Chapter 4
Physical Activity and Sport Participation Among Adolescents from MENA

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4.1 Introduction

Physical activity (PA) is defined as any bodily movement produced by muscles that requires energy expenditure above the resting metabolic rate (RMR). PA includes non-structured or structured activities, organized sports, or active play. Examples of non-structured activities are leisure walking, cycling, and dancing (WHO 2020). Organized sport is defined as "a subset of PA that is structured, goal-oriented, competitive and contest-based" (Paulo et al. 2018). Active play may involve "symbolic activity or games with or without clearly defined rules; the activity may be unstructured or unorganized, social or solitary, but the distinguishing features are a playful context, combined with activity that is significantly above resting metabolic rate" (Paulo et al. 2018). PA is associated with various health benefits, such as lowering the risk of developing chronic conditions, improving mental health, and increasing overall well-being (Craggs et al. 2011; Eime et al. 2013). Despite the various benefits, many individuals are not physically active; in fact, low levels of PA are main risk factors for deaths around the world and key risk factors for non-communicable diseases, such as cancer, diabetes, and obesity (WHO 2020).

Among young people, regular PA relates to improved self-esteem, academic achievement, and cognitive performance (Chaabane et al. 2020). In addition to these relatively short-term benefits, regular youth participation in PA and sport relates to

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long-term benefits across the life course. In particular, adolescence is a key period of transition between childhood and adulthood, when the formation and establishment of many lifestyle patterns and behaviors begins and evolves across the life course. The World Health Organization defines an adolescent as an individual between the ages of 10 and 19. Regular PA and sport participation during adolescence can have implications on one's health in later life by increasing confidence, self-efficacy, the sense of belonging, and improved health (Allafi et al. 2014; Sarsour et al. 2019; Tesler et al. 2019), all of which can promote continuous PA and/or sport participation across the life course.

Metabolic equivalent (MET) values are measures that indicate whether the PA is light intensity, moderate intensity, or vigorous intensity. MET allows for precise measurement of both total energy expenditure (EE) and energy intake (EI) based on time spent in various intensities of activity (Ridley et al. 2008). The MET intensity values have been developed as part of an instrument known as "The Compendium of Physical Activity" for adults and its equivalent for youth (Al-Hazzaa et al. 2011; Hamrani et al. 2015). For example, vigorous-intensity PA include activities such as, stair-climbing, jogging, running, cycling, self-defense, weight training, and vigorous sports, such as soccer, basketball, handball, and singles tennis (8 METs), while low-intensity activities may include household chores (3 METs) (Al-Hazzaa et al. 2011). The global consensus for the recommended amount of moderate-to-vigorous-intensity PA(MVPA) for health in children and adolescents aged 5–18 years is a minimum of 60 min daily (Paulo et al. 2018; Tremblay et al. 2011). For adults between the ages of 18 and 64 years, the recommended guidelines are a minimum of 150 min of moderate aerobic PA or at least 75 min of vigorous intensity of aerobic throughout the week (Chaabane et al. 2020; Tremblay et al. 2011). Undertaking more than the minimum daily amount of PA incurs additional health benefits, and incorporating aerobic vigorous-intensity activities sustains and increases muscle strength (WHO 2020).

The importance of PA promotion is more salient in geographical regions that exhibit environmental factors that pose challenges to adopting recommended PA guidelines, particularly if these factors are modifiable. For example, some places may promote behavioral and societal practices for younger generations (particularly girls), which are mostly based on sedentary activities rather than on moderate-to-vigorous PA (Tesler et al. 2019). Other places may hinder PA due to physical environmental features, such as loss of green space and open fields due to urbanization or low access to sport facilities. For many countries in the Middle East and North Africa (MENA), research findings consistently suggest that low levels of adolescent PA are public health concerns (Chaabane et al. 2020; Yammine 2017). Political and economic landscapes across MENA countries appear to hinder adolescent participation in sport and physical activity, due to a number of geographically based factors, such as low access to resources and opportunities, particularly in less affluent countries (Tesler et al. 2019). For example, in the Gaza Strip, social and environmental determinants interact to hinder PA levels in various communities; these determinants include insufficient public areas for practicing physical activity, the negative

effects of the unstable political situation on the behavior of the community, and low awareness on the importance and benefits of PA (Sarsour et al. 2019).

In addition to the influence of place-specific socioeconomic and physical features on PA and sport participation levels, individual factors play a big role in influencing adolescent participation in sport and physical activity. Indeed, a multitude of individual, communal, social, physical, and cultural factors interact to influence adolescent sport and PA levels. These include specific gender roles, cultural beliefs, environmental features, and individual experiences (Sharara et al. 2018; Tesler et al. 2019). In particular, research findings have long documented the influence of gender factors on adolescent sport and PA participation. Girls are more likely to have negative experiences in relation to sport and PA than boys, which hinders their interest in sport and PA and leads to less involvement in subsequent leisure time PA (Tesler et al. 2019). Specifically, girls may experience negative effects due to their perceived competence in relation to sport and physical activity, which often stems from being negatively assessed by their coaches, teachers, or peers (Klicnik et al. 2020; Mohammed et al. 2021).

4.1.1 Physical Activity and Sport Participation in the MENA

A recent study that explored PA in the MENA region highlighted that only approximately 25% of youth were sufficiently active (Chaabane et al. 2020). Majority of adolescents fail to meet the recommended PA guidelines of 60 min of PA per day (Musaiger et al. 2013; Sharara et al. 2018; Yammine 2017). For example, UAE-based research has found that the prevalence of adolescents who meet the recommended medium-vigorous PA has fallen from 20% to 16% over a 13-year time period (Paulo et al. 2018; Zaabi et al. 2016).

Low levels of PA are positively associated with heart disease morbidities, childhood obesity, and other chronic diseases in the MENA (Benajiba et al. 2020). Factors that contribute to low levels of adolescent PA include heavy reliance on modern transportation rather than active transport options and spending long periods of screen time including watching television or surfing the Internet (Benajiba et al. 2020; Musaiger et al. 2013; Sharara et al. 2018). Indeed, research findings highlight high levels of sedentary behavior (less than 1.5 metabolic equivalents), where adolescents' behaviors exceed the recommended screen time per day guidelines (Henry et al. 2004; Paulo et al. 2018). Given the short- and long-term benefits of PA during adolescence, it is crucial to investigate factors that influence PA levels and sport participation among adolescents from the MENA. *Barriers* or *constraints* to PA or sport participation are factors that hinder PA levels. This chapter will refer to these factors as *constraints* to emphasize that factors can be mitigated or negotiated rather than act as conclusive *barriers* to PA and sport participation. Comprehensive knowledge on constraints to PA and sport participation can facilitate culturally appropriate interventions and has the capacity to inform

programming and policy that promote healthier behaviors among young people (Obermeyer et al. 2015; Chaabane et al. 2020).

