability of all subscales exceeded the acceptable threshold of 0.70.

Sedentary Behavior

To evaluate sedentary behavior, the sitting time section of the International Physical Activity Questionnaire short form was used. According to the standard questionnaire protocol, sitting time was evaluated as minutes per day on a typical working day. This method is used because workday routines constitute the main, structured part of an adult's weekly sedentary behavior. This includes work and household chores. Therefore, it is a consistent indicator of chronic inactivity. This tool is valid and reliable in Iranian societies and has been accepted as a global standard measure.

Data Collection Procedures

A trained research team performed data collection. After obtaining informed consent and completing objective physiological measurements (height, weight, blood pressure) in a quiet and standardized environment, participants completed self-report questionnaires. This process was conducted during the spring and summer of 2024. All measurement protocols were standardized to minimize observation and measurement error. The final data were double-checked before being entered into the statistical software.

Statistical Analysis

All statistical analyses were performed using SPSS version 26. The main goal of the statistical analysis was to investigate the bivariate relationships between psychosocial barriers and health outcomes. For this purpose, Pearson's correlation coefficient was used. Then, a multiple linear regression analysis was performed using the simultaneous entry method. This work aimed to

determine the independent predictive contribution of each dimension of barriers on physiological indicators of health (such as body mass index and blood pressure). No secondary endpoints were statistically evaluated in this study.[29,30]

Before performing the statistical tests, the statistical assumptions were strictly checked. For Pearson›s correlation and multiple regression, normality was assessed using the Kolmogorov-Smirnov test. Also, linearity and homogeneity of variances were checked and confirmed.[31] In addition, the absence of multicollinearity in the multiple regression models was confirmed. For this, the tolerance criterion and the variance inflation factor (VIF) were checked, and both were acceptable.[31]

To determine the magnitude of the findings, the effect size was calculated. The coefficient of determination for the regression models was reported to indicate the proportion of variance explained by the predictors. Also, %95 confidence intervals were reported for unstandardized beta coefficients. The significance level was previously set to a value less than 0.05.[32,33] Due to the exploratory nature of this study, the aim was to identify possible barriers, not to confirm pre-determined hypotheses. Regarding multiple comparisons for the Pearson correlation tests, a correction (such as Bonferroni) was deemed unnecessary. According to Motulsky[31], corrections are not strictly advised when the study is exploratory, aiming to generate hypotheses and find potential leads rather than making definitive clinical decisions.[31]

Results

Prior to inferential analyses, probability test assumptions were verified. The assumptions of normality, linearity, homoscedasticity, and absence of multicollinearity were met for Pearson's correlation and multiple regression tests. The descriptive findings for participants' demographic characteristics are presented in Table 1. In summary, the mean age of the total sample was 34.7±9.8 years, and the proportion of male and female participants was approximately equal. The mean body mass index (BMI) in the sample was 26.3±4.2 kg/m², indicating a general tendency towards overweight and obesity in the study population. The mean systolic and diastolic blood pressures were also reported as 124.5±15.3 and 80.2±9.5 mmHg, respectively. Descriptive data related to the main study variables, including physical activity levels and dimensions of psychosocial barriers, are presented in Table 3. The mean physical activity level was 1105.8 MET-min/week, indicating that a substantial portion of the sample falls into the low-to-moderate physical activity category. Gender and sex demographic information was collected with full respect for participants' individual identities[1]. Disaggregated data based on gender are presented strictly for descriptive purposes, as gender-based comparative analyses were not part of the primary study aims(Table 2).[1]

Table 2. Descriptive Characteristics of Participants (N = 298).

Variable	Category	n (%) or Mean ± SD
Age (years)	–	34.7 ± 9.8
Sex	Male	133 (44.6%)
	Female	165 (55.4%)
Educational Status	Primary/Secondary School	90 (30.2%)
	High School Diploma	110 (36.9%)
	University Degree	98 (32.9%)
Body Mass Index (kg/m²)	–	26.3 ± 4.2
Systolic Blood Pressure (mmHg)	–	124.5 ± 15.3
Diastolic Blood Pressure (mmHg)	–	80.2 ± 9.5

Note: The average psychosocial barrier score was excluded from the multiple regression to prevent connotative overlap.

