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Title Page

Full title: Recreational physical activity context and type preferences among male and female
Emirati university students

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Ethics:

This study was cleared in accordance with the ethical review guidelines and processes of The University of Queensland (2017000527).

Recreational physical activity context and type preferences among male and female Emirati university students

Abstract

Background. The study assessed physical activity type and context preferences of Emirati university students. **Method.** This was a cross sectional study in which a stratified random sample (n=628) (female 69.1%; mean age 20.79 ± 3.81 years) completed an online survey. Relationships between gender and preferences were assessed using regression analysis, adjusted for BMI and age. **Results.** Activities with a fun element were the most preferred context (87.1%). Walking (66.7%) and swimming (61.7%) were the most preferred activity types. Males had significantly higher odds to prefer competitive activities; and activity types of football, weights, and jogging. Females had significantly higher odds to prefer activities with people of the same gender, with supervision and done at home; and activity types of walking, aerobics, cycling, squash, and yoga. **Conclusion.** These results can inform physical activity planning for university students in the UAE. Fun activity opportunities involving walking or swimming and in the local neighborhood may be popular for both males and females. Future research could explore uptake and maintenance of activity options, based on preferred activity attributes.

Key words: Physical activity, Preferences, Emirati, University students, College students

Introduction

Participation in physical activity is associated with reduced risk of all-cause mortality, cardiovascular disease, type-2 diabetes, hypertension, breast cancer, colon cancer, gestational diabetes, ischemic heart disease, and ischemic stroke.(1) Physical activity is also associated with a range of psychological health benefits including reduced risk of depression, (2, 3) anxiety, (3) and stress; (2, 3) and improved mood.(2) Among university students, previous research has identified a positive association between physical activity participation and academic performance (4, 5) and retention.(6) Despite these benefits, university students typically report low physical activity participation with 30-50% meeting physical activity guidelines with females less active than males.(7, 8) A systematic review of physical activity research in the oil producing countries of the Arabian Gulf (UAE, Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia) indicated low physical activity.(9) Low levels of physical activity have also been reported in Saudi university students (10, 11) with females less active than males.(11) Low physical activity has significant implications for health and wellbeing of adults in this region. In the adult population of the UAE, obesity has risen from 21.8% in 2000 to 31.7% in 2016.(12) Non-communicable diseases, many of which are inactivity related, are the cause of 65% of all deaths in the 30-70 year age group in the UAE.(13)

It is likely that interventions to increase participation in physical activity will be more successful if they suit the preferences of the intended population. For example, individuals' physical activity type preferences have been linked to adherence and retention.(14) Studies examining activity preferences have tended to adopt a narrow contextual focus (e.g. alone versus in groups; with an instructor versus no instructor) or to focus on preference for activity types (e.g. walking, swimming etc.). Few studies have examined more broadly the physical activity context and type preference of university students. One study found both male and

female Canadian university students preferred exercise with others outside of a structured class.(15) Gender differences have been demonstrated in Australian university students' preferences. One study noted females prefer group exercise and males prefer no assistance.(16) Studies on physical activity types have reported that males prefer weight lifting and team sports whereas females prefer aerobics, walking, dance and yoga,(16) and that male students prefer team sports while female students prefer indoor, gymnasium based activities (yoga, aerobics, dancing) and walking outside.(17)

There has been limited research on the physical activity preferences of Arab university students. One study with Saudi university students assessed preference for physical activity type and found walking was the most preferred physical activity (70%), followed by jogging (49%), weight lifting (31%), football (29%) and swimming (18%).(10) However, there has been no research on context preferences. Research from Western countries may not be applicable to Arab countries due to distinct social-cultural differences. Socio-cultural norms and family values may have an important influence on physical activity preferences, particularly among female Emirati university students. Past research has, for example, noted specific barriers for females associated with needing permission to walk alone or attend social gatherings, and socio-cultural norms limiting outdoor exercise (18) which may influence physical activity preferences. To facilitate the design of potentially appealing and culturally appropriate physical activity interventions for Arab university students, more research is needed to understand the physical activity preferences of this group. The aim of the current study was to assess physical activity context and physical activity type preferred by Emirati university students, and to assess potential differences by gender.

Materials and Methods

Sample and procedure

This was a cross sectional study in which a stratified random sample of Emirati university students (n=628) completed a self-administered online survey assessing preferences for physical activity context and type. The student population of the university was 21,754 for the 2016-17 academic year. Based on achieving a representative sample with 4% margin of error and 95% confidence interval, a sample of 585 was targeted. Past unpublished research conducted by the authors with the same population obtained response rates of 41%. Anticipating a response rate of 40%, the study invitation (including participant information sheet and informed consent) was therefore sent to 1462 students (50% female) randomly selected from the university student database. The email study invitation contained a link to the online questionnaire. Survey completion was taken as informed consent. All participants were recruited from a Higher Education Institute in the Middle East. The university offers undergraduate programs and has separate campus for males and females. Study inclusion criteria were: male or female aged over 18, UAE national and native Arabic speaker.