This chapter synthesizes evidence on the prevalence and constraints to PA and sport participation among adolescents from the MENA. The chapter uses a case study approach to examine results of a brief study on the prevalence of sport participation among adolescents from the UAE. The chapter objectives are to present evidence related to the prevalence of PA among adolescents from the MENA, to identify constraints to PA for these adolescents, and to examine the prevalence of PA and sport participation among adolescents from the UAE.

4.2 Methodology

4.2.1 Literature Review

A literature search used four main databases: CINAHL, PubMed, Google Scholar, and Ovid. The following terms were used in each database: (1) "physical activity" or "exercise" or "fitness" or "sport," (2) "adolescent*" or "teen" or "youth" or "young adults," and (3) "Middle East," "MENA," "Arab," or "UAE." The searches were limited to articles published in English between 2000 and 2020. Two researchers (SY and SM) screened the retrieved articles using a multistep process, first using the article titles followed by the abstracts. Articles were included in this review if they addressed PA among adolescents in the MENA. Studies that did not focus on adolescents or occurred outside the MENA were excluded. Researchers examined articles that passed the title and abstract screening and extracted data related to prevalence of PA and related constraints, using a self-developed data extraction sheet.

4.2.2 Case Study UAE

Setting and Study Design

Case study data were obtained from the National Study of Population Health in the UAE (*NSPHUAE)* research program, conducted between 2007 and 2009 (Barakat-Haddad 2013). This program was carried out in collaboration with the UAE Ministry of Education (MOE) and was based on cross-sectional data from 147 private and public schools in the 7 emirates, distributed across 9 educational zones. A survey was developed and administered to 6363 adolescents aged 13–20, who attended the selected schools.

Analysis

Data analysis related to select survey items that focused on PA and sport participation. Analyses focused on the prevalence of ever participating in PA or sport in the last 12 months, as well as responses to the following items: "I do physical exercise" (to maintain my health) (yes or no) and "which of the following physical activities have you practiced in the past year during your leisure time?" Two follow-up questions asked whether these activities occurred indoors or outdoors and the duration of these activities. Response options included walking for exercise, swimming, bicycling, popular or social dance, home exercises, skating or rollerblading, jogging or running, golfing, exercise class or aerobics, bowling, tennis, weight training, fishing, volleyball, basketball, soccer, and an open-ended option for other sports or forms of physical activity. IBM SPSS 27 generated univariate frequency analysis. Types of PA were categorized as either organized (structured) sport or unstructured or active play; the latter included walking, swimming, bicycling, home exercise, skating or rollerblading, jogging or running, exercise class, bowling, weight training, and fishing. Organized or structured sport included tennis, volleyball, basketball, soccer, dancing, and golfing. In order to calculate the proportion of participants who report being outdoors for several hours a day, the number of hours per weeks for participants who reported participating in activities outdoors was aggregated. A total that exceeded 7 h a week approximated whether participants reported being outdoors for several hours a day. Chi-square analysis determined potential gender differences in PA and sport participation.

4.3 Results

4.3.1 Literature Review

The search strategy led to the retrieval of 17 research articles that focused on PA levels among adolescents from the MENA. One article reported on a systematic review (Sharara et al. 2018), one was a meta-analysis on five UAE-based studies (Yammine 2017), and one was cross-cultural (Musaiger et al. 2013). Two original studies took place in Palestine (Al Sabbah et al. 2007; Sarsour et al. 2019), and three studies were based in Israel (Kaluski et al. 2009; Tesler et al. 2019; Yaffe 2018). Four studies were UAE-based (Bani-Issa et al. 2020; Henry et al. 2004; Paulo et al. 2018; Wasfi et al. 2008); two studies were based in the Kingdom of Saudi Arabia (Al-Hazza et al. 2011; Alsubaie and Omer 2015), and one study was in each of Morocco (Hamrani et al. 2015), Lebanon (Fazah et al. 2010), and Kuwait (Allafi et al. 2014). For most studies, recruitment consisted of school-aged adolescents with sample sizes varying from 58 to over 16,000 participants. Most studies were cross-sectional and employed quantitative analyses. Extracted themes focused on gender and demographic differences in relation to PA levels and diverse constraints to PA and sport participation.

Gender and Demographic Differences in Relation to Physical Activity

A systematic review based on 172 studies reported on physical inactivity levels for adolescents from the MENA (Sharara et al. 2018). Physical inactivity among children or adolescents was based on nationally representative samples from the global school-based student health surveys (GSHS) (n = 46,426) and was defined as participation in PA for less than 60 min per day on 5 or more days during the past 7 days. Results from the GSHS suggested that physical inactivity is relatively high for MENA adolescents, ranging from 65% in Lebanon to 91% in Egypt. Synthesis from original research studies (n = 20) confirmed high levels of physical inactivity and low levels of PA and sport participation. Overall, the prevalence of inactivity was higher among women or girls for 161 of the 172 studies that were included in the review.

Similarly, a systematic review and meta-analysis of five prospective studies (n = 12,782) that focused on mild, moderate, and vigorous PA among adolescents from the UAE found that girls were more likely to engage in mild physical activity, while moderate and vigorous PA were significantly higher among boys (Yammine 2017). In addition, approximately 19% of Emirati students compared to 22% of expatriate students never participated in physical activity. Results from the United Arab Emirates' 2018 Report Card on PA reported that while overall 16% of UAE children met the recommended guidelines for moderate-vigorous physical activity, expatriate children and boys had higher levels of PA compared to Emirati children and girls (Paulo et al. 2018). Expatriate children were more physically active (total 17%; M 22%; F 12%) compared to Emirati children (total 14%; M 18%; F 10%) across the examined age groups and gender. Furthermore, the study reported that PA declined from ages 13–15 years (total 17%; M 22%; F 12%) to ages 16–17 years (total 14%; M 19%; F 10%). An earlier UAE-based study reported that the prevalence of PA was higher (33.9%) among Emirati private secondary school adolescents compared to expatriates (34% versus 19%) in relation to vigorous exercise for more than three times per week for 20 min. Significant gender differences also were seen for boys (26%) compared to girls (15%) (Wasfi et al. 2008). In addition, regular sport participation was significantly higher among Emirati students (51%) compared to their expatriate adolescents (40%). A cross-sectional study (n = 58) that examined physical activity levels (PAL) and the activity-related energy expenditure among adolescent girls from Abu Dhabi, UAE (using a 3-day activity diary), reported relatively low PAL compared to other countries (e.g., PAL of 1.26 versus 1.73–1.80 for Sweden).

