Original Article :

Pilot Testing of the Arabic Version of Cognitive and Affective Variable and Physical Activity Questionnaire for Adolescents (PAQ-A) Scales

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Abstract

Background and Aims:

Inadequate physical activity (PA) among Arabic-speaking female adolescents is a major health concern, yet psychometrically sound instruments are lacking to assess their physical activity and perceptions related to the behavior. The aim of this cross-section study was to translate; culturally adapt; and evaluate face and content validity, internal consistency and test-retest relaibility of the Physical Activity Questionnaire for Adolescents (PAQ-A) and scales assessing psychosocial factors related PA for use with Arabic-speaking female adolescents.

Methods:

A total of 31 Saudi female adolescents, 13-18 years of age, enrolled in 7th-12th grade in intermediate (54.7%) and high (45.1%) schools in Saudi Arabia participatedin the study. They were asked to complete the surveys focusing on their demographic information, PA and perceived barriers to PA, self-efficacy, PA enjoyment, social support for PA and commitment to PA. The psychometric properties of the scales, including face validity (6 Saudi female adolescents), content validity (5 bilingual experts in the field), and internal consistency/test-retest reliability (25 Saudi female adolescents) were evaluated.

Results:

The PAQ-A and PA perceptions scales had interrater reliability coefficients ranging from .75-1.00, which reflects acceptable content validity. Also, all scales had good test-retest reliability with the intraclass correlation coefficients ranging from .84-.96. Internal consistency was acceptable with Cronbach's α ranging from .84-.90.

Conclusions:

The PAQ-A and PA perceptions scales were found to be reliable and valid tools to use with Arabic-speaking female adolescents.

Key words:

Physical activity, adolescents, Saudi Arabia

Introduction

Physical activity (PA) is defined as any movement by skeletal muscles that involves energy expenditure[1]. A is essential during the adolescence period to maintain physical and mental health as well as reduce the risk of obesity and development of chronic conditions, such as diabetes and hypertension[2,3,4]. PA provides social and psychological benefits as well, such as improving concentration and learning [5,6,7], reducing anxiety and depression[4,8,9,10.] The World Health Organization (WHO) established a recommendation for adolescents to engage in at least 60 minutes of moderate to vigorous PA (MVPA) per day to attain or maintain a state of health[11]. Despite the well-recognized importance of attaining sufficient PA, participation remains inadequate among adolescents, especially for those who are female. For example, in Saudi Arabia, approximately 75% of Saudi female adolescents do not meet the WHO recommendation[3,12].

In Saudi Arabia, numerous factors, such as sedentary behaviors, inadequate PA, and lack of PA classes in all-female schools, contribute to the high prevalence of overweight (12.4%) and obesity (20.9%) noted among female adolescents in the country[3,13,14]. Several studies conducted in Saudi Arabia have established physical inactivity as a major risk factor for several chronic conditions, including overweight and obesity, among adolescents[12,15]; however, no studies were found that assessed PA perceptions among those populations. Numerous studies conducted in Saudi Arabia have shown dramatic declines in PA across adolescence[12,16], particularly among females[17], indicating that intervening with female adolescents to help them increase their PA is a priority. To optimally promote PA among female adolescents, an urgent need exists to understand factors that influence their PA, including those that are psychosocial[18]. Unfortunately, in Saudi Arabia, reliable and valid scales to examine psychosocial variables related to PA among female adolescents are lacking. Moreover, scales typically used to assess PA globally, such as the Physical Activity Questionnaire for Adolescents (PAQ-A), have not been translated to Arabic and then tested with Arabic-speaking Saudi female adolescents to evaluate their psychometric properties.

Thus, the aim of this study was to translate (from English to Arabic), culturally adapt, and evaluate the psychometric properties of the PAQ-A and the following scales assessing psychosocial factors related PA with Arabic-speaking female adolescents in Saudi Arabia: Perceived Barriers Scale, Perceived PA Self-efficacy Scale, PA Enjoyment Scale, Social Support Scale, and

Commitment to PA Scale for Adolescents. Specifically, internal consistency, test-retest reliability, and content validity were assessed.

