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Potential psychosocial influences on gender differences in physical activity among Qatari adolescents: a first insight through descriptive observation

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ABSTRACT

Adolescents in Qatar have some of the highest levels of inactivity and gender inequality in physical activity (PA) among all adolescents in the world. Contextual psychosocial influences remain unknown to date. The current study is a secondary analysis of 1,157 Qatari students (13 to 20 years of age) who completed a national cross-sectional survey. Males reported significantly higher daily PA than females ($p < 0.0001$) and increasing daily PA with personal importance for PA ($p = 0.0140$). However, compared to females, significantly higher proportion of daily active males were in the lowest level of self-efficacy ($p = 0.0096$), body shape satisfaction ($p = 0.0003$), likeness of body in pictures ($p = 0.0011$), and highest levels of psychological distress ($p = 0.0313$). Our results support positive association between adverse psychosocial constructs and daily PA in both genders; poor psychosocial profile was more pronounced among adolescent males. Future strategies aiming to increase PA should take into consideration these differences.

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KEYWORDS

Physical activity; adolescence; activity inequality; general self-efficacy; body image; Qatar


Introduction

Adequate physical activity (PA) among youth has considerable benefits for health and psychological wellbeing (World Health Organization [WHO], 2017). However, the majority of youth worldwide fall short of the PA requirements set by World Health Organization (WHO) (WHO, 2015). Adolescents in Qatar have some of the highest level of inactivity among all adolescents in the entire Eastern Mediterranean region (EMR), with as high as ninety percent of this population considered to be inactive (Organization, 2010). Qatar, a small, yet rapidly developing nation in the Arabian Peninsula, will be hosting the 2022 FIFA World Cup – one of the most anticipated athletic events in the world. At the country level, Qatar has witnessed remarkable rates of economic growth, Westernization and modernization over the past decade. The impact of these rapid changes on sedentary lifestyle, media use, and consumerism is likely to contribute to the lack of PA, poor dietary patterns, and rising trends of obesity and non-communicable chronic diseases in Qatar and other neighbouring countries (WHO, 2014).

Physical activity and sedentary behaviour among adolescents in the arabian peninsula

In 2016, the Qatar Active Healthy Kids Report Card (QAHK) provided the first synthesis of the available evidence on PA in children and adolescents, reporting alarming grades for the six

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 Supplemental data for this article can be accessed [here](#).

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measured indicators of physical activity, health behaviours and outcomes. Four of these indicators were assigned low grades (D grades), including sedentary behaviour, dietary habits, organized sports participation, and family and peer influence. PA and obesity were both graded F, the lowest grade on the scale (obesity F-, indicating an increasing trend) (Al-Kuwari, Ibrahim, Hammadi, & Reilly, 2016).

Gender-gaps with regard to different behavioural health indicators and outcomes have also been consistently reported in this part of the world. For example, a study reported that 35% of the Qatari male adolescents and approximately 24% female adolescents were found to be overweight or obese (Makhlouf Obermeyer, 2015). Another study found a high prevalence of low levels of PA among Qatari teens, with female participants rating lower in all types of physical activities than males (Daradkeh, Al Muhannadi, Chandra, Al Hajr, & Al Muhannadi, 2015). A recent systematic review on physical activity and sedentary behaviour in the Arabian Peninsula evidenced a gender gap in screen time and PA with girls showing higher levels of screen time and less PA than boys (Mabry, Koohsari, Bull, & Owen, 2016).

These findings in addition to identified weaknesses in the evidence on barriers to PA among youth in the Arabian Gulf (Al-Kuwari et al., 2016) clearly demonstrate the need for more investigation into context driven psychosocial factors that may contribute to existing low levels and gender gap in PA. Identifying these factors is crucial for the development of effective health promotion and preventative interventions for poor behavioural indicators and outcomes in relation to PA, general health, and wellbeing in this context.

Psychological factors of PA in adolescent populations

Several studies investigating behavioural determinants for PA in youth have reported that self-efficacy was linked to PA patterns, with particular importance for adolescent girls (Motl, Dishman, Saunders, Dowda, & Pate, 2007; Nalecz, Guskowska, Mazur, & Dzielska, 2012; Rutkowski & Connelly, 2012; Sallis, Prochaska, & Taylor, 2000). Commonly, self-efficacy is understood as a domain-specific construct (Bandura, 1997); nonetheless, many researchers have used the domain-unspecific construct of General Self-Efficacy (GSE) in their investigations with PA behaviour (Nalecz et al., 2012; Sallis et al., 2000; Sawari & Mansor, 2013), which describes a relatively stable sense of perceived competence to deal with a variety of stressful situations in an efficient way (Schwarzer, 1992) and to engage in PA (Sallis et al., 2000). In Canada, a study found that self-efficacy was an important correlate of PA among adolescent girls; boys were generally more physically active and reported higher levels of GSE for PA than girls (Spence et al., 2010). Similar findings have also been reported by other studies (Cardon et al., 2005; Sallis et al., 2000).

Another important construct is Body Image (BI), which can be defined as the internal representation of one's external appearance, integrating mutable perception, emotion, and physical sensations concerning personal appearance (Croll, 2005; Nalecz et al., 2012; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). BI in adolescents appears to be strongly influenced by sociocultural standards regarding physical appearance, attractiveness, and social relationships (Croll, 2005). Evidence of the association of BI and PA in adolescence shows that body dissatisfaction is negatively associated with PA (Añez et al., 2018; Neumark-Sztainer, Paxton, Hannan, Haines, Story, 2006; Stankov, Olds, & Cargo, 2012) and that female adolescents seem to show higher levels of negative BI when compared to males (Kantanista, Osiński, Borowiec, Tomczak, & Król-Zielińska, 2015). A longitudinal study of adolescents in the US found that lower body satisfaction among male and female adolescents predicted lower levels of PA (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006). Furthermore, findings from a review of qualitative studies showed that adolescents' negative perception of their body relative to actual physical appearance was a barrier to PA (Stankov et al., 2012). With respect to adolescents in Arab countries, available literature supports dissatisfaction with BI to be positively associated with negative eating attitudes and higher Body Mass Index or BMI (Mousa, Mashal, Al-Domi, & Jibril, 2009; Shaban, Vaccaro, Sukhram,

& Huffman, 2016). However, we found no studies that looked into the association between BI and PA in Arab adolescents to date.

