

Psychometric Properties of the Adolescent Health Concern Inventory: The Persian Version

Azam Baheiraei, PhD, MPH^{1, 2}

Elham Khoori, PhD³

Fazlollah Ahmadi, PhD⁴

Abbas Rahimi Foroushani, PhD⁵

Fazlollah Ghofranipour, PhD⁶

Robert M Weiler, PhD, MPH⁷

1 Department of Reproductive Health, Tehran University of Medical Sciences, Tehran, Iran.

2 Centers for Community-Based Participatory Research, Tehran University of Medical Sciences, Tehran, Iran.

3 Department of Reproductive Health, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran.

4 Department of Nursing, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran,

5 Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

6 Department of Health Education, School of Medical Sciences, Tarbiat Modares University, Tehran, Iran

7 Department of Health Education & Behaviour, University of Florida, Florida, USA.

Corresponding author:

Elham khoori, Department of Reproductive Health, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran.

Po. Code: 1419733171,

Po. Box: 6459, Tehran, Iran.

Email: elhamkhoori@yahoo.com

Objective: It is important to consider the health concerns of adolescents before developing and implementing public health promotion or health education curriculum programs aimed at ameliorating priority health problems experienced by adolescents. The aim of this study was to test the psychometric properties of the original Adolescent Health Concern Inventory (AHCI) for use with an Iranian population .

Methods: This was a methodological study in which 50 adolescents with age range of 14-18 years were selected using convenience sampling. The translation and cultural adaptation process of The AHCI followed recognized and established guidelines. The face and content validity was established by analyzing feedback solicited from teenagers and professionals with expertise in health, sociology and psychology. Reliability was examined using test-retest and Cronbach's alpha for internal consistency reliability. Kappa and McNemar tests were used to examine test-retest reliability for each item.

Results: Minor cultural differences were identified and resolved during the translation process and determining the validity of the checklist. Results from Kappa and McNemar tests indicate a high degree of test-retest reliability. Internal consistency reliability as measured by Cronbach's alpha for the subscales were between 0.68 and 0.87 with total instrument reliability of 0.96 indicating considerable overall reliability .

Conclusion: The Persian version of the AHCI appears valid and reliable. Hence, it can be used for filling a gap in identifying the adolescents' health concerns in the research and community settings and school health education programs in Iran to design appropriate interventions.

Key words: Adolescent, Health, Psychometrics, Questionnaires, Reproducibility, Validity

Iran J Psychiatry 2013; 8:1: 28-36

Teenagers face many new health concerns during adolescence. Although Adolescent Health Concerns (AHCs) do not represent a major public health problem like high risk behaviors, their existence is a threat to adolescent health and well-being (1). Examining the AHCs may increase our understandings of motivations that underlie specific behaviors (2) and in some cases the concerns and problems reported by adolescents precede the onset of high risk behaviors (3). In fact, health concerns represent all major issues affecting individual health. Health concerns differ by age groups,

life stage, and a host of socio-economic and intrapersonal variables (2). When examining AHCs, it is important to identify their corresponding problems as evidenced by epidemiologic data so that appropriate policies and strategies to improve their health can be established (4). Despite the importance of examining the health concerns of adolescents, few comprehensive questionnaires design to systematically assess AHCs exist. A variety of tools have been used in different studies for studying AHCs (5-14). Due to lack of comprehensive and psychometrically sound

questionnaires for assessing the AHCs in Iran, two options were available: create a new questionnaire, or translate and pilot test an existing questionnaire from its original language to Persian. While designing a new questionnaire is a time consuming process and requires considerable effort (15), using existing tools in different countries requires translation and cultural adaptation (16,17). The process of translation and cultural adaptation of a tool is required when the tool is going to be used in a new language and culture (18). The purpose of this process is to obtain a different version of the original language equal for any of the target countries or cultures in terms of concept (19).

