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Identifying Barriers to the Participation of Diabetic Patients in Khuzestan Province in Sports Activities

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Abstract

Objective: Exercise and physical activity as an essential factor and an integral part in the prevention of standard management of diabetes, however, most people with diabetes are not active enough. The objective of this research was to identify the obstacles hindering the participation of diabetic patients in sports activities in Khuzestan province.

Materials and Methods: The study followed an exploratory-applicative approach, utilizing a mixed qualitative-quantitative methodology. The qualitative section involved 18 knowledgeable experts, while the quantitative section included all diabetes patients in Khuzestan province. The sample size for the quantitative section was determined to be 384 patients, based on Morgan's table. Data collection in the qualitative part was conducted through semi-structured interviews, resulting in the extraction of 46 concepts, 19 sub-categories, and 8 main categories over three stages. In the quantitative part, a researcher-designed questionnaire was used, based on the interview findings. The reliability of the questionnaire was assessed using Cronbach's alpha coefficient, which yielded a value of 0.90. Data analysis was performed using SPSS and Smart PLS software.

Results: The findings indicated that various factors act as barriers to the participation of diabetic patients in sports activities, including self-actualization (7.79), environmental (6.10), educational and research (5.83), managerial (5.72), cultural (2.85), physical and supportive (2.8), time (2.62), and economic (2.15) factors.

Conclusion: Therefore, it is recommended that sports and health officials in the province take measures to alleviate these obstacles and improve the quality of life for diabetic patients.

Keywords: Diabetes, Sport activities, Insulin resistance, Khuzestan

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Introduction

Diabetes is a metabolic disease characterized by insulin resistance in target tissues and inadequate compensatory insulin secretion from cells in response to high blood sugar (1). This chronic condition results in sustained elevation of blood sugar levels and the release of hormones, free fatty acids, and inflammatory cytokines from adipose tissues over time. The metabolic environment with high levels of tissue fat contributes to persistent insulin resistance and impaired beta cell function, leading to severe damage to multiple organ systems, and potentially resulting in amputation and premature death (2).

Physical activity plays a crucial role in maintaining overall health and is a vital preventive measure against diseases such as diabetes, hypertension, and obesity (3). Exercise and physical activity are recognized as essential factors in the prevention and management of diabetes (4). Regular exercise helps improve blood sugar control, enhances insulin sensitivity, and contributes to the general well-being of patients (5). Despite the proven benefits of exercise and physical activity in diabetes management, it is unfortunate that the majority of individuals with diabetes are not sufficiently active (6). It is important to emphasize that physical activity is an integral part of the standard management of diabetes, as it has been proven to effectively improve blood sugar control (7).

Research has indicated that diabetic patients face various barriers when it comes to engaging in sports activities. These obstacles encompass a range of factors. Firstly, there is a lack of access to sports physiologists, and patients often do not possess sufficient information about the benefits of exercise (8,9). Furthermore, time constraints and insufficient support from the transportation system pose significant challenges (10). Moreover, barriers such as lack of awareness, inadequate infrastructure, time limitations, low self-confidence, weather conditions, media influence, physical limitations, and societal perceptions towards individuals with diabetes (11), all contribute to the reluctance of diabetic patients to engage in physical activities. The lack of support from family and friends (12), fear of injury (13), depression, and lack of motivation (14) have also been identified as obstacles which discourages them from participating in physical activities.

Given that enhancing public health relies on promoting people's engagement in sports activities, particularly for individuals with diabetes who require additional support to maintain their physical and mental well-being, it is crucial to address this matter comprehensively. However, despite the significance of this issue, there has been a lack of comprehensive research on the barriers faced by diabetic patients in participating in sports activities, particularly in Khuzestan province.

The present study aims to address the barriers hindering the participation of diabetes patients in sports activities in Khuzestan province using a novel approach and employing content analysis methodology. This research seeks to gather insights from experts and, notably, the patients themselves, as they possess firsthand experience of the existing obstacles. The researcher anticipates that the findings of this study will offer valuable solutions for federations, sports organizations, and government institutions, facilitating improved planning and budget allocation. By providing sports facilities and spaces comparable to those available to the general population, it is hoped that diabetic patients can actively engage in sports activities, thereby enhancing their quality of life and promoting mental well-being for both patients and their families.

