

# Attitudes and perceived barriers toward healthy lifestyle behaviors in Jordanian adolescents: a developing country perspective

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**Background and aims:** There is an urgent need to address the role of healthy diet and behaviors promoting health among school adolescents in order to tailor appropriate interventions in Jordanian schools. This study aims to evaluate the reliability and validity of the Arabic version of Students As LifeStyle Activists (SALSA) survey alongside Jordanian adolescents' attitudes and perceived barriers to healthy eating and physical activity.

**Methods:** This study uses baseline data from a randomized controlled trial recruiting school students from 29 male and 27 female public high schools that have grades 7 and 8. Cronbach's alpha and principal components analysis/factor analysis were used to check reliability and validity. Numbers, percentages, and chi square were used to explore healthy diet and physical activities preferences among Jordanian school students and determine gender differences for all evaluated items.

**Results:** The Arabic version-SALSA survey has acceptable Cronbach's alpha values (>0.78) for most of its scales. Five scales were derived from the Arabic version-SALSA survey using principal components analysis/factor analysis (factors loading above 0.3). A higher proportion of female students agreed that "healthy food makes you more comfortable" compared to male students (44% vs 36%,  $P < 0.05$ ). Few Jordanian high school students held positive attitudes toward healthy food. This study identified both social and personal barriers to exercise among Jordanian adolescents, including lack of skills for physical activity, easy access and low cost of fast food, scarce opportunities for physical activity, and lack of peers and friends.

**Conclusion:** Interventions should be tailored to health attitudes and beliefs of Jordanian school students in parallel with improving physical resources and enhancing peer and/or friend support.

**Keywords:** adolescent, attitude, practices, barriers, lifestyle, peer education, Jordan

## Background

NCDs such as cardiovascular diseases are increasingly responsible for the burden of disease in developing countries,<sup>1</sup> resulting in a "double burden" of both communicable and NCDs for these countries.<sup>1,2</sup> This double burden is especially salient for countries in the WHO Eastern Mediterranean Region,<sup>1</sup> including many Arab countries such as Jordan and Egypt. In Jordan, for instance, NCDs are now the leading cause of death, obesity, and diabetes, in which all of them are significant public health problems.<sup>3</sup> Analyses of the global disease burden demonstrate that risk factors, such as high blood pressure, physical inactivity, and overweight and obesity, play an increasingly important role in the disease burden in Northern Africa and the Middle East.<sup>4</sup> Critically, the NCD burden can be reduced or prevented if certain approaches are adopted.<sup>5</sup> Thus, there is

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a growing interest in interventions to address these issues, and schools are a recognized venue for health promotion.<sup>6</sup>

School-based health-promoting interventions are increasingly widespread, and have been shown to have beneficial effects, especially on the amount of physical activity during and outside school.<sup>7</sup> Such interventions are important for school-aged children, including adolescents, because behaviors and attitudes developed during this time can continue in later life. Previous studies of Arab adolescent lifestyle practices demonstrated that many adolescents have high-calorie/fatty diets and very low levels of physical activity.<sup>8–11</sup> A region-wide study found that few adolescents consumed fruits and vegetables as frequently as guidelines recommended.<sup>12</sup> Additionally, several barriers to adopting healthy eating and adequate physical activity behaviors by Arab adolescents, including Jordanians,<sup>10,11,13</sup> were identified. These barriers include expenses, facilities, accessibility, safety, education, and knowledge. Therefore, programs targeting these barriers to modify healthy lifestyle among this population are urgently needed.

A first step in developing successful interventions to empower adolescents to adopt healthier lifestyles is determining the relevant barriers to these lifestyles, as well as tailor interventions appropriately. While information on the association across different lifestyle behaviors is available for Saudi Arabia<sup>14,15</sup> and Kuwait,<sup>16,17</sup> it is scarce in Jordan despite the urgent need. Therefore, the aims of this study are to 1) evaluate the reliability and validity of an Arabic questionnaire evaluating healthy lifestyle behaviors; and 2) assess Jordanian adolescents' attitudes and perceived barriers to healthy eating and physical activity.