Materials

Physical activity context preferences were assessed using a questionnaire adapted from previous research.(19) The wording of two items was changed: “are not just about exercise” was changed to “include a fun element”; and “are done with one or two others” was changed to “are done with an exercise buddy/partner”. Four new items were added to extend data collection: “I can choose the intensity”, “are done with people who have the same health condition as I do”; “are done at my work place”; and “are done at the university”. An additional response option (not applicable) was added for these latter three items given that they may not be applicable to all respondents. The questionnaire was then translated to Arabic using recommended procedures.(20, 21) The final Physical Activity Context Preference

Questionnaire-Arabic (PAC-A) asked people to indicate extent of agreement/disagreement with each of 23 physical activity contexts. Items assess how (e.g., “I prefer activities that are vigorous”); where (“I prefer activities that are done at the university”); and with whom (e.g., “I prefer activities that are done with people of my own gender”) people prefer to participate in physical activity. Responses are indicated on a 5 point Likert scale: (strongly agree, agree, no preference, disagree, strongly disagree).

To assess preference for physical activity types, respondents were asked which activities they would like to start or to do more of from a list of 14 physical activity types (e.g. football, swimming, yoga etc.). Respondents were allowed to make multiple responses. Similar items have been used in previous studies.(16, 22)

Participants completed demographic information on age (years), gender, height and weight (used to derive body mass index: BMI), living situation (single and living alone, single and living with family, married and living with partner, other), and if they had children (yes, no). Some data were categorized for descriptive purposes e.g. age was reported in blocks of years 18-20, 21-24, 25+; BMI was reported in categories using recommended cut points: <18.5 = underweight, 18.5-25 = healthy weight; 25-30 = overweight; 30+ = obese.(23)

Statistical analyses

All data were exported into IBM SPSS Statistics for Windows Version 24. Ten percent of the data entered were checked for accuracy and no errors were found. Responses for context preference were collapsed into 3 categories (strongly disagree/disagree = disagree, neither agree nor disagree = neutral, strongly agree/agree = agree) for descriptive statistics. The five most commonly preferred physical activity contexts and physical activity types are reported.

Gender differences were explored using binary logistic regressions conducted on participant responses dichotomised into preferred (strongly agree and agree) and not preferred (neither agree nor disagree, disagree, and strongly disagree), adjusting for BMI and age.

Results

Of the 1462 students invited to participate in the study, 628 completed the questionnaire (response rate 43%). The majority of the sample was female (69.1%) and the mean age of participants was 20.79 (SD 3.81) years. Approximately 40% of the sample were overweight or obese. Most of the participants lived at home with their family and had no children. Additional characteristics of the participants are described in Table 1.

INSERT TABLE 1 HERE

Activity context preferences are presented in Table 2. The most commonly preferred contexts for physical activity participation for the whole sample (> 73%) were those that: include a fun element, the individual can choose the intensity, can be done on one's own, are done at a fixed time/scheduled, and involve little or no cost. Male students also reported a common preference for activities that include a social aspect and that can be done in the local neighbourhood or area. Female students reported a common preference for activities that can be done with people of the same gender. After adjustment for BMI and age, results showed that male students were more likely than females to prefer physical activity contexts that involve competition (OR = 1.7; 95% CI = 1.2-2.4; p=0.07) and female students were more likely than males to prefer physical activity contexts that are with people of the same gender (OR = 1.9; 95% CI = 1.3-2.8; p=0.001), supervised (OR = 1.8; 95% CI = 1.3-2.6; p=0.001), and that are done at home

(OR = 1.8; 95% CI = 1.2-2.5; p=0.002). No significant gender differences were found for preference for any of the other contexts.

INSERT TABLE 2 HERE

Activity type preferences are presented in Table 3. For the whole sample, the most commonly preferred types for physical activity participation (> 62%) were swimming and walking. Other common preferences among males were jogging, football and fitness/weights, and among females were cycling and aerobics. Having controlled for BMI and age, results showed that male students were more likely than females to prefer football (OR = 6.7; 95% CI = 4.4-10.1; p<0.00), fitness/weights (OR = 2.9; 95% CI = 2.0-4.2; p<0.00), jogging (OR = 1.7; 95% CI = 1.2-2.4; p=0.004), martial arts (OR = 1.6; 95% CI = 1.1-2.4; p=0.02) and table tennis (OR = 3.8; 95% CI = 2.2-6.5; p<0.00). Female students were significantly more likely to report a preference for aerobics (OR = 3.6; 95% CI = 2.4-5.6; p<0.00), cycling (OR = 1.5; 95% CI = 1.1-2.2; p=0.02), squash (OR = 3.5; 95% CI = 1.9-6.5; p<0.00), walking (OR = 2.1; 95% CI = 1.4-3.0; p<0.00) and yoga (OR = 2.6; 95% CI = 1.7-4.0; p<0.00). No significant gender differences were found for preference for basketball, swimming, tennis or volleyball.