Evidence of psychological distress including depression and anxiety in adolescents in relation to PA, suggests that PA induce anxiolytic and antidepressive effects and leads to improvements in self-esteem (Biddle & Asare, 2011). Furthermore, consistent evidence exists for the negative association between mental health and sedentary behaviour in children and adolescents (Biddle & Asare, 2011; Hamer, Stamatakis, & Mishra, 2009). Research conducted on adolescent health in Arab countries identifies depression, anxiety, and behavioural problems as some of the predominant mental health issues among Arab adolescents (Makhlouf Obermeyer, 2015). Furthermore, gender differences in depressive symptoms and anxiety were reported in Arab adolescents with females being at a higher risk of experiencing depression and anxiety than males (Baroun, 2006; Dardas, Bailey, & Simmons, 2016). However, evidence is still lacking on the association of PA, gender, and psychological distress in Qatar and other Arab countries.

In summary, based on the reviewed literature above, and to the best of our knowledge, no prior studies have investigated the association between PA and these psychological factors and their influence on PA among adolescent girls and boys in the State of Qatar or the Arabian Peninsula to date.

Social correlates of PA in adolescent populations

Findings on motivational variables such as personal importance and peer importance show that these variables are positively correlated with PA (Martins, Marques, Peralta, Palmeira, & Da Costa, 2017; Sterdt, Liersch, Walter, Sterdt, Liersch, & Walter, 2014). Among Arab adolescents, a study reported that 'to be with friend and have fun' was one of the main motivators for PA in male Saudi adolescents. In addition, one of the most common reasons discouraging the adolescent students from engaging in PA was "lack of friend and peer support" (Alsubaie & Omer, 2015). In contrast, only 5% of adolescents attributed 'to be with friends' among the most important reasons for being physically active among secondary school adolescents in Qatar (Daradkeh et al., 2015). A recent review reported evidence of lack of social support of parents, peers and teachers as important barrier for PA in Saudi Arabian, Egyptian, and Jordanian children and adolescents in addition to other environmental barriers (Sharara, Akik, Ghattas, & Makhlouf Obermeyer, 2018).

Focus of current study

The aim of this study was to explore the influence of psychosocial factors on PA among adolescents in Qatar, a rapidly developing country in the Middle East. In addition, we aimed to assess, whether significant gender differences exist in self-reported PA and whether certain psychosocial variables may contribute to these differences. Based on reviewed literature, we hypothesized that Qatari female adolescents are less likely to be physically active than males. We also hypothesized that females are likely to have a higher BMI, would be less satisfied with their BI and more likely to report anxiety-depressive symptoms than males. Finally, we hypothesized that all these adverse psychological phenomena will be negatively associated with daily PA, potentially explaining activity level inequality between the gender.

Methodology

Study design and data collection

The current study is a secondary analysis of a cross-sectional survey of Qatari adolescents' use of digital technology for health information and monitoring. The institutional review board approved this study. The Social and Economic Research Institute (SESRI) at Qatar University conducted the data collection in schools across the country from April 22 through 17 May 2017. The survey was

self-administered in Arabic using laptop computers. Survey questionnaire took on average about 20 minutes to complete. Parental and students consent were obtained beforehand.

Sample and participants

All Qatari students in preparatory and secondary schools, from grade 8 to grade 12 comprised our target population. For more information about sampling design, please see Appendix I. A total of 1,218 students completed the survey (i.e. reached the final question in the survey). The school level and student level response rates were 84.0% and 91.0%, respectively. The respondents were Qatari nationals, male and female, students in the age range of 13 to 20 years (grades 8 to 12) attending private and public schools (total of 36) in Qatar. There were no exclusions.

Measures

All measures were translated from English to Arabic by the first author and back translated to English by another member of the research team. Minor discrepancies in translation arose and were resolved by consensus among bilingual team members. Further face validation of the Arabic translation was obtained for all psychological measures through qualitative interviews with 24 Qatari students.

Participants were asked to answer questions about their gender, nationality, age, school grade, height and current weight. To measure PA, a question asking the participants the following 'In the past 30 days, how often have you participated in physical activities such as playing sports, running, working out, taking a dance class, or doing yoga?' Response options provided were: 1 "Several Times a Day" 2 "Once A day" 3 "Once or More a Week" 4 "Once or more a Month" 5 "Never". For the purpose of this analysis, we collapsed options 1 and 2 into one category to indicate daily PA.

Self-efficacy was measured using the New General Self-Efficacy Scale by Chen, Gully, and Eden (2001), which has previously been validated in a similar study population in Qatar (Crandall, Abdul Rahim, & Yount, 2016). Psychological distress was assessed using the Kessler 6-item scale measuring non-specific psychological distress over the last 30 days (Kessler, Barker, & Colpe, 2003). The scale has been previously validated as screening tool in adolescence (Mewton et al., 2015; Mui Chan & Tong Fung, 2013), as well as Arabic-speaking population (Easton, Safadi, Wang, & Hasson, 2017).

To assess BI, we included three questions taken from the Body Esteem Scale for adolescents and adults (Mendelson, Mendelson, & White, 2001). Personal and peer importance of PA was assessed on a 4-point Likert scale (from 'Not at all' to 'A lot').

Statistical analysis

We conducted descriptive analysis of the data. Weighted proportions with corresponding 95% confidence intervals (CI) were estimated for categorical variables and weighted means with standard deviations (SD) were estimated for continuous variables. To determine if findings may have occurred due to chance and evaluate statistical significance at alpha value of 0.05, we conducted bivariate analysis using statistics appropriate for complex survey data. Means were compared using the adjusted Wald test for complex survey design (Korn & Graubard, 1990). Similarly, to correct for survey design effects on the variances of reported proportions, the F-transformed version of the Pearson Chi-square statistic was used (Heeringa, West, & Berglund, 2011). All analyses were run in STATA version 14.