## Methods

### Design and participants

This analysis is part of a larger study evaluating a school-based, peer-led healthy lifestyle intervention. This analysis uses the baseline data from a randomized controlled trial of the intervention. A multistage stratified sampling technique was used to ensure equal representation of socioeconomic status (including monthly income and level of education) – by school district – and both sexes. After stratification for school district and gender, a total of 6 male and 6 female schools (all Jordanian schools are split by sex) were randomly selected using opaque, sealed envelopes from 29 male and 27 female public high schools that have grades 7 and 8 (56 is the entire number of public high schools that met the inclusion criteria in the 3 districts), in Northern Jordan.

Within selected schools, the entire seventh and eighth grade classes were invited to participate. Students were eligible to participate if they were physically and cognitively capable of completing the self-reporting survey and were free of major diseases that could affect their responses such as diabetes, hypertension, and cardiovascular diseases.<sup>18,19</sup>

### Ethical considerations

Approval for the study was obtained from the Human Research Ethics Committees at the Ministry of Education, relevant educational school districts, and Jordan University of Science and Technology in Jordan. The students and parents were provided with detailed information about the study. Subsequently, written informed consent and assent were voluntarily obtained from eligible parents and students, respectively, prior to participation. The study was carried out in accordance with the principles of the Declaration of Helsinki.

### Instruments

The SALSA survey<sup>20</sup> was used to determine adolescents' attitudes, practices, and perceived barriers toward healthy eating and physical activity. The SALSA survey is part of a peer-led educational program originally developed in Sydney, Australia.<sup>20</sup> Before implementing the survey in Jordan, it was translated into Arabic and back translated again into English by a professional translator but has not been validated in Arabic-speaking populations or in Australia. The survey, a classroom activity, is self-administered by students in 15 minutes and facilitated by two research assistants and a volunteer school teacher. For the purposes of the current study, students from the 12 schools completed a total of 66 items. The item responses were “yes”/“no”; and 4-to-5 point Likert scale answers depending on the question itself.

### Statistical analyses

#### Reliability

Cronbach's alpha *was* used to assess reliability. Coefficients above 0.8 were interpreted as indicative of high reliability.<sup>21</sup> The five scales were determined based on the relevance of the items to each other and the experts' opinions.

#### Validity

As we did not have prior hypotheses about the dimensionality of the Arabic version of SALSA, we used PCA to identify and extract factors in the data. We then rotated the factors using Varimax rotation with Kaiser Normalization. We used 0.30

as a cutoff value for factor loading. All analyses, including PCA and Cronbach’s alpha, were performed using SPSS v21.0 (SPSS Inc., Chicago, IL, USA) and SAS software (v 9.4, Cary, NC, USA). Data are presented as numbers and percentages. The chi-squared test was used to determine gender differences for all evaluated items. *P*-values of <0.05 were considered statistically significant.

## Results

As illustrated in Table 1, a total of 791 students participated in the study from 12 public high schools. Participants were mostly female (N=475, 60%), and aged between 13 and 15 years (60% were 14 years of age).

### Results of the reliability analysis

All scales got desirable values of Cronbach’s alpha, above 0.7, except two scales. Those two scales obtaining low Cronbach’s alpha values are eating behaviors (0.05) and food preferences (0.30) (Table 2).

**Table 1** Participants’ demographical characteristics (N=791)

Characteristic	N (%)
Gender	
Male	316 (40)
Female	475 (60)
Age (years)	
13	247 (31)
14	474 (60)
15	58 (7)
Missing/not provided	12 (2)

**Table 2** The reliability coefficients for each of the five scales of Arabic version of Students As LifeStyle Activists

Scale	Reliability coefficient (Cronbach’s alpha)
Eating behaviors (9 items)	0.05
Food preferences (9 items)	0.30
Thoughts and attitudes of eating (12 items)	0.789
Physical activity behavior (19 items)	0.78
Encouraging and facilitators (17 items)	0.837

**Table 3** Factor analysis of the eating behaviors scale

	Factor 1 (frequency of eating and drinking)	Factor 2 (fruit and vegetables consumption)
Items loading to factor <sup>a</sup>	<ul style="list-style-type: none"> <li>• Weekly frequency of eating breakfast</li> <li>• Frequency of eating junk food while watching TV</li> <li>• Frequency of drinking carbonated beverages</li> <li>• Frequency of eating fast food</li> </ul>	Weekly fruit consumption Weekly vegetable consumption Weekly fruit juice consumption

**Notes:** <sup>a</sup>Variables ordered in terms of decreasing loadings.

## Results of validity analysis

We divided the SALSA survey into smaller scales based on their related questions resulting in five scales. Then, we addressed each scale alone, showing how many factors each scale has.