Table 3. Descriptive Statistics of Key Study Variables (N = 298).

Variable	Unit/Scale	Mean ± SD	Range (Min – Max)
Physical Activity Level (IPAQ)	MET-min/week	1105.8 ± 850.5	0 – 5000+
Sedentary Behavior	minutes/day	395.2 ± 120.9	60 – 720
Average Psychosocial Barrier Score	1–5 scale	3.24 ± 0.65	1.8 – 5.0
Motivational Barriers	1–5 scale	3.45 ± 0.88	1.0 – 5.0
Social Barriers	1–5 scale	3.10 ± 0.75	1.2 – 5.0
Cultural Barriers	1–5 scale	2.95 ± 0.69	1.0 – 5.0
Women-Specific Barriers	1–5 scale	3.20 ± 0.95	1.0 – 5.0

Note: Scores for all barrier variables are based on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

To examine the binary associations between psychosocial and cultural barriers, sedentary behaviors, and physiological health indicators, a Pearson correlation coefficient was used. The results of this analysis are presented in Table 4 as a correlation matrix. Based on the findings, all psychosocial barriers (motivational, social, and cultural) were positively and significantly associated with sedentary behaviors ($p<0.01$); thus, the greater the perceived barriers, the greater the reported sitting time. Psychosocial barriers in general were also positively and significantly associated with physiological health indicators (BMI and systolic blood pressure) ($p<0.05$).

Table 4. Pearson Correlation Coefficients Among Psychosocial Barriers, Physical Activity, BMI, and Blood Pressure (N = 298).

Variable	1	2	3	4	5
1. Average Psychosocial Barrier Score	1	—	—	—	—
2. Physical Activity Level (MET-min/week)	−0.41 (**)	1	—	—	—
3. BMI (kg/m²)	0.29 (**)	−0.25 (*)	1	—	—
4. Systolic Blood Pressure (mmHg)	0.21 (*)	−0.15	0.42 (**)	1	—
5. Diastolic Blood Pressure (mmHg)	0.15	−0.10	0.38 (**)	0.65 (**)	1

Note: **$p<0.01$; *$p<0.05$. BMI=Body Mass Index. SBP=Systolic Blood Pressure

Multiple regression analysis (Table 5) was performed to determine the independent contributions of psychosocial barrier dimensions to body mass index (BMI). The overall regression model predicting BMI was significant, $R^2 = 0.11$, F (4, 293) = 7.15, p <.001. Among all barrier dimensions, motivational barriers were identified as the strongest and most significant positive predictor of BMI ($\beta=0.35$, $p < 0.001$). This finding suggests that high motivational barriers are independently associated with a higher BMI. None of the other dimensions (social, cultural, and women-specific barriers) had a significant independent contribution in this model.

A similar regression analysis was performed to examine the predictive effect of barriers on systolic blood pressure. The regression model predicting systolic blood pressure was also significant, $R^2 = 0.06$, F (4, 293) = 3.90, p = .015. In this model, social barriers emerged as the only independent and significant positive predictor of systolic blood pressure ($\beta=0.28$, $p=0.015$). Therefore, barriers to social and economic support appear to directly affect objective indicators of cardiovascular health.

Table 5. Physiological Health Indicators from Psychosocial and Cultural Barriers (N = 298).