Results

Psychometrics

Psychological distress was normally distributed with mean score of 12.8, SD = 7.2, Skewness = 0.04, and Kurtosis = 1.90. The scale had a good internal consistency with Cronbach alpha value of 0.92

and average inter-item covariance of 1.39. The GSE scale was normally distributed with mean score of 18.5, SD = 9.6, Skewness = 0.05, and Kurtosis = 1.60. The GSE had a good internal consistency with Cronbach alpha value of 0.98 and average inter-item covariance of 2.20.

Sample characteristics

Main characteristics of the total sample and by gender are shown in Table 1. Briefly, a total of 1,157 Qatari adolescents were included in this analysis. The sample was comprised of 49% females and 51% males. Approximately, 89% of those respondents attended public high school. Each of the grades (8 to 12) was represented by 14 to 26% of these respondents with the lowest proportion in grade 12 (approximately 14%) and highest proportion of students in Grades 8 and Grade 10 (approximately 26%). The mean age was 15.8 (SD = 1.5) and the median age was between 15 and 16 years. Boys had a slightly higher mean age than girls (15.6 vs. 15.9), but these differences were not statistically significant ($F_{1, 31} = 4.13$, $p = 0.0507$). The mean BMI was 24.6 (SD = 8.4) with a median of 23. Reported levels of PA were daily (12.0%), weekly (19.0%), monthly (51.4%), and never (17.6%), respectively.

Variable distribution by gender

Physical activity (PA)

The distribution of the sample across PA levels by gender was statistically significant ($F_{2, 68} = 6.52$, $p = 0.0019$) and is shown in Figure 1. Males reported significantly higher daily activity than females (60.9% vs. 41.4%; $F_{1, 31} = 22.37$, $p < 0.0001$). In comparison to males, more females reported activity on weekly (22.4% vs. 15.7%; $F_{1, 31} = 2.17$, $p = 0.158$) and monthly basis (15.8% vs. 8.3%; $F_{1, 31} = 10.37$, $p = 0.0030$) over the last 30 days. Inactivity levels were also higher among female adolescents compared to males (20.3% vs. 15.1%; $F_{1, 31} = 3.61$, $p = 0.0668$).

Body mass index (BMI)

Mean BMI for a male was 25.0 (SD 7.8) with a median of 23. Mean BMI for a female was of 24.1 (SD 7.5) with a median of 22. The differences in mean BMI between gender groups were not statistically significant ($F_{1, 31} = 0.86$, $p = 0.3604$).

Generalized self-efficacy (GSE)

Significantly more males than females scored in the lowest level of perceived self-efficacy (47.0% vs. 28.4% respectively) and only 24.5% males compared to 38.0% of females scored in the highest level of GSE. Differences in these proportions were statistically significant ($F_{2, 60} = 9.32$, $p = 0.0003$).

Body image (BI)

Body Shape Satisfaction (BSS). Males displayed lower levels of BSS than females with approximately 38.9% of males reporting low levels of BSS compared to 18.1% of females. Males showed a comparably smaller proportion of individuals in the highest satisfaction level than females (22.2% vs. 33.8%). Differences in these proportions were statistically significant ($F_{3, 84} = 14.30$, $p < 0.0001$).

Likeliness in Pictures of oneself (LiP). Twice as many males than females reported low levels of satisfaction with their own image in pictures (35.8% versus 16.9%). In addition, 25.1% of males were very satisfied about how they look in pictures when compared to 43.0% of females. Differences in these proportions were statistically significant ($F_{3, 78} = 13.90$, $p < 0.0001$).

Body Weight Unhappiness (BUW). About half of the sample in each group reported low levels of unhappiness about their body weight (43.0% of females, 47.5% of males) and only 13.9% of


Table 1. Distribution by socio-demographics and other characteristics for male and female subpopulations and total sample.

	Female (N = 607)			Male (N = 550)			Total Sample (N = 1,157)		
	(n/total)	95% CI	%	(n/total)	95% CI	%	(n/total)	95% CI	%
Physical Activity									
Never	20.3 (103/552)	17.1–24.0	15.1 (66/490)	11.2–20.0	0.0019	17.6 (169/1,046)	15.0–20.6		
Monthly	15.8 (81/552)	12.3–20.0	8.3 (38/490)	5.8–11.8		12.0 (119/1,046)	9.7–14.7		
Weekly	22.4 (128/552)	17.2–28.5	15.7 (69/490)	9.9–23.90		19.0 (198/1,046)	15.0–23.8		
Daily	41.5 (240/552)	36.0–47.2	60.9 (317/490)	52.8–68.5		51.4 (560/1,046)	45.6–57.2		
Physical Activity Important- Personally									
Not	11.5 (59/598)	8.3–15.7	8.6 (49/532)	6.2–11.9	0.1350	10.0 (108/1,134)	8.0–12.5		
Somewhat	33.0 (190/598)	27.5–38.9	28.0 (142/532)	23.7–32.7		30.4 (332/1,134)	27.2–33.7		
A lot	55.5 (349/598)	49.9–61.1	63.4 (341/532)	57.9–68.5		59.6 (694/1,134)	55.3–63.8		
Physical Activity Important – Friends									
Not	16.9 (89/607)	13.0–21.7	13.5 (72/550)	9.7–18.5	0.0607	15.1 (161/1,047)	11.9–19.1		
Somewhat	32.7 (181/607)	26.5–39.6	26.7 (125/550)	21.8–32.1		29.7 (308/1,047)	25.4–34.5		
A lot	50.3 (282/607)	43.1–57.6	59.8 (294/550)	54.5–64.9		55.1 (578/1,047)	50.0–60.0		
Like Image in Pictures									
Low	16.9 (96/564)	13.0–21.7	35.8 (172/482)	29.8–42.3	0.0000	26.2 (269/1,050)	22.1–30.7		
Moderate	13.6 (82/564)	11.0–16.7	18.6 (97/482)	14.6–23.4		16.8 (181/1,050)	13.6–19.1		
High	26.4 (153/564)	22.3–31.1	20.5 (100/482)	16.2–25.5		23.4 (253/1,050)	20.3–26.9		
Very High	43.0 (233/564)	38.3–47.9	25.1 (113/482)	18.5–33.1		34.2 (347/1,050)	30.0–38.7		
Unhappiness about Weight									
Low	43.0 (242/556)	38.2–47.9	47.5 (233/482)	42.3–52.8	0.3770	45.4 (478/1,042)	41.3–49.4		
Moderate	24.5 (134/556)	21.0–28.3	25.2 (124/482)	20.7–30.2		24.7 (258/1,042)	21.4–28.4		
High	18.6 (105/556)	14.1–24.3	15.1 (68/482)	11.6–19.4		16.8 (173/1,042)	13.8–20.4		
Very High	13.9 (75/556)	11.3–16.9	12.2 (57/482)	8.9–16.3		13.1 (133/1,042)	10.9–15.5		