### Eating behaviors scale

This scale has nine items prior to PCA. As illustrated in Table 3, two items do not load above 0.3 on this scale, so we removed the following two items: How many times you eat useless meals per week? How many cups of water do you drink usually (one cup =052 mL)? Then, we iterated the analysis until we got two factors. The first factor has four items (How many times you eat breakfast per week? How many times you eat junk food during watching TV? How many cups of carbonated beverages do you usually drink? How many times per week do you eat fast food, such as McDonalds, Hungry Jacks, Pizza Hut, Chinese, or Asian takeaway?). The second factor has three items (How much share of the fruits do you eat per week? How much share of the vegetables do you eat per week? How many cups of fruit juice do you drink a day: one cup =052 mL?).

### Food preferences scale

This scale has nine items prior to PCA. The item of “I rarely eat vegetables and fruits at home?” does not load above 0.3, so we removed it, resulting in two factors. As illustrated in Table 4, the first factor has four items (I avoid eating fries and chips? Do you have opinion about the food, which is bought to the house? Do you choose what you eat at home? Do you have opinion about the meals that are bought to the house?). The second factor has four items (Do you use fast food and carbonated beverages equally? I cannot eat fruits and vegetables due to their high cost? Do you choose what you eat for lunch? Do you bring some fruits and vegetables to school?).

### Thoughts of eating scale

This scale has 12 items prior to PCA. The item of “Do you think that healthy food help you to build muscle?” does not

load above 0.3, so we removed it. Then, after iterating the analysis, we found the item of “Do you think that healthy food help you to have more energy?” does not load above 0.3, so we removed it as well. Eventually, we got two factors, as illustrated in Table 5. The first factor has six items (Do you think that healthy food help you to set a good example for your friends? Do you think that healthy food help you to increase the fame? Do you think that healthy food help you to perform better in sports? Do you think that healthy food help you save money? Do you think that healthy food help you to improve the outward appearance? Do you think that healthy food help you to achieve good scores in school?). The second factor has four items (Do you think that healthy food help you lose weight? Do you think that healthy food help you to concentrate and think better? Do you think that healthy food help you to gain weight? Do you think that healthy food help you feeling better?).

### Play and exercises scale

This scale has 19 items prior to PCA. The item of “During the week, how many times you play sports of various kinds (such as walking to school or jogging, aerobics, basketball, volleyball, jumping rope, football ... etc.)?” does not load above 0.3, so we removed it. Then, we iterated the analysis with four factors as a cutoff for the number of factors. However, we did not reach the simple structure of factor analysis, so we fixed

the number of factors into 3. We found that two items do not load above 0.3 (Do you agree that there is a close space I can go to it in order to exercise? And do your parents believe that going to/coming back from school is safe?). Thus, we removed them and iterated the analysis. However, we did not reach the simple structure with three factors, so we iterated the analysis with two factors. We found that two items do not load above 0.3; these are: Do you think that playing sport is difficult if there is no one train with you? And do you think that it is difficult to play sport because you prefer not to sweat or increase your body temperature? Thus, we removed these items and iterated the analysis, to get a two-factor scale, as illustrated in Table 6.

The first factor has 11 items (Do you think that you are not good at sports, and this makes the sport difficult for you? Do you think that the lack of sufficient power make your training difficult? Do you think that full awareness of your body shape and fitness level makes your sport training difficult? Do you think that having to wear sports clothes makes it difficult for you to play sport? Do you think that you not preferring to play or train makes difficult for you to do regular sport? Do you think that if your parents do not want to play sport with you make it difficult for your practice? Do you think the fact that you do not want to get any injuries makes the sport difficult? Do you think that if others scoff at your performance level it will make your practice difficult? Do you think that

**Table 4** Factor analysis of the food preferences scale

	<b>Factor 1 (in-home eating habits)</b>	<b>Factor 2 (out-home eating habits)</b>
<b>Items loading to factor<sup>a</sup></b>	<ul style="list-style-type: none"> <li>• Avoid eating fries and chips</li> <li>• Having opinion about the food varieties that are bought into the house</li> <li>• Choosing what you eat at home</li> <li>• Having opinion about the meals that are brought to the house</li> </ul>	<ul style="list-style-type: none"> <li>• Using fast food and carbonated beverages equally</li> <li>• Not able to eat fruits and vegetables due to their high cost</li> <li>• Choosing what you eat for lunch</li> <li>• Bringing some fruits and vegetables to school</li> </ul>