Material and methods

This research adopts a mixed-methods approach, encompassing both qualitative and

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quantitative components, with practical objectives.

Qualitative

In the qualitative section of the targeted sampling method and snowball sampling have been used. In this section, first, the theoretical foundations and the background of the subject have been reviewed by referring to the information available on internet databases, books, journals, and various articles. In this section, the dataset includes in-depth and semi-structured interviews with 18 diabetic patients from Khuzestan province, as well as university professors and experts from the Special Patients Sports Federation. In these interviews, an opportunity was provided to investigate the existing reasons for the barriers to the active participation in sports activities by diabetic patients or to follow up on the cases briefly mentioned through interviews. The qualitative interviews continued until reaching a consensus and provided the opportunity to examine the perspectives of diabetic patients on the barriers to sports participation.

In this section, semi-structured interviews were conducted and content analysis method was used. Content analysis includes a set of methods used to analyze written texts resulting from interviews. After each interview, the contents were implemented and categorized, and immediately after the interview, initial analysis and coding were done through continuous comparative method. In the open coding stage, the contents were read line by line, and each part of the data (which may be a word, line, or paragraph) was assigned a label. This piece of data can be considered an event. Several events form a concept. Basically, each key point is considered an event. Then the events were transferred to a higher level, meaning the concept. Some concepts are derived from the combination of several events, and some are derived from just one event or key point. In the selective coding stage, subthemes and main or core themes were formed through continuous comparison of codes and concepts generated in the previous stage (15).

Quantitative

In the quantitative part, the statistical population consists of diabetic patients in Khuzestan province.In This part Using Morgan's table, a sample size of 384 individuals is calculated, and the sampling is conducted randomly among diabetic patients attending hospitals, medical clinics, and through an online questionnaire. Based on the interview results, a researcher-designed questionnaire is developed. In this research, data was collected using a researcher-made questionnaire that was developed based on the responses obtained from interviews. To determine the formal and content validity of the questionnaire, it was reviewed by 10 prominent professors and experts in the field of sports management. Their feedback and suggestions regarding the wording of the questions, options, number of questions, alignment with research objectives, etc., were considered. After distributing and collecting the questionnaires, the suggestions of sports experts were reviewed and incorporated into the questionnaire. The original version of the questionnaire was then prepared with 42 5-point Likert scale questions (ranging from very low - 1, low - 2, moderate - 3, high - 4, to very high - 5).

To assess the reliability of the questionnaire, a study was conducted with the participation of 30 members of the community, resulting in a Cronbach's alpha coefficient of 0.90. Furthermore, the Cronbach's alpha coefficient for the final questionnaire was found to be 0.92.

The questionnaire consists of two sections. The first section includes questions about the personal information of diabetic patients, such as gender, age, education, marital status, city of residence, type of disease, medical history, exercise history, and sports specialization. The second section of the questionnaire comprises 42 questions related to the barriers to diabetic patients' participation in sports activities.

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These questions identify 7 factors: self-sufficiency, environmental, educational and research, managerial, cultural, physical and supportive, and temporal and economic factors. Patients expressed their feelings and opinions regarding the options provided, and any questions that scored below the average score of 3 indicated that the option chosen had no impact on their participation.

Statistical analysis

In order to analyze the data, information from the subjects was obtained from descriptive statistics indices. After that, in order to answer the hypotheses of the research, the inferential statistical method of one variable was used for the effectiveness of each of the 8 factors and of the Friedman test for prioritizing obstacles to the participation of diabetic patients in sports activities. SPSS version 22 and Smart PLS version 3 software were used for data analysis.

Ethical considerations

In this study, the initial step involved obtaining permission from the Research Ethics Committee of Jundishapur Ahvaz University of Medical Sciences. The study was conducted in compliance

With ethical guidelines, and the research received the code of ethics under the number IR.AJUMS.REC.1400.261. To ensure the confidentiality of the participants' information and to respect their rights, informed consent was obtained from each individual. The research process involved conducting interviews and distributing questionnaires among the participants.