Criterion Variable (R^2)	Predictor Variable	B (Unstandardized)	SE	95% CI for B	β (Standardized)	t	p Value
BMI ($R^2 = 0.11$)	Motivational Barriers	0.85	0.20	[0.46, 1.24]	0.35	4.25	<0.001 (**)

	Social Barriers	0.15	0.18	[-0.20, 0.50]	0.06	0.83	0.410
	Cultural Barriers	0.05	0.17	[-0.28, 0.38]	0.02	0.29	0.772
	Women-Specific Barriers	−0.10	0.19	[-0.47, 0.27]	−0.04	−0.53	0.596
Systolic Blood Pressure (R^2 = 0.06)	Motivational Barriers	0.25	0.35	[-0.43, 0.93]	0.04	0.71	0.478
	Social Barriers	0.75	0.30	[0.16, 1.34]	0.28	2.50	0.015 (*)
	Cultural Barriers	0.18	0.32	[-0.45, 0.81]	0.05	0.56	0.579
	Women-Specific Barriers	0.05	0.34	[-0.62, 0.72]	0.01	0.15	0.880

Note: B = Unstandardized Coefficient, **SE** = Standard Error, CI = Confidence Interval, **β** = Standardized Coefficient (*) $p < 0.05$, (**) $p < 0.01$

Finally, to provide a visual summary of the significant predictive relationships from the multiple regression analysis, the conceptual model of this study is presented in Figure 2. This diagram shows how motivational barriers and social barriers, as the only independent predictors, affect BMI and systolic blood pressure. The strong, positive relationship between motivational barriers and BMI, as well as the positive, significant relationship between social barriers and systolic blood pressure, highlight the primary paths of influence in this conceptual model.

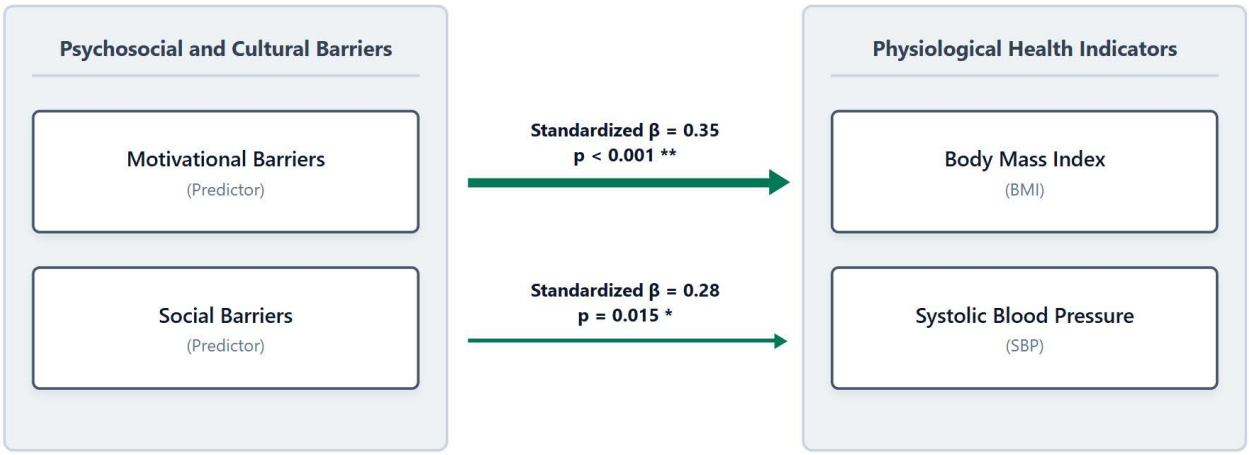


Figure 2. Visual summary illustrating significant predictive relationship of psychological barriers health indicators observed for the study sample (N = 298). The predictive paths display **standardized β** coefficients indicating the strength and direction of the independent relationships. Note: ** p < 0.01; * p < 0.05**.**

Discussion

The primary objective of this cross-sectional-composite study was to examine the relationship between psychosocial and cultural barriers to physical activity and physical inactivity, as well as physiological health indicators (including BMI and systolic blood pressure), among adults residing in Chaharmahal and Bakhtiari provinces in Iran. The research findings generally showed that perceived psychosocial barriers were negatively and significantly correlated with levels of physical activity, confirming the initial expectation that physical inactivity exists in the target population (Table 4). More importantly, multiple regression analysis showed a separate and independent

effect of two specific dimensions of barriers on objective health indicators: motivational barriers were the strongest predictors of BMI, and social barriers significantly predicted systolic blood pressure (Table 5). However, it is important to note that the R^2 values (0.11 for BMI and 0.06 for SBP) are modest. This indicates that these barriers explain only a small portion of the total variance in BMI and SBP, highlighting that physiological health is multifactorial. However, it is important to note that the R^2 values (0.11 for BMI and 0.06 for SBP) are modest. This indicates that these barriers explain only a small portion of the total variance in BMI and SBP, highlighting that physiological health is multifactorial.