(Continued)

Table 1. (Continued).

	Female (N = 607)			Male (N = 550)			Total Sample (N = 1,157)		
	% (n/total)	95% CI	% (n/total)	95% CI	% (n/total)	95% CI	% (n/total)	95% CI	
Body Image Satisfaction	Low	18.1 (106/571)	14.8–21.9	38.9 (192/483)	33.2–44.9	28.4 (300/1,058)	24.7–32.5		
	Moderate	21.2 (120/571)	17.3–25.9	22.7 (110/483)	17.4–28.9	21.9 (230/1,058)	18.7–25.4		
	High	26.9 (153/571)	21.5–33.0	16.2 (77/483)	12.5–20.7	21.5 (230/1,058)	18.1–25.4		
	Very High	33.8 (192/571)	28.8–39.1	22.2 (104/483)	18.3–26.7	28.1 (298/1,058)	25.1–31.4		
		28.4 (134/482)	22.6–35.1	47.0 (207/436)	38.3–55.8	37.8 (344/918)	31.9–44.4		
Self-Efficacy	Low	28.4 (134/482)	22.6–35.1	47.0 (207/436)	38.3–55.8	37.8 (344/918)	31.9–44.4		
	Moderate	33.6 (165/482)	28.1–39.5	28.5 (124/436)	22.8–34.9	31.0 (289/918)	26.7–35.5		
	High	38.0 (183/482)	31.6–44.8	24.5 (105/436)	18.5–31.6	31.2 (288/918)	26.5–36.0		
Psychological Distress	Low	35.5 (187/526)	30.5–40.8	39.1 (170/465)	30.9–48.0	37.3 (357/991)	32.4–42.2		
	Moderate	39.1 (209/526)	34.4–2-44.0	21.6 (99/465)	17.8–25.9	30.2 (308/991)	26.4–34.4		
		25.4 (130/526)	20.1–31.5	39.3 (196/465)	29.8–49.6	32.4 (326/991)	26.6–39.2		

Note. All percentages are based on weighted proportions; *F-transformed version of the Pearson Chi-square statistic



Table 2. Distribution by socio-demographics and other characteristics for Male and Female subpopulations and total sample across categories of physical activity in the past 30 days.

	Female (N = 552)						Male (N = 490)						Total Sample (N = 1,042)					
	% Active (Daily)	% Active (Weekly)	% Active (Monthly)	% Inactive (Never)	* χ^2 p value	% Active (Daily)	% Active (Weekly)	% Active (Monthly)	% Inactive (Never)	* χ^2 p value	% Active (Daily)	% Active (Weekly)	% Active (Monthly)	% Inactive (Never)	* χ^2 p value			
Important – Personality	12.5	8.3	13.5	12.8	0.1678	6.7	9.1	17.3	9.4	0.0140	9.2	8.6	14.9	11.4	0.0049			
	25.3	37.9	42.4	37.9		22.7	31.3	16.4	41.9		23.6	35.0	33.1	39.6				
	62.2	53.8	44.1	49.3		70.6	59.6	66.3	48.7		67.3	56.4	52.0	49.0				
Important to Friends	18.5	16.8	14.9	15.2	0.6407	14.1	15.6	6.0	16.0	0.1889	15.8	16.2	11.6	15.5	0.0708			
	27.7	38.6	35.3	32.6		22.2	34.6	37.0	21.6		24.5	37.2	35.9	27.8				
	53.9	44.6	49.8	52.2		63.7	49.8	57.0	62.4		59.7	46.5	52.45	56.6				
BMI	26.0	23.3	22.9	22.7	0.6247	24.8	24.3	26.9	25.4	0.5027	25.2	23.7	24.4	23.9	0.7717			
BMI (SD)	(11.4)	(5.9)	(8.3)	(5.3)	0.6247	(7.8)	(7.0)	(8.6)	(7.9)	0.5027	(9.5)	(6.3)	(8.5)	(6.6)	0.7717			
Like Image in Pictures	24.9	11.4	6.2	19.0	0.0440	44.0	18.4	23.1	27.9	0.0026	36.3	14.1	11.5	22.8	0.0000			
	14.8	15.3	17.4	8.9		21.7	14.0	15.7	12.1		19.0	15.2	16.9	10.2				
	20.7	35.3	34.3	22.5		13.2	39.7	25.7	26.6		16.1	36.9	31.6	24.3				
	39.6	37.9	42.1	49.6		21.0	29.7	35.4	33.4		28.5	33.8	40.0	42.7				
Unhappiness about Weight	44.9	40.4	35.5	43.0	0.0392	56.6	31.5	33.6	30.6	0.0000	52.0	37.1	34.8	37.7	0.0000			
	28.6	23.3	33.0	14.4		25.9	25.0	18.7	27.6		26.8	23.9	28.0	20.0				
	12.6	27.7	20.0	22.4		8.5	37.5	18.8	20.5		10.1	31.5	19.6	21.6				
	13.9	8.5	11.5	20.2		9.0	5.9	28.9	21.3		11.0	7.5	20.7	20.7				
Body Image Satisfaction	23.2	13.8	10.2	21.5	0.2089	44.6	22.6	46.5	29.0	0.0109	36.0	17.8	21.9	24.7	0.0006			
	21.0	19.4	20.3	21.5		25.8	22.0	18.4	15.4		23.8	20.4	19.7	18.9				
	22.8	37.1	35.0	21.8		10.9	27.3	20.1	21.9		15.6	32.8	30.2	21.8				
	33.0	29.7	34.4	35.2		18.6	28.1	15.0	33.7		24.6	28.9	28.2	34.6				
Self-Efficacy	38.1	15.7	22.8	27.6	0.0162	54.0	24.3	32.5	40.8	0.0164	47.9	19.1	26.0	33.1	0.0000			
	24.3	38.9	38.4	41.8		35.5	35.5	33.5	32.3		25.1	37.5	36.7	37.8				
	37.6	45.4	38.9	30.6		20.2	40.2	34.0	26.8		27.0	43.3	37.2	29.0				
Psychological Distress	28.8	44.2	38.4	36.4	0.0047	29.2	60.3	48.6	50.0	0.0000	28.9	50.5	42.1	42.2	0.0000			
	32.7	45.4	47.8	36.0		17.5	27.4	32.9	26.6		23.3	38.4	42.4	31.9				
	38.5	10.4	13.7	27.5		53.3	12.3	18.5	23.9		47.8	11.1	15.5	25.9				