Results

In the qualitative phase of the study, the main objective was pursued by conducting interviews with a total of 18 diabetic patients, university professors with expertise in the field, the head of the sports committee for special patients in Khuzestan province, and the public relations officer for sports activities targeting special patients. To ensure a comprehensive understanding of the research topic, relevant articles and research backgrounds were thoroughly reviewed prior to the interviews. Moving on to the quantitative section, the sample size was determined to be 384 individuals based on Morgan's table, considering the size of the statistical population. To distribute the questionnaires, visits were made to dialysis centers across different cities within the province. The questionnaires were randomly distributed to the individuals comprising the statistical sample, and their demographic information is presented in Table 1.

As shown in Table 2, a total of 149 primary codes were obtained after completing the interviews, and some of these codes were repetitive or synonymous. Subsequently, during the open coding stage, these codes were merged to create 46 concepts or initial open independent codes. In the following stage, the concepts were further categorized into subcategories to account for their plurality. The categorization was based on conceptual and semantic affinity. Ultimately, 10 main categories were identified, comprising individual barriers, organizational barriers, environmental barriers, facilities and amenities, self-fulfillment and behavioral factors, physical factors, structural and economic factors, cultural factors, time factors, and support factors.

The initial questionnaire, consisting of 42 items, was subjected to principal component analysis with vertical rotation using the varimax technique for data analysis. The Kaiser-Meyer-Olkin (KMO) index was calculated to assess the adequacy of the sample, yielding a value of 0.867. A KMO index value between 0 and 1 is regarded as an indicator of sampling suitability, and a value of 0.5 or higher is considered acceptable for factor analysis (Williams, Ensman, & Bravan, 2010). Furthermore, Bartlett's test of sphericity was conducted, and the results indicated statistical significance (P= 0.001), suggesting the appropriateness of the correlation matrix for factor analysis of the data.

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Table 1. Frequency distribution of demographic characteristics of qualitative and quantitative samples

Variable			Number	Percent
Qualitative sample	Age	25-35	4	22.22
		36-45	11	61.12
		45-55	3	16.66
	Gender	Man	8	44.44
		Female	10	55.56
	Interviewees	Knowledgeable professors and experts	8	44.44
		Diabetic patients	8	44.44
		Chairman of the federation board and public relations officer of special patients sports	2	11.12
Quantitative	Education	diploma	2	11.12
		Associate degree	3	16.66
		Masters	1	5.56
		Masters	4	22.22
		P.H.D	8	44.44
	Age	20-29	45	11.81
		30-39	129	33.86
		40-49	138	36.22
		50-59	69	18.11
	Gender	Man	202	53.02
		Female	179	46.98
	Education	Student	14	3.67
		Diploma	93	24.41
		Associate degree	85	22.31
		Bachelor's degree	88	23.10
		Master's degree	63	16.54
		P.H.D	3	0.79
		Other	35	9.18
	Marital status	Married	218	57.22
		Single	163	42.78
	employment	Full-time	24	6.30
		Part-time	40	10.50
		Free	122	32.02
		Student or student	16	4.20
		Housewife	124	32.54
		Retired	8	2.10
		Other	47	12.34

Table 2. open, central and selective coding of barriers to the participation of diabetic patients in physical activities in Khuzestan province

Main categories	Subcategories	Abundance	Concepts	Abundance
Supportive	Family Connections	6	Lack of family support and encouragement	3
			Parents' lack of awareness or low awareness of the patient's ability and the benefits of exercise	3
	Friendly relations	4	Not having a companion and partner of the same type for exercise	4
	Family obligations	4	Problems and preoccupation of personal life	4
	Lack of knowledge	4	Lack of belief in the benefits of exercise	4
	Institutional relations	1	Not doing exercise during the treatment period as recommended by the doctor	1
Time	lack of time	9	Study problems and preoccupation	3
			Not having enough time to do sports activities	5
			Interference between exercise time and doctor visit time	1
Cultural	Advertising and public relations	5	Lack of media support for sports activities of certain patients	3
			Lack of information and introduction of sports needed by certain patients	2
Planning	Organizational policies	11	Lack of support from the officials of sports organizations and organizations that support special patients for the sports activities of special patients	5
			Lack of number of expert trainers in the field of sports activities of special patients	5
			Absence of consultants and relevant specialist doctors to guide sports activities	5

