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Original Article

Assessment of physical activity level, self-efficacy and perceived barriers to physical activity among adult Saudi women

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الملخص

أهداف البحث: بشكل عام، من المعروف أن النشاط البدني له دور هام في الحفاظ على صحة الفرد وتحسينها. مع ذلك أصبح الخمول البدني أحد أكبر التحديات في جميع أنحاء العالم. لذلك، تركز هذه الدراسة على تقييم مستويات النشاط البدني لدى النساء السعوديات البالغات، كما تقيم تأثير النجاعة الذاتية، الخصائص الاجتماعية والديموغرافية والعوائق المتصورة على مستويات النشاط البدني.

طرق البحث: استخدمت هذه الدراسة التصميم الوصفي المقطعي الكمي. من خلال استبانة عبر الويب يتم تعبئتها ذاتيا من المشاركين. ضمت العينة ٥٠٩ امرأة سعودية تم تجنيدهن باستخدام طريقة العينات الهادفة. تم جمع البيانات باستخدام استبانات موجودة مسبقا ومثبتة صحتها. قدم المشاركون معلومات حول مستوى النشاط البدني، النجاعة الذاتية والعوائق المتصورة.

النتائج: بلغت نسبة إتمام المسح ٥١٪. أظهرت عينة الدراسة مستويات عالية من النشاط البدني. شارك أربعة وخمسون بالمائة من العينة في نشاط بدني عالي الشدة، بينما (٣٠٪) لم يمارسوا النشاط البدني بشكل كاف. كانت النجاعة الذاتية ضمن العينة معتدلة، اظهر اختبار الانحدار البسيط أن النجاعة الذاتية لها تأثير كبير على مستوى النشاط البدني. تم الإبلاغ عن "الافتقار إلى الإرادة" و"نقص الموارد" كأهم العوائق للنشاط البدني. مع ذلك أظهر اختبار الانحدار المتعدد أن " الافتقار إلى الإرادة" و " الخوف من الإصابة" و"العوائق البيئية" فقط لها تأثير على مستوى النشاط البدني. كما لوحظ أن الخصائص الديموغرافية لم تظهر أي تأثير على مستوى النشاط البدني.

الاستنتاجات: أظهرت نسبة كبيرة من عينة الدراسة مستويات كافية من النشاط البدني. كما وجد أن المحددات النفسية، بما في ذلك النجاعة الذاتية وقوة الإرادة ترتبط بأداء النشاط البدني بشكل كبير، بالإضافة إلى البيئة المادية. هذه النتائج لها آثار على المبادرات المستقبلية واستراتيجيات تعزيز الصحة التي تستهدف المرأة السعودية. من هذه المعرفة، يمكن تصميم التدخلات القائمة على النظريات لتحسين النجاعة الذاتية وقوة الإرادة مع اعتبار استراتيجيات للتعامل مع الحواجز.

الكلمات المفتاحية: النشاط البدني؛ السعودية؛ النجاعة الذاتية؛ المرأة؛ قوة الإرادة

Abstract

Objectives: Generally, physical activity (PA) is accepted to have a crucial role in sustaining and improving individuals' health. Consequently, it is considered a viable solution to the public health challenge of chronic diseases, particularly as sedentary behaviour is becoming a considerable concern worldwide. Therefore, this study focused on PA levels among adult Saudi women, and assessed the effects of self-efficacy, socio-demographic characteristics and perceived barriers on PA level.

Methods: This study used a quantitative cross-sectional descriptive design involving a self-reported web-based survey. The sample included 509 Saudi women recruited through purposive sampling. Data were collected with validated pre-existing questionnaires. The information provided by participants included their PA levels, self-efficacy and perceived barriers to PA.

Results: The survey's completion rate was 51%. Analysis of the study sample responses indicated that the participants' had high levels of PA: 54% participated in vigorous PA, whereas 30% had insufficient PA (less than 600 MET m/week). In the sample, self-efficacy was moderate, and simple regression indicated that self-efficacy significantly affected the levels of PA ($p = 0.001$). The leading barriers to PA were a lack of resources and willpower. However, multiple regression indicated that only lack of willpower ($p = 0.004$), fear of injury ($p = 0.043$) and environmental barriers ($p = 0.021$) significantly influenced PA levels. Moreover, demographic characteristics had no significant effects on PA levels.