INSERT TABLE 3 HERE

Discussion

Understanding the physical activity type and context preferences of Emirati university students can assist in developing physical activity interventions for this group. In the current study, Emirati university students commonly reported a preference for activities that include a fun element, where the individual can choose the intensity, can be done on one's own, are done at

a fixed time/scheduled, and involve little or no cost. Walking and swimming were the most popular activity types. Male students also had a common preference for jogging, fitness/weights and football as well as activities in the local neighbourhood or area, and with a social aspect. Female students had a common preference for cycling, aerobics and jogging as well as activities with people of the same gender. Significant gender differences were found for physical activity contexts with males preferring competition; and females preferring same gender, supervision, and activities done at home. Significant gender differences were also found for activity types with males preferring football, fitness/weights, jogging, martial arts and table tennis; and female students preferring aerobics, cycling, squash, walking and yoga.

Overall, the most preferred type of activity among these Emirati university students was walking. This is similar to other previous research with American university students (17) and Australian adult populations.(22) This preference for walking is consistent with current study results for preferred physical activity contexts that can be done on one's own, involve little or no cost, where the individual can choose the intensity and in the local neighborhood. Walking may be appealing to university students as it does not involve fees or specialist equipment, and can be more easily incorporated into busy schedules (including study) than other activities that may be facility, equipment and teammate dependent (e.g. tennis, table tennis).

The most preferred physical activity context was those which had a fun element. Past research has noted that university can be a particularly stressful time (24) and students may experience significant academic challenges. Given the stressful nature of academic life, university students may prefer fun activities as they are typically less evaluative and result oriented. Many universities often however, cater for competitive sports and gym based activities. Investment in fun-based activities may assist in improving on-campus physical activity participation by

university students. Activities done on one's own at a fixed time/scheduled involving little or no cost, with people of the same gender and where the individual can choose the intensity may also be particularly appealing to Emirati university students.

For male Emirati university students, there was a common preference for activities in the local neighbourhood/area and with social elements. The majority of participants in this study lived in the family home and activities in the local neighbourhood may require significantly less travel which may be appealing given the time constraints that many university students typically report.(25-27) The preference for social aspects is consistent with other research that highlighted the role of friends as one of the key enablers of physical activity participation for university students.(28, 29) It is unclear why these contexts were more salient for males than females and more research may be required to examine this. Males were also more likely to prefer competitive activities than females and this was consistent with the increased likelihood to prefer activity types such as football, martial arts and table tennis. Male students' preference for football and weightlifting is consistent with other research with university students in Australia.(16, 17)

For female Emirati university students, there was a common preference for activities that are gender specific. This is not surprising given the distinct socio-cultural factors regarding gender in Muslim countries like the UAE, and that the females in the current study attended a female-only campus. Females were more likely than males to prefer activities that are done at home. Past research with Arab females has noted that a lack of culturally appropriate places (11, 18) and lack of permission to attend gatherings (18) were key barriers to physical activity participation. Home-based activities may be therefore, more socio-culturally acceptable for females in this population. Females also commonly preferred activities with a fixed

time/schedule and this may be related to time constraints related to domestic duties and family responsibilities (30) and academic life.(25-27) Females were more likely than males to prefer activities that are supervised, which may explain their preference for aerobics and yoga, which are typically instructor led. Other physical activity types preferred by females were walking, swimming, cycling and jogging. These results are consistent with other research reporting that female Australian university students prefer walking, aerobics and yoga.(16, 17)

A higher proportion of students (male and female) reported a preference for activities that are held in the neighborhood or local area than on the university campus (71.3% versus 59.6%). Possible reasons for this may be that universities are not providing preferred activity types, university activities may not be scheduled at suitable times for students (e.g. outside of class times), that activities or facilities closer to home may be more desirable due to heavy academic and home schedules, or that students may wish to participate with friends who are not enrolled at the university. More research may be required to identify why the campus is a less preferred place to participate in physical activity.

A strength of this study is that it used a stratified random sample which improves representativeness of the student population at this university. Results may however, be vulnerable to response bias, and may not be generalizable to other university students in the UAE. The preference questionnaire (the PAC-A) allowed for assessment of a board range of physical activity contexts which has typically not been looked at previously. A limitation is that the respondents indicated preferences for activity types and contexts separately, which may lead to conflicting results. For example, females reported strong preferences for activities done at home and for activities supervised by a leader. However, it may also be that females prefer doing yoga at home and aerobics under the supervision of an instructor.

Conclusion

These results on activity context and type preferences can inform physical activity planning for university students in the UAE. Walking and swimming may be popular for both males and females. Physical activity opportunities should prioritise having fun, be low cost, and activities in the local neighborhood may be more appealing than university based activities. Social and competitive activities (e.g., football) may be more attractive to male than female students, and female students may be more interested in organised and supervised activities (e.g., yoga and aerobics classes). Future research could explore the uptake and maintenance of activity options among university students, based on preferred activity attributes.

Author contributions: All authors contributed to conception of study, design of protocol, data collection, analysis and interpretation of data, drafting of manuscript, and review of manuscript for intellectual content. All authors read and approved the final manuscript.