Gender differences in PAL were also reported among adolescents who reside in the West Bank, Gaza Strip, and Israel. A large cross-sectional study (n = 8885) that examined PAL for adolescent students from the West Bank (53%) and the Gaza Strip (47%) found that boys were significantly more physically active for more than 5 days per week than girls ($p < 0.01$), while girls reported doing more homework ($p < 0.001$) (Al Sabbah et al. 2007). Physical activity levels declined with increasing age for both boys and girls ($p < 0.001$). In addition, PAL were higher among adolescents who reside in the West Bank compared to those who reside in the Gaza Strip

(25% versus 13%, $p < 0.001$). In a more recent study, Sarsour et al. (2019) examined levels of PA and sedentary behavior among 205 adolescent boys and 173 adolescent girls who reside in Palestine. The study found that 30% of adolescents were classified as active, with significant gender differences (6.4% of girls versus 50% of boys). In addition, 86% of girls had a significantly higher frequency of sedentary behavior than boys (34.1%, $p < 0.001$). The study also reported significant gender differences in the mean number of minutes per day of PA, with 58 min for boys versus 68 min for girls. A WHO-based study (n = 16,145) reported significant sociodemographic differences in leisure physical activity levels among Arab adolescents (87%) and those from Jewish decent (73%, $p < 0.01$) (Tesler et al. 2019). Among boys, lack of PAL was 17% for Arab adolescents compared to 13% for adolescents of Jewish decent, while 25% of adolescent Arab girls did not engage in PA compared to 23% of their counterparts.

Gender differences in PAL were also shown among adolescents from the Kingdom of Saudi Arabia. Al-Hazzaa et al. (2011) examined PA levels using MET values for 2908 secondary school students from three major cities in Saudi Arabia (Riyadh, Jeddah, and Al-Khobar). Vigorous-intensity sports were assigned an average MET value of 8, while moderate and household activities were assigned an average of 4 and 3 or lower, respectively. Results suggested that 56% of adolescent boys and 22% of girls met the current recommendations of 1 h daily of moderate-intensity PA. Compared with boys, girls on average were significantly ($p < 0.05$) more sedentary (6.6 versus 5.3 h/week for combined TV time and computer use) and less active (1211.1 versus 3051.4 METs-min/week), especially with vigorous-intensity physical activities (554.4 versus 2149.9 METs-min/week). In terms of minutes per week, the total physical activity time for adolescent boys was 503.3 ± 475.4 and 265.9 ± 313.0 min for girls, which equates to about 72 and 38 min of daily PA for adolescent boys compared to girls.

A study based in Lebanon (n = 1000) examined PA levels using the MET system by means of the compendium of PA (Fazah et al. 2010). Results were expressed in MET/week for PA in school, health clubs, and leisure time and at home. The study found significant gender differences in PA levels with adolescent boys reporting higher total scores than girls for the normal-weight, overweight, and obese groups ($p = 0.0001$, $p = 0.004$, and $p = 0.0024$, respectively). For example, scores for PA at health clubs were higher for adolescent boys compared to girls in the normal-weight group (16.33 ± 31.9 versus 4.39 ± 12.3); for school PA was 7.17 ± 8.7 for boys compared to 5.45 ± 3.6 for girls; the same was seen for PA at home with boys reporting 24.00 ± 29.7 compared to 21.12 ± 29.0 for girls.

Similarly, a Kuwait-based study (n = 463 boys and 443 girls) reported that 45% of adolescent boys and 76% of adolescent girls get the recommended daily PA level of more than 2520 MET-min per week (Allafi et al. 2014). Boys were significantly more physically active as determined by the total MET-min score per week ($p = 0.001$). Moreover, 96.3% of adolescent boys and 96.7% of girls reported sedentary behaviors, with girls significantly spending more time per day watching television ($p = 0.02$) and using a computer ($p < 0.001$).

A similar study examined PA behaviors for 669 randomly recruited adolescents from secondary schools in Kenitra, Morocco (Hamrani et al. 2015). Participants were categorized into physically active or inactive based on total PA cutoff scores of 1680 MET-min/week (60 min/d × 7 d/week×4 MET), corresponding to 1 h of daily moderate-intensity PA (Hamrani et al. 2015). Overall, one in five adolescents were inactive, with almost 45% reporting television viewing for more than 2 h per day, and 38% engaged in computer use for a similar period. The study found that adolescent boys were more active than girls across a typical week and engaged in more vigorous-intensity PA (such as jogging, running, soccer, basketball) than adolescent girls, who instead spent more time undertaking moderate-intensity PA (e.g., normal-pace walking, brisk walking, recreational swimming, household activities, and sports such as volleyball, badminton and table tennis). The study also reported that most adolescent girls (67%) engaged in PA at school with classmates.

Constraints to Physical Activity in the MENA

A recent systematic review examined evidence from 23 studies in the MENA that focused on constraints to PA among adolescents (Sharara et al. 2018). Reported constraints included gender (F); increasing age; low socioeconomic status; lack of support and encouragement from parents, peers, and teachers (reported in 16 studies); hot climate (9 studies); attitudes in relation to PA such as insufficient motivation or interest (8 studies); lack of knowledge on the benefits of physical activity; and insufficient time (17 studies). In addition, 23 studies highlighted the built environment as a constraint to physical activity, and 8 studies reported constraints related to gender norms, such as the norms of dressing conservatively not being suitable for physical activity, the need for girls to be chaperoned in public spaces, and the scarcity of gender-segregated fitness facilities.

A cross-cultural study (n = 4698) across seven countries from the MENA reported similar constraints related to gender (F), lack of motivation, low support from teachers, time, culture, religion, and lack of opportunities for girls (Musaiger et al. 2013). Overall, across all countries included in the study (Algeria, Jordan, Kuwait, Libya, Palestine, Syria, and the United Arab Emirates), girls faced more barriers to PA than boys (Musaiger et al. 2013). Importantly, significant gender differences existed for lack of motivation (ranging from 13% to 19% for girls compared to 6–20% for boys across the seven countries), not having teacher support in relation to participation in PA (ranging from 21% to 36% for girls compared to 16–39% for boys), and time (range of 39–68% for girls compared to 29–45% for boys).