Conclusion: A large proportion of the study sample demonstrated sufficient levels of PA. Psychological

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determinants, including self-efficacy and willpower, significantly correlated with performance. The physical environment was also found to be a highly influential factor. These findings have implications for future initiatives and health promotion strategies targeted at Saudi women. The knowledge gained may be used to design theory based interventions for improving self-efficacy and willpower, while considering strategies for overcoming barriers to PA.

Keywords: Physical activity; Saudi; Self-efficacy; Willpower; Women

Introduction

Lack of physical activity (PA) is a public health concern worldwide: it is among the top ten risk factors influencing global mortality. The major challenge associated with a lack of PA the increased burden of non-communicable diseases (NCDs).[1–3] Despite the dangers of a sedentary lifestyle, authorities and healthcare institutions still face challenges in encouraging people to increase their PA.[4] Advocates of PA note its association with longer life expectancy and effective prevention of more than 20 chronic conditions, including cardiovascular disease, diabetes, various types of cancer, obesity, psychological disorders and musculoskeletal conditions.[4] PA includes any bodily movement that requires energy, such as day-to-day activities including walking, washing clothes or dishes, and other household chores. Therefore, PA differs from physical exercise, which is a subset of PA.[5] A substantial body of evidence has led organisations such as the World Health Organization and the Centers for Disease Control and Prevention to recommend performing half an hour of regular moderate PA 5 days per week to attain health benefits.[4,6]

In KSA, environmental, cultural and economic factors considerably affect day-to-day life patterns that influence PA, such as walking.[7] The country's rapid development has led to major changes in how people live, thus causing them to rely on technology to accomplish tasks; consequently, increases have been observed in obesity rates and associated NCDs.[8,9] For example, statistics data have attributed 78% of deaths in the country to NCDs.[10] Therefore, decreasing NCDs will be a considerable challenge if the lack of PA is not addressed. Moreover, the ability to control risk factors, such as low PA and prolonged sitting time, may enable primary prevention of NCD development.[11] Some researchers have estimated that increasing PA could decrease the incidence of NCDs by 10%.[12]

Previous studies have concluded that PA prevalence in KSA is extremely low.[13–16] and is expected to decline further in the future.[14] This forecast is supported by a national study conducted in KSA, which has concluded that physical inactivity is high overall, at 66.6%,[15] and the prevalence of sedentary behaviour among women is higher, at approximately 70–80%.[15,17] The finding that women in KSA have lower levels of PA than men has also been validated by a systematic international study.[18]

Most educational campaigns aimed at decreasing sedentary behaviour in KSA have not produced the anticipated results.[14,19] Moreover, most related previous research in KSA has concentrated on barriers to practising PA.[14,16,20,21] However, an analysis of these studies has indicated that they have overlooked the psychological determinants of behavioural change. Notably, increasing awareness and removing environmental hurdles might not necessarily lead to behavioural change, because no evidence has linked either factor to motivation or persuasion of people to undertake PA.[22,23] For example, individuals may have the required knowledge and be aware of the attitudes associated with health behaviours, yet fail to practice them.[24] Therefore, understanding the factors that might motivate women in KSA to change their behaviour and embrace an active lifestyle is crucial.

Studies focusing on the correlations and predictors of PA have increased in the past several decades. Some of these studies have concluded that factors including willpower, self-efficacy, health status, sex and age are strongly associated with PA levels.[25] In addition, a strong link has been observed between self-efficacy and PA level, such that self-efficacy mediates the effects of interventions on PA behaviour.[25] Self-efficacy as a central element in psychological theories including the Social Cognitive Theory by Bandura (1977)[26] and the Theory of Planned Behaviour by Ajzen (1985).[27] For example, Bandura[25] posits that people tend to embrace a behaviour if they believe that they are in control and will be successful. Because self-efficacy can explain how individuals' actions are guided, determining how self-efficacy can be increased is crucial.