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Competing interests: None to declare

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27th September 2018

Dear Editors,

We (the authors listed below) wish to submit an original article entitled "Recreational physical activity context and type preferences among male and female Emirati university students" for consideration by International Health Journal.

We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere.

In this paper, we report on the physical activity context and type preferences of Emirati university students. To date, research on physical activity preferences has tended to focus on types of sports (e.g. football, basketball etc.) or whether activities are instructor led or not. This study attempts to broaden our understanding of the physical activity preferences to include a wider range of context preferences.

Our results are significant because there are serious public health concerns (related to inactive lifestyles) in the UAE and Arabian Gulf and developing interventions to address this can be informed by the preferences of the target population.

Our results provide valuable insight into an understudied population and this information can be used to inform interventions to improve levels of activity.

We have no conflicts of interest to disclose. We have no funding sources to disclose.

Please address all correspondence concerning this manuscript to me at ciarandoyle@hotmail.com.

Thank you for your consideration of this manuscript.

Sincerely,

Ciaran Doyle

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Table 1 Characteristics of participants (n=628)

Characteristics	All		Female		Male	
	n	%	n	%	n	%
Gender	628	100.0	434	69.1	194	30.9
Age group (years)						
18-20	362	57.64	253	58.29	109	56.19
21-24	216	34.39	153	35.25	63	32.47
25+	50	7.96	28	6.45	22	11.34
Self-reported body mass index (kg/ m2)						
Underweight (<18.5)	78	12.42	64	14.75	14	7.22
Healthy weight (18.5-25)	299	47.61	226	52.07	73	37.63
Overweight (25-30)	125	19.90	69	15.90	56	28.87
Obese (>30)	126	20.06	75	17.28	51	26.29
Living Situation						
Single and live alone	9	1.43	2	0.46	7	3.61
Single and live with family	551	87.74	379	87.33	172	88.66
Married and live with partner	50	7.96	38	8.76	12	6.19
Other	18	2.87	15	3.46	3	1.55
Children						
Yes	34	5.41	22	5.07	12	6.19
No	594	94.59	412	94.93	182	93.81

Table 2 Preference for physical activity context, by gender (n=628)

	Total (n=628)			Male (n=194)			Female (n=434)		
	A %	N %	D %	A %	N %	D %	A %	N %	D %
How:									
Include a fun element	87.1	8.9	4.0	84.0	9.3	6.7	88.5	8.8	2.8
I can choose the intensity	73.6	18.8	7.6	74.2	17.5	8.2	73.3	19.4	7.4
Are done at a fixed time i.e. scheduled sessions	72.8	17.8	9.4	68.6	20.6	10.8	74.7	16.6	8.8
Involve little or no cost	72.5	18.9	8.6	69.6	22.7	7.7	73.7	17.3	9.0
Are structured with a set routine or format	69.6	22.1	8.3	68.6	22.2	9.3	70.0	22.1	7.8
Are vigorous	68.0	24.8	7.2	69.6	22.7	7.7	67.3	25.8	6.9
Are supervised e.g., by a leader*	67.8	19.1	13.1	59.3	24.2	16.5	71.7	16.8	11.5
Include a social aspect	67.5	23.7	8.8	70.1	23.2	6.7	66.4	24.0	9.7
Involve competition*	59.7	27.2	13.1	68.6	26.8	4.6	55.8	27.4	16.8
Require skill and practice	59.7	26.6	13.7	61.3	27.3	11.3	59.0	26.3	14.7
Where:									
Are done in my neighbourhood/local area	71.3	20.5	8.1	70.1	23.2	6.7	71.9	19.4	8.8
Are done outdoors	64.2	25.6	10.2	62.4	29.4	8.2	65.0	24.0	11.1
Are done at the university	59.6	23.4	13.4	60.3	25.8	9.3	59.2	22.4	15.2
Are done at home*	53.3	28.0	18.6	42.8	29.9	27.3	58.1	27.2	14.7
Are done at my work place	45.7	27.4	21.0	42.3	33.5	16.5	47.2	24.7	23.0
With whom:									
Are done on my own	72.9	20.2	6.8	71.6	20.1	8.2	73.5	20.3	6.2
Are done with people of my own gender*	71.0	19.1	9.9	61.3	27.8	10.8	75.3	15.2	9.4
Are done with an exercise partner/buddy	66.7	22.8	10.5	67.5	23.7	8.8	66.4	22.4	11.3
Are done with people who have the same health condition as I do	64.2	22.8	10.2	64.4	21.1	9.3	64.1	23.5	10.6
Are done with people at my level of ability	63.5	23.4	13.1	69.1	20.1	10.8	61.1	24.9	14.1
Are done with people my age	63.2	24.5	12.3	62.4	26.3	11.3	63.6	23.7	12.7
Are done in a small group (e.g., 3-6 people)	62.1	24.8	13.1	64.9	23.2	11.9	60.8	25.6	13.6
Are team based	52.5	31.1	16.4	57.2	30.4	12.4	50.5	31.3	18.2

* on context indicates significant gender difference (p<.05)