Considering that adolescents have concerns in all of their functional aspects including physical, mental and social dimensions, we found Adolescent Health Concern Inventory (AHCI) as the most comprehensive instrument; AHCI was developed and its Psychometric characteristics were examined by Weiler in 1990 in the United States of America (USA). It assesses the health concerns of adolescents, teachers' beliefs about adolescents' health concerns, and parents' beliefs about adolescents' health concerns. The three instrument forms contained identical core items of concerns, differing only with respect to the perspective from to which the subjects of the three study groups responded. Thus, for Form A: "a personal concern for myself"; Form B: "teenagers in our school have a concern"; Form C: "teenager(s) living in our home have a concern" (6). This instrument have at least two possible applications: "(1) as a needs assessment instrument to determine the health concerns of adolescents and to determine teachers' and parents' beliefs about the health concerns of adolescents; and (2) as an instructional tool to be used by health educators and other health professionals for staff development programs"(6). Some changes (minor revisions) were made to the AHCI in 2005 by Weiler. In the present study, we report the psychometric characteristics of the adolescence form .The AHCI contains 150 items, grouped into 12 subscales: (1) Substance Use and Abuse (14 items); (2) Diseases and Disorders (17 items); (3) The Environment (11 items); (4) Consumer Health (7 items); (5) Human Sexuality (11 items); (6) Personal Health (13 items); (7) Nutrition (9 items); (8) Injury Prevention and Control (13 item); (9) Social Health (16 items); (10) Relationships (14 items); (11) Emotional Health (17 items); and (12) The Future (8 items). Responses are based on a check-off response option. Adolescents are instructed to check each item in the inventory that represented a personal concern. The scores are calculated based on the number of items chosen or checked within the inventory, with each item equaling one point. Thus, the total score of health concerns vary between 0 and 150 (2,6).

AHCI was originally designed in English for use in the USA. Thus, in order to use the AHCI with Iranian adolescents for our own needs assessment purposes, we decided to translate the AHCI from the English version to Persian and then assess its cultural relevance,

validity, and reliability to ensure that it would be culturally appropriate for our target population .

Translation is the most common method of preparing questionnaires for cross-cultural application (20). The process of questionnaire translation provides cultural adaptation. With a good translation, one can receive similar feedbacks by completing the questionnaire from different samples (21). The purpose of cultural adaptation is also to ensure compatibility between the reference version and new versions regarding face and content validity (22). As a result of cultural and linguistic differences, terms, concepts, directions, questions, of the translated instrument may have different meanings. Paying careful attention to the process of translation and cultural adaptation will ensure the validity and reliability of the instrument (16). There are no agreement upon uniform steps for culturally translating and adapting health promotion materials and measures. For instance, WHO recommends four steps for translation (19), while Beaton suggests six steps including initial translation, synthesis of the translations, back translation, expert committee, test of the pre-final version, submission of documentation to the developers/ coordinating committee for appraisal of the adaptation process (22). Wild recommends ten steps including forward translation, reconciliation, back translation, back translation review, harmonization, cognitive debriefing, review of cognitive debriefing, results and finalization, proof reading, and final report (23). We used a combination of approaches of Beaton and Wild in the process of translation and cultural adaptation (22, 23). This study aimed to assess the validity and reliability of the Persian version of the questionnaire (i.e., the AHCI-P) to evaluate adolescent concerns in the Iranian population. Therefore, this report describes the process and principles used in the translation and cultural adaptation of the AHCI, and presents the psychometric properties resulting from a pilot study for the first time in Iran.

Materials and Method

The ethical approval for this study was obtained from the Research Ethics Committees of Tehran University of Medical Sciences. Initially, permission to translation and use the AHCI was obtained from Prof. Weiler. Selection guidelines used to develop our approach for translating and culturally adapting the AHCI was based on examination of the literature. The instrument was translated to Persian by two Persian translators. Review and comparison of the two translated texts was conducted by both translators and principal investigator. A final version of the questionnaire was agreed upon after selecting the most appropriate translated phrases and was then translated back to English by two English teachers to ensure the accuracy of the primary translation. The two teachers, one whose native language was English had no medical knowledge, and had never seen the original English

version. Subsequently, the translated English and the original versions of the checklist were compared and the differences were discussed by the research team and English teachers, and then the final Persian version of the inventory AHCI-P was adjusted.