**Notes:** <sup>a</sup>Variables ordered in terms of decreasing loadings.

**Table 5** Factor analysis of the thoughts of eating scale

	<b>Factor 1 (thoughts about foods and personal performance)</b>	<b>Factor 2 (thoughts about personal health)</b>
<b>Items loading to factor<sup>a</sup></b>	<ul style="list-style-type: none"> <li>• Thoughts about healthy food help you to set a good example for your friends</li> <li>• Thoughts about healthy food help to increase the fame</li> <li>• Thoughts about healthy food help in better performance in sports</li> <li>• Thoughts about healthy food help you to save money</li> <li>• Thoughts about healthy food help in improving the outward appearance</li> <li>• Thoughts about healthy food help you to achieve good marks in school</li> </ul>	<ul style="list-style-type: none"> <li>• Thoughts about healthy food help you lose weight</li> <li>• Thoughts about healthy food help you concentrate and think better</li> <li>• Thoughts about healthy food help you gain weight</li> <li>• Thoughts about healthy food make you feel better and healthier</li> </ul>

**Notes:** <sup>a</sup>Variables ordered in terms of decreasing loadings.

not having access to suitable places to play and have fun will make your practice difficult? Do you think that the lack of playgrounds makes your practice difficult? Do you think that your friends not practicing any kind of physical exercise will make your practice difficult?).

The second factor has three items (During the school day, how much time do you spend watching TV before and after school? How do you go to and from school [you can choose more than one answer]? In the school day, how much time do you spend using a computer or Facebook before and after school?).

### Encouragement scale

This scale has 17 items prior to PCA, 4 factors were determined immediately as a simple structure. As illustrated in Table 7, the first factor has six items (Does your dad encour-

age you to watch TV and play video games and computers? Do your friends encourage you to play by telling you that you are good at exercise and sports? Does your teacher encourage you to exercise? Does your mother encourage you to exercise? Do your friends ask you to walk or ride a bike with them? Does your teacher encourage you by telling you that you play well and exercise?). The second factor has five items (Do your friends encourage you to play and exercise with you? Does your dad encourage you by telling you that you play well and exercise? Does your mother encourage you to watch TV and play with video games and computers? Does your dad encourage you to exercise? Does your mother encourage you to play and exercises with you?) The third factor has three items (Do your friends encourage you to exercise? Does your dad encourage you to play and exercise with you? Does your mother encourage you by telling you that you play

**Table 6** Factor analysis of the play sport and exercise scale

	<b>Factor 1 (health and exercises)</b>	<b>Factor 2 (entertainments)</b>
<b>Items loading to factor<sup>a</sup></b>	<ul style="list-style-type: none"> <li>• Thought about being not good at sports, which makes the sport difficult</li> <li>• Thought about the lack of sufficient power makes your practice difficult</li> <li>• Your awareness of your body shape and low fitness level makes it difficult to do sport</li> <li>• Feeling uncomfortable to wear sports clothes makes it difficult to do sport</li> <li>• Do not personally like to play or train makes it difficult to do sport</li> <li>• Parents do not want to play sport, which makes the sport difficult</li> <li>• Not wanting to get any injuries makes it difficult to practice</li> <li>• Others scoff at your practice of sport makes your decision to practice difficult</li> <li>• Not having access to suitable places to play and have fun makes it difficult to do sport</li> <li>• The lack of playgrounds makes sport difficult to perform</li> <li>• Friends who do not practice any kind of physical exercise make it hard for you to do regular activity</li> </ul>	<ul style="list-style-type: none"> <li>• Watching TV before and after school</li> <li>• How to go to and from school</li> <li>• Using a computer or an amusement net or Facebook before and after school</li> </ul>