A=agree, N = neither agree nor disagree; D = disagree

Table 3 Preference for physical activity type, by gender

Type	Total (n=628)	Male (n=194)	Female (n=434)
Walking*	66.7%	56.0%	71.4%
Swimming	61.7%	56.5%	64.1%
Jogging*	43.1%	50.8%	39.6%
Cycling*	38.6%	32.1%	41.5%
Fitness/Weights*	33.3%	49.7%	26.0%
Aerobics*	33.2%	16.6%	40.6%
Yoga*	28.7%	16.1%	34.3%
Football*	24.4%	49.7%	13.1%
Martial Arts*	23.8%	29.5%	21.2%
Basketball	16.6%	17.6%	16.1%
Squash*	16.6%	6.7%	21.0%
Volleyball	15.9%	17.6%	15.2%
Table Tennis*	10.4%	19.7%	6.2%
Tennis	8.6%	10.9%	7.6%

* on type indicates significant gender difference ($p < .05$)

Title Page

Full title: Recreational physical activity context and type preferences among male and female
Emirati university students

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Ethics:

This study was cleared in accordance with the ethical review guidelines and processes of The
University of Queensland (2017000527).

Recreational physical activity context and type preferences among male and female Emirati university students

Abstract

Background. The study assessed ~~recreational-recreational~~ physical activity type and context preferences of Emirati university students. Method. This was a cross sectional study in which a stratified random sample (n=628) (female 69.1%, 30.9% male; mean age 20.79 ± 3.81 years) completed an online survey. Relationships between gender and preferences were assessed using regression analysis, adjusted for BMI and age. Results. Activities with a fun element were the most preferred context (87.1%). Walking (66.7%) and swimming (61.7%) were the most preferred activity types. Males had significantly higher odds to prefer competitive activities; and activity types of football, weights, and jogging. Females had significantly higher odds to prefer activities with people of the same gender, with supervision and done at home; and activity types of walking, aerobics, cycling, squash, and yoga. Conclusion. These results can inform physical activity planning for university students in the United Arab Emirates (UAE). Fun activity opportunities involving walking or swimming and in the local neighborhood may be popular for both males and females. Future research could explore uptake and maintenance of activity options, based on preferred activity attributes.

Key words: Physical activity, Preferences, Emirati, University students, College students

Introduction

Participation in physical activity is associated with reduced risk of all-cause mortality, cardiovascular disease, type-2 diabetes, hypertension, breast cancer, colon cancer, gestational diabetes, ischemic heart disease, and ischemic stroke.(1) Physical activity is also associated with a range of psychological health benefits including reduced risk of depression, (2, 3) anxiety, (3) and stress; (2, 3) and improved mood.(2) Among university students, previous research has identified a positive association between physical activity participation and academic performance (4, 5) and retention.(6) Despite these benefits, university students typically report low physical activity participation with 30-50% meeting physical activity guidelines with females less active than males.(7, 8) A systematic review of physical activity research in the oil producing countries of the Arabian Gulf (UAE, Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia) indicated low physical activity.(9) Low levels of physical activity have also been reported in Saudi university students (10, 11) with females less active than males.(10, 11) Low physical activity has significant implications for health and wellbeing of adults in this region. In the adult population of the UAE, obesity has risen from 21.8% in 2000 to 31.7% in 2016.(12) Non-communicable diseases, many of which are inactivity related, are the cause of 65% of all deaths in the 30-70 year age group in the UAE.(13)

It is likely that interventions to increase participation in recreational physical activity will be more successful if they suit the preferences of the intended population. For example, individuals' physical activity type preferences have been linked to adherence and retention.(14) Studies examining activity preferences have tended to adopt a narrow contextual focus (e.g. alone versus in groups; with an instructor versus no instructor) or to focus on preference for activity types (e.g. walking, swimming etc.). Few studies have examined more broadly the physical activity context and type preference of university students. One study found both

male and female Canadian university students preferred exercise with others outside of a structured class.(15) Gender differences have been demonstrated in Australian university students' preferences. One study noted females prefer group exercise and males prefer no assistance.(16) Studies on physical activity types have reported that males prefer weight lifting and team sports whereas females prefer aerobics, walking, dance and yoga,(16) and that male students prefer team sports while female students prefer indoor, gymnasium based activities (yoga, aerobics, dancing) and walking outside.(17)

There has been limited research on the recreational physical activity preferences of Arab university students. One study with Saudi university students assessed preference for physical activity type and found walking was the most preferred physical activity (70%), followed by jogging (49%), weight lifting (31%), football (29%) and swimming (18%).(10) However, there has been no research on context preferences. Research from Western countries may not be applicable to Arab countries due to distinct social-cultural differences. Socio-cultural norms and family values may have an important influence on physical activity preferences, particularly among female Emirati university students. Past research has, for example, noted specific barriers for females associated with needing permission to walk alone or attend social gatherings, and socio-cultural norms limiting outdoor exercise (18) which may influence physical activity preferences. To facilitate the design of potentially appealing and culturally appropriate recreational physical activity interventions for Arab-Emirati university students, more research is needed to understand the physical activity preferences of this group. The aim of the current study was to assess physical activity context and physical activity type preferred by Emirati university students, and to assess potential differences by gender.