PA levels among the general Saudi population have been found to be very low, because the population tends to live sedentary lifestyles. As expected, the proportion of people who are obese and overweight in the population has increased, thereby promoting NCDs. Although a high proportion of the Saudi population lives a sedentary lifestyle, this problem affects primarily women; therefore, determining the contributing factors is critical. Because self-efficacy is an essential determinant of PA, its effect on PA levels among a sample of women in KSA must be determined. This information would provide insight into the best ways to promote and increase individual self-efficacy regarding PA, and to ensure that developed initiatives are successful.[25] To our knowledge, studies using the theoretical concept of self-efficacy among Saudi women are rare. The available studies have tended to be restricted either in size or in geographical scope.[28–31] Barriers to PA is another area that must be examined to better understand the effects of different variables preventing Saudi women from reaching acceptable levels of PA. An analysis of previous studies has indicated deficiencies in PA levels. However, because most prior studies have concentrated on specific geographic locations, the findings may require replication to determine whether the same conclusions might be

drawn if the same study were conducted on different samples from different locations. Consequently, the present study was aimed at assessing the current status of PA among Saudi women, and simultaneously determining the effects of self-efficacy, socio-demographic characteristics and perceived barriers to PA.

Materials and Methods

Study design

The present study used a quantitative cross-sectional design involving a survey. The data collected with the survey instrument were statistically analysed and subjected to hypothesis testing to draw inferences regarding the variables. The study was conducted between July and August of 2020.

Sampling strategy and access

The non-probability purposive sampling technique was used to select participants for this study. The recruitment process also used the snowball technique, wherein participants were requested to ask others they knew to participate. This method enabled data to be collected from different cities in KSA and proved extremely useful during the restrictions imposed to stop the spread of the COVID pandemic. Women from different parts of KSA were asked to participate in the online survey. Each participant received a link via the social media application WhatsApp. Each WhatsApp group administrator was asked for approval to distribute the link. To be admitted into the sample, women were required to be older than 18 years of age. Because this study involved a pragmatic approach, the sample size was not predetermined. Consequently, all qualifying women who were willing to participate were included.

Ethical considerations

Each participant was provided with an electronic consent form and information sheet before participating. The information sheet included details on the purpose of the study, the time required to complete the survey and a guarantee that the participants would not be named in the report. No significant risks were associated with the survey, given that it was web based and involved no direct contact with the participants. The survey responses were anonymously recorded, and the confidentiality of each participant was ensured.

Data collection methods

The survey was created on the Qualtrics platform. The items in the questionnaire were obtained from previously validated surveys on PA levels, self-efficacy and barriers to PA. The questionnaire consisted of four parts. The first part included questions aimed at collecting socio-demographic information, including region, age, level of education, marital status and employment status. Participants were also asked to indicate whether they care for children or older people, or have a domestic helper or another person performing household chores for them. Seven questions were designed to collect information associated with the participants' PA levels in the second part. This part used a shortened Arabic version of the International Physical Activity Questionnaire.[32] In answering the questions, the participants provided details including the amount of time in hours and minutes spent participating in PA in the previous 7 days. The questions also specifically asked participants to indicate the amount of time spent conducting vigorous activity, moderate activity, walking and sitting on an average day. According to the International Physical Activity Questionnaire scoring guidelines, the reported minutes/week were converted to metabolic equivalent task (MET)-min/week.

The third part of the questionnaire gathered details relating to self-efficacy by using the exercise self-efficacy scale developed by Bandura.[26] The Arabic version of these measures was adapted from Darawad et al.,[33] after permission was obtained. The questionnaire asked participants to grade their confidence in regularly performing 18 different exercises in the face of barriers. A three-point scale ranging between 0 and 100 was used for grading confidence:

- 0 to 30: cannot do
- 40 to 70: can do somewhat
- 80 to 100: definitely can do

According to the grading scheme above, the larger the scale rating, the higher the participant's confidence in performing the 18 different exercises. Several studies have tested the questionnaire's validity and indicated a high Cronbach alpha of 0.95.[34] The Arabic version had a Cronbach alpha of 0.89 and 0.83 for split-half coefficients, thus indicating its reliability.[33]