One of the key findings of this study was the strong, independent association between motivational barriers as a positive predictor for BMI. These results show that motivational barriers are not an individual defect or a lack of willpower.[34] Instead, these barriers are complex constructs influenced by the social environment and prior experiences. Cultural environments and previous negative experiences can strongly alter the determinants of motivation for physical activity. Previous studies confirm that chronic environmental stress can reduce motivation and increase metabolic risk.[35-38,15,16]

The second important finding from the multiple regression analysis was that social barriers were the strongest and most significant positive predictor of systolic blood pressure (SBP) (β=0.28, p=0.020). This result suggests that barriers related to the socio-economic environment, such as a lack of social support for exercise, inadequate facilities, or financial difficulties, are independently associated with increased objective cardiovascular risk. This finding demonstrates the profound impact of socio-environmental factors on health, extending beyond purely exercise behaviors, and can be explained through psychosocial stress pathways. Persistent social barriers, such as feelings of isolation or resource scarcity, can lead to increased levels of chronic stress, which in turn disrupts physiological mechanisms of blood pressure regulation and potentially contributes to hypertension.[39] This finding is consistent with research confirming the role of social support in modulating physiological responses to stress.[40,41] It emphasizes the need for community-based interventions and environmental change to improve cardiovascular health.

Correlational findings revealed that the average psychosocial barrier score was negatively and significantly associated with weekly physical activity levels ($r = -0.41$, $p < 0.001$). This finding suggests that, overall, the more mental, social, or cultural barriers an individual perceives, the lower their physical activity levels tend to be. This is consistent with social-cognitive health frameworks, such as the Theory of Planned Behavior, which identify perceived barriers as a major obstacle to initiating and maintaining health behaviors.[42] Also, as expected, perceived barriers were positively and significantly associated with sedentary behaviors. These results underscore the significant role of social environments and cultural contexts in perpetuating the cycle of physical inactivity. They are consistent with previous studies in areas of similar socioeconomic status that have identified perceived barriers as a significant factor in non-participation in sports.[21,23] These strong correlations underscore the need to implement multifaceted interventions to break the cycle of Physical inactivity, in which both motivational and environmental barriers play a significant role.[43]

Interestingly, although cultural and female-specific barriers showed bivariate correlations with physical activity, they did not have independent predictive effects in multiple regression models. This lack of independent significance in the final model is likely due to connotative overlap among the questionnaire subscales. Cultural barriers often manifest as motivational deficits or lack of

support, making it difficult for simultaneous multiple regression to tease out their independent effects. Cultural barriers, such as women's lack of access to separate sports spaces, often manifest as motivational barriers or a lack of social support. Considering the exploratory nature of this study, future studies should use mediation analysis or structural equation modeling. These methods can examine how cultural barriers affect physiological health through motivational pathways.[44,45]

This study has several methodological strengths and innovations that strengthen its findings. First, this study employed a quantitative component of a mixed research design, which enabled the development of a specific barrier questionnaire tailored to the local cultural context. This approach ensured the instrument's results were valid within the study population. Second, focusing on the adult population in Chaharmahal and Bakhtiari province, one of the least studied regions in the field of sport science and physical inactivity, is considered a geographical innovation and contributes to understanding physical activity barriers in regions with specific socioeconomic structures. Third, our study employed a combination of objective physiological measurements (such as BMI and blood pressure) alongside self-reported barrier data; this approach confirms the direct association between perceived barriers and objective health indicators, providing higher validity than studies relying solely on self-reported behaviors. Finally, a multiple regression model revealed the independent contributions of each barrier dimension, separately identifying the strongest contextual factors for designing targeted future interventions.