Continued

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Main categories	Subcategories	Abundance	Concepts	Abundance
Structural and economic	Financial	15	High treatment costs	5
			Lack of dedicated budget support for the sports of special patients	4
			Economic status and income of the patient to participate in sports activities	4
			Non-support of physical activity by associations of certain diseases	2
	Affection	3	Lack of interest in sports	3
	Skill and ability	1	The inability of the patient to design a sports training program suitable for the disease and physical problems	1
Self-actualization and behavior	Negative perception	24	Lack of concentration necessary to participate in sports activities	5
			Depression and despair	2
			Fear of appearing in the community due to illness problems	5
			Feeling embarrassed and frustrated	1
			Having anxiety to participate in sports activities	3
			Low self-confidence of the patient to participate in sports activity	5
			Laziness and impatience of the sick person	3
			Not having complete independence to participate in sports activities (need to have a companion)	1
Individual	Attitudinal	9	The patient's fear of getting injured and making it harder to do daily activities	2
			Lack of motivation to participate in sports activities	6
			Not having enough movement skills due to illness	3
			sports injury	3
Physical	Physical	16	Fatigue	4
			Having physical problems (bleeding, anemia, shortness of breath, chest pain and osteoporosis)	6
Facilities and facilities	Available and usable hardware facilities	12	Lack of sports facilities for special patients at the level of the cities compared to the center of the province	4
			Absence or shortage of specialized centers for sports activities in the field of sports for special patients	3
			Lack of easy access and far from the availability of sports facilities and spaces for special patients	2
			The impossibility of using the sports facilities of the city and parks	3
Environmental	Dominant culture	10	Parents' fear of children getting injured in sports activities	4
			Attitudes and views of people in society towards special patients	3
			The lack of easy access, especially for women, to open sports spaces due to the culture and customs of the society	3
	Weather	7	Bad weather conditions (air pollution, sweltering and extreme heat) for the participation of certain patients	7
	Environmental infrastructure	4	Interest fields are not active in the city of residence	1
			Lack of accessible and easy public transportation	3
	Health and safety	5	Lack of safety equipment and sports facilities for special patients	4
			Lack of proper hygiene in sports facilities for special patients	1

Table 3. KMO and Bartlett test results in the exploratory factor analysis of participation barriers questionnaire

KMO test	Bartlett's sphericity test	df	*P*- value
0.867	x^2 =42261.246	861	0.001

Further details regarding the results of the KMO test and Bartlett's sphericity test can be found in Table 3.

According to Table 4, 8 main factors were identified by performing exploratory factor analysis and vertical rotation. These 8 factors explain a total of 50.728 percent of the variance of barriers to participation of diabetic patients, which is an acceptable amount.

Investigating the construct validity of research questionnaires (confirmatory factor analysis)

To conduct confirmatory factor analysis, the eight-factor model was tested based on the questionnaire items. In the Partial Least Squares (PLS) method, the measurement model's fit was evaluated by assessing the reliability of the instrument using three

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criteria: 1) Cronbach's alpha, 2) composite reliability (CR), and 3) factor loading coefficients. Convergent and divergent validity were also examined. Cronbach's alpha is a classic criterion for assessing reliability and is commonly used to evaluate internal consistency. Moss et al. (1998) have suggested a threshold of 0.6 for Cronbach's alpha coefficient when dealing with variables with a small number of items. Another reliability criterion used in PLS is the composite reliability value (CR), which measures the reliability of constructs based on their intercorrelations. If the CR value for each construct exceeds 0.7, it indicates satisfactory internal consistency for the measurement model. According to Table 6, the Cronbach's alpha coefficients and composite reliability (CR) values fall within an acceptable range. Factor loadings, which represent the correlation between each indicator and its corresponding construct, are another criterion used to assess the reliability of the instrument. Holland (1999) suggests that factor loadings equal to or greater than 0.4 indicate that the construct's variance is larger than the measurement error variance, thereby indicating acceptable reliability. If factor loadings are below 0.4, the questionnaire items may need modification or removal from the research model (16). In this study, Question 15 was removed due to its low factor loading and T value. The second criterion for evaluating the measurement model's fit is convergent validity, which examines the average variance shared between each construct and its indicators. It measures the correlation between each construct and its corresponding items, and higher correlation values indicate better model fit. Magner et al. (1996) consider an average variance explained (AVE) value of 0.4 or higher to be sufficient. According to the results presented in Table 5, the appropriateness of convergent validity can be confirmed.