The fourth part of the questionnaire contained questions providing information for assessment of barriers to PA. The questions associated with this factor were used from a Centers for Disease Control and Prevention questionnaire.[35] This part contained 21 questions. The scoring system was designed to collect information regarding the likelihood of each item being considered a barrier as follows:

- Very likely = 3
- Somewhat likely = 2
- Somewhat unlikely = 1
- Very unlikely = 0

Each category had a maximum possible score of 9. If an item had a score of 5 or above, it was considered a major barrier. The barriers were divided into seven categories:

i) Lack of time
ii) Lack of social influence
iii) Lack of energy
iv) Lack of resources
v) Lack of willpower
vi) Fear of injury
vii) Lack of skill

The Arabic version was translated and validated by a Saudi study.[20] The original tool did not include questions about whether the environment or religion could be perceived as PA barriers. To include these factors, we used questions from an Omani study with a McDonald omega

coefficient of 0.750.[36] Twenty-seven questions were provided in random order within this part of the questionnaire, with each set of three questions representing one barrier category.

Data analysis

Statistical Package for the Social Sciences (SPSS) version 26 was used to analyse data in this study. The significance level was set at $P \leq 0.05$. The analysis included mean, median, percentage, frequency and standard deviation.[37] The data were verified for skewness and interquartile range. The relationships among variables were assessed with inferential analysis. Simple and multiple regression were used to determine the effects of independent variables (self-efficacy/socio-demographic characteristics/barriers) on PA level.[37] A confidence interval of 95% indicated the validity of the estimated result.

Validity and reliability

The questionnaires used in this study have been extensively tested for validity in previous studies. Nonetheless, a reliability evaluation was performed with Cronbach's alpha to assess the internal consistency of the tools. Cronbach's alpha of the self-efficacy scale was 0.95 and that of the barrier scale was 0.86. Therefore, the scales were internally consistent. Moreover, a pilot sample was used to evaluate validity. The same pilot study was used to ensure that the statements in the survey were understood as intended. The individuals who participated in the study were asked to provide feedback on improvements. Because the feedback indicated no problems with the statements, no adjustments were made, and the preliminary study included the data from the pilot study.

Results

Demographic characteristics

Of 990 completed surveys, 481 were excluded because they were incomplete, thus leaving 509 fully completed questionnaires, representing 51% of the total. As indicated in Table 1, more than half the respondents (n = 340, 66.8%) were 18–28 years of age. Most respondents (n = 402, 79.0%) had a college degree or attended tertiary education. Fifty-two percent (n = 188) were single, and (n = 128, 25.1%) were housewives. More than half the respondents (n = 271, 53.2%) cared for older adults or children. Most respondents (n = 360, 70.7%) did not have a domestic worker or a person helping with chores.

Table 1: Distribution of the overall study sample according to demographic characteristics.

Variables	Items	Frequency	Percentage
Region	Northern	86	16.9
	Southern	74	14.5
	Eastern	63	12.4
	Western	181	35.6
	Central	105	20.6
Age	18–28	340	66.8
	29–39	143	28.1
	40–49	19	3.7
	50 or more	7	1.4
Level of education	Elementary or high school	107	21.0
	College degree or higher education	402	79.0
Marital status	Single	265	52.1
	Married	228	44.8
	Widowed/ divorced	16	3.1
Employment status	Employed	125	24.6
	Unemployed/ retired	68	13.4
	Housewife	128	25.1
	Student	188	36.9
Do you care for children or older people?	Yes	271	53.2
	No	238	46.8
Do you have a domestic helper or someone who does chores for you?	Yes	149	29.3
	No	360	70.7

Physical activity level

The recorded mean for vigorous PA among participants was 1002.9 ± 1775.1 MET-min/week, with a median of 0.0. The mean for moderate PA was 863.7 ± 1164.2 MET-min/week, with a median of 480.0. The average walking time for the participants amounted to 950.5 ± 1130.6 MET-min/week, with a median of 594.0. The overall PA score for the sample was 2692.9 ± 3005.8 MET-min/week, with a median of 1752.0. Consequently, the level of PA among participants was vigorous. As indicated in Table 2, the average time spent sitting on weekdays was 497.1 ± 514.8 min/day, with a median of 360.0. Table 3 shows that the PA level (n = 275, 54%) for more than half the participants was high. In contrast, 30.1% of respondents had low levels of PA. Individuals with moderate PA levels (n = 81) constituted 15.9%.