Note. All percentages are based on weighted proportions; *F-transformed version of the Pearson Chi-square statistic

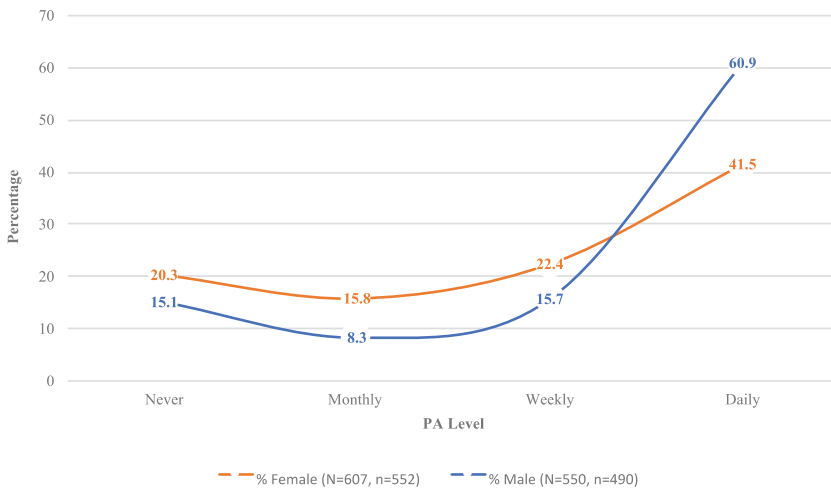


Figure 1. Self-reported physical activity over the last 30 days in male and female qatari adolescents ($p = 0.001$); PA level = physical activity level. Please refer to [Table 1](#) for more information.

females and 12.2% of males reported very high levels of unhappiness. BUW was approximately equally distributed across both genders ($F_{3, 82} = 1.03$, $p = 0.3770$).

Psychological distress (PD)

PD variable distribution was u-shaped across the three categories in males, but a bell shape in females. Almost a similar proportion of low, as well as high levels of psychological distress (39.1% and 39.3% respectively), with the least proportion accumulating at moderate levels of distress (21.6%) in males. In contrast, the majority of the females exhibited moderate levels of psychological distress (39.1%) and smaller proportions were in the lowest and highest variable category (35.5% and 25.4%, respectively). Differences in this variable distribution by gender were statistically significant ($F_{1, 44} = 10.60$, $p = 0.0007$).

Personal importance of PA and importance to friends

Similar distribution across the categories was found for males and females ($F_{2, 58} = 2.10$, $p = 0.1350$), with more than half of the individuals in both groups reporting PA to be of high importance for them personally and only a minority reporting low levels of personal importance for PA (11.5% female vs. 8.6% male). A similar distribution was also found for importance of PA to friends ($F_{2, 60} = 2.96$, $p = 0.0607$), though significantly fewer females (50.3%) than males (59.8%) reported that their friends cared a 'lot' about PA ($F_{1, 31} = 5.33$, $p = 0.0278$).

Variable distribution by gender across PA categories

For more details on the following results, please refer to [Table 2](#)

PA x BMI

We did not find significant differences in mean BMI across PA categories in the total study population ($F_{3,29} = 0.74$, $p = 0.7717$), within female ($F_{3,29} = 1.46$, $p = 0.6247$) or male groups ($F_{3,29} = 1.02$, $p = 0.5027$). (see [Table 2](#))

PA x importance of PA

Statistically significant association between personal importance for PA and self-reported PA level was found ($F_{4,134} = 3.77, p = 0.0049$). The results suggest that increasing personal importance is associated with being daily active for males ($F_{4,133} = 3.15, p = 0.0140$), but not for females ($F_{4,126} = 1.64, p = 0.1678$).

PA x GSE

When comparing the distribution of GSE among the four PA categories in females and males (Figure 2), a similar trend of increasing GSE with increasing activity peaking at weekly activity was observed, but then unexpectedly decreasing with daily activity (Female: $F_{5,135} = 3.05, p = 0.0162$; Male: $F_{5,142} = 2.98, p = 0.0164$). Compared to females, significantly higher proportions of daily active males were distributed in the lowest level of self-efficacy (54.0% vs. 38.1%; $F_{1,31} = 7.62, p = 0.0096$) and significantly lower proportions of males were distributed in the high GSE when compared to females (37.6% vs. 20.2%; $F_{1,31} = 8.80, p = 0.0058$). Although shown in Figure 2, the gender comparisons were not statistically significant for other levels of PA frequency.