Materials and Methods

Sample and procedure

This was a cross sectional study in which a stratified random sample of Emirati national university students (n=628) completed a self-administered online survey assessing preferences for recreational physical activity context and type. The student population of the university was 21,754 for the 2016-17 academic year. Based on achieving a representative sample with 4% margin of error and 95% confidence interval, a sample of 585 was targeted. Past unpublished research conducted by the authors with the same population obtained response rates of 41%. Anticipating a response rate of 40%, the study invitation (including participant information sheet and informed consent) was therefore sent to 1462 students (50% female; 50% male) randomly selected from the university student database. The email study invitation contained a link to the online questionnaire. Survey completion was taken as informed consent. All participants were recruited from a Higher Education Institute in the Middle East. The university offers undergraduate programs and has separate campus for males and females. Study inclusion criteria were: male or female aged over 18, UAE national and native Arabic speaker.

Materials

Recreational pPhysical activity context preferences were assessed using a questionnaire adapted from previous research.⁽¹⁹⁾ The original measure had nineteen items that assessed preference for format (how), location (where), and social setting (with whom) in which physical activity occurred. The wording of two items was changed: “are not just about exercise” was changed to “include a fun element”; and “are done with one or two others” was changed to “are done with an exercise buddy/partner”. Four new items were added to extend data collection: “I can choose the intensity”, “are done with people who have the same health condition as I do”; “are done at my work place”; and “are done at the university”. An additional

response option (not applicable) was added for these latter three items given that they may not be applicable to all respondents. The questionnaire was then translated to Arabic using recommended procedures.(20, 21) The final Physical Activity Context Preference Questionnaire-Arabic (PAC-A) asked people to indicate extent of agreement/disagreement with each of 23 physical activity contexts. Items assess how (e.g., “I prefer activities that are vigorous”); where (“I prefer activities that are done at the university”); and with whom (e.g., “I prefer activities that are done with people of my own gender”) people prefer to participate in physical activity. Responses are indicated on a 5 point Likert scale: (strongly agree, agree, no preference, disagree, strongly disagree).

Formatted: English (United States)

To assess preference for recreational physical activity types, respondents were asked which activities they would like to start or to do more of from a list of 14 physical activity types (e.g. football, swimming, yoga etc.). Respondents were allowed to make multiple responses. Similar items have been used in previous studies.(16, 22)

Participants completed demographic information on age (years), gender, height and weight (used to derive body mass index: BMI), living situation (single and living alone, single and living with family, married and living with partner, other), and if they had children (yes, no). Some data were categorized for descriptive purposes e.g. age was reported in blocks of years 18-20, 21-24, 25+; BMI was reported in categories using recommended cut points: <18.5 = underweight, 18.5-25 = healthy weight; 25-30 = overweight; 30+ = obese.(23)

Statistical analyses

All data were exported into IBM SPSS Statistics for Windows Version 24. Ten percent of the data entered were checked for accuracy and no errors were found. Responses for context

preference were collapsed into 3 categories (strongly disagree/disagree = disagree, neither agree nor disagree = neutral, strongly agree/agree = agree) for descriptive statistics. The five most commonly preferred physical activity contexts and physical activity types are reported. Gender differences were explored using binary logistic regressions conducted on participant responses dichotomised into preferred (strongly agree and agree) and not preferred (neither agree nor disagree, disagree, and strongly disagree), adjusting for BMI and age.

Results

Of the 1462 students invited to participate in the study, 628 completed the questionnaire (response rate 43%). The majority of the sample was female (69.1%) and the mean age of participants was 20.79 (SD 3.81) years. Over half of respondents (57.64%) were aged 18-20 and the remainder were aged 21-24 (34.39%) or over 25 (7.96%). Approximately 40% of the sample were overweight or obese. Most of the participants lived at home with their family and had no children. Additional characteristics of the participants are described in Table 1.

INSERT TABLE 1 HERE

Activity context preferences are presented in Table 2. The most commonly preferred contexts for recreational physical activity participation for the whole sample (> 73%) were those that include a fun element, the individual can choose the intensity, can be done on one's own, are done at a fixed time/scheduled, and involve little or no cost. Male students also reported a common preference for activities that include a social aspect and that can be done in the local neighbourhood or area. Female students reported a common preference for activities that can be done with people of the same gender. After adjustment for BMI and age, results showed that male students were more likely than females to prefer physical activity contexts that

involve competition (OR = 1.7; 95% CI = 1.2-2.4; p=0.07) and female students were more likely than males to prefer physical activity contexts that are with people of the same gender (OR = 1.9; 95% CI = 1.3-2.8; p=0.001), supervised (OR = 1.8; 95% CI = 1.3-2.6; p=0.001), and that are done at home (OR = 1.8; 95% CI = 1.2-2.5; p=0.002). No significant gender differences were found for preference for any of the other contexts.