Self-efficacy

The sample's overall self-efficacy score was 38.2, the SD was 22.0, and the median was 36.7, thus indicating a low level of self-efficacy. Item 15 had the highest total score (58.3), an SD of 34.0 and a median of 60.0. Item 4 had the lowest total score (17.4), an SD of 22.0 and a median of 10.0, as shown in

Table 2: Mean, median, standard deviation and IQR for the level of physical activity in the sample.

Items	Mean	SD	Median	Interquartile		
				25	50	75
Vigorous (446)	1002.9	1775.1	0.00	0.0	0.0	1280.0
Moderate (509)	863.7	1164.2	480.0	0.0	480.0	1230
Walking (509)	950.5	1130.6	594.0	99.0	594.0	1386.0
Sitting (509)	497.1	514.8	360.0	240	360	600
Total[a]	2692.9	3005.8	1752.0	480	1752	3840

[a] Total without sitting.

Table 3: Levels of physical activity in the sample (in three categories).

Categories		Frequency	Percentage
Low		153	30.1
Moderate		81	15.9
High		275	54.0
Total		**509**	**100.0**
Skewness		1.912	
Interquartile	25.0	480.0	
	50.0	1752.0	
	75.0	3840.0	

Table 5: Levels of self-efficacy in the sample (in three categories).

Categories		Frequency	Percentage
Low		197	38.7
Moderate		291	57.2
High		21	4.1
Total		**509**	**100.0**
Skewness		0.338	
Interquartile	25.0	21.1	
	50.0	36.7	
	75.0	53.3	

Table 4. After the overall self-efficacy score for respondents was calculated, the scores were grouped in to three categories, as indicated in Table 5. For more than half the respondents, self-efficacy was moderate (n = 291, 57.2%). In contrast, 38.7% of respondents (n = 197) had low self-efficacy. Only 4.1% (n = 21) of respondents had high self-efficacy.

Barriers to physical activity

Overall, the median for PA barriers in the sample was 1.26, representing 55.9%. Lack of willpower was perceived as a significant barrier to practising PA and had the highest rank, with a percentage of 68.7%. Lack of resources followed, at 67.1%, and lack of energy was in third place. The least cited barrier to PA was religious barriers, at 35.6%, as indicated in Table 6.

Inferential analysis

As shown in Table 7, linear regression was used to determine whether self-efficacy influenced the level of PA among the participants. We concluded that self-efficacy significantly affected the level of PA, with t: 6.554 (p. value: 0.001) (R^2 value:0.071). This finding suggested that the influence of self-efficacy on physical activity accounted for 7.1% of the variability within the model. Consequently, 92.9% of the variability could not be explained (i.e., variables not included might have had an effect).

Multiple regression was used to determine the effects of barriers to PA faced by respondents. The overall barriers and categories (lack of willpower, fear of injury and environmental barriers) had a statistically significant effect on the level of PA in the sample of women in KSA, with p-values of 0.004, 0.043 and 0.021, respectively, and an R^2 of 0.070. This finding suggested that the proportion of influence of the overall barriers and the previously described sub-dimensions on PA was 7.0%. Moreover, we observed no effect regarding barriers associated with lack of time, energy, skill, resources or religion on the level of PA in the study sample (Table 8).

The effects of socio-demographic characteristics on the sample's level of PA was determined with multiple regression. We concluded that socio-demographic characteristics associated with caregiving, employment status, marital status, level of education, age, region, or availability of domestic help had no effects on the levels of PA among the participants. The significance levels were 0.82, 0.821, 0.332, 0.324, 0.641, 0.078 and 0.478 (Table 9). Because the values were above 0.05, no statistical significance was observed.