Studies based in the UAE also highlighted diverse and similar constraints to PA and sport participation, including age, gender (F), smoking status, father's education level, socioeconomic status, school workload, unavailability of places for sport participation, high costs of sport clubs, climate, transportation, school and parental support, culture, and low self-efficacy (Henry et al. 2004; Bani-Issa et al. 2020; Wasfi et al. 2008; Yammine 2017). According to results from the United Arab

Emirates' 2018 report on PA for children and youth, PA levels declined from early to late adolescence (aged 13–17 years) among both Emirati and expatriate boys and girls (Paulo et al. 2018). Particularly for adolescent girls, poor levels of PA were related to factors including cultural and weather restrictions and social change of the community (Henry et al. 2004). Wasfi et al. (2008) found significant positive associations between low levels of adolescent sport practice and each of obesity and tobacco smoking, the latter only significant for adolescent boys. Furthermore, 22.3% of average-weight students undertook vigorous exercise for more than three times per week for about 20 min per session and also more than 30 min of moderate PA most days of the week, compared to 18% of students who classified as obese. Among adolescent smokers, 62% of boys had no or a poor level of sport practice compared to 70% of girls. Perceived exercise self-efficacy, defined by the belief in one's ability to maintain an exercise routine, was significantly higher among adolescent boys than girls ($t(608) = 5.31$, $p < 0.001$) (Bani-Issa et al. 2020). However, UAE adolescents had lower perceived self-efficacy compared to adolescents from Western countries. Significant predictors of exercise self-efficacy for UAE adolescents were age, city location, eating breakfast regularly at home, school support in exercising regularly, and how often schools offered physical exercise classes, with frequency of weekly exercise classes emerging as the strongest predictor of perceived exercise self-efficacy ($\beta = 0.183$, $p = 0.001$) (Bani-Issa et al. 2020).

Consistently, increasing age emerges as a constraint to PA for studies conducted in Palestine and Israel, particularly for girls (Al Sabbah et al. 2007; Kaluski et al. 2009; Sharara et al. 2018; Tesler et al. 2019). Earlier studies also reported that PA levels were related to gender norms, location, overcrowding, lack of sport centers, maternal education, smoking, parental education, socioeconomic status, school workload, high costs, weather, transportation, and urban changes (Al Sabbah et al. 2007; Kaluski et el. 2009). Al Sabbah et al. (2007) found that boys were significantly more physically active than girls but that PA levels significantly decrease with increasing age for both boys and girls. Participation in PA for Palestinian adolescents was positively associated with maternal level of education (OR: 1.26, CI 1.09–1.46, $P < 0.01$). The same study concluded that decreasing levels of PA with increasing age for boys may be linked to social responsibility to secure a future and income, particularly given the overcrowded living conditions and low standards of living in some places (Al Sabbah et al. 2007). The study found that girls reported doing more homework than boys ($p < 0.001$) in Palestine and watching more TV than boys in the West Bank ($p < 0.001$). Kaluski et al. (2009) found that levels of sport practice were associated with both maternal and paternal education (OR = 0.69, 0.58–0.84, 95% CI). Age also emerged as a constraint to sport practice, with 53% more girls from middle school classified as optimally physically active compared to girls from high school ($p = 0.001$). The study concluded that PA levels decline with increasing responsibilities in relation to higher education. For boys, PA levels were negatively related with sleep time for 6 h per night (OR = 0.56, 0.43–0.73 95% CI), smoking hookah, and socioeconomic status. Specifically, boys from lower social status schools were 1.29 (95% CI 1.06, 1.56) times more likely to be optimally active than boys from higher SES schools (OR = 1.30; 95% CI 1.02, 1.65). The type

of involvement in sport was related to gender, with more boys reporting involvement in ball games, such as tennis, football, basketball, and volleyball, while girls reported participating more commonly in walking or aerobic activities.

More recent studies reaffirmed PA constraints related to gender, culture, age, parenting style, exercise self-efficacy, peer influence, costs, and parental and school support (Yaffe 2018; Sarsour et al. 2019; Tesler et al. 2019). Findings suggest that boys are given less constrictions and more opportunities to freely practice PA outside their homes in the Gaza Strip (Sarsour et al. 2019). Parents who participated in focus group sessions highlighted that boys are more interested in PA than girls. Quantitative analyses confirmed these results as 86% of girls were involved in sedentary behavior compared to 34% among boys. Gender differences in relation to interest in PA was reported in other regional studies, often due to girls' negative experiences, low motivation, and low perceived self-efficacy (Sharara et al. 2018; Tesler et al. 2019). In addition to age and gender, Tesler et al. (2019) reported that parental engagement in PA was positively related to PA among girls (OR = 0.79; $p < 0.05$). Family affluence was also closely related to parental education and further influences PA levels. Tesler et al. (2019) reported positive associations between PA and family wealth for both girls and boys (OR = 0.92, $p < 0.1$; OR = 0.93, $p < 0.01$, respectively). Significant effects for parenting styles on PA levels were also observed, such that Arab adolescent boys who perceived their parents as authoritative reported doing more PA than their counterparts who perceived their parents as either permissive or authoritarian (Yaffe 2018). Tesler et al. (2019) found that having friends engaged in PA was associated with greater lower likelihood of physical inactivity (OR = 0.64, $p < 0.05$). Additionally, the existence of an in-school physical exercise break was associated with a lower chance of lack of PA (OR = 0.76, $p < 0.01$), and a positive attitude toward physical exercise was inversely related to lack of PA (OR = 0.77, $p < 0.01$).

Consistently, across different countries from the MENA, studies reported diverse constraints to PA. For example, studies based in the Kingdom of Saudi Arabia found evidence of constraints related to gender, age, perceived body weight, absence of sport facilities, lack of peer support, and lack of suitable sport club in the community (Alsubaie and Omer 2015; Al-Hazzaa et al. 2011). Studies based in Morocco, Lebanon, and Kuwait reaffirmed PA constraints related to gender, body weight, and types of PA.

4.3.2 Case Study on Physical Activity and Sport Participation in the UAE

Results of the National Study on Population Health in the United Arab Emirates ($n = 6363$) (NSPHUAE) found that UAE adolescents participate in various forms of PA and organized sport (Figs. 4.1 and 4.2). Table 4.1 presents results of data analysis related to PA and sport participation of UAE adolescents. Overall, 73% of females compared to 44% of males reported practicing physical exercise to