To establish face validity and to determine how long the checklist take to complete, the AHCI-P was piloted with 5 boys and 5 girls aged 14-18 years old. After the adolescents individually completed the AHCI-P, data collected from face to face interviews were examined to determine the participant's overall understanding and interpretation of the questionnaire (i.e., words, terms, phrases, directions, etc.). Furthermore, a quantitative assessment of face validity of the checklist was conducted. For each of the 150 items of the instrument, a 5-point Likert scale was considered in which strongly important concerns were scored as 5 and the answers of not at all were scored as 1. Then, the adolescents were asked to complete the inventory accordingly. Impact scores of the items were measured using formula (24,25). Impact score equal or above 1.5, was identified as an important item.

Content validity of the AHCI-P was also determined. In the qualitative content analysis (expert panel opinion), after interviewing and communicating with 10 experts in the field of health, sociology and psychology, they were asked to provide their editorial views in written form after careful study of the inventory. Moreover, the qualitative analysis examined grammar, use of appropriate words, and placement of the items in their proper position. Content validity, item importance and accuracy were estimated using Content Validity Ratio (CVR). Furthermore, to ensure that the items are well designed, Content Validity Index (CVI) with direct feedback was collected from our panel of 10 experts.

CVR was measured using the formula after answering to three spectrums of "item is essential", "item is useful but not essential" and "item is not necessary" for each 150 items (26). According to lawsche table, values of CVR for 10 experts above 0.62 were considered as necessary items in the instrument. After that, the AHCI-P was given again to our panel of experts to express their ideas about clarity, simplicity and relevancy of each item in a 4-point Likert scale. CVI was then calculated according to the formula (15). The following criteria were used as quantitative values for CVI: below 0.70: unacceptable; 0.7-0.78: revision and correction; and equal or above 0.79: suitable.

The research team did not intend to remove any items from the instrument. Hence, the items with inappropriate scores in all three measurements of impact score, CVI and CVR (21 items) were revised, and modification were made with the least possible changes to the original inventory. In the second round, the inventory was given again to 4 experts from the previous group to determine CVI. This process enabled us to ensure the quantitative method of content validity, as much as possible. After re-measuring the CVI of the revised items, Scale Content Validity Index Average

method(S-CVI/Ave), on the basis of average score of all items CVI, was calculated. Based on the results of pilot study and experts' opinion, necessary changes were made and the AHCI-P was modified as appropriate. Finally, the face validity and content validity of the AHCI were conducted and the final checklist was obtained. In the next step, test-retest and internal consistency were used to assess the reliability of the AHCI-P and subscales. For this purpose, 50 adolescents (72% girls) aged 14-18 years were selected using convenience sampling. One of the parents provided informed permission and adolescent participants agreed to take part in the survey. Adolescents were instructed to check each item in the inventory that represented a personal concern. They completed the anonymous self-report AHCI-P twice within a two week period. Test-retest reliability was calculated using McNemar and Kappa tests for all items of the inventory and internal consistency using the Cronbach's alpha coefficient. In this study, the reference values for the strength of agreement (Kappa coefficient) are from Gordis (27) who considers ≤ 0.40 as poor agreement, 0.41-0.75 as moderate to good, and > 0.75 as excellent agreement. The statistical software used was SPSS 18.0.

In the final phase, a report of translation, cultural adaptation, validity and reliability determination along with the final version of the translated inventory was sent to the principal developer in written form. A summary of the above steps is shown in Figure 1.