Table 4: Levels of self-efficacy in the sample.

N	Items	Mean	Median	SD
1	When I am feeling tired	30.9	30.0	25.4
2	When I am feeling under pressure from work	28.2	20.0	25.3
3	During bad weather	37.6	30.0	31.6
4	After recovering from an injury that caused me to stop exercising	17.4	10.0	22.0
5	During or after experiencing personal problems	45.1	40.0	32.0
6	When I am feeling depressed	45.2	40.0	32.3
7	When I am feeling anxious	42.8	40.0	32.6
8	After recovering from an illness that caused me to stop exercising	26.7	20.0	28.0
9	When I feel physical discomfort when I exercise	33.4	30.0	26.9
10	After a vacation	52.8	50.0	30.9
11	When I have too much work to do at home	36.8	30.0	29.9
12	When visitors are present	21.2	10.0	26.5
13	When there are other interesting things to do	41.5	40.0	31.7
14	If I do not reach my exercise goals	45.4	40.0	32.0
15	Without support from my family or friends	58.3	60.0	34.0
16	During a vacation	54.7	50.0	33.5
17	When I have other time commitments	28.4	20.0	28.0
18	After experiencing family problems	40.7	40.0	33.1
Total		38.2	36.7	22.0

Table 6: Barriers to physical activity in the sample.

N	Barriers	Median	Percentage	Ranking
1	Lack of time	1.67	62.1	4
2	social influence	1.33	60.4	5
3	Lack of energy	1.67	66.9	3
4	Lack of willpower	1.67	68.7	1
5	Fear of injury	0.33	38.3	8
6	Lack of skill	1.00	50.9	7
7	Lack of resources	1.67	67.1	2
8	Religious barriers	0.00	35.6	9
9	Environmental barriers	1.00	52.8	6
Overall score		**1.26**	**55.9**	-

Table 7: Self-efficacy influences the level of physical activity in the sample.

	B	Std. error	Beta	t	Sig.
(Constant)	1325.73	257.913		5.140	0.001
Self-efficacy	36.310	5.855	0.266	6.202	0.001

R: 0.266; R^2: 0.071; f: 38.461; p. value: 0.001.
Linear regression.

survey method, we concluded that 69.9% of the sample was sufficiently active. This result was unexpected, given the PA levels reported by previous studies, which have concluded that Saudi Arabian women have among the lowest activity levels in the population. For example, in a study by Alandijani,[38] 72.2% of the study sample had low PA levels. Another study by Al-Zalabani et al.[15] has arrived at a similar conclusion, reporting that 66.6% of participants were physically inactive. In a study by Aljohani et al.,[17] 79% of the participants reported performing low levels of regular PA.

The current study's findings differ from those in studies from Gulf countries involving nationally representative samples, including KSA. For instance, studies have reported that between 26.3% and 28.4% of women are physically active.[39,40] Another review of physical inactivity in Muslim countries has concluded that Arab women are the least physically active group.[41] Although the results of the present study differ from those of most previous studies,[28,31] they are comparable to those from certain studies, such as those by AI Zahib,[19] in which 58.9% of the participants were generally active, and by Amin et al.,[14] in which 59% of the sample was generally active. A recent study involving Somali women has concluded that almost

Table 8: Effects of barriers to physical activity faced by the respondents.

	B	Std. error	Beta	t	Sig.
(Constant)	1955.924	651.472		3.002	0.003
Lack of time	−91.055	223.017	−0.024	−0.408	0.683
Social influence	−81.400	239.626	−0.018	−0.340	0.734
Lack of energy	161.723	252.910	0.040	0.639	0.523
Lack of willpower	681.837	238.855	0.170	2.855	0.004
Fear of injury	−517.273	254.393	−0.107	−2.033	0.043
Lack of skill	102.230	265.179	0.024	0.386	0.700
Lack of resources	22.642	203.033	0.006	0.112	0.911
Religious barriers	48.646	270.996	0.010	0.180	0.858
Environmental barriers	464.306	199.848	0.128	2.323	0.021
Overall barriers	1117.993	275.946	0.177	4.051	0.001

R: 0.264; R^2: 0.070; f: 4.156; p. value: 0.001.
Multiple regression.