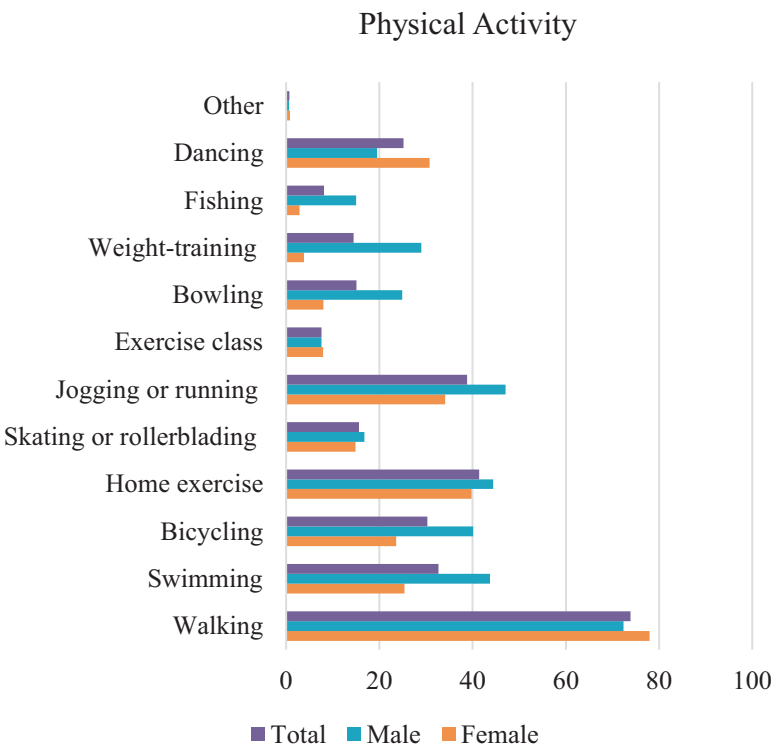

Fig. 4.1 Prevalence of physical activity among male and female adolescents living in the UAE

maintain health ($p < 0.001$). Forms of PA that were most reported included walking for exercise (74%), home exercise (41%), and jogging or running (39%) (Fig. 1). In addition to those reported in Figs. 1 and 2, participants reported participation in *other* organized sport activities (karate, $n = 13$; hockey, $n = 7$; gymnastics, $n = 4$; boxing, $n = 1$; football, $n = 6$; badminton, $n = 26$, and cricket, $n = 39$), as well as *other* physical activities (skipping, $n = 13$; handball, $n = 2$; yoga, $n = 7$; horseback riding, $n = 25$; treadmill, $n = 2$; wrestling, $n = 1$, and ping pong, $n = 5$). Participation in leisure PA including dancing and walking was significantly higher among girls compared to boys ($p < 0.001$). Interestingly, a higher proportion of girls reported playing basketball than boys (26% versus 22%, $p < 0.01$), while significantly more boys played volleyball, soccer, and golf (Table 4.1). Significant gender differences were found in relation to participation in physical activity, with a higher proportion of boys participating in swimming, bicycling, jogging or running, bowling, weigh training, or fishing, while more girls undertook walking, home exercise, and dancing. Participating in outdoor PA or sport for 7 h or more per week was significantly higher among boys than girls (23% versus 18%, $p < 0.001$). Overall, 3.6% of participants did not participate in any organized sport or PA ($n = 234$). Overall, 56% of participants participated in both organized sport and PA ($n = 3648$). Overall, 11% of adolescents reported less than 2 h of television and computers/video games per day

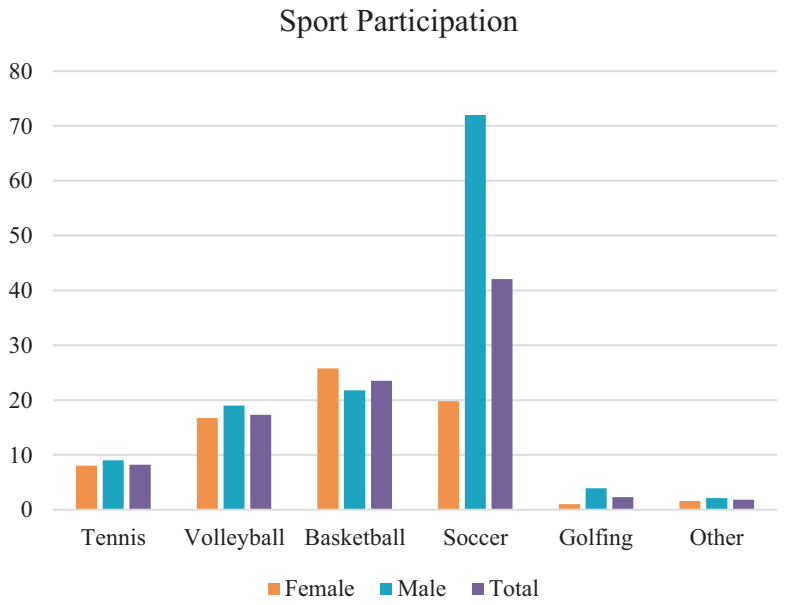

Fig. 4.2 Prevalence of female and male adolescents who participate in organized sports in the UAE

and thus met the Canadian Sedentary Behavior Guidelines and Global Matrix 3.0 (Aubert et al. 2018).

4.4 Discussion

Despite unequivocal evidence on the diverse benefits of PA during adolescence, research highlights high levels of sedentary behavior among adolescents from the MENA, ranging between 65% and 91% (Sarsour et al. 2019; Sharara et al. 2018; Yammine 2017). In addition, studies point to the lack of PA and sport participation among adolescents from MENA. For example, 11–49% of UAE adolescents never participate in PA (Yammine 2017). Gender-specific differences in relation to participation in types of PA or sports and the location (outdoors versus indoors) are apparent among adolescents from MENA. This highlights the importance of PA research that specifically focuses on these factors when assessing the prevalence of physical activity. For instance, research that focuses on aerobic exercises or dance is scarce, although it tends to be quite popular among girls from MENA. In fact, to date, MENA-based studies often examined overall PA without specific attention to different types of physical activity and focused on MET values, which falls short of addressing cultural and social sensitivities (Al-Hazzaa and AlMarzooqi 2018) and may have underestimated the levels of PA among MENA adolescent girls.