One of the criteria for evaluating the fit of measurement models is convergent validity. The convergent validity of the model was assessed using the factor loading and Larker method. In this method, the correlation between a construct and its indicators is compared with the correlation of that construct with other constructs. In the main diagonal of this matrix, the square root of Average Variance Extracted (AVE) for variables is entered, and to confirm convergent validity, this value needs to exceed the correlation between that variable and other variables (16).

Table 4. Determining the number of main factors and explaining the relevant variance

Dimensions	Total	Percentage of variance	The cumulative percentage	Total	Percentage of variance	The cumulative percentage	Total	Percentage of variance	The cumulative percentage
1	11.403	20.101	20.101	11.403	20.101	20.101	5.254	9.262	9.262
2	4.107	7.240	27.341	4.107	7.240	27.341	3.989	7.031	16.293
3	3.347	5.900	33.241	3.347	5.900	33.241	3.670	6.469	22.762
4	2.390	4.213	37.454	2.390	4.213	37.454	3.570	6.293	29.056
5	2.175	3.834	41.288	2.175	3.834	41.288	3.607	6.359	35.414
6	1.925	3.394	44.682	1.925	3.394	44.682	3546	6.251	41.665
7	1.732	3.053	47.735	1.732	3.053	47.735	2.477	4.367	46.032

Table 5. Examination of the reliability coefficients of the 8-factor model of barriers to the participation of diabetic patients in sports activities

Eight factors	Cronbach's alpha coefficient <0.6 (a)	Composite reliability < 0.7 (CR)	Average extracted variance (AVE) < 0.5
Cultural	0.697	0.786	0.654
Economic	0.717	0.841	0.640
Educational and research	0.610	0.709	0.591
Environmental	0.709	0.806	0.516
Management and planning	0.696	0.749	0.539
Self-actualization and behavior	0.719	0.800	0.516
Time	0.667	0.799	0.500
Physical and supportive	0.646	0.746	0.525

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Based on the results in Table 6, the square root of AVE, which is shown in the main diagonal of the matrix below, exceeds the correlation of each construct with other variables, indicating appropriate convergent validity and a good fit of the measurement models.

Based on the research findings, a questionnaire was developed to assess the obstacles faced by diabetes patients in participating in sports activities. The questionnaire consists of 41 items and encompasses eight factors: self-actualization and behavior, environmental, educational and research, planning and management, physical and support, cultural, time, and economic factors. The questionnaire exhibited satisfactory reliability and validity, confirming its appropriateness for measuring the identified obstacles faced by diabetes patients in their engagement with sports activities.

Based on the results obtained from this study, the Friedman non-parametric test was used to prioritize the barriers to participation of diabetic patients in Khuzestan province in sports activities. In this study, the barriers of self-efficacy and behavioral (79.7), environmental (10.6), educational and research (83.5), management and planning (5.72), cultural (2.85), physical and supportive (2.83), time (2.62), and economic (2.15) were considered as the top eight priorities for the lack of participation of diabetic patients in sports activities in Khuzestan province.