This study, despite its methodological strengths, has limitations that should be considered when interpreting its results. The most important limitation is the study's cross-sectional design, which inherently prevents causal inference. Although multiple regression analysis revealed predictive relationships, it cannot definitively establish a cause-and-effect relationship between psychosocial barriers and physiological health indicators; longitudinal studies or randomized controlled trials (RCTs) are necessary to confirm the direction of this relationship. Another limitation is reliance on self-report data to measure sedentary behaviors and barrier dimensions, which may be susceptible to recall or social desirability bias. However, attempts were made to mitigate this limitation to some extent by using culturally valid and validated measures. Finally, despite the use of cluster sampling, the generalizability of the findings should be approached with caution, as our study was limited to a specific province with a unique cultural and economic structure, and the findings may not be fully generalizable to other regions or communities with differing demographics.

The results of this study have important practical implications for the design of future interventions to mitigate physical inactivity. Overcoming environmental obstacles is not easy. Therefore, practical recommendations should follow the socio-ecological model approach. Public health interventions should not focus only on individual education. Policymakers should invest in environmental changes, such as improving affordable sports infrastructure and creating safe spaces for women. These social supports can reduce chronic stress and, in turn, improve cardiovascular health in local communities.[46]

Given the limitations of this study, future research should focus on several key areas to deepen our understanding of the relationship between psychosocial barriers and physiological health. First, longitudinal studies are needed to more confidently confirm the direction of the cause-and-effect relationship between motivational barriers and increased BMI, as well as social barriers and high blood pressure. This will help us determine whether increased barriers lead to worse health

outcomes or whether worse health outcomes lead to increased barriers. Second, the effectiveness of targeted interventions based on the findings of this study should be evaluated in randomized controlled trials (RCTs). For example, interventions that directly target intrinsic motivation and coping skills when faced with motivational barriers could be tested for their effectiveness in reducing BMI. Furthermore, future research should examine mediating mechanisms, particularly understanding how cultural and women-specific barriers, through motivational or social barriers, affect sedentary behaviors and ultimately physiological health.

One limitation of this study is that demographic variables (e.g., age, sex, and education) were not entered as covariates in the final regression model. Future research should use adjusted models to further explore these interactions.

This study had limitations in evaluating the questionnaire. Cronbach's alpha coefficient is sensitive to the number of items evaluated. A formal exploratory factor analysis (EFA) was not conducted for the newly developed questionnaire during this phase due to sample constraints. Therefore, future studies must prioritize EFA to determine the level of correlation between the questionnaire's subscales and improve construct validity. In addition, future research should examine the correlation between the questionnaire developed in this study and other validated and translated questionnaires to confirm the instrument's convergent and concurrent validity.[47]

In conclusion, the results of this study emphasize the importance of distinguishing between different dimensions of psychosocial barriers; in particular, it shows that motivational and social barriers, as the strongest independent factors, are key predictors of objective indicators of physiological health (BMI and systolic blood pressure) in the study population. Therefore, future interventions to promote public health should specifically target these underlying barriers at the individual motivational and socio-environmental levels to be more effective in combating physical inactivity and its health consequences.

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We respectfully acknowledge that this research was conducted on land that traditionally belongs to the Bakhtiari people and is part of the Central Zagros region's cultural heritage. We express our commitment to respecting and appreciating the past and present indigenous inhabitants of the land on which the research was conducted.

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Supplementary Table

Table S1. Demographic and Professional Characteristics of the Expert Panel for Questionnaire Content Validity.