Methods

Design, Participants, and Setting

The convenience sample for this cross-sectional study included 31 female adolescents (6 participants for face validity and 25 participnats for internal consistency/ test-retest reliability[19,20], 13-18 years of age, in Jeddah, Saudi Arabia, who were recruited from a summer student camp by the first author. Participants were included in the study if they: (a) were between 13 and 18 years old, (b) were females, (c) enrolled in intermediate and high schools, and (d) were able to read and understand the assent form and questionnaires written in Arabic. Adolescents were excluded from the study if they had a chronic condition or health problem preventing them from participating in PA. Approval from a University institutional review board (IRB) in the U.S. and King Abdullah International Medical Research Center (KAIMRC) in Saudi Arabia were obtained before any data collection.

Procedures

After contacting the principal and obtaining the camp center's leader permission, the first author visited the center to recruit female adoelscents participants. Upon arriving, the center manager briefly introduced the first author to the selected age groups. Then, the first author approached each of the six groups to again introduce herself in more detail and invite ten female adolescents from each group to participate in the study. The first author discussed the study aim, inclusion and exclusion criteria, consent and assent process, and study procedures with 60 female adolescents. The first author ensured that the participants were able to identify the difference between the consent and assent form and understand that participation would not be possible without completed and signed forms. The first author thoroughly explained to the prospective participants their role in the study, such as completing the questionnaires and providing feedback and suggestions. The first author assumed responsibility for obtaining information related to both tasks.

The first author then distributed the consent and assent forms in an envelope with the center's address on it to 60 participants and asked them to return the completed forms the next day in the same envelope, but sealed. The first author explained that consent and assent forms signed by the parents and their daughters, respectively, were needed prior to any study participation or data collection. The first author

answered all of the prospective participants' questions. Only ten female adolescents were interested in participating and returned signed consent and assent forms. To evaluate face and content validity, the first author invited 10 female adolescents who were interested to participate, but only 8 were received information about this part of the study. The first author excluded 2 of the 8 participants because they did not meet the inclusion criteria (one less than 13 and the other above 18 years of age). As a result, 6 participants were included in this part of the study for face validity evaluation.

To assess test-retest reliability, 25 participants who were interested to participate, completed the questionnaires at baseline and again two weeks later were recruited virtually. At both time points, the participants completed the questionnaires online via Qualtrics. A recruitment flyer for the study was created by the first author. Parents and participants indicated their interest in participating in the study by electronically signing consent and assent forms, respectively. Each participant was then able to complete the questionnaires directly through a link provided in the flyer. The flyer was sent through electronic apps called "WhatsApp" to several individuals known by the first author, and then a snowballing method was used to send the flyer to additional people.

Translation procedure:

The translation of these scales was completed in 4 steps: (a) forward translation, (b) revision of the translation, (c) back-translation, and (d) revision of the back-translation[21,22]. All questionnaires were translated to Arabic by a bilingual native Arabic translator who was identified as being fluent in English by a qualified translation center in Jeddah, Saudi Arabia. Then, all translated questionnaires were translated back to English by another bilingual Arabic translator who was reported to be fluent in English by another qualified translation center in Jeddah, Saudi Arabia. The English, Arabic, and back-translated versions were compared and discussed by a panel comprised of five experts in pediatrics or survey development who were fluent in Arabic/English languages. The discussion resulted in a preliminary version of the scales.

Psychometric properties testing procedure:

After the data were collected, reliability and validity of the following scales were examined: Perceived Barriers Scale, Perceived PA Self-efficacy Scale, PA Enjoyment Scale, Social Support Scale, Commitment to PA Scale for Adolescents, and PAQ-A. The validity of the scales was evaluated using face validity and content

validity. The face validity was used to determine the relevance of the items to the theoretical constructs based on the judgment of non-experts or test participants[21]. To establish face validity, the scales were pilot tested among 6 female adolescents who met with the first author individually so that each adolescent could complete the paper-pencil questionnaire to report if the items associated with each instrument were relevant, easy to complete, meaningful, and understandable. The six participants read and completed all questionnaires. The first author interviewed each participant and discussed with the participants any feedback and any recommendations for improving each instrument. Revisions and modifications were made to the scales based on the female adolescents' feedback and recommendations. Items that were identified as being inappropriate to Saudi culture were removed from the questionnaires, and new items that were reported as being appropriate to Saudi culture were added to the questionnaires to replace the deleted inappropriate items.