Table 6. Assessment of model convergent validity using the Fornell and Larcker method

Factor	Cultural	Economic	Educational and research	Environmental	Management and planning	Self-actualization and behavior	Time	Physical and supportive
cultural	0.834	-	-	-	-	-	-	-
Economic	0.314	0.846	-	-	-	-	-	-
Educational and research	0.547	0.419	0.781	-	-	-	-	-
environmental	0.561	0.328	0.508	0.842	-	-	-	-
Management and planning	0.615	0.372	0.585	0.709	0.834	-	-	-
Self-actualization and behavior	0.353	0.333	0.535	0.378	0.442	0.847	-	-
Time	0.357	0.248	0.488	0.312	0.406	0.551	0.816	-
physical and supportive	0.347	0.252	0.484	0.366	0.376	0.622	0.502	0.803

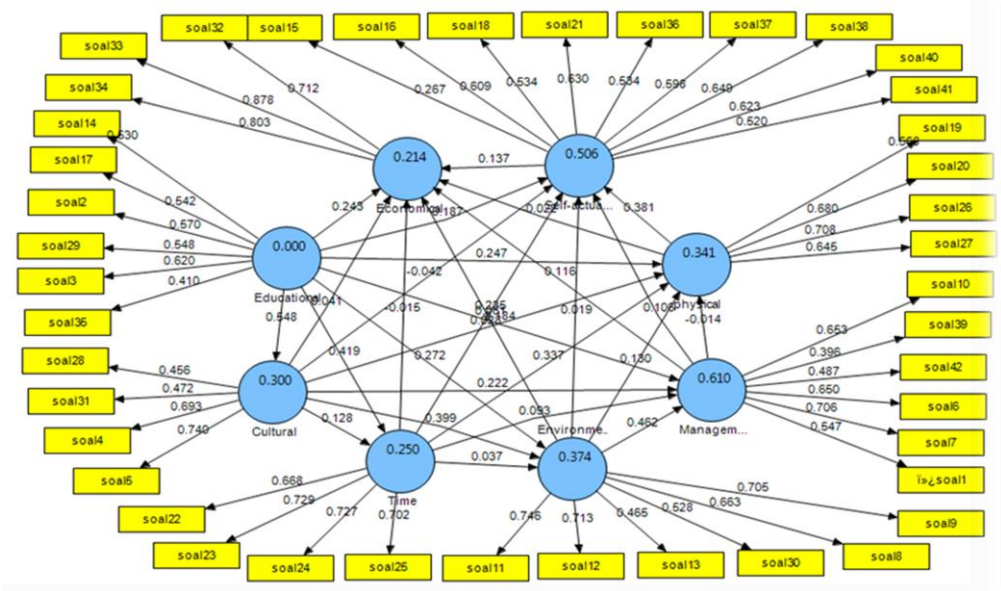

Figure 1. Factorial load of the items constituting barriers to the participation of diabetic patients in sports activities

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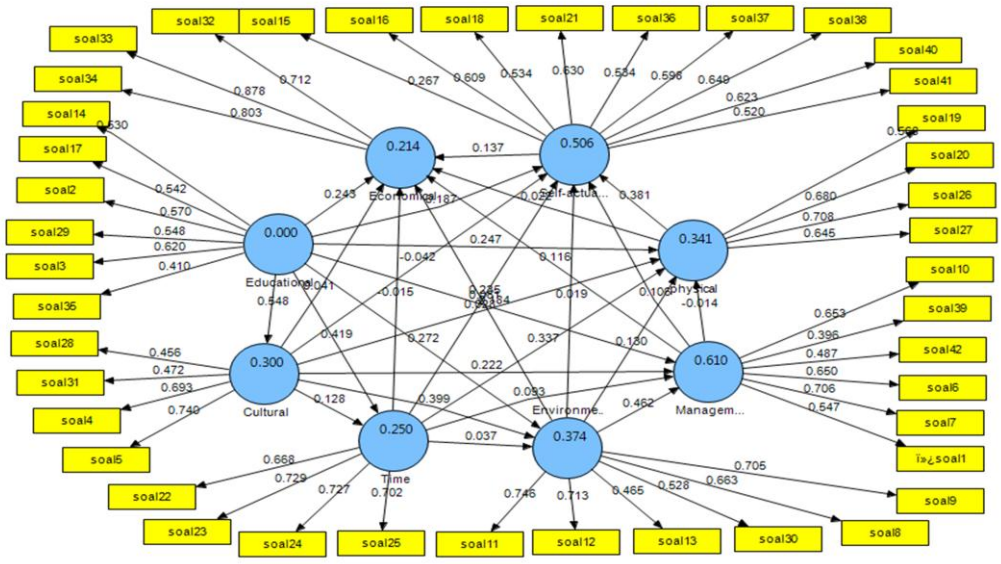