No.	Expert Name	Academic Degree	Area of Expertise	Academic Affiliation
1	Expert 1	Ph.D.	Exercise Physiology	Shahrekord University
2	Expert 2	Ph.D.	Sports Psychology	University of Isfahan
3	Expert 3	M.D.	Public Health & Preventive Medicine	Shahrekord University of Medical Sciences
4	Expert 4	Ph.D.	Sociology of Sport	University of Tehran
5	Expert 5	Ph.D.	Health Education & Promotion	Tarbiat Modares University
6	Expert 6	Ph.D.	Motor Behavior	Kharazmi University
7	Expert 7	Ph.D.	Physical Education & Sports Science	Shahrekord University
8	Expert 8	Ph.D.	Clinical Psychology	Shiraz University
9	Expert 9	M.D., MPH	Community Medicine	Isfahan University of Medical Sciences
10	Expert 10	Ph.D.	Sports Management & Policy	Allameh Tabataba'i University
11	Expert 11	Ph.D.	Exercise Physiology	University of Tehran
12	Expert 12	Ph.D.	Health Sociology	University of Isfahan
13	Expert 13	Ph.D.	Public Health	Shahrekord University of Medical Sciences
14	Expert 14	Ph.D.	Sports Psychology	Kharazmi University
15	Expert 15	Ph.D.	Physical Education	Shahrekord University

Supplemental Material: Perceived Barriers to Physical Activity Questionnaire
Instructions: Please indicate your level of agreement with each of the following statements regarding barriers to physical activity in your daily life.

General Items (Applicable to All Participants)

No.	Statement	Strongly Agree	Agree	Neutral / No Opinion	Disagree	Strongly Disagree
1	Lack of sufficient time prevents me from having the necessary physical activity in my life.					
2	Work or academic preoccupations prevent me from having the necessary physical activity.					
3	Being far from sports facilities prevents me from having the necessary physical activity.					
4	Lack of motivation prevents me from having the necessary physical activity in my life.					
5	Lack of transportation prevents me from having the necessary physical activity.					
6	Being alone and lacking a companion/ friend prevents me from having the necessary physical activity.					
7	My parents did not exercise; therefore, I never learned to exercise.					
8	Lack of appropriate sports clothing/ attire prevents me from having the necessary physical activity.					
9	Laziness and procrastination prevent me from having the necessary physical activity.					
10	Since I did not develop a habit of exercise during childhood, I lack necessary physical activity now.					
11	Bad memories of physical education/ sports at school prevent me from being active.					
12	During walking, I have so many intrusive thoughts that I prefer not to walk.					
13	Because I cannot perform sports movements as well as others, I do not exercise.					
14	Extensive transportation facilities and ride-hailing services (e.g., Snapp) have reduced my activity.					
15	Physical fatigue prevents me from having the necessary exercise and physical activity.					
16	Not perceiving exercise as important prevents me from engaging in necessary physical activity.					

No.	Statement	Strongly Agree	Agree	Neutral / No Opinion	Disagree	Strongly Disagree
17	Economic problems prevent me from having the necessary exercise and physical activity.					
18	Lack of sports facilities in public spaces prevents me from having the necessary physical activity.					
19	Procrastination (putting things off until tomorrow) prevents me from exercising.					
20	Social media has prevented me from exercising and having the necessary physical activity.					
21	Since the COVID-19 pandemic, I have not had sufficient physical activity.					
22	My job involves enough physical movement; therefore, I do not feel the need to exercise.					
23	My body does not have the physical strength or ability for exercise and physical activity.					
24	Geographical location (e.g., extreme cold, excessive sun) prevents me from sufficient activity.					
25	Lack of local sports groups in the neighborhood prevents me from being active.					
26	Mental/Psychological exhaustion prevents me from having the necessary physical activity.					
27	Lacking sufficient motivation for life prevents me from exercising and being active.					
28	Dependence on my mobile phone prevents me from exercising and having physical activity.					
29	In my opinion, exercise and physical activity are luxury pursuits.					
30	Family conflicts and disputes prevent me from exercising and being active.					
31	The high cost of sports/exercise prevents me from having the necessary physical activity.					
32	Lacking the skills to exercise at home prevents me from being physically active.					
33	Fear of being mocked or ridiculed for exercising prevents me from being physically active.					
34	Lack of facilities appropriate for my age and gender prevents me from sufficient physical activity.					