Results

In total, the checklist was clear and took less than 15 minutes to complete. Results of the quantitative face validity (impact score) revealed that 88 of 150 items (58.7%) had an item impact scores ≥ 1.5 . That is, these items were identified as important to the adolescents in the target group. Score fell between 0.0 for "boating accidents" to 4.7 for "what I'll be like in ten years". In measuring CVR, the score of 93 items (62%) was more than lawsche table (0.62 for 10 experts) indicating that the presence of the relevant items in the instrument is necessary and important (25). The CVI scores for 120 items (80%) were ≥ 0.79 . Therefore, they were identified as suitable. At the same time, the score of some of the remaining 30 items were between 0.70 and 0.78 necessitating revision and correction. Some of the items also had CVI score < 0.70 , which was unacceptable (15). For instance, after revising the items of "the homeless" and "terrorism", the CVI scores of 0.6 and 0.46 increased to 0.8, respectively.

Nine of 21 items which obtained an inappropriate score in all the three measurements (CVI, CVR and impact score) had a high relevancy score (≥ 0.8) [the most important criteria in CVI]. Therefore, despite unacceptable CVI score, these items were accepted. The number of items with inappropriate score decreased to 12 items. S-CVI/Ave of the checklist was reported as 0.85.

Table 1: Test-retest reliability of Adolescent Health Concern Inventory Persian version (AHCI-P)

Subscales and items	Yes (%)		McNemar P- value	Kappa
	Test	Retest		
Substance Use & Abuse				
1. use of cannabis *	40	48	0.62	0.68
2. use of substances that enter the body through breathing	40	40	1	0.67
3. use of hallucinogen (e.g., LSD & Ecstasy)	56	48	0.62	0.68
4. use of crack *	40	52	0.37	0.60
5. use of heroin/opium *	32	48	0.12	0.68
6. use of stimulants (e.g., Ice) *	32	44	0.37	0.60
7. use of depressants (e.g., tranquilizers)	28	36	0.62	0.63
8. use of alcohol	64	64	1	0.65
9. use of cigarettes	44	56	0.37	0.61
10. use of water pipe *	32	40	0.65	0.65
11. use of smokeless tobacco	32	40	0.62	0.65
12. use of steroids (Hormons)	28	36	0.62	0.63
13. use of diet pills	44	32	0.37	0.59
14. use of drugs without a prescription* (e.g., aspirin)	48	44	1	0.60
15. driving while under the influence of alcohol or drugs	48	52	1	0.60
Diseases & Disorders				
16. diabetes	36	36	1	0.65
17. stroke	32	40	0.65	0.65
18. heart disease	32	48	0.12	0.67
19. cancer	68	68	1	0.63
20. respiratory illness (e.g., inflammation of respiratory tracts)*	36	48	0.37	0.60
21. lung infection* or influenza	20	28	0.62	0.56
22. liver diseases*	28	36	0.62	0.64
23. hardening of blood vessels	16	28	0.25	0.66
24. sexually transmitted diseases	48	64	0.15	0.68
25. AIDS *	64	64	1	0.65
26. eating disorders	20	24	1	0.65
27. fatigue	40	40	1	0.67
28. stomach aches	40	36	1	0.75
29. physical disability	32	40	0.62	0.65
30. headaches	36	40	1	0.58
31. sleep problems	44	56	0.45	0.45
32. birth defects	32	40	0.62	0.65
The Environment				
33. littering	68	60	0.62	0.65
34. the greenhouse effect (unusual increase in global temperature)*	44	40	1	0.75
35. air pollution	68	68	1	0.63
36. water pollution	56	36	0.63	0.60
37. acid rain (the rain which polluted with gases from power plants, vehicles and factories which lead to destruction of the natural resources)*	28	24	1	0.69
38. endangered wildlife	44	40	1	0.59
39. population growth	52	60	0.68	0.52
40. destruction of wilderness areas	48	52	1	0.60
41. the depletion of the ozone layer	56	60	1	0.75
42. disposal of hazardous wastes (e.g., Hospital and industrial waste)*	40	40	1	0.67
43. nuclear accidents	60	56	1	0.59
Health Services*				
44. the costs of medical care	36	40	1	0.75
45. the ability to make correct decisions when in need for health information, consultation and care*	44	32	0.25	0.75
46. talking with a doctor and sharing one's problems*	40	20	0.63	0.65
47. health advertizing	24	32	0.50	0.80
48. False beliefs and wrong reasoning towards health*	36	40	1	0.75
49. health-care confidentiality	60	56	1	0.75
50. parental consent for health care for teenagers	32	40	0.50	0.83
Human Sexuality				
51. close and intimate relationship with the opposite sex *	44	48	1	0.60
52. familiarity with usual and normal sexual behavior*	16	16	1	0.70
53. pressures to have sex	44	44	1	0.67
54. having an abortion	40	48	0.62	0.68
55. using contraception	29	25	1	0.89
56. Physical sexual development	44	56	0.37	0.61
57. reproductive health	28	28	1	0.61
58. gender roles (The role you have as a boy or girl in your community)*	32	36	0.62	0.56
59. talking about sex	24	40	0.62	0.64
60. having sexual intercourse	37.5	37.5	1	0.82
61. teenage pregnancy	48	48	1	0.68