Table 9: Effects of respondents' characteristics on their levels of physical activity.

	B	Std. error	Beta	t	Sig.
(Constant)	2434.529	1477.246		1.648	0.100
Region	−21.506	97.140	−0.010	−0.221	0.825
Age	57.472	253.164	0.012	0.227	0.821
Level of education	333.106	342.834	0.045	0.972	0.332
Marital status	−282.109	285.694	−0.052	−0.987	0.324
Employment status	59.545	127.806	0.024	0.466	0.641
Do you care for children or older people?	−521.945	295.444	−0.087	−1.767	0.078
Do you have a domestic helper or someone who does chores for you?	214.870	302.619	0.033	0.710	0.478

R: 0.264; R^2: 0.070; f: 4.156; p. value: 0.001.
Multiple regression.

Discussion

This study was aimed at assessing the current levels of PA among women in KSA. From the data collected with the

all women in the sample were sufficiently active.[42] Another area in which the present study's findings differ from those of previous studies is that vigorous activity levels were more common than moderate levels. For example, studies

by Samara et al.[30] and Al-Hazzaa[43] have reported greater levels of moderate activity among women.

However, we note that young adults were overrepresented in our study. Therefore, the high levels of PA in the study's sample might be attributed to social media influence. Young adults spend a substantial amount of time using technology.[44] One study has correlated higher levels of PA with a desire among young adults to look like people they see on social media.[45]

Regarding sedentary levels, this study found that an average of 497.1 ± 514.8 min per day was spent sitting, with a median of 360 min. These results align with those from numerous other studies. A study evaluating sitting time among adults in 20 countries has found that Portugal, Brazil and Colombia have the lowest sitting times, with a median of 180 min per day; in contrast, adults in Taiwan, Norway, Hong Kong, KSA and Japan sat for an average of 360 min daily.[46] In a study conducted by Samara et al.,[30] the average sitting time of the participants was between 3 and 6 h. Similarly, 62% of the time spent by Omani women has been reported to be devoted to sedentary activities.[40] Cohen et al. have found comparable results in a study conducted in the United States.[47] Considerable time spent sitting may be cause for concern; prolonged sitting has been found to pose a severe health risk when accompanied by an increase in PA.[48]

Self-efficacy

Self-efficacy is associated with PA, as supported by the findings of this study: 57% of respondents had a moderate level of self-efficacy. Self-efficacy was also found to have a statistically positive effect on the amount of PA ($p = 0.001$). In agreement with our findings, Samara et al.[30] and Gawwad[49] have found that self-efficacy is positively associated with PA, thereby indicating that more motivated women to practice PA were frequently more active. In addition, international research has demonstrated a positive correlation between PA and self-efficacy.[50] Indeed, self-efficacy has been identified as a crucial determinant of elevated levels of PA.[25]

Assessing self-efficacy is of utmost importance because it determines how people function regarding their behavioural choices, effort, persistence, thought patterns and emotions.[51] Previous research has indicated that self-efficacy can mediate the effects of interventions on PA behaviour.[25,52] Moreover, the greater self-efficacy an individual perceives, the greater the goals they set for themselves.[53] Only 4.1% of the study sample had a high level of self-efficacy. In future initiatives, determining the most effective means of enhancing self-efficacy regarding PA will be critical.

Willpower

Willpower is essential to accomplishing a task.[54] Seven percent of the current sample reported a lack of willpower as the primary obstacle. In addition, regression analysis revealed that a significant lack of willpower influences PA level ($p = 0.004$). These results are comparable to those of other studies involving Saudi and Omani participants.[20,21,36] People who report internal barriers, such as a lack of willpower, are less likely to engage in PA than those who report external barriers, such as a lack of facilities or transportation.[53]