For the PAQ-A scale, some choices were removed from question 1 for the activities that were not applicable in Saudi Arabia, such as, rowing/canoeing, in-line skating; and some activity choices that were applicable in Saudi Arabia were added, such as Zumba, outdoor play (hide and seek), indoor chores (mopping, vacuuming, sweeping, cleaning), use of stairs or treadmill, karate, and taekwondo. Question 2 concerning physical education was removed from the scale because this type of class is not offered in female schools in Saudi Arabia. Question 3 regarding lunch was changed to breakfast because breakfast is the only meal served to Saudi students in schools.

For the perceived barriers to PA scale, item 13 ("It costs too much to do physical activities that I like") was changed to "It costs too much to do physical activities that I like or participation in the gyms costs a lot of money;" and item 14 ("It is hard to find good places to do physical activities that I like"), was changed to "It is hard to find good places to do physical activities that I like or lack of gyms facility in each district". The following item (item 18) was added to the scale to assess barriers to PA evident in Saudi Arabia: "There are no physical education classes in female schools". The PA Enjoyment Scale, items 1 and 4 ("It's fun" and "I enjoy it") were combined into one item (item 1) because female adolescents reported that both questions had the same meaning (when translated into Arabic). For the social support scale, one option was removed from item 9 (gym teacher, other teacher, or coach) because it is not applicable in Saudi Arabia.

The content validity was used to determine the relevance of the items of the content domains in the scales. Five bilingual Arabic-English speaker experts with expertise in scale development or pediatric nursing evaluated each modified questionnaire for item relevance and appropriateness to the theoretical constructs. A 4-point ordinal rating relevance scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = very relevant) was used in this study to evaluate the relevance of each scale's items[22].

The content validity was evaluated using three indicators. First, the interrater reliability (or agreement) regarding all items of each scale was examined. The process involved measuring the degree of agreement among several raters for the same construct and scale based on the same predefined criteria[22]. Second, the content validity index (CVI), which is the most-used measure among nurse researchers, was determined. It is defined as "the degree to which an instrument has an appropriate sample of items for the construct being measured"23,p.423). It can be measured with two index types: the item content validity index (I-CVI) and the scale content validity index (S-CVI) [24]. Third, the average congruency percentage (ACP) was calculated. It is defined as the average percentage across all experts of each expert's indication regarding whether the scale is congruent or relevant to the construct[24]. An instrument with an inter-rater reliability greater than 75%[25,26], an I-CVI of 0.83, a S-CVI of 0.80 or above[23], and an ACP of 90% or higher is considered acceptable[24]. Test-retest reliability and internal consistency were determined. The test-retest reliability was conducted to evaluate the reliability and stability of all questionnaires over time[21]. Test-retest reliability was assessed by calculating the intraclass correlation coefficient (ICC) [27]. The internal consistency was used to determine the consistency of the results across the scale items within the test [21]. Internal consistency was assessed by calculating Cronbach's α for each instrument[28,29].

Measures

Physical activity (PA):

The PAQ-A is a 7-day recall measure of adolescents' general PA levels and level of PA engaged in 7 days during the school year30, which is a modified version of the Physical Activity Questionnaire for Older Children (PAQ-C). The questionnaire for older children differs from the one for adolescents because it includes a question regarding "recess", which does not apply for adolescents. The PAQ-A can be administered in a classroom setting, and it provides a summary PA score derived from

8 items. A higher mean score indicates a higher level of PA, and a lower mean score indicates a lower level of PA[30]. Acceptable internal consistency reliability has been reported with Cronbach's alpha coefficients ranging from 0.77 to 0.8831. Moderate and high concurrent validity (rho = 0.56 and 0.63) was reported for the PAQ-A when its results were compared with those from an activity monitor (r = 0.33 and 0.93) [31].

Perceived barriers to PA:

The Perceived Barriers of PA Scale is a17-item scale that is used to measure the perceived struggles or obstacles that prevent adolescents from engaging in PA[32,33]. Cronbach's alphas ranging from .86 to .88 have been reported[34]. A higher mean score on the Perceived Barriers to PA Scale indicates greater barriers to PA.

Perceived PA self-efficacy:

The PA Self-Efficacy Scale is a 6-item scale used to determine how confident adolescents are while doing PA in their spare time[35]. A higher mean score for the scale indicates a higher level of PA self-efficacy. PA enjoyment: The PA Enjoyment Scale includes 6 items to assess pleasant and non-pleasant PA experiences[36]. Cronbach's alpha coefficients of .78 and .81 have been noted[34]. A higher mean scale score indicates a higher level of PA enjoyment.