INSERT TABLE 2 HERE

Activity type preferences are presented in Table 3. For the whole sample, the most commonly preferred types for recreational physical activity participation (> 62%) were swimming and walking. Other common preferences among males were jogging, football and fitness/weights, and among females were cycling and aerobics. Having controlled for BMI and age, results showed that male students were more likely than females to prefer football (OR = 6.7; 95% CI = 4.4-10.1; p<0.00), fitness/weights (OR = 2.9; 95% CI = 2.0-4.2; p<0.00), jogging (OR = 1.7; 95% CI = 1.2-2.4; p=0.004), martial arts (OR = 1.6; 95% CI = 1.1-2.4; p=0.02) and table tennis (OR = 3.8; 95% CI = 2.2-6.5; p<0.00). Female students were significantly more likely to report a preference for aerobics (OR = 3.6; 95% CI = 2.4-5.6; p<0.00), cycling (OR = 1.5; 95% CI = 1.1-2.2; p=0.02), squash (OR = 3.5; 95% CI = 1.9-6.5; p<0.00), walking (OR = 2.1; 95% CI = 1.4-3.0; p<0.00) and yoga (OR = 2.6; 95% CI = 1.7-4.0; p<0.00). No significant gender differences were found for preference for basketball, swimming, tennis or volleyball.

INSERT TABLE 3 HERE

Discussion

Understanding the recreational physical activity type and context preferences of Emirati university students can assist in developing physical activity interventions for this group. In the current study, Emirati university students commonly reported a preference for activities that include a fun element, where the individual can choose the intensity, can be done on one's own, are done at a fixed time/scheduled, and involve little or no cost. Walking and swimming were the most popular activity types. Male students also had a common preference for jogging, fitness/weights and football as well as activities in the local neighbourhood or area, and with a social aspect. Female students had a common preference for cycling, aerobics and jogging as well as activities with people of the same gender. Significant gender differences were found for recreational physical activity contexts with males preferring competition; and females preferring same gender, supervision, and activities done at home. Significant gender differences were also found for activity types with males preferring football, fitness/weights, jogging, martial arts and table tennis; and female students preferring aerobics, cycling, squash, walking and yoga.

Overall, the most preferred type of activity among these Emirati university students was walking. This is similar to other previous research with both Australian university students (17) and adult populations.(22) This preference for walking is consistent with current study results for preferred recreational physical activity contexts that can be done on one's own, involve little or no cost, where the individual can choose the intensity and in the local neighborhood. Walking may be appealing to university students as it does not involve fees or specialist equipment, and can be more easily incorporated into busy schedules (including study) than other activities that may be facility, equipment and teammate dependent (e.g. tennis, table tennis).

The most preferred recreational physical activity context was those which had a fun element. Past research has noted that university can be a particularly stressful time (24) and students may experience significant academic challenges. Given the stressful nature of academic life, university students may prefer fun activities as they are typically less evaluative and result oriented. Many universities often however, cater for competitive sports and gym based activities. Investment in fun-based activities may assist in improving on-campus physical activity participation by university students. Activities done on one's own at a fixed time/scheduled involving little or no cost, with people of the same gender and where the individual can choose the intensity may also be particularly appealing to Emirati university students.

For male Emirati university students, there was a common preference for activities in the local neighbourhood/area and with social elements. The majority of participants in this study lived in the family home and activities in the local neighbourhood may require significantly less travel which may be appealing given the time constraints that many university students typically report.(25-27) The preference for social aspects is consistent with other research that highlighted the role of friends as one of the key enablers of physical activity participation for university students.(28, 29) It is unclear why these contexts were more salient for males than females and more research may be required to examine this. Males were also more likely to prefer competitive activities than females and this was consistent with the increased likelihood to prefer activity types such as football, martial arts and table tennis. Male students' preference for football and weightlifting is consistent with other research with university students in Australia.(16, 17)

For female Emirati university students, there was a common preference for activities that are gender specific. This is not surprising given the distinct socio-cultural factors regarding gender in Muslim countries like the UAE, and that the females in the current study attended a female-only campus. Females were more likely than males to prefer activities that are done at home. Past research with Arab females has noted that a lack of culturally appropriate places (11, 18) and lack of permission to attend gatherings (18) were key barriers to physical activity participation. Home-based activities may be therefore, more socio-culturally acceptable for females in this population. Females also commonly preferred activities with a fixed time/schedule and this may be related to time constraints related to domestic duties and family responsibilities (30) and academic life.(25-27) Females were more likely than males to prefer activities that are supervised, which may explain their preference for aerobics and yoga, which are typically instructor led. Other physical activity types preferred by females were walking, swimming, cycling and jogging. These results are consistent with other research reporting that female Australian university students prefer walking, aerobics and yoga.(16, 17)

A higher proportion of students (male and female) reported a preference for activities that are held in the neighborhood or local area than on the university campus (71.3% versus 59.6%). Possible reasons for this may be that universities are not providing preferred activity types, university activities may not be scheduled at suitable times for students (e.g. outside of class times), that activities or facilities closer to home may be more desirable due to heavy academic and home schedules, or that students may wish to participate with friends who are not enrolled at the university. More research may be required to identify why the campus is a less preferred place to participate in physical activity. [In the meantime, the university may still play an important role in creating awareness and promoting actual physical activity participation in Emirati university students. One potential strategy may be for the university to promote](#)

physical activity types and contexts most preferred by students e.g. campaigns to promote campus walking may be well received.