PA x body image

In males, differences in distribution of BSS across the different PA categories were statistically significant ($F_{5,155} = 3.09, p = 0.0109$). Daily and monthly active males peaked at low BSS, and weekly and inactive males peaked at high and very high levels of BSS. In contrast, no statistically significant difference in the distribution across the PA categories was observed in females ($F_{5,163} = 1.44, p = 0.2089$). However, graphical illustration of the results demonstrates less accumulation of high or very high BSS across the PA categories in females compared to males (Figure 3 (a1, a2)). Additionally, significantly higher proportion of daily active males compared to females, were distributed in the lowest level of BSS (44.6% vs. 23.2; $F_{1,31} = 16.91, p = 0.0003$).

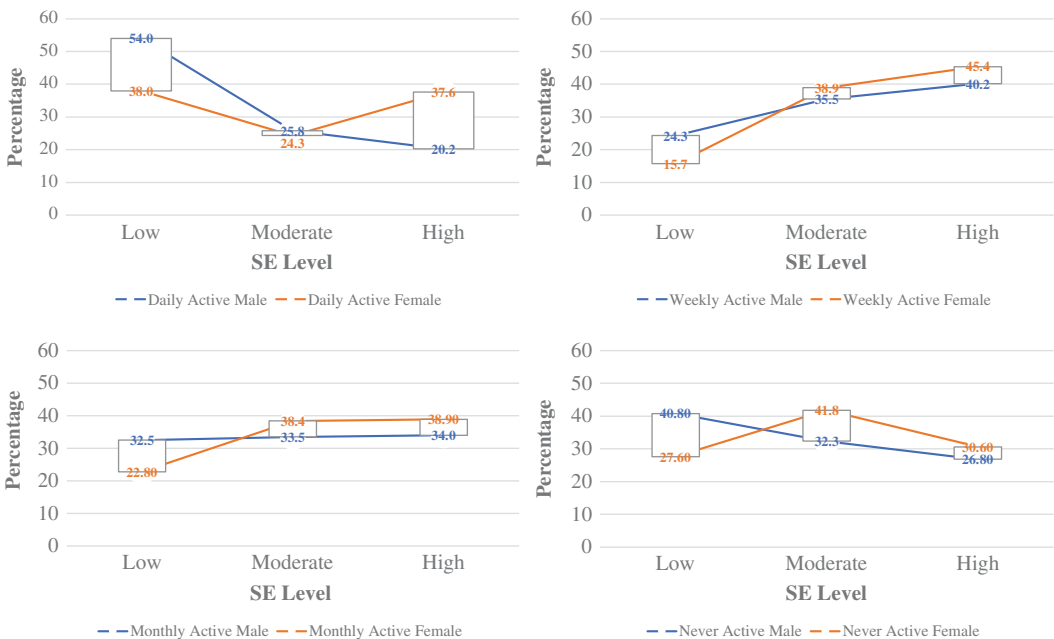


Figure 2. Distribution of self-efficacy categories in male and female adolescents across all PA categories; se level = self-efficacy level. Please refer to Table 2 for more information.

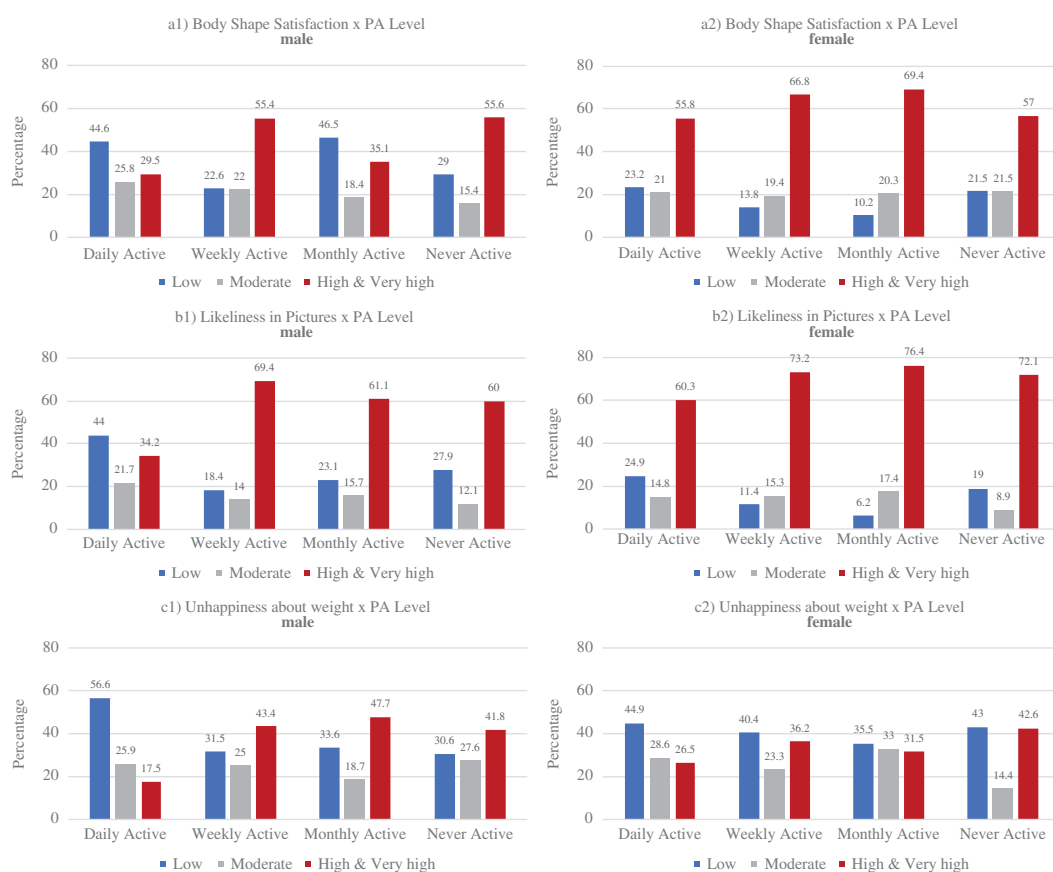


Figure 3. a, b, c. Distribution of body image variables across PA categories in male and female sub-population. A) body shape satisfaction x PA level; b) likeliness in pictures x PA level; c) unhappiness about weight x PA level; PA = Physical Activity. Please refer to Table 2 for more information.