No.	Statement	Strongly Agree	Agree	Neutral / No Opinion	Disagree	Strongly Disagree
35	Excessive household chores prevent me from having sufficient physical activity.					
36	Childcare responsibilities prevent me from having sufficient physical activity.					
37	The requirement to wear specific/ appropriate clothing for exercise prevents me from being active.					
38	Women are "watched" or "stared at" in parks and sports areas, which prevents me from being active.					
39	Regulations such as the prohibition of women's cycling in public spaces prevent me from being active.					
40	Lack of women-only parks prevents me from having sufficient physical activity.					
41	Shortage of sports halls available for women during the afternoon and evening prevents me from exercising.					
42	Traditional views regarding women's exercise in parks prevent me from having sufficient activity.					
43	The general public does not have a positive view toward women's sports/ exercise.					

coring and Interpretation Instructions
The Perceived Psychosocial and Cultural Barriers Questionnaire consists of 43 items rated on a 5-point Likert scale:

- Strongly Disagree = 1
- Disagree = 2
- Neutral / No Opinion = 3
- Agree = 4
- Strongly Agree = 5

Subscale Scores: To calculate scores for each dimension, average the responses for the items comprising that subscale. A higher score indicates a higher perceived barrier in that specific domain.

- Motivational Barriers (14 items): Average of items 1 to 14
- Social Barriers (12 items): Average of items 15 to 26
- Cultural Barriers (8 items): Average of items 27 to 34
- Women-Specific Barriers (9 items): Average of items 35 to 43

Composite Score: The "Average Psychosocial Barrier Score" is calculated by averaging the responses of all 43 items. This composite score represents the overall severity of perceived constraints to leisure-time physical activity.

لطفا نظر خود را درباره هریک از گویه های زیر بیان فرمایید

ردیف	پرسش					
1	نداشتن فرصت کافی مانع داشتن تحرک لازم در زندگی میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
2	مشغله های کاری یا درسی مانع داشتن تحرک لازم در زندگی میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
3	دور بودن از مکان های ورزشی مانع داشتن تحرک لازم من میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
4	بیانگیزگی مانع داشتن تحرک لازم در زندگی من میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم

5	نداشتن وسیله رفت و آمد مانع داشتن تحرک لازم در زندگی من میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
6	تنها بودن و نداشتن دوست پایه مانع داشتن تحرک لازم در زندگی من میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
7	والدین من ورزش نمیکردند. من هم یادنگرفتم که ورزش کنم	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
8	نداشتن لباس مناسب مانع داشتن تحرک لازم در زندگی من میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
9	تنبلی و اهمالکاری مانع داشتن تحرک لازم در زندگی من میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
10	چون از بچگی عادت به ورزش و تحرک در من ایجاد نشده، ورزش و تحرک لازم را در زندگی ندارم	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
11	خاطرات بد ورزش در مدرسه مانع داشتن تحرک لازم در زندگی من میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
12	موقع پیاده روی آنقدر افکار مزاحم دارم که ترجیح می دهم پیاده روی نکنم	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
13	چون نمیتوانم حرکات ورزشی را به خوبی و مثل دیگران انجام دهم، ورزش نمیکنم	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
14	امکانات زیاد حمل و نقل و فراگیر بودن اسنپ، تحرک لازم را از من گرفته	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
15	خستگی مانع ورزش و تحرک لازم برای من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
16	نداشتن اهمیت ورزش و تحرک مانع فعالیت و تحرک لازم در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
17	مشکلات اقتصادی مانع ورزش و تحرک لازم در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
18	نبود امکانات ورزشی در مکان های عمومی مانع ورزش و تحرک لازم در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
19	امروز فردا کردن مانع ورزش و تحرک لازم در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
20	فضای مجازی مانع ورزش کردن و تحرک لازم در من شده است	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
21	کرونا باعث شد بعداز آن من ورزش و تحرک کافی نداشته باشم	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
22	شغل من به اندازه کافی تحرک دارد، نیازی به ورزش کردن ندارم	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
23	جسم من توان ورزش و تحرک را ندارد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
24	موقعیت جغرافیایی محل زندگی من (سردی،آفتاب زیاد و...) مانع ورزش و تحرک کافی در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
25	فقدان گروه های ورزشی درمحله ها مانع ورزش و تحرک در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
26	خستگی روانی مانع ورزش و تحرک لازم در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
27	نداشتن انگیزه لازم برای زندگی کردن مانع ورزش و تحرک لازم در من میباشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
28	وابستگی به تلفن همراه مانع ورزش و تحرک در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
29	ورزش و تحرک از نظر من یک کار لوکس است	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
30	اختلافات و درگیری های خانوادگی مانع ورزش و تحرک در من است	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم

31	هزینه بر بودن ورزش مانع ورزش و تحرک لازم در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
32	نداشتن مهارت برای انجام ورزش در خانه، مانع ورزش و تحرک در من است	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
33	مسخره شدن بخاطر ورزش کردن مانع ورزش و تحرک لازم در من است	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
34	فقدان امکانات مناسب سن و جنس مانع ورزش و تحرک کافی من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
	سوالات مخصوص خانمها					
35	کار زیاد خانه مانع ورزش و تحرک کافی برای من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
36	بچه داری مانع ورزش و تحرک کافی برای من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
37	اینکه باید لباس مناسب بپوشم برای ورزش کردن مانع ورزش و تحرک کافی در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
38	خانم ها در پارک ها و مکان های ورزشی زیر نگاه هستند و این مانع ورزش و تحرک کافی برای من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
39	قوانینی مثل منع دوچرخه سواری خانم ها در مکان های عمومی مانع ورزش و تحرک لازم در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
40	فقدان پارک های مخصوص بانوان مانع ورزش و تحرک کافی در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
41	کمبود سالن های ورزشی بعداز ظهر و شب برای خانم ها مانع ورزش و تحرک کافی در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
42	نگاه های سنتی به ورزش خانم ها در پارک ها مانع ورزش و تحرک کافی در من می باشد	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم
43	نگاه مردم به ورزش خانمها مثبت نیست	کاملا موافقم	موافقم	نظری ندارم	مخالفم	کاملا مخالفم

دستورالعمل نمره‌دهی و تفسیر

پرسشنامه موانع روانی-اجتماعی و فرهنگی درک‌شده شامل ۴۳ گویه است که بر اساس یک طیف لیکرت ۵ امتیازی ارزیابی می‌شود:

- کاملاً مخالفم = ۱
- مخالفم = ۲
- نظری ندارم = ۳
- موافقم = ۴
- کاملاً موافقم = ۵

نمرات خرده‌مقیاس‌ها (ابعاد): برای محاسبه نمره هر بُعد، میانگین پاسخ‌های داده شده به گویه‌های مربوط به آن خرده‌مقیاس را محاسبه کنید. نمره بالاتر نشان‌دهنده موانع درک‌شده بیشتر در آن حیطه خاص است.

- موانع انگیزشی (۱۴ گویه): میانگین گویه‌های ۱ تا ۱۴
- موانع اجتماعی (۱۲ گویه): میانگین گویه‌های ۱۵ تا ۲۶
- موانع فرهنگی (۸ گویه): میانگین گویه‌های ۲۷ تا ۳۴
- موانع خاص زنان (۹ گویه): میانگین گویه‌های ۳۵ تا ۴۳

نمره کل (نمره ترکیبی): «نمره میانگین موانع روانی-اجتماعی» از طریق محاسبه میانگین پاسخ‌های هر ۴۳ گویه به دست می‌آید. این نمره ترکیبی، نشان‌دهنده شدت کلی محدودیت‌های درک‌شده برای انجام فعالیت بدنی در اوقات فراغت است.