A strength of this study is that it used a stratified random sample which improves representativeness of the student population at this university. Results may however, be vulnerable to response bias, and may not be generalizable to other university students in the UAE. The preference questionnaire (the PAC-A) allowed for assessment of a broad range of physical activity contexts which has typically not been looked at previously. A limitation is that the respondents indicated preferences for activity types and contexts separately, which may lead to conflicting results. For example, females reported strong preferences for activities done at home and for activities supervised by a leader. However, it may also be that females prefer doing yoga at home and aerobics under the supervision of an instructor.

Conclusion

These results on activity context and type preferences can inform physical activity planning for university students in the UAE. Walking and swimming may be popular for both males and females. Physical activity opportunities should prioritise having fun, be low cost, and activities in the local neighborhood may be more appealing than university based activities. Social and competitive activities (e.g., football) may be more attractive to male than female students, and female students may be more interested in organised and supervised activities (e.g., yoga and aerobics classes). Future research could explore the uptake and maintenance of activity options among university students, based on preferred activity attributes.

Author contributions: All authors contributed to conception of study, design of protocol, data collection, analysis and interpretation of data, drafting of manuscript, and review of manuscript for intellectual content. All authors read and approved the final manuscript.

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Competing interests: None to declare

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Thank you for your kind words and thoughtful feedback. It is most appreciated. We have attempted to address all of the minor revisions below. We hope that these edits are acceptable.

Reviewer 1

1. The methods indicates that the sample population is Arabs (Emiratis and non-Emiratis) studying in a University in the Emirates. The title and introduction should reflect this important distinction. – **The sample population consisted solely of Emirati nationals (no other nationality was included as the university in question is only for Emirati nationals). We have included the word “national” on p5 to reinforce that it was solely Emirati nationals that participated in the study and also changed Arab to Emirati on p.4 to reduce possibility of potential confusion.**
2. The focus of this study is on recreational physical activity and not the occupational and transport domains. Although clearly stated in the title, it should also be clearly defined in the Introduction and Methods. – **Have added the word “recreational” before physical activity throughout the introduction, method, results and discussion sections to reinforce that the focus of the study is on recreational physical activity preferences. These changes can be seen on p. 2, 3, 4, 5, 6, 7, 8, and 9**
3. Include one or two more sentences explaining the PAC before explaining the changes made to the tool. – **Have added this info to page 5**
4. Although the University may not be the priority place for physical activity, include suggestions on how could the university could better promote physical activity (i.e., creating a walkable campus) given the interest students have in walking and bearing in mind the local context. **Have added this on p.11**

Reviewer 2

Abstract

The content does not show that men were also examined (see table 1), which should be included as well. – **have added male % in abstract p2**

Introduction

The article indicates good knowledge of physical activity in various countries. I suggest supplementing the research from various countries around the world by adding the data from the following publications (Sallis JF., Bowles HR., Bauman A., Ainsworth BE., Bull FC.,

Craig CL. Et al., Neighborhood environments and physical activity in 11 countries.) Am J Prev Med. 2009 Jun; 36 (6): 484 - 90), and from Europe (Junger J., Frömel K., Bergier J., Ács P., Bergier B., Salonna F., Niżnikowska E. Physical activity in students from Visegrad countries by BMI Status. Health Prob. 2018; 12 (1): 41-48). – **Have added the Junger et al., reference to support PA levels on p.3. Have added some information from Sallis et al., paper on p 3 to report prevalence of PA in adult populations.**

It is worth showing the differences in physical activity in the respondents from Saudi Arabia (item 10 of the literature) broken by gender, because only general data are included: walking 70%, jogging 49% etc., and yet the subject of the paper is the specificity of physical activity by gender. – **We agree with this point but unfortunately that paper (Al Drees et al., 2016) does not provide any data or text that details the gender difference in activity type preference so it is not possible to add this information. Have added the reference to support that female Saudi engage in less PA than male Saudi on p3**

Material and methods

It is suggested that more detailed information about the number and percentage of respondents is included as its lack may again be misleading for the reader. The data on the numbers of women and men in each age group should be supplemented, i.e. 18-20, 21-24, 25+- **have added some additional numbers in the results section for age group p7**

The authors write that the surveys were sent randomly to 1462 students (50% women). Does it mean that the number of men is 731 (50%)? – **have added additional text to p.5**

Please provide more detailed numbers. - **Done**

Results

The problem is sufficiently described. **Thank you**

Discussion

The discussion part shows a good knowledge of the issue. **Thank you**

Conclusions

The conclusions seem carefully specified but still valuable as they postulate enhancing the physical activities for students, including the ones targeting studying women. – **Thank you**

The information about the consent of the Bioethical Commission should be included.