Social support:

The 8-item Social Support Scale measures the assistance received from others to encourage PA. Cronbach's alphas ranging from .93 to .84[37], and item-total correlation coefficients ranging from .50 to .66 have been reported. A test-retest reliability coefficient of .78 has been noted[38]. Validity of the scale was established by correlating the females' social support mean score with their accelerometer-measured light, moderate, and vigorous PA (LMVPA) and MVPA. The scale had good criterion-related validity based on the positive correlations with the females' accelerometer-measured LMVPA ($r = .12$, $p < .0001$) and MVPA ($r = .13$, $p = .006$)38. A higher mean score of the social support scale indicates a higher level of social support for PA.

Commitment to PA:

The Commitment to Physical Activity Scale for Adolescents (CPASA) is an 11-item modified version developed from 3 scales[39,40,41]. Internal consistency was supported for the modified 11-item scale in 5th to 8th grade females with a Cronbach's alpha coefficient of .81, and item-total correlation coefficients ranging from .35 to .64. The scale had a good test-retest reliability coefficient of .88[42]. Also, the CPASA was significantly correlated with LMVPA ($r = .10$, $p = .038$) and MVPA ($r = .10$, $p = .032$) 42. A higher mean score of the CPASA

scale indicates a higher level of commitment to PA.

Statistical Analsis:

The Statistical Package for the Social Sciences computer software was used to analyze the data. Descriptive statistics were calculated to describe participant demographics and the study variables. For content validity evaluation, the interrater reliability (or agreement), the content validity index (CVI), and the average congruency percentage (ACP) were calculated[23,24,25,26]. The intraclass correlation coefficient (ICC) was calculated to assess the test-retest reliability[27] and the Cronbach's alpha was calculated to assess the internal consistency[29].

Results

Demographic characteristics

A total of 31 Saudi female adolescents were recruited from Jeddah, Saudi Arabia. Participants' ages ranged from 13 to 18 years with a mean of 15.22 (SD = 1.67) years. As shown in Table 1, the largest percentage represented 14-year-old females (n = 8, 25.8%). Slightly more than half of the study participants' were from intermediate schools (7th-9th grade; n = 17, 54.7%), compared with high schools (10th-12th grade; n = 14, 45.1%). As shown in Table 1, 8th grade had the highest percentage of participants (n = 7, 22.5%).

Table 1: Sample Demographic Characteristics (N = 31)

Demographic variable	*n*	%
Age		
13	5	16.1
14	8	25.8
15	5	16.1
16	5	16.1
17	4	12.9
18	4	12.9
Grade		
7th	6	19.3
8th	7	22.5
9th	4	12.9
10th	5	16.1
11th	5	16.1
12th	4	12.9

Validity

Face and content validity:

As shown in Table 2, the interrater reliability coefficients ranged from 75% to 100%. The PA Enjoyment scale had the highest coefficient (IRR = 100%). The item content validity indexes (I-CVI) of all scales were acceptable at 1.00. The average congruency percentages (ACP) ranged from 90.80 to 95.20 with the PA Enjoyment scale having the highest percentage (ACP = 95.20). As demonstrated in Table 2, all scales had acceptable content validity based on the three indicators[23,24,25,26].

Reliability

Test-retest reliability:

As shown in Table 3, the intraclass correlation coefficients were reported for all scales with the Commitment to PA Scale having the highest coefficients (ICC = .96). As

Table 2: Content Validity for all Scales

Scales	Inter-rater reliability coefficient (%)	I-CVI	S-CVI/UA	ACP (%)
PAQ–A	87	1.00	1.00	95.00
Perceived barriers to PA	76	1.00	1.00	91.60
PA self-efficacy	90	1.00	1.00	93.60
PA enjoyment	100	1.00	1.00	95.20
Social support	75	1.00	1.00	90.80
Commitment to PA	85	1.00	1.00	93.20

demonstrated in Table 3, all the scales had good or excellent reliability based on criteria for good reliability ranging between 0.70 to 0.90 and excellent reliability being greater than 0.90[27].