Personal Health				
62. acne	60	52	0.625	0.68
63. bad breath	44	52	0.62	0.68
64. body odor	36	40	1	0.75
65. teeth	56	52	1	0.60
66. vision	32	36	1	0.73
67. hearing	24	28	1	0.90
68. body shape	44	44	1	0.67
69. being too tall	28	36	0.62	0.64
70. being too short	52	60	0.62	0.68
71. being underweight	20	32	0.25	0.70
72. being overweight	56	52	1	0.92
73. attractiveness to others	52	60	0.62	0.68
74. exercise/fitness	44	48	1	0.60
Injury Prevention & Control				
75. auto accidents	68	76	0.62	0.61
76. motorcycle accidents*	48	48	1	0.68
77. bicycle accidents	32	32	1	0.63
78. home accidents	40	52	0.37	0.60
79. recreational accidents	44	48	1	0.60
80. Familiarity with cardiopulmonary resuscitation in the emergency situations*	20	24	1	0.65
81. knowing first aid	32	36	1	0.73
82. preventing sport injuries	32	40	0.62	0.65
83. rape in the appointments (when forced sex/no consent occurs between two people who already know each other)*	48	60	0.37	0.60
84. carrying cold weapons in the school (e.g., knife)*	40	44	1	0.60
85. sexual abuse	48	60	0.37	0.60
86. fights at school	56	68	0.37	0.58
87. being murdered	48	60	0.37	0.60
Nutrition				
88. eating a balanced diet	28	20	0.50	0.78
89. eating foods high in fat	48	52	1	0.68
90. eating foods high in sugar	28	28	1	0.60
91. drinking drinks high in sugar	52	52	1	0.68
92. food additive	40	48	0.62	0.68
93. food processing (e.g., hot dog)*	84	84	1	0.70
94. dieting for weight control	44	40	1	0.75
95. eating fast foods	60	68	0.62	0.65
Social Health				
96. discrimination	64	64	1	0.65
97. becoming homeless*	56	64	0.62	0.67
98. family violence	40	40	1	0.67
99. physical or emotional or sexual child maltreatment*	48	56	0.62	0.68
100. unemployment	76	88	0.25	0.60
101. activity in certain social , religious or sectarian groups*	20	24	1	0.65
102. crime	44	40	0.5	0.84
103. the violence by the rabbles*	68	60	0.62	0.65
104. gun control	32	28	1	0.71
105. military conflict	40	40	1	0.67
106. the war on drug	32	52	0.63	0.61
107. terrorist activities and intimidation such as murder and bombing*	44	48	1	0.76
108. world peace	28	44	0.12	0.66
109. human rights abuses	80	64	0.12	0.61
110. school dropout	60	68	0.62	0.65
111. illiterate people*	60	56	1	0.59
Relationships				
112. getting along with parent(s)	36	32	0.62	0.67
113. spending time with parents	32	36	1	0.73
114. getting along with brothers and sisters	36	36	1	0.65
115. getting along with adult	24	32	0.5	0.80
116. getting along with friends	40	44	0.5	0.84
117. being popular	36	36	1	0.65
118. falling in love	36	36	1	0.65
119. having friends	48	36	0.37	0.60
120. having a boyfriend or girlfriend	36	36	1	0.65
121. lovers date (usually for exploring whether they're compatible as a couple)*	48	36	0.25	0.76
122. having a role model	36	52	0.12	0.68
123. protecting your reputation	52	56	1	0.60
124. getting married	36	44	0.62	0.67
125. getting divorced*	56	56	1	0.67
Emotional Health				