Figure 2. T-values of factors and items constituting barriers to participation of diabetic patients in sports activities

Discussion

The main objective of this study was to identify the barriers preventing diabetic patients in Khuzestan province from participating in sports activities. Overall, the research findings revealed several factors that hinder the involvement of diabetic patients in sports activities in Khuzestan province. The results indicated that there are eight key barriers to the participation of diabetic patients in sports activities: self-actualization and behavior, environmental factors, educational and research aspects, planning and management, physical and supportive factors, cultural factors, time constraints, and economic factors. These findings align with previous research conducted by Bickel et al. (2020), which identified poor knowledge, the perception that exercise may worsen the disease, the absence of an exercise partner, societal attitudes, and a lack of support from family members, healthcare professionals, and friends as barriers to participation (17). Amin et al. (2023) also found similar barriers, including lack of awareness, inadequate infrastructure, time constraints, and weather conditions, lack of self-confidence, media influence, societal perspectives, and physical limitations (8). Tripathi et al. (2023) (11) identified weather conditions and lack of facilities and sports halls as barriers, while Parent et al. (2023) (9) highlighted lack of time, facilities, high costs, and transportation systems as hindrances. Other barriers found in the literature include the absence of green spaces and parks for sports activities, stress, lack of social support, and physical problems Katanolli et al., 2022 (12), fear of injury, weather conditions, fatigue, and limited access to sports facilities Finn et al., 2022 (13), lack of motivation, lack of support from family and friends, and depression Villafranca et al., 2021 (14), lack of motivation, lack of social support, weather conditions, and economic circumstances Craddock et al., 2021 (18), lack of family or friends, medical conditions, lack of awareness, and limited sports facilities Lim et al., 2020 (19), time constraints Lopez et al., 2019 (20), structural, individual, and interpersonal factors Foroughi Fard et al., 2019 (21), transportation issues, misconceptions, lack of awareness regarding exercise benefits, and fear of injury Steves et al., 2019 (22), patients' disinterest, laziness, illness, fatigue, discomfort, and lack of time Pati et al., 2019 (23), lack of time, lack of

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motivation, fatigue, and joint pain Koponen et al., 2019 (24), lack of time and lack of motivation Al-Harbi et al., 2017 (25), lack of time, fear of elevated blood sugar levels, lack of willpower, and lack of exercise habit Gill et al., 2017 (26), pain and symptoms of depression Schneider et al., 2016 (27), lack of awareness and lack of social support Lorenzo et al., 2015 (28), lack of specialized facilities Baldossi et al., 2015 (29), and lack of motivation and laziness Miller et al., 2012 (30). Diabetes is a chronic condition characterized by inefficient insulin utilization in the body, resulting in high blood sugar levels. It represents the majority of diabetes cases globally (31). Effective communication plays a vital role in addressing this issue (32). Unfortunately, many individuals remain unaware of their condition. Currently, there is limited media coverage of sports and physical activities for individuals with special and incurable conditions such as diabetes, including in Khuzestan province. On social media platforms, the representation of sports activities for diabetes patients is minimal, with most publications and news outlets focusing on the experiences of healthy individuals in the country, including Khuzestan.