Internal consistency: An internal consistency analysis was performed calculating Cronbach's α for each instrument[29]. As shown in Table 3, the internal consistency of the scales ranged from .84 to .90 with the Commitment to PA Scale having the highest Cronbach's α for the (α = .90). As demonstrated in Table 3, all scales had good reliability based on criteria for "acceptable internal consistency" [29] recommended by Tavakol and Dennick (2011).

Table 3: Test-Retest Reliability and Internal Consistency for all Scales

Scales	ICC	[95% CI]	*α*
PAQ–A	.84	[.65, .93]	.84
Perceived barriers to PA	.94	[.86, .97]	.85
PA self-efficacy	.88	[.74, .95]	.88
PA enjoyment	.89	[.76, .95]	.89
Social support	.95	[.89, .98]	.87
Commitment to PA	.96	[.91, .98]	.90

Discussion

To our knowledge, this study is the first to cross-culturally validate the Arabic version of scales assessing PA and PA psychosocial factors related to PA among Saudi female adolescents. The cross-cultural adaptation method recommended by Furr & Bacharach (2008) and Waltz et al. (2010) that consisted of a forward translation of the scale to Arabic, followed by a back-translation to English was followed[21,22]; this method is cost efficient and widely accepted and applied[43,44]. The validity and reliability of the Arabic version of scales were evaluated. The results showed that the scales were psychometrically sound measures of PA and psychosocial factors related to PA among Arabic speaking population. Importantly, the scales had acceptable validity, achieving an average of 1.00 of S-CVI/UA and I-CVI. Moreover, the findings indicated that the scales had good internal consistency, achieving Cronbach alphas ranging from .84 to .90, respectively.

Modifying previously validated measures is more efficient and effective than developing new one, so the changes and modifications made to the scales were done with the consideration to the appropriateness to Saudi culture.

Consistent with a study including Malay adolescents[45] and Taiwanese adolescents as well46, and American adolescents[31], a good internal consistency were reported with a high intraclass correlation coeffieincets and Cronbach alpha for the PAQ-A, which supported the results of this study that the PAQ-A is useful tool among different culture groups. Moreover, the findings of this study were consistent with others conducted among Dutch adolescents showing good content validity and inter-rater agreement between items for PAQ-A that was evaluated by experts in the field[47], which supports the results of this study.

Moreover, the findings of this study are consistent with others showing that the Perceived Barriers to PA Scale had good internal consistency and high Cronbach alpha[32,33,34], which support the results of this study that the Perceived Barriers to PA Scale is useful tool.

In addition, the results of this study are consistent with other studies conducted among American female adolescents that show Perceived PA Self-efficacy Scale has a good reliability with high coefficient and Cronbach alpha[40,48], and contrasted with a study conducted among adoelscents that showed acceptable reliability with acceptable level of Cronbach alpha[49].

The findings of this study are consistent with others showing that PA Enjoyment Scale had good reliability with high Cronbach's alpha at baseline and at post-intervention[34,48], which supports the results of this study that the PA Enjoyment Scale is a good scale to be used.

Also, the findings of this study are consistent with others showing that the Social Support Scale had good reliability with high Cronbach's alpha, item-total correlation, and a test-retest reliability coefficients[37,38], which supported the results of this study that the PAQ-A is useful tool to be used among different groups.

In addition, the findings of this study are consistent with others showing that Commitment to PA Scale for Adolescents had good reliability with high Cronbach's alpha coefficient and good test-retest reliability coefficient[42], which supported the results of this study that the Commitment to PA Scale for Adolescents is useful tool among different groups.

Strengths and Limitations

The study had strengths and limitations. The study included Saudi female adolescents, manyof whom are at high risk for

health-related problems to their low levels of PA. A rigorous translation process was employed that adhered to the steps outlined by Furr & Bacharach (2008) and Waltz et al. (2010) [21,22]. The sample size was small and an alternative criterion standard for each measure was not used; therefore, criterion validity was not evaluated.

PA was measured with a self-report survey (PAQ-A) that elicited PA over the past 7 days, possibly resulting in recall bias50. Although test-retest reliability of the PAQ-A was acceptable at .84, the PAQ-A reports only PA level and not intensity or duration, the latter two of which are important for achieving adequate health[51]. Future research is needed to examine the duration and intensity of PA with this population using an objective measure. Further assessment of the validity of the PAQ-A, as compared to an objective measure, when used with Saudi female adolescents is also recommended. The cross-section study did not test whether psychosocial factors can predict future PA among this age group.