126. having a psychological balance*	40	32	0.5	0.83
127. conforming to other's expectations	16	28	0.25	0.66
128. being anxious	68	68	1	0.63
129. being pressured to succeed	48	44	1	0.60
130. being independent	32	40	0.62	0.65
131. feeling good about one's self	28	36	0.62	0.63
132. having control over others	36	36	1	0.83
133. having control over one's self	24	20	1	0.65
134. being compared to others	44	44	1	0.67
135. dying	44	54	0.37	0.61
136. depression	64	68	1	0.55
137. loneliness	68	80	0.25	0.69
138. suffering from a mental illness	56	44	0.37	0.61
139. feeling guilty	48	40	0.62	0.68
140. nervousness	64	68	1	0.55
141. having faith in a religion	36	36	1	0.65
142. suicide	52	48	1	0.76
The Future				
143. getting good grade*	80	68	0.25	0.69
144. own situation in the next 10years*	76	74	1	0.69
145. going to University*	74	84	0.25	0.66
146. choosing an occupation or career	76	80	1	0.65
147. having lots of money	52	52	1	0.68
148. making a different in my life	44	44	1	0.67
149. being successful	76	80	1	0.65
150. having my own family	52	56	1	0.60

*The items which changed during the translation and adaptation

Table 2: Cronbach's alpha coefficient for total scale and the 12 Subscales of AHCI-P

Subscales	Ti ^a	CA ^b
1. Substance Use & Abuse	15	0.89
2. Diseases & Disorders	17	0.83
3. The Environment	11	0.79
4. Health Services	7	0.68
5. Human Sexuality	11	0.82
6. Personal Health	13	0.82
7. Injury Prevention & Control	13	0.71
8. Nutrition	7	0.70
9. Social Health	16	0.87
10. Relationships	14	0.86
11. Emotional Health	17	0.81
Total Scale	150	0.96

^aTotal number of items, ^bCronbach's Alpha

According to the results of pilot phase and suggestions by the expert panel opinion, and the research team, brief explanations was provided for some of the items and minor modifications were applied to suit the Iranian culture. For instance, in the subscale of "Substance Use and Abuse", marijuana was changed into its more known name in the Middle East, cannabis. Instead of cocaine, crack was used which is the most common form in Iran. Because of using opium in some Iranian people (28) including adolescents (29), it was added to the item 5, heroin. In item 6, use of speed as a stimulant was substituted with ice, the known stimulant in Iran.

Due to a spread of Water pipe smoking globally, particularly among Middle Eastern and Iranian adolescents (30, 31), the item water pipe smoking was also added to this subscale .

The subscale of "Consumer Health" was translated as "Health Services". In this subscale, item 45 (making healthy consumer decisions) were translated as the "ability to make right decisions when in need for health

information, consultation and care". Item 48 (health myths and fallacies) was translated as "false beliefs and wrong reasoning towards health". In the subscale of "Injury Prevention and Control", item 76 (boating accidents) which is not common in Iran was substituted by the common vehicle among the Iranian youths, i.e., "motorcycle accidents". Because carrying weapons is illegal in Iran and strictly enforced, item 84 (weapon in school) was completely changed to carrying "cold weapons in school (e.g., knife)."