Table 4.1 Prevalence of physical activity and sport participation among male and female adolescents from the UAE ($n = 6356$)

	Classification	Overall		Male		Female	
		n	%	*n*	%	*n*	%
Sex				2826	45	3530	56
Practice physical exercise to maintain health***	Yes	3595	57	2000	73	1540	44
Physical activity	Walking***	4783	74	1997	72	2722	78
	Swimming***	2118	33	1196	44	885	25
	Bicycling***	1959	30	1100	40	821	24
	Home exercise**	2677	41	1089	40	1548	44
	Skating or rollerblading	1008	16	405	15	586	17
	Jogging or running***	2509	39	1289	47	1188	34
	Exercise class	489	8	205	8	274	8
	Bowling***	974	15	677	25	280	8
	Weight training***	939	15	793	29	131	4
	Fishing***	522	8	407	15	100	3
	Dancing***	1633	25	531	20	1074	31
	Other	47	<1	17	<1	30	<1
Organized sport	Tennis	530	8	244	9	280	8
	Volleyball*	1120	17	517	19	581	17
	Basketball**	1518	24	593	22	899	26
	Soccer***	2742	42	1991	72	688	20
	Golfing***	151	2	106	4	36	1
	Other	114	2	59	2	55	2
Outside for 7 or more hours/week***	Yes	2678	41	1509	23	1132	18

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

In relation to constraints to PA and sport participation, studies have identified unique circumstances specific to the region. A number of studies have attributed low levels of PA to rapid economic development and urbanization that characterizes many countries in this region (Allafi et al. 2014; Henry et al. 2004; Sharara et al. 2018; Wasfi et al. 2008). For example, within the past few decades, rapid economic development in the UAE led to lifestyle changes, such as changes in community design, more passive leisure and entertainment pursuits, and reductions in active transportation, all of which contribute to sedentary lifestyles (Henry et al. 2004; Paulo et al. 2018; Wasfi et al. 2008). Locations or facilities conducive to adolescent physical activity, as well as related opportunities, are noted constraints to PA and sport participation due to these economic and developmental changes. For instance, Wasfi et al. (2008) reported limited indoor spaces available for girls' participation in PA and sport, which is very important given the climate restrictions in the UAE and other MENA countries (Henry et al. 2004). Other studies also identified constraints to PA and sport participation related to limited sport centers and facilities and lack of access to safe parks and playgrounds (Al Sabbah et al. 2007; Fazah et al. 2010). Particularly for girls, accessibility to both indoor and safe outdoor facilities for PA and sport participation has the capacity to increase PA levels and sport participation

(Sharara et al. 2018; Allafi et al. 2014). The availability of outdoor safe space for PA is particularly important and essential, particularly during global crises such as the ongoing COVID-19 pandemic, given that adolescents may not be able to achieve optimal PA levels within the home and equally may not be able to access facilities and sport clubs due to public restrictions. In addition, rapid economic development in many MENA counties led to changes in the occupational interests of the population, as well as changes related to day-to-day house chores. Occupations that require physical exertion generally rely on expatriate labor, as do personal and household duties, such as house cleaning and gardening, which discourage PA and promote sedentary lifestyles (Sharara et al. 2018). Furthermore, economic development led to a heavy reliance on motor vehicles and a general absence of active transport options (Al-Hazzaa et al. 2011).

Social support is another noted constraint to PA and sport participation for adolescents in the MENA. Several studies highlighted the link between adolescent PA and support from friends, parents, and teachers (Bani-Issa et al. 2020; Musaiger et al. 2013; Sharara et al. 2018; Yaffe 2018). Recent studies highlighted that adolescents were more likely to be active when they had the support of their friends and peers (Tesler et al. 2019). Alongside, evidence highlighted parental preferences toward spiritual and educational activities rather than PA and sport participation and focused on how this resulted in low adolescent PA levels and sedentary behaviors (Sharara et al. 2018). Parental education positively related to adolescent PA levels (Al Sabbah et al. 2007; Wasfi et al. 2008). Although evidence of the influence of parental and peer support on adolescent PA level is consistent, some studies have linked this relationship to local geopolitical regional factors. For example, adolescents from the Gaza Strip, particularly boys, may be encouraged and more inclined to give up on PA and sport participation in favor of securing an income and improving their socioeconomic status (Al Sabbah et al. 2007).

While the previously discussed constraints to PA focused on physical and social environmental factors, literature evidence suggests that individual factors play an important role in enhancing adolescent PA levels and sport participation. Literature notes self-efficacy beliefs and self-regulatory skills, which begin to form during adolescence, as constraints to adolescent PA and sport participation (Muturi et al. 2016; Pajares and Urdan 2006). Constraints to PA and sport participation that are above noted, including age, gender, and those related to rapid economic development and social support, interact to contribute to high levels of adolescent sedentary behavior and low levels of physical activity, which in turn influence one's self-efficacy and self-regulatory skills. Thus, the perceived ability of an adolescent to maintain a healthy level of PA may be indirectly correlated to increasing age, gender (F), lack of facilities, and lack of support among friends, peers, and teachers (Al-Hazzaa et al. 2011; Alsubaie and Omer 2015; Musaiger et al. 2013; Sharara et al. 2018). Although findings suggest that self-efficacy in relation to physical activity relates to parental, peer, and teacher influences, and especially opportunities for different forms of exercise during school hours, researchers note that there is limited extant research on the exercise self-efficacy of adolescents in the MENA (Bani-Issa et al. 2020). Furthermore, other individual constraints include hindered

individual motivation and interest in PA and sport participation and prioritization of other activities that improve education and social status, largely due to increasing social responsibilities. On the other hand, outcomes of reduced PA and sport participation, such as overweight or obesity, may be elements of a positive feedback loop for decreased levels of PA and sport participation. Fazah et al. (2010) reported normal-weight boys and girls demonstrate higher levels of PA than their obese peers and equally reap the benefits of higher physical functioning and quality of life (Fazah et al. 2010).

The UAE case study suggests that the prevalence of not participating in neither sport nor PA in the last year among adolescents is relatively low (3.6%). While results suggested that over 60% of adolescents regularly participated in some form of PA or sport, study limitations prevented assessments on whether participants met the recommended levels of moderate-vigorous PA levels. In parallel with other MENA-based study findings, results support that practicing PA or exercise to maintain health is significantly higher among boys compared to girls. The type of sport or PA was gender-related, interestingly with girls more likely to play basketball. Indeed, basketball in the MENA has been growing in popularity, making it one of the five top most-participated sports in the region, with women's basketball gaining popularity particularly in Saudi Arabia (Jamali 2014). In addition, girls may be more inclined to play basketball, as it is often an indoor sport and has less physical contact than other competitive sports. As soccer is a traditionally recognized sport in the MENA, the high prevalence of participation in soccer among boys is not surprising. Soccer is often an outdoor sport, and thus its relative unpopularity among girls from the MENA may be due to the cultural and normative construction imposed throughout the MENA for a long period, that only boys practice soccer or "football" in schools. In regard to adolescent preferences to the different type of sports and physical activity, the changes that many MENA countries are experiencing, resulting from globalization, modernization, and educational reform, have provided greater knowledge and awareness of the benefits of PA and sport (Harkness and Hongsermeier 2015).