A limitation of this pilot study is that did not determine the construct and criterion validity due to the small sample size and future analysis of psychometric properties with a big sample size among Saudi Adolescents. More research is needed with female adolescents in Saudi Arabia to examine the relationships between cognitive and affective variables and PA measured objectively, such as with accelerometers. Limited studies were found in the literature that objectively measured PA among children[52,53] and adolescents in Saudi Arabia[54].

Conclusion

The PAQ-A and psychosocial factors related to PA were successfully cross-culturally adapted and translated into Arabic. The Arabic version of PAQ-A and psychosocial factors related to PA were found to be reliable and valid for future use among female adolescents in Saudi Arabia. However, having psychometrically sound measures for similar constructs in different languages increases the ability to compare study findings with those from other countries.

References

1. Caspersen J, Powell E, Christenson M. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Pub. Heal. Rep. 1985Mar;100(2):126-31.
2. Al Hazzaa M. Prevalence of physical inactivity in Saudi Arabia: a brief review. East. Med. Heal. J. 2004; 10(4-5): 663-70.
3. Al-Hazzaa M, Abahussain A, Al-Sobayel I, Qahwaji M, Musaiger O. Physical activity, sedentary behaviors and

dietary habits among Saudi adolescents relative to age, gender and region. Int. J. of Beha. Nutr. Phy. Act. 2011 Dec;8(1):1-4.

4. Wassenaar TM, Wheatley CM, Beale N, Salvan P, Meaney A, Possee JB, Atherton KE, Duda JL, Dawes H, Johansen-Berg H. Effects of a programme of vigorous physical activity during secondary school physical education on academic performance, fitness, cognition, mental health and the brain of adolescents (fit to study): study protocol for a cluster-randomised trial. Trials. 2019 Dec;20(1):1-4.
5. Brisswalter J, Collardeau M, René A. Effects of acute physical exercise characteristics on cognitive performance. Sports medicine. 2002 Aug;32(9):555-66.
6. Caterino C, Polak D. Effects of two types of activity on the performance of second-, third, and fourth-grade students on a test of concentration. Per. Mot. Skil. 1999 Aug;89(1):245-8.
7. Field T, Diego M, Sanders E. Exercise is positively related to adolescents' relationships and academics. Adolescence. 2001 Mar;36(141):105-10.
8. Andermo S, Hallgren M, Jonsson S, Petersen S, Friberg M, Romqvist A, Stubbs B, Elinder LS. School-related physical activity interventions and mental health among children: a systematic review and meta-analysis. Sports medicine-open. 2020 Dec;6(1):1-27.
9. Centers for Disease Control and Prevention (CDC). The association between school-based physical activity, including physical education, and academic performance. Retrieved October 30, 2021 from http://www.cdc.gov/healthyyouth/health_and_academics/pdf/pa-pe_paper.pdf. (2010).
10. Hilyer C, Wilson G, Dillon C, Caro L, Jenkins C, Spencer A, Meadows E, Booker W. Physical fitness training and counseling as treatment for youthful offenders. J. Couns. Psy. 1982 May;29(3):292-3.
11. The World Health Organization. Physical activity and young people. Retrieved October 8, 2021 from http://www.who.int/dietphysicalactivity/factsheet_young_people/en/ (2018).
12. Alqahtani N, Scott J, Ullah S. Physical activity and sedentary behaviors as risk factors of obesity among rural adolescents. J. Child Adoles Behav. 2015 Feb;3(1):185-90.
13. Al-Hazzaa M, Abahussain A, Al-Sobayel I, Qahwaji M, Musaiger O. Life-

style factors associated with overweight and obesity among Saudi adolescents. BMC Pub. Heal. 2012 Dec;12(1):1-1.

14. Al-Enazy WH, Al Dahi SK, Al Hariri IM. Prevalence of overweight and obesity among Saudi primary school students in Tabuk, Saudi Arabia. Saudi journal of obesity. 2014 Jan 1;2(1):13.

15. Mahfouz A, Shatoor S, Khan Y, Daffalla A, Mostafa A, Hassanein A. Nutrition, physical activity, and gender risks for adolescent obesity in Southwestern Saudi Arabia. Sau. J. Gastro. 2011 Sep;17(5):318-22.