In the subscale of "Nutrition", since items 89 (eating foods high in fat) and 90 (eating foods high in cholesterol) were not clearly identifiable by Iranian adolescents, these two items were converted into one item expressed as "eating foods high in fat". In the subscale of "Social Health", item number 97 (the homeless) was not applicable in this study for two reasons: (1) few adolescents in Iran are homeless and (2) in our future study,



Fig1: The algorithm for the different steps of translation and cultural adaptation

Adolescents would be assessed using inventory in their homes. Hence, this item was changed to "become homeless" which also includes leaving home or becoming homeless due to natural disasters. Finally, the total number of the items was preserved as 150; and the AHCI-P was developed.

The remaining 12 items which did not get the quorum score were those expressed by the adolescents and the experts not to be probable adolescent health concerns. These 12 items included stroke, heart disease, chronic liver disease, pneumonia or influenza, hardening of blood vessels, littering, the greenhouse effect, acid rain, endangered wildlife, depletion of the ozone layer, disposal of hazardous wastes, and health advertising. In determining the reliability of the inventory, out of 50 adolescents who completed the AHCI-P, the girls made up 48.1% of the sample. The mean age of adolescents was 16.16 ± 1.28 years. The McNemar test of all items, confirmed the agreement between the first and second questionnaire completion ($P > 0.05$). The Kappa coefficients of all items were between 0.40 and 0.75 or above 0.75 which indicated good to excellent agreement between the two administrations of the AHCI-P (27) (Table 1). Internal consistency was estimated for the total scale and each subscale using Cronbach's coefficient α (Table 2).

Discussion

The psychometric characteristics of the AHCI-P were examined in this study. We did not face serious problems during the translation and cultural adaptation process of AHCI. Therefore, substantial changes to the original version were not necessary. We made minor changes in the inventory such as providing parenthetical descriptions for some items to make a better conception for the adolescents or substituting some words and expressions of the original AHCI with more concrete ones in Persian. In other words, it can be said that there was a very close correlation between English and Persian versions of AHCI.

Results indicated that the AHCI-P had satisfactory reliability indicators. The internal consistency of all subscales was high (Cronbach's α range: 0.68–0.87), which is similar to the original AHCI (range, 0.76–0.93) (6). A Cronbach's $\alpha \geq 0.7$ is generally considered as a satisfactory level of internal consistency (32, 33). In this study, only Cronbach's α value of the subscale "Health Services" was 0.68; however, according to Carriço's study, 0.68 may also be considered a high and satisfactory Cronbach's α value (17). The test-retest evaluation with a 2-week interval showed appropriate stability of the instrument; McNemar test of all items confirmed agreement between the responses in the two times ($p > 0.05$).

In order to evaluate validity, face and content validity was used. Face validity is mainly associated with understanding the text by the target group. The measurement tool should be understandable and comprehensible for the target group to ensure their cooperation and motivation to respond (34). In our study, the adolescents generally found the questionnaire interesting and enjoyed getting the chance to ponder their views.

In content validity, the content of questionnaire is evaluated. A questionnaire has content validity when the questions measure all goals of the test (35). Content validity is primarily evaluated by experts. One advantage of our study is that we used both quantitative and qualitative methods to establish face and content validity. Each one of quantitative and qualitative methods offers different but complementary perspectives of the study; this is the benefit of using combination methods in evaluating the instrument validity (15). By combining different methods of validity assessment, we took advantage of simultaneous or sequential application of various methods, and by providing a more comprehensive approach by which the study instrument was judged.

Lynn, Polit and Beck believe that in measuring CVI, "relevancy" is the most important criterion (35). Thus, in our study, the items with unacceptable CVI score which had a high relevancy score (≥ 0.8) were accepted and the number of items with inappropriate score in all three measurements decreased. Because more than 80% of the items had a CVI score of ≥ 0.79 and S-CVI/Ave of the instrument was estimated 0.85, we decided to retain all the items. Only one item from the "Nutrition" subscale was eliminated and since we wanted to retain the structure of the instrument along with its items, the deleted item was replaced with "use of water pipe" item in "Substances Use and Abuse" subscale.