Statistical analysis revealed significant differences of LiP across the PA categories in both genders (Female: $F_{5,149} = 2.38$, $p = 0.0440$; Male: $F_{6,174} = 3.62$, $p = 0.0026$). For males, we see the biggest accumulation of low LP in daily activity (Figure 3(b1, b2)) with almost twice as many males than females reported low levels of perceived likeliness (44.0% vs. 24.9%; $F_{1,31} = 13.02$, $p = 0.0011$). Compared to males, more females report very high levels of perceived likeliness in pictures across all PA levels. Except for daily PA, perceived likeliness in pictures does not seem to be significantly associated with PA in both genders.

The gender differences in the distribution of BWU across PA levels are shown in Figure 3(c1, c2). Statistically significant distributions of BWU across the PA categories were found in both genders (Female: $F_{6,187} = 2.26$, $p = 0.0392$; Male: $F_{6,179} = 5.44$, $p < 0.0001$). The highest proportion of female individuals reporting unhappiness about their weight was found in the inactive category (42.6%), while the lowest was among daily category active (26.5%). The results suggest that daily PA seems to be negatively associated with BWU in females. Similar pattern was found for males. More females than males reported being either unhappy or very unhappy about their weight in the active daily category (26.5% vs. 17.5%), these differences were statistically significant ($F_{1,31} = 5.20$, $p = 0.0296$).

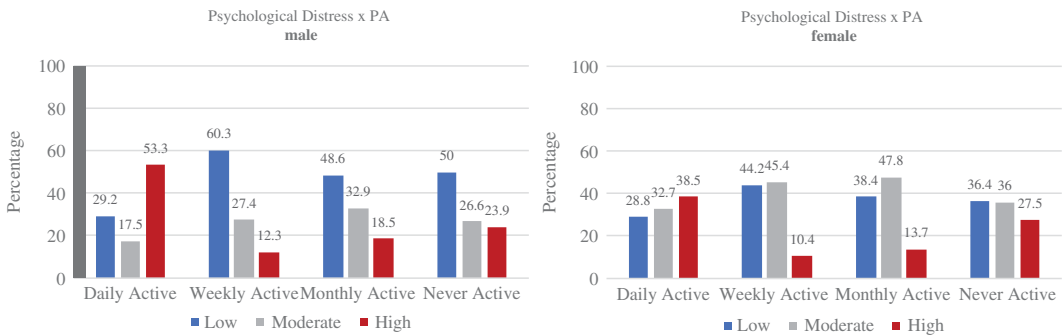


Figure 4. Distribution of psychological distress across PA categories in male and female sub-population; PA= physical activity. Please refer to Table 2 from more information.

PA x psychological distress

Statistically significant differences of PD variable distribution across the PA categories were found in both genders (Figure 4) with a trend of increasing levels of PD among daily active compared to less active individuals (Female: $F_{4,110} = 4.20$, $p = 0.0047$; Male: $F_{5,143} = 7.29$, $p < 0.0001$). Both groups demonstrated the highest accumulation of high PD in the daily active category and second largest proportional accumulation among the sedentary individuals (Figure 4), with more daily active males reporting PD than females (53.3% vs. 38.5%; $F_{1,31} = 5.09$, $p = 0.0313$). In both genders, the highest proportion of low PD was found in the weekly active individuals (Figure 4).

Discussion

Consistent with prior studies in Qatar and other Arab countries, our results supported a significant inequality in PA between male and female adolescents: approximately 40% of the males and 60% of the females did not meet with the WHO recommendation of 60 minutes of daily activity for children and adolescents (WHO, 2018). This gender gap in PA has been attributed to cultural norms that restrict females' independent pursuit of outdoor activities including PA (Mui Chan & Tong Fung, 2013) and conservative traditional clothing not suitable for PA (Nakamura, 2002). Gender activity-inequality has also been reported in large samples of young adults in European countries, emphasising the seriousness of this issue on a global level (Acs et al., 2016; Junger et al., 2018). For example, a recent study conducted in four central European (Visegrád) countries found a significant physical activity inequality among university students, with males exhibiting higher PA levels as well as PA intensity. Furthermore, this significant activity-inequality persisted across all four participating countries (Junger et al., 2018).

Overall, an alarming proportion of adolescents classified as 'sedentary' in this population (Sedentary Behaviour Research Network, 2012). Considering the fact that most adolescents of both genders consider PA to be important to themselves (including a large proportion of those who are never active) and the abundance of sports facilities and financial resources dedicated to sports in Qatar, this low prevalence of PA poses a serious public health concern for this rapidly developing nation. Physical and environmental barriers to PA have been previously reported for adults in this region (Awadalla et al., 2014) and worldwide (Sallis et al., 2009). However, less is known about environmental correlates of PA among adolescents and youth in general and the Arabian Gulf in particular, an area warranting further future research.

An unexpected finding was the preponderance of low GSE among male adolescents, with significantly higher levels reported among their female counterparts. The results for body image constructs demonstrated a similar pattern, with daily active males rating significantly lower than

females on BSS and LiP. We also expected females to rate higher on psychological distress than males. The results of the study told otherwise: 14% more male scored in the highest psychological distress category than females. With respect to mean BMI, we found no statistically significant differences between the gender groups on this variable.