16. Al-Nuaim A, Al-Nakeeb Y, Lyons M, Al-Hazzaa M, Nevill A, Collins P, Duncan J. The prevalence of physical activity and sedentary behaviours relative to obesity among adolescents from Al-Ahsa, Saudi Arabia: rural versus urban variations. J. Nutr. Metab. 2012 Jan;1(3):156-64.

17. Khalaf A, Ekblom Ö, Kowalski J, Berggren V, Westergren A, Al-Hazzaa H. Female university students' physical activity levels and associated factors: a cross-sectional study in southwestern Saudi Arabia. Int. J. Env. R. Pub. Heal. 2013 Aug;10(8): 2-17.

18. Aarnio M, Winter T, Peltonen J, Kujala M, Kaprio J. Stability of leisure time physical activity during adolescence: a longitudinal study among 16-, 17-and 18-year-old Finnish youth. Scan. J. Med. Sc. Spo. 2002 Jun;12(3):179-85.

19. Browne RH. On the use of a pilot sample for sample size determination. Statistics in medicine. 1995 Sep 15;14(17):1933-40.

20. Julious SA. Sample sizes for clinical trials.chapmanandhall/CRC;2009Aug26.

21. Furr RM. Psychometrics: an introduction. SAGE publications; 2021 Aug 13.

22. Waltz F, Strickland L, Lenz R. The Delphi technique. Strickland O, Lenz E Waltz C, eds. Measurement in Nursing and Health Research. 4th ed. New York, NY: Springer. 2010:311-8.

23. Polit F, Beck T. Nursing research: principles and methods. Lippincott Williams & Wilkins; 7th ed. 2004.

24. Polit F, Beck T. The content validity index: are you sure you know what's being reported? Critique and recommendations. R. Nur. Heal. 2006 Oct;29(5):489-97.

25. Portland Community College. Inter-rater reliability. Retrieved October 9, 2021 from https://www.pcc.edu/resources/academic/learning+assessment/documents/LAC-Mtg2InterRater_Reliability.pdf.

26. Wongpakaran N, Wongpakaran T, Wedding D, Gwet L. A comparison of Cohen's Kappa and Gwet's AC1 when calculating inter-rater reliability coefficients: a study conducted with personality disorder samples. BMC Med. Res. Method. 2013 Dec;13(1):1-7.

27. Koo TK, Li MY. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. J. Chir. Med. 2016 Jun;15(2):155-63.

28. Streiner L. Starting at the beginning: an introduction to coefficient alpha and internal consistency. J. Pers. Ass. 2003 Feb;80(1):99-103.

29. Tavakol M, Dennick R. Making sense of Cronbach's alpha. Int. J. Med. Edu. 2011;2(1):53-55.

30. Kowalski C, Crocker R, Donen M. The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual. College of Kinesiology, University of Saskatchewan. 2004 Aug;87(1):1-38.

31. Janz F, Lutuchy M, Wenthe P, Levy M. Measuring activity in children and adolescents using self-report: PAQ-C and PAQ-A. Med. Sci. Spo. Ex. 2008 Apr;40(4):767-72.

32. Robbins B, Wu Y, Sikorskii A, Morley B. Psychometric assessment of the adolescent physical activity perceived benefits and barriers scales. J. Nurs. Meas. 2008 Sep;16(2):98-112.

33. Robbins B, Sikorskii A, Hamel M, Wu Y, Wilbur J. Gender comparisons of perceived benefits of and barriers to physical activity in middle school youth. Res. Nurs. Heal. 2009 Apr;32(2):163-76.

34. Robbins LB, Pfeiffer KA, Maier KS, Lo YJ, Wesolek SM. Pilot intervention to increase physical activity among sedentary urban middle school girls: a two-group pretest–posttest quasi-experimental design. J. Sch. Nurs. 2012 Aug;28(4):302-15.

35. Saunders P, Pate R, Felton G, Dowda M, Weinrich C, Ward S, Parsons A, Baranowski T. Development of questionnaires to measure psychosocial influences on children's physical activity. Prev. Med. 1997 Mar;26(2):241-7.

36. Kendzierski D, DeCarlo J. Physical activity enjoyment scale: two validation studies. J. Spo. Ex. Psy. 1991 Mar;13(1):50-64.