In this study, the S-CVI/Ave was used for reporting the scale's content validity. A CVI value was first separately measured for each item of the instrument [which refers to as Item-Level CVI (I-CVI)] and then for the whole instrument [which it calls a Scale-Level CVI(S-CVI)]. Finally, calculate the average I-CVI across items [which it calls S-CVI/Ave]. Instrument designers often consider the measure of 0.80 as the acceptable limit for S-CVI/Ave (35). In our study, we also used a more liberal approach that considered a minimum score of 0.8 for S-CVI/Ave. We computed S-CVI/Ave score equaling 0.85 which was appropriate. However, when the aim is to develop an instrument, a more conservative approach should be used.

In conclusion, AHCI-P was developed through translation and cultural adaptation of the original AHCI using an amalgam of guidelines presented in the literature. The findings showed that despite minor cultural differences, the AHCI-P had satisfactory reproducibility, internal consistency, and validity; and its use in the target group was acceptable, easy, and comprehensible and attracted cooperation and

motivation to respond. Therefore, the AHCI-P can be used by public health researchers and practitioners to assess and prioritize adolescents' health concern which is just one source of information that should be used to inform public health promotion programs and policies.

Acknowledgments

This study was funded and supported by Tehran University of Medical Sciences [grant number 89-04-28-11912] as part of a PhD thesis.

Conflict of interest: None.

References

1. Denning ML. Rural Adolescent Perceptions of Health Related Issues: Gonzaga University; 1995.
2. Weiler RM. Adolescents' perceptions of health concerns: an exploratory study among rural midwestern youth. *Health Educ Behav* 1997; 24: 287-299.
3. Palti H, Halevy A, Epstein Y, Knishkowsky B, Meir M, Adler B. Concerns and risk behaviors and the association between them among high-school students in Jerusalem. *J Adolesc Health* 1995; 17: 51-57.
4. Feldman W, Hodgson C, Corber S and Quinn A. Health concerns and health-related behaviours of adolescents. *CMAJ* 1986; 134: 489-493.
5. Sobal J, Klein H, Graham D and Black J. Health concerns of high school students and teachers' beliefs about student health concerns. *Pediatrics* 1988; 81: 218-223.
6. Weiler RM, Sliepcevich EM, Sarvela PD. Development of the Adolescent Health Concerns Inventory. *Health Educ Q* 1993; 20: 569-583.
7. Engs RC. Construct validity and re-assessment of the reliability of the Health Concern Questionnaire. In: Feldman RHL, Humphrey JH. *Advances in Health Education: Current Research*. New York, USA: AMS Press, Inc; 1996:303-313.
8. Gallagher M, Millar R. Gender and age differences in the concerns of adolescents in Northern Ireland. *Adolescence* 1998; 33: 863-876.
9. Puskar KR, Tusaie-Mumford K, Sereika S and Lamb J. Health concerns and risk behaviors of rural adolescents. *J Community Health Nurs* 1999; 16: 109-119.
10. Waters E, Wake M, Toumbourou J, Wright M, Salmon L. Prevalence of emotional and physical health concerns amongst young people in Victoria. *J Paediatr Child Health* 1999; 35: 28-33.
11. Ackard DM, Neumark-Sztainer D. Health care information sources for adolescents: age and gender differences on use, concerns, and needs. *J Adolesc Health* 2001; 29: 170-176.

12. Khodarahimi S, Rahimi A, Rahimian R, Khodabande Z. The study of adolescents worries and wishes in the north of Fars province. *US-China Educ Rev* 2005; 2: 7-12.
13. Knishkowsy B, Amitai Y, Hardoff D, Levy Y, Kiro A. Assessment of health issues and concerns of Israeli seventh graders during school physician examinations: a pilot study. *J Sch Health* 2007; 77: 87-91.
14. Nikbakht Nasrabadi AR, Mazloom SR, Nesari M, Goodarzi F. Relation between worry domains and health related quality of life in medical sciences students. *Payesh Health Monitor* 2009; 8: 85-92.
15. Hyrkas K, Appelqvist-Schmidlechner K, Oksa L. Validating an