Hence, media outlets and the press can contribute significantly by generating appropriate content to showcase sports activities and even competitions for individuals with special and incurable conditions. By increasing public awareness about the benefits of sports and physical activities, they can encourage participation and guide diabetes patients towards engaging in such activities. This, in turn, can shape positive perceptions and attitudes towards diabetic patients, highlighting their capabilities in performing daily tasks. The findings of this study align with the results of previous research conducted by Amin et al. (2023), Tripathi et al. (2023), Steves et al. (2019), Gall et al., (8,11,22,26,28,29). Furthermore, the research findings indicated that while the lack of support and companionship from family and friends can be barriers to participating in sports activities for diabetic patients, their encouragement and active involvement can serve as motivating and facilitating factors. In fact, the support and participation of friends, relatives, and family members were found to positively impact the engagement of diabetic patients in sports activities. These results align with the research conducted by Cattanoli et al. (2022), Villafranca et al. (2021), Craddock et al. (2021), Lim et al., (12,14,18,19,25,33). Another obstacle identified for diabetes patients in Khuzestan province is the prevailing cultural norms within society. To address this, solutions such as raising awareness among the public about the essential needs of diabetic patients in sports, educating families about the capabilities of these individuals and the benefits of sports for them, respecting their rights, fostering a sense of duty and responsibility towards them, and transforming societal attitudes towards diabetic patients can be implemented. By promoting motivation and a fighting spirit among diabetes patients and directing public opinion towards the importance of exercise for them, society's overall perception and attitude towards these individuals can be improved. These findings are consistent with the research conducted by Tripathi et al. (2023) (11), Bickel et al. (2020) (17), and Foroughi Fard et al 2020 (21). Diabetic patients who refrain from exercising often harbor concerns about the potential dangers of sports-related injuries, in addition to the risks associated with their underlying condition. Consequently, despite being aware of the benefits of exercise, these patients, along with their family members, experience fear, low mood, lack of motivation, and even depression. Many diabetic patients lack interest in sports activities, which contributes to their perceived lack of commitment to exercise. Moreover, they may believe that their daily responsibilities prevent them from engaging in sports activities. The support and encouragement of family members hold significant value and serve as a major source of motivation for diabetic patients to participate in sports. Health-related

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motivations, physical fitness considerations, enjoyment of sports, and the feeling of vitality and relaxation all play pivotal roles in facilitating the involvement of diabetic patients in sports activities. Individuals who acknowledge the possibility of disease occurrence or exacerbation and recognize the associated risks understand that preventive measures are more important than disease treatment, thereby leading to healthier behaviors. Strong motivations, such as pleasure, excitement in sports, and the pursuit of improved health through engagement in a sports environment and socializing with friends and colleagues, contribute to increased participation. Therefore, it is crucial to inform the families, friends, and colleagues of diabetic patients about the benefits of exercise, thus creating an environment that supports their involvement in sports activities and promotes their mental and physical well-being. These findings align with the research conducted by Craddock et al. (2021) (18), Villafranca et al. (2021) (14), Pati et al. (2019) (23), Schneider et al. (2016) (27), and Miller et al. (30).

Conclusion

Prioritizing sports activities by relevant managers and diabetes associations, including through volunteer efforts, can establish a foundation for the participation of diabetic patients in sports activities. Providing financial support or assistance for sports programs targeting diabetic patients, including organized sports competitions facilitated by volunteer organizations, can further encourage their engagement in sports activities. In recent years, there has been significant progress and development in the sports-related aspects of specific patient populations, providing increased opportunities for their participation. The collaboration between special patient associations and sports federations dedicated to these individuals has fostered the belief that diabetes patients can not only improve and maintain their health, vitality, and well-being through sports but also actively participate in various aspects of life such as education, family, and social environments. Given the significance of exercise for diabetes patients in Khuzestan province across various social, cultural, and other domains, it is important to establish facilities that enable these patients to engage in physical activity anytime and anywhere, individually or in groups of their choice, in any sports field. These facilities should aim to promote their physical and mental health while keeping costs minimal. Although the results of this research have provided valuable insights into the importance of exercise for diabetic patients and have identified various obstacles in the realms of self-actualization, environment, education, research, management, physical support, culture, time, and economics, there are some limitations to consider, which may restrict the generalizability of the findings. Firstly, like many other studies, this research relied on self-report measures rather than observing actual behavior, potentially leading participants to provide responses influenced by social approval and a desire to avoid stigma associated with perceived inadequacy. Therefore, it is recommended to employ tools and methods that capture more realistic behaviors of individuals. Secondly, since the sample group was limited to diabetic patients from Khuzestan province, it is suggested that similar research be conducted with individuals from other provinces as well to obtain a more comprehensive understanding of the topic.

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Conflict of Interest

The authors declare no conflict of interest.

Authors' contributions

A. P: Collected the data and wrote initial draft of the manuscript.

S. H and E. V: Conceived and designed the analysis and performed the analysis.

All authors have accepted responsibility for the entire content of this manuscript and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved and approved the version to be published.

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