**Notes:** <sup>a</sup>Variables ordered in terms of decreasing loadings.

**Table 7** Factor analysis of the encouragement scale

	<b>Factor 1 (encouragement from surrounding people)</b>	<b>Factor 2 (encouragement from family/friends)</b>	<b>Factor 3 (verbal encouragement)</b>	<b>Factor 4 (encouragement to exercise with)</b>
<b>Items loading to factor<sup>a</sup></b>	<ul style="list-style-type: none"> <li>• Encouragement from dad to watch TV and play with video games</li> <li>• Encouragement from friends telling you that you play and exercise well</li> <li>• Encouragement from teacher to exercise</li> <li>• Encouragement from mother to exercise</li> <li>• Encouragement from friends to walk or ride a bike with them</li> <li>• Encouragement from teacher telling you that you play and exercise well</li> </ul>	<ul style="list-style-type: none"> <li>• Do your friends encourage you to play and exercise with you?</li> <li>• Does your dad encourage you and tell you that you play and exercise well?</li> <li>• Does your mother encourage you to watch TV and play with video games and computers?</li> <li>• Does your dad encourage you to exercise?</li> <li>• Does your mother encourage you to play and exercise with you?</li> </ul>	<ul style="list-style-type: none"> <li>• Encouragement from friends to exercise</li> <li>• Encouragement from dad to play and exercise with you</li> <li>• Encouragement from mother telling you that you play and exercise well</li> </ul>	<ul style="list-style-type: none"> <li>• Request from dad to walk or ride a bike with them</li> <li>• Encouragement from teacher to play and exercise with you</li> <li>• Encouragement from friends to watch TV and play with them video games and computers</li> </ul>

**Notes:** <sup>a</sup>Variables ordered in terms of decreasing loadings.

well and exercise?). The same number of items was obtained for the fourth factor (Does your dad ask you to walk or ride a bike with him? Does your teacher encourage you to play and exercises with you? Does your friends encourage you to watch TV and play with video games and computers?).

## Attitudes regarding healthy food

Regardless of gender, most students did not view healthy food in a positive light (Figure 1). For nearly all items, male students were more likely to endorse positive statements about healthy food than female students, although these differences were not significant (Figure 1). There was one major exception: a higher proportion of female students agreed that “healthy food makes you feel better”, and this difference was statistically significant (44% vs 36%,  $P<0.05$ ). Slightly fewer male students (37%) than female students (40%) agreed that healthy food helped you gain weight, but this difference was not statistically significant. The proportion of female students agreeing with the statements about healthy food was <50% for all items. For male students, 50% agreed that healthy food helped them achieve success in school, perform well in sport, and set a good example for friends. However, for the remaining nine items, <50% of male students agreed (Figure 1).

## Exercise barriers and facilitators

In terms of exercise facilitators, a minority of students agreed that they had access to nearby places to exercise (44%) and that

their parents agreed that they had a safe route to school (40%) (Table 3). Interestingly, less than half of the students (35%) reported that access to places to play was a problem, and again a minority (39%) of students reported familial barriers. The most frequently endorsed barriers were the lack of someone to train with (62%) and a lack of desire to sweat (61%). For both of these barriers, a significant gender difference was identified, with higher proportions of male students endorsing these statements compared to female students (Table 8).

Gender differences were also seen for other barriers, and in general higher proportions of male students were more likely to agree that barriers existed. The exception was lack of access to places to play, where a slightly higher proportion of female students (35%) reported this as a barrier compared to male students (34%) (Table 8).

## Discussion

The results from this study indicate several areas in which healthy lifestyle interventions can be targeted. First, relatively few students held positive attitudes toward healthy food. Second, students identified both social and personal barriers to exercise that can be targeted in interventions. These barriers were more frequently reported for male students, suggesting that additional emphases in these areas can be included in interventions delivered at male schools.

In terms of the SALSA survey, most scales had reasonable reliability except low values of eating behaviors (0.05)