37. Robbins B, Pfeiffer A, Vermeesch A, Resnicow K, You Z, An L, Wesolek M. Girls on the move, intervention protocol for increasing physical activity among low-active underserved urban girls: a group randomized trial. BMC

Pub. Heal. 2013 Dec;13(1):1-2.

38. Ling J, Robbins B, Resnicow K, Bakhoya M. Social support and peer norms scales for physical activity in adolescents. Am. J. Heal. Behav. 2014 Nov;38(6):881-9.

39. DeBate RD, Huberty J, Pettee K. Psychometric properties of the commitment to physical activity scale. Am. J. Heal. Behav. 2009 Jul;33(4):425-34.

40. Dishman K, Dunn L, Sallis F, Vandenberg J, Pratt A. Social-cognitive correlates of physical activity in a multi-ethnic cohort of middle-school girls: two-year prospective study. J. Ped. Psy. 2010 Mar;35(2):188-98.

41. Pender J, Garcia W, Ronis L. Health Promotion Model-Instruments to Measure HPM Behavioral Determinants: Planning for Exercise [Commitment](Adolescent Version). (1995).

42. Robbins B, Ling J, Wesolek M, Kazanis S, Bourne A, Resnicow K. Reliability and validity of the commitment to physical activity scale for adolescents. Am. J. Heal. Prom. 2017 Jul;31(4):343-52.

43. Beaton E, Bombardier C, Guillemin F, Ferraz B. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000 Dec;25(24):86-91.

44. Geisinger F. Cross-cultural normative assessment: translation and adaptation issues influencing the normative interpretation of assessment instruments. Psy. Ass. 1994 Dec;6(4):304-12.

45. Koh D, Zainudin NH, Zawi MK. Validity and Reliability of the Modified Physical Activity Questionnaire for Adolescents (PAQ-A) among Malaysian Youth. SAJ. 2020;8:355-60.

46. 46.Pratanaphon S, Longlalerng K, Jitmana J, Chaikla K, Nankanya T, Pirunsan U, Boontha N. Content validity and psychometric characteristics of the Thai translated version of the physical activity questionnaire for children (PAQ-C) and adolescents (PAQ-A). J. Assoc. Med. Sci. 2020 Aug;53(3):84-91.

47. Bervoets L, Van Noten C, Van Roosbroeck S, Hansen D, Van Hoorenbeeck K, Verheyen E, Van Hal G, Vankerckhoven V. Reliability and validity of the Dutch physical activity questionnaires for children (PAQ-C) and adolescents (PAQ-A). Archives of Public Health. 2014 Dec;72(1):1-7.

48. Ling J, Robbins LB, McCarthy VL, Speck BJ. Psychosocial determinants of physical activity in children attending afterschool programs: a path analysis. Nursing Research. 2015 May 1;64(3):190-9.

49. Huhman ME, Potter LD, Duke JC, Judkins DR, Heitzler CD, Wong FL. Evaluation of a national physical activity intervention for children: VERB™ campaign, 2002–2004. American journal of preventive medicine. 2007 Jan 1;32(1):38-43.

50. Prince SA, Adamo KB, Hamel ME, Hardt J, Gorber SC, Tremblay M. A comparison of direct versus self-report measures for assessing physical activity in adults: a systematic review. International journal of behavioral nutrition and physical activity. 2008 Dec;5(1):1-24.

51. Strath SJ, Kaminsky LA, Ainsworth BE, Ekelund U, Freedson PS, Gary RA, Richardson CR, Smith DT, Swartz AM. Guide to the assessment of physical activity: clinical and research applications: a scientific statement from the American Heart Association. Circulation. 2013 Nov 12;128(20):2259-79.

52. Al-Hazzaa HM. Pedometer-determined physical activity among obese and non-obese 8-to 12-year-old Saudi schoolboys. Journal of physiological anthropology. 2007;26(4):459-65.

53. Al-Hazzaa HM, Al-Rasheedi AA. Adiposity and physical activity levels among preschool children in Jeddah, Saudi Arabia. Saudi medical journal. 2007 May 1;28(5):766.

54. Al-Ahmadi M, Al-Hazzaa HM. Validity of a self-reported questionnaire for youth 15–25 years: Comparison with accelerometer, pedometer and heart rate telemetry. Saudi Sports Med J. 2004;7:2-14.