It is interesting that the sport commercial industry has recently taken note of the gender-related constraints to PA and sport participation. Sporting brands have created sporting attire that appeals to the Muslim girl, as inspired by various Muslim girl athletes around the world, including Fatima Al-Nabhani (Omani tennis player) and Bahraini sprinter Al-Ghasara, as well as more recently Ibtihaj Muhammad, all of whom competed in athletics wearing a hijab (Harkness and Islam 2011; Alvarez 2017). Marketing of sports clothing that is culturally sensitive to MENA populations through big brands such as *Nike*, estimated to be worth five trillion dollars by 2020 (Alvarez 2017), may further increase influence and encourage the breaking of sociocultural norms, in relation to gender-related and cultural factors attached to practicing sport in the MENA. Role model female athletes and culturally sensitive sport attire are key to addressing gender-specific sport constraints. Concurrently, these factors have the capacity to increase girl participation in the MENA, by accounting for hot climate, safety and religious concerns, and cultural trends. All these constraints have been attributed to low levels of PA and sport participation

among adolescent girls from the MENA, particularly in relation to outdoor activities and once they reach the age of 12 (Sharara et al. 2018; Musaiger et al. 2013; Obermeyer et al. 2015; Sarsour et al. 2019).

Given the clear social and health benefits associated with being physically active during adolescence, many organizations have emphasized the importance of meeting PA guidelines for adolescents (Tesler et al. 2019). In the MENA, regional constraints to PA and sport participation require appropriately tailored interventions and recommendations. First, there appears to be a need to ensure that physical environments within the MENA region promote adolescent PA and sport participation. This can be achieved through urban design that accounts for sidewalk space, improved walkability, green and park space, as well as outdoor and indoor sport facilities to combat challenges related to climate conditions. An emphasis on the development of active transport systems, walkable environments, and safe spaces may aid in encouraging PA (Paulo et al. 2018). Special attention should focus on opportunities and facilities tailored for adolescent girls' participation in PA and sport. Second, interventions should focus on educating adolescents and their families on the benefits of PA and sport, in order to target related social and cultural perceptions and to emphasize the importance of being physically active (Mohammed et al. 2020). These interventions may be more effective during early years, given evidence that forming early beliefs and perceptions of PA in childhood can develop positive self-efficacy toward an adolescents' perceived ability to maintain exercise self-efficacy and build their skills (Bani-Issa et al. 2020). Lastly, it is essential for future research to further examine constraints to PA among adolescents in the MENA, in order to inform culturally appropriate interventions (Paulo et al. 2018). Studies conducted at various local and regional scales have the capacity to uncover geographically based modifiable constraints. In addition, further research should explore the challenges that girls from the MENA face as these are environmental, cultural, and individual unique constraints that have the capacity to interact and compound the effects of decreased PA and sport participation (Klicnik et al. 2020; Mohammed et al. 2020). By exploring constraints to PA among adolescents, research can inform appropriate interventions to promote PA in the MENA.

Reflection Questions

- Discuss the benefits of physical activity during adolescence.
- Discuss the role of gender in relation to constraints to physical activity within the MENA region. In your opinion, would this apply to regions outside of MENA?
- How may constraints interact to impact physical activity or sport participation among adolescents in the MENA region?
- Reflecting on sociocultural environments, how can we tackle social disparities to ensure equal opportunities for physical activity among adolescents from the MENA?

References

Al Sabbah, H., Vereecken, C., Kolsteren, P., Abdeen, Z., & Maes, L. (2007). Food habits and physical activity patterns among Palestinian adolescents: Findings from the national study of Palestinian schoolchildren (HBSC-WBG2004). Public Health Nutrition, 10(7), 739–746. https://doi.org/10.1017/S1368980007665501

Al-Hazzaa, H. M., & AlMarzooqi, M. A. (2018). Descriptive analysis of physical activity initiatives for health promotion in Saudi Arabia. *Frontiers in public health*, *6*, 329. https://doi.org/10.3389/fpubh.2018.00329

Al-Hazzaa, H. M., Abahussain, N. A., Al-Sobayel, H. I., Qahwaji, D. M., & Musaiger, A. O. (2011). Physical activity, sedentary behaviors and dietary habits among Saudi adolescents relative to age, gender and region. International Journal of Behavioral Nutrition and Physical Activity, 8(1), 1–14. https://doi.org/10.1186/1479-5868-8-140

Allafi, A., Al-Haifi, A. R., Al-Fayez, M. A., Al-Athari, B. I., Al-Ajmi, F. A., Al-Hazzaa, H. M., ... & Ahmed, F. (2014). Physical activity, sedentary behaviours and dietary habits among Kuwaiti adolescents: gender differences. *Public health nutrition*, 17(9), 2045–2052. doi:https://doi.org/10.1017/S1368980013002218

Alsubaie, A. S., & Omer, E. O. (2015). Physical activity behavior predictors, reasons and barriers among male adolescents in Riyadh, Saudi Arabia: evidence for obesogenic environment. *International journal of health sciences*, 9(4), 400.

Alvarez. A. (2017). Hijab in Sports: How Muslim Women Athletes Are Fighting for Acceptance. www.rollingstone.com

Aubert, S., Barnes, J. D., Abdeta, C., Abi Nader, P., Adeniyi, A. F., Aguilar-Farias, N., ... & Tremblay, M. S. (2018). Global matrix 3.0 Physical activity report card grades for children and youth: results and analysis from 49 countries. *Journal of Physical Activity and health*, 15(s2), S251–S273.

Bani-Issa, W., Dennis, C. L., Brown, H. K., Ibrahim, A., Almomani, F. M., Walton, L. M., & Al-Shujairi, A. M. (2020). The Influence of Parents and Schools on Adolescents' Perceived Diet and Exercise Self-Efficacy: A School-Based Sample From the United Arab Emirates. *Journal of Transcultural Nursing*, 31(5), 479–491. https://doi.org/10.1177/1043659619876686

Barakat-Haddad C. (2013) Prevalence of high blood pressure, heart disease, thalassemia, sickle-cell anemia, and iron-deficiency anemia among the UAE adolescent population. *Journal of environmental and public health*. https://doi.org/10.1155/2013/680631

Benajiba, N., Mahrous, L., Janah, K., Alqabbani, S. F., Chavarria, E. A., & Aboul-Enein, B. H. (2020). Physical activity interventions promoted in the Arabic-speaking region: A review of the current literature. Obesity Reviews, 21(8). https://doi.org/10.1111/obr.13032

Chaabane, S., Chaabna, K., Abraham, A., Mamtani, R., & Cheema, S. (2020). Physical activity and sedentary behaviour in the Middle East and North Africa: An overview of systematic reviews and meta-analysis. Scientific reports, 10(1), 1–24. https://doi.org/10.1038/s41598-020-66163-x

Craggs, C., Corder, K., Van Sluijs, E. M. F., & Griffin, S. J. (2011). Determinants of change in Physical activity in children and adolescents: A systematic review. *American Journal of Preventive Medicine*, 40(6), 645–658. https://doi.org/10.1016/j.amepre.2011.02.025

Eime, R., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: Informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity*, 10. https://doi.org/10.1186/1479-5868-10-98

Fazah, A., Jacob, C., Moussa, E., El-Hage, R., Youssef, H., & Delamarche, P. (2010). Activity, inactivity and quality of life among Lebanese adolescents. *Pediatrics International*, 52(4), 573–578. https://doi.org/10.1111/j.1442-200X.2009.03021.x

Hamrani, A., Mehdad, S., El Kari, K., El Hamdouchi, A., El Menchawy, I., Belghiti, H., ... & Aguenaou, H. (2015). Physical activity and dietary habits among Moroccan adolescents. *Public health nutrition*, 18(10), 1793–1800. doi:https://doi.org/10.1017/S1368980014002274

Harkness, G. & Islam, S. (2011). Muslim Female Athletes and the Hijab. Contexts 10(4): 64–65.