Natural environment

The climate in KSA is so hot and dry that people prefer to drive rather than walk or ride bicycles.[38] The current findings indicated that weather was one of the most significant obstacles to PA. Regression analysis revealed significant correlations between two variables ($p = 0.021$). In addition, 52.8% of respondents indicated that environmental barriers influenced their PA. Herein, 60.5% of the study sample agreed with the statement "The weather (very hot and cold) prevents me from engaging in physical activity". The statement "Physical activity in the summer is not suitable for me" was supported by 54.7% of participants. In addition, respondents lacked enthusiasm for regular exercise "during bad weather". These findings are consistent with those of other studies conducted in Gulf nations, which have concluded that extreme heat is a significant barrier to PA.[39,55] More research is needed to examine the effects of seasonal changes on PA in Gulf nations. This work will be particularly important because these countries have climates characterized by substantial seasonal changes in weather.[39] Only one study in Bahrain has examined seasonal differences in relation to outdoor walking and has found that the proportion of individuals involved in outdoor walking varies significantly between summer (42%) and winter (67%), thus indicating that weather significantly influences outdoor activities.[56]

Built environment

The present study's analysis indicated that a lack of facilities was perceived as a significant barrier to PA. However, regression analysis did not reveal a significant relationship between PA and lack of resources ($p = 0.911$). This seemingly contradictory result might be explained by some Saudi women preferring to exercise at home.[30] Consequently, a lack of facilities would not be significantly correlated with low PA levels.

The barrier of a lack of resources was identified by 67.1% of the study sample as the second most prevalent barrier. These results are consistent with findings reported by AlQuaiz and Tayel.[20] According to Samara et al.,[30] the primary barrier for women is a lack of facilities, in agreement with findings from KSA and the United Arab Emirates.[14,48,57,58] Al-Hajri et al.[58] have included female participants from KSA and the United Kingdom, and have reported a lack of facilities as a barrier, thus suggesting that cultural sensitivity regarding exercise facilities and gender segregation may be a significant factor. In a study conducted in the United Arab Emirates, participants in a focus group have emphasised the need for culturally sensitive facilities.[57]

Limitations

The primary limitation of cross-sectional studies is that they do not permit causal inferences. Recruitment of participants to complete the online questionnaire via a link shared via WhatsApp and other social media platforms

might have resulted in some selection bias. However, because data collection occurred during a COVID-19 quarantine, this design was considered the simplest and most efficient primary data collection method. Self-reported data may also be subject to bias, thus potentially compromising the validity of the findings. The study did not include women without access to technology. In addition, the survey did not collect information regarding the presence of diseases that might prevent respondents from engaging in PA.

Conclusion

This study was based on the premise that individuals' beliefs and environments are likely to influence healthy behaviour. The correlations between PA levels and self-efficacy and willpower supported these findings. The physical environment also had a significant effect.

The significance for future research and practice

To achieve sustainable change, a clear national policy for enhancing PA is required, with a particular focus on women. This view is associated with national policies being an important indicator of political commitment. The policy should include a combination of strategies that target all levels of influence. Involving women in designing and implementing their own strategies for improvement should be a top priority. To encourage women to use an active lifestyle, interventions based on psychological and behavioural change strategies must be implemented.

To encourage walking, jogging and cycling in communities, continued efforts are required to create an infrastructure that makes spaces in KSA more accessible, including improvements in urban architecture, transit systems and recreational spaces. Women of all ages in urban and rural areas must be able to access these public spaces safely, taking the weather into account, at all times. One option may be to use existing air-conditioned spaces, such as schools, universities and shopping malls.

To create role models and alter cultural and social norms, community organisations and the media should be involved. Making healthy choices, such as physical activity, should become the norm.

When developing initiatives and facilities to address obstacles relating to women's public modesty, segregation and cultural sensitivity should be considered. Any change to cultural norms must always consider the Saudi community's cultural limitations if it is to be accepted, and not met with resistance and criticism.

Future initiatives must use theoretically grounded strategies. More research is required regarding the utility of self-efficacy and willpower to guide interventions aimed at promoting PA among Saudi women. Researchers must collaborate to transform research outcomes into actual community change.

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Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

Swansea University's College of Human and Health Sciences Research Ethics Committee granted ethical approval in July, 2020 (reference no-290620a).

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