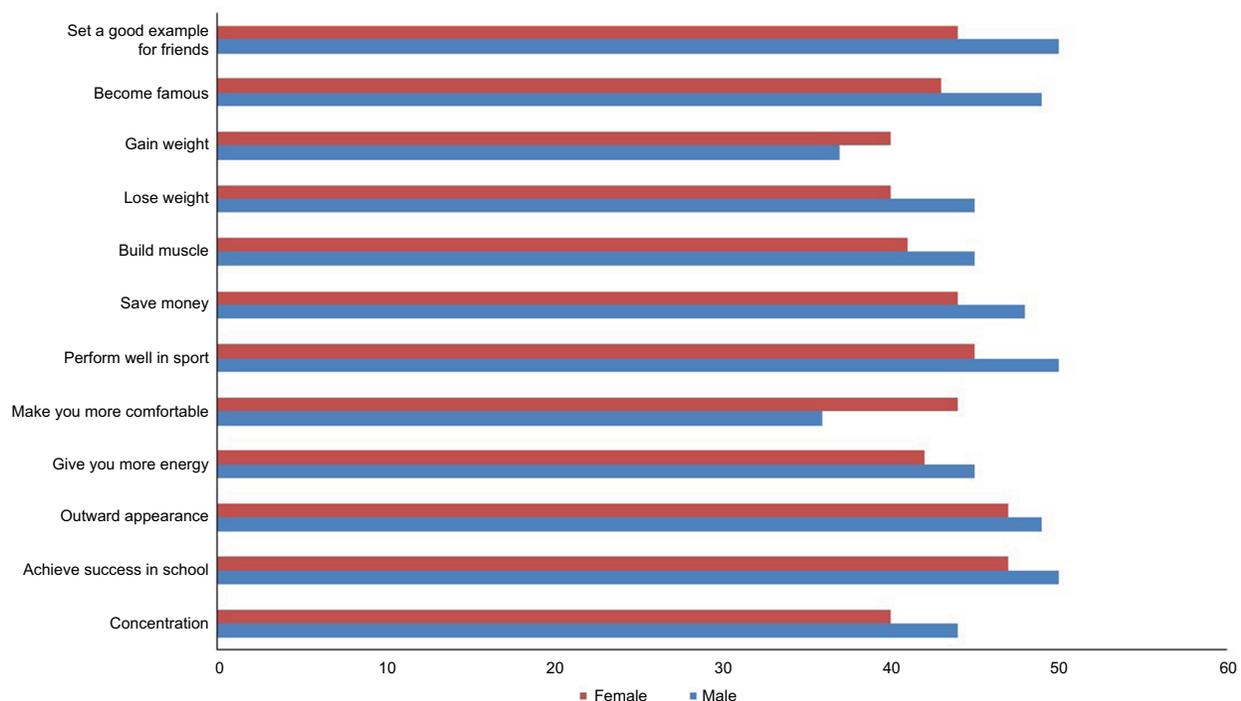


Figure 1 Attitudes toward healthy food, by sex: % agreeing with statements about healthy food.

**Table 8** Exercise barriers and facilitators, overall and by sex: N (%) students endorsing statements

Statement	Overall N (%)	Male N (%)	Female N (%)
<b>Facilitators</b>			
There are places to exercise nearby	350 (44)	146 (46)	204 (43)
Parents feel route to school is safe	316 (40)	117 (37)	199 (42)
<b>Barriers to practice/sport: environmental</b>			
Lack of access to places to play	275 (35)	109 (34)	166 (35)
<b>Barriers to practice/sport: familial</b>			
Parents do not want you to play a sport <sup>a</sup>	305 (39)	149 (47)	156 (33)
<b>Barriers to practice/sport: social</b>			
Lack of person to train with <sup>a</sup>	489 (62)	220 (70)	269 (57)
Friends do not exercise	286 (36)	116 (37)	170 (36)
Belief that others mock practice	296 (37)	122 (39)	174 (37)
<b>Barriers to practice/sport: personal</b>			
Lack of power <sup>a</sup>	298 (38)	150 (47)	148 (31)
Awareness of body shape and its suitability <sup>a</sup>	301 (38)	147 (47)	154 (32)
Concern about injury <sup>a</sup>	324 (41)	161 (51)	163 (34)
Do not like training <sup>a</sup>	299 (38)	150 (47)	149 (31)
Belief of not being good at sports <sup>a</sup>	294 (37)	151 (48)	143 (30)
Do not want to sweat <sup>a</sup>	486 (61)	213 (67)	273 (57)
Do not like wearing sports clothes <sup>a</sup>	309 (39)	157 (50)	152 (32)

**Note:** <sup>a</sup>Indicates a significant difference between genders (chi-squared test,  $P < 0.05$ ) for the statement.

and food preferences (0.30). Those low values are referred to variances in the nature of questions from asking about drinking water, tea, and juice to eating vegetables and fruits pertaining to validity, five scales (eating behaviors, food preferences, thoughts of eating, play and exercises, and encouraging scales) derived from SALSA survey entail items loading above 0.3 on their scales, in which these items are correlated well with each of them. This is considered the first preliminary factor analysis conducted for SALSA survey since its inception in Australia.

Few Jordanian high school students held positive attitudes toward healthy food. Students also reported several barriers to exercise, with some barriers more salient for male than female students.