Harkness, G., & Hongsermeier, N. (2015). Female sports as non-movement resistance in the Middle East and North Africa. Sociology Compass, 9(12), 1082–1093.

Henry, C. J. K., Lightowler, H. J., & Al-Hourani, H. M. (2004). Physical activity and levels of inactivity in adolescent females ages 11-16 years in the United Arab Emirates. *American Journal of Human Biology*, 16(3), 346–353. https://doi.org/10.1002/ajhb.20022

Jamali, H. (2014, October 29). Women in Saudi Arabia Use Basketball to Push for More Rights (Rep.). Retrieved from https://www.nbcnews.com/news/world/women-saudi-arabia-use-basketball-push-more-rights-n236336

Kaluski, D. N., Mazengia, G. D., Shimony, T., Goldsmith, R., & Berry, E. M. (2009). Prevalence and determinants of physical activity and lifestyle in relation to obesity among schoolchildren in Israel. Public health nutrition, 12(6), 774–782. doi:https://doi.org/10.1017/S1368980008002991

Klicnik, I., Mohammed, S., & Barakat, C. (2020). Development and Validation of a Survey Instrument to Build Capacity for Examining Constraints to Sport Participation: A Pilot Study. Manuscript in Preparation.

Mohammed, S., Kerpan, S., Stanyon, W., & Barakat, C. (2020). Examining Constraints to Sport Participation among Immigrant Adolescent Girls who reside in the Greater Toronto Area. *Archives of Health Science*, 4(1), 1–13.

Mohammed, S., Kerpan, S., Stanyon, W., & Barakat, C. (2021). Exploring Experiences of Immigrant Adolescent Girls on Constraints to Sport Participation. Manuscript in Preparation.

Musaiger, A. O., Al-Mannai, M., Tayyem, R., Al-Lalla, O., Ali, E. Y. A., Kalam, F., … Chirane, M. (2013). Perceived barriers to healthy eating and physical activity among adolescents in seven Arab countries: a cross-cultural study. Scientific World Journal, 232164. https://doi.org/10.1155/2013/232164

Muturi, N. W., Kidd, T., Khan, T., Kattelmann, K., Zies, S., Lindshield, E., & Adhikari, K. (2016). An examination of factors associated with self-efficacy for food choice and healthy eating among low-income adolescents in three U.S. states. Frontiers in Communication, 1, 6. doi:https://doi.org/10.3389/fcomm.2016.00006

Obermeyer, C. M., Bott, S., & Sassine, A. J. (2015). Arab Adolescents: Health, Gender, and Social Context. *Journal of Adolescent Health*, 57(3), 252–262. https://doi.org/10.1016/j.jadohealth.2015.01.002

Pajares, F., & Urdan, T. (2006). Adolescence and education: Self efficacy beliefs of adolescents (Vol. 5). Greenwich, CT: Information Age

Paulo, M. S., Nauman, J., Abdulle, A., Aljunaibi, A., Alzaabi, M., Barakat-Haddad, C., … Loney, T. (2018). Results from the United Arab Emirates' 2018 Report Card on Physical Activity for Children and Youth. Global Health Action, 15(1), 419–422. https://doi.org/10.3402/gha.v6i0.20100

Ridley, K., Ainsworth, B.E. & Olds, T.S. (2008). Development of a Compendium of Energy Expenditures for Youth. Int J Behav Nutr Phys Act 5, 45. https://doi.org/10.1186/1479-5868-5-45

Sarsour, A. K., Turban, M., Al Wahaidi, A., Abed, Y., & Alkahlout, H. (2019). Does gender influence food intake and PApattern among palestinian adolescents in the gaza strip? Eastern Mediterranean Health Journal, 25(10), 722–727. https://doi.org/10.26719/emhj.19.073

Sharara, E., Akik, C., Ghattas, H., & Obermeyer, C. M. (2018). Physical inactivity, gender and culture in Arab countries: a systematic assessment of the literature. BMC Public Health, 18(1), N.PAG-N.PAG. https://doi.org/10.1186/s12889-018-5472-z

Tesler, R., Kolobov, T., Ng, K. W., Shapiro, E., Walsh, S. D., Shuval, K., & Harel-Fisch, Y. (2019). Ethnic disparities in physical activity among adolescents in Israel. *American Journal of Health Behavior*, 43(2), 337–348. https://doi.org/10.5993/AJHB.43.2.10

Tremblay, M. S., LeBlanc, A. G., Janssen, I., Kho, M. E., Hicks, A., Murumets, K., ... & Duggan, M. (2011). Canadian sedentary behaviour guidelines for children and youth. *Applied Physiology, Nutrition, and Metabolism*, *36*(1), 59–64. https://doi.org/10.1139/H11-012

Wasfi, A., El-Sherbiny, A., Gurashi, E., & Al Sayegh, F. (2008). Sport Practice Among Private Secondary Students in Dubai in 2004. La Revue de Sante de La Mediterranee Orientale, 4(3).

WHO (2020). https://www.who.int/news-room/fact-sheets/detail/physical-activity

Yaffe, Y. (2018). Physical Activity Among Israeli-Arab Adolescent Males: How Do Parenting Styles Matter? American Journal of Men's Health, 12(6), 2037–2043. https://doi.org/10.1177/1557988318790881

Yammine, K. (2017). The prevalence of physical activity among the young population of UAE: A meta-analysis. Perspectives in Public Health, 137(5), 275–280. https://doi.org/10.1177/1757913916675388

Zaabi MA, Shah SM, Sheek-Hussein M, et al. (2016). Results from the United Arab Emirates' 2016 report card on physical activity for children and youth. J Phys Act Health, 13(11 suppl 2):S299–S306. doi:https://doi.org/10.1123/jpah.2016-0312