Physical activity and general self-efficacy

We predicted based on present evidence, that high levels of GSE would be related to the highest frequency of PA among adolescents in our sample. However, the results suggest, that in both genders daily PA was associated with low self-efficacy perception with significantly higher proportions of daily active males having low GSE than their female counterparts. Frequently active males (and some females) are exposed to sport game competition with peers, including the repeated experience of loss or failure in the game. According to 'performance attainment', as one of the main sources of information for self-efficacy beliefs identified by Bandura (1997), successes will raise SE appraisals and repeated failure lowers them. Frequent experience of loss or the difficulty of a sport competitive situation may contribute to high personal appraisals in task performance and goal achievement and induce a more circumspect perception of GSE. A recent study found significant gender differences in frequent team sport participation between female and male Qatari adolescents (Daradkeh et al., 2015). The fact that females are less exposed to sport competition on daily basis may explain the gender-based disparities in GSE among respondents who report daily PA.

Physical activity and body image

In contrast to our hypothesis that higher PA frequency would be associated with positive BI in adolescents, our results demonstrate that among adolescent males, individuals active on daily basis showed an overall negative BI – low BSS and LiP levels. In contrast, higher PA and high rating on all three of measured BI sub-constructs was evident among adolescent females. Previous studies show that for boys (not girls) appearance criticism is a strong direct predictor for BI unhappiness, at least in Western cultures (Jones, Vigfusdottir, & Lee, 2004). Peer surveillance, especially in PA context (PE class), has been argued to give rise to self-policing tendencies and negatively impacting BI (Kenny, O'Malley-Keighran, & Kelly, 2017; Lawler & Nixon, 2011). Nonconformity with a muscular body shape seemed a source of peer teasing in male adolescents and individuals deviating from social and cultural appearance expectations have been found to be at greater risk of receiving negative attentiveness from their peers (Kenny et al., 2017). Despite the finding that daily PA seems to be negatively associated with BWU, a significantly higher proportion of daily active females reported weight unhappiness compared to males. Considering findings from Western countries (De Bruin, Woertman, Bakker, & Oudejans, 2008; Hoare, Stavreski, Jennings, & Kingwell, 2017), this may suggest that body weight regulation through exercise among adolescent females may be a stronger motivating factor for daily activity than for males.

Physical activity and psychological distress

According to the existing literature, PA has stress, anxiety and depression reducing effects. As such, we predicted that most frequently active individuals would show the lowest level of PD when compared to less frequent activity or complete inactivity. However, our results suggest otherwise: daily activity was associated with high levels of psychological distress in both genders. In addition, for both groups, weekly activity was associated with lower rather than higher levels of distress. Assuming the involvement in sport games by the adolescents, one explanation for high distress levels in daily PA could be the 'competitive anxiety' phenomenon, the trigger of negative physiological arousal through (or prior to) competition (Treasure, Monson, & Lox, 1996). A study conducted in Tunisia reported that young members of team sports (mean age 19.37 ± 1.26) exhibit low self-esteem and a high level of anxiety (Ichraf, Ali, Khaled, Liwa, & Ali, 2013). However, only sport-

specific measures in combination with PD level information could support this conjecture. An alternative plausible explanation for this observation is that adolescents with already high psychological distress levels may search for symptom improvement through frequent PA participation (Dolenc, 2015; Shahrill & Mundia, 2014). Future longitudinal studies are needed to better explain these findings.

Strength and limitations

The strength of this investigation is its novelty value with regard to the research questions, selected variables, study population, and its sample size. It is one of the first investigations on this topic in the Arabian Peninsula, contributing to the knowledge gain in a field of fundamental importance for population health promotion (Esterhay et al., 2014). Primary limitation of the study is the cross-sectional design, prohibiting causal interpretations about the effects of psychosocial variables and gender on adolescents' PA levels. The measure of PA through self-report was another major limitation. Self-reported PA levels are prone to measurement errors and bias (Helmerhorst, Brage, Warren, Besson, & Ekelund, 2012). In addition, our PA measure was unspecific with respect to the type, intensity, and purpose of these activities. The use of more specific measures like the International Physical Activity Questionnaire (Helou et al., 2018) in future population based studies in Qatar would allow for detailed benchmarking of PA levels among adolescents and youth in this context as well as across-cultural comparability and generalizability of findings. The self-efficacy measure was not specific to PA. The assessment of PA-specific self-efficacy would have been a more valid measure in this context and for further understanding of our results. Future studies should also take into account the age of respondents and its potential modifying effects on the relationship between adverse psychosocial constructs and PA across gender groups.

Conclusions and future directions

The results of this study revealed both, expected and unexpected findings. As expected, Qatari adolescents exhibit high levels of inactivity that do not meet national and international recommendations for adolescents' PA (Al-Kuwari et al., 2016; Centers for Disease Control and Prevention, 2016). Like previous studies, our results also supported a significant PA inequality between male and female adolescents, but with both genders awarding PA high personal importance. Participation in physical activity demonstrated unexpected association with adverse psychosocial constructs among adolescent males, with comparably high rates of low GSE, negative BI, and elevated PD when compared to females. Low GSE and high PD were unexpectedly associated with daily PA behaviour in both genders and with a negative BI in males. For the purpose intended, this research provided a first insight into a selection of psychosocial variables of importance in physical activity and other health behaviours among Qatari adolescents suggesting insufficient understanding of these factors in this important segment of the population to this date. Future research needs to investigate the reasons behind our observations that daily PA seems to be associated with low GSE in both genders and why this observation is more pronounced in male than female adolescents. Future research should investigate the reasons behind daily PA as a potential source of negative BI in male adolescents only and high psychological distress levels in both genders, by linking to type and purpose of practiced sport in adolescents. Future research into behavioural mechanisms is needed to better understand the effects of these psychosocial factors on PA levels of adolescents in the Arabian Peninsula, in order to effectively tackle the rising health problems in this part of the world.

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Author Contributions

Salma M. Khaled contributed to all aspects of the study including conception, design, data collection, analysis, and writing of the manuscript. Saller, F. I. V. contributed to the conception and writing of the manuscript. All authors revised and approved the final manuscript.

Disclosure statement

The authors have no conflict of interest to report.

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