These findings have some consistency with findings from other studies in Arab countries. For example, few gender-specific differences for barriers to healthy eating were identified for Kuwaiti university students, whereas such differences were found for barriers to physical activity.<sup>22</sup> Interestingly, Musaiger et al found these barriers to be more salient for female students than male students; for example, higher proportions of female students reported access to affordable places to be active and lack of skills for activity as barriers compared to male students. In a seven-country study of Arab adolescents, including Jordanian adolescents, aged 15–18, lack of enjoyment of and

motivation for eating healthy foods was a barrier.<sup>22</sup> In this study, Jordanian adolescents also reported concern about lack of skills for physical activity as a barrier. Interestingly, higher proportions of Jordanian adolescents reported access to places to exercise as a barrier in Musaiger et al's study<sup>22</sup> than in our study (49% reporting it as "important" or "somewhat important" in that study, vs 35% in this study). One possible explanation for this difference is the different age groups, as the adolescents in Musaiger et al's study<sup>22</sup> were older. Another possibility is regional difference: data for this study were collected from a city in Northern Jordan, whereas Musaiger et al collected data from an unspecified "major city" in Jordan. Musaiger et al<sup>22</sup> also found that lack of information and motivation for healthy eating were significant barriers. Although our study did not evaluate this explicitly, it may be that lack of information around healthy food is a factor in students' relative absence of positive attitudes regarding healthy eating. Regardless, the findings from the current study suggest that health-promoting interventions should target beliefs about healthy food and work to address personal and social barriers to exercise. The approach for addressing some of these barriers may need to be gender-specific.

Furthermore, obesity in children and youth has been associated with multifaceted barriers to adopt healthy eating and adequate physical activity<sup>13,23</sup> including cultural norms,

neighborhood characteristics, and school environment, and these can significantly differ among various settings.<sup>24,25</sup> In the current study, participating students reported several barriers to healthy eating and physical activity with some of them having already been identified in the literature. For example, literature has identified several barriers to healthy eating, including easy access and low cost of fast food,<sup>26–29</sup> which is not the case for healthy food.<sup>30–32</sup> Adolescents' attitude toward healthy food can significantly impact their eating behaviors<sup>30,33,34</sup> including lack of funding to provide healthy food,<sup>27</sup> availability of unhealthy food at school,<sup>29</sup> insufficient food brought from home,<sup>33,35</sup> and peer pressure such as teasing and stigma.<sup>27,29,36,37</sup> School students tend to choose their food preferences and eating behaviors based on their parents' preferences and beliefs. Consistent with the literature, the current study identified several barriers to regular exercise including school's scarce physical activity opportunities<sup>36,38–40</sup> and lack of peer and parental support<sup>41,42</sup> can negatively impact adolescents' attitude toward physical activity. Parents reported lack of time or motivation to exercise with their children.<sup>43–45</sup> Interestingly, one of the barriers to regular exercise, as reported by students in the current study, was having nobody to exercise with, which could imply peers and friends. In Arab countries, the main barriers to healthy diet were lack of information related to healthy nutrition, motivation, and time to prepare or eat healthy foods due to school commitments.<sup>22</sup> These barriers were similar for physical activity as well.<sup>22</sup> In fact, Arab countries, including Jordan, have high availability of unhealthy food and low level of physical activity promoting high intake and low expenditure.<sup>22</sup>

## Conclusion

The Arabic version of SALSA survey is reliable and valid to determine attitudes and perceived barriers to healthy eating and physical activity in Jordanian adolescents. Positive attitudes and beliefs of healthy eating and adequate physical activity in Jordanian adolescents should be enriched through providing health education in school classes, improving schools' facilities tailored to exercises performance, and enhancing sharing motivations and feelings about exercises among peers/friends in schools.

## Abbreviations

NCDs, noncommunicable diseases; PCA, principal components analysis; SALSA, Students As LifeStyle Activists; WHO, World Health Organization.

## Ethics approval and consent to participate

Approval for the study was obtained from the Human Research Ethics Committees at the Ministry of Education, relevant educational school districts, and Jordan University of Science and Technology in Jordan. The study was carried out in accordance with the principles of the Declaration of Helsinki.

## Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

## Author contributions

SS developed the original questionnaire and advised on the study. All authors contributed toward data analysis, drafting and critically revising the paper, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

## Disclosure

The authors report no conflicts of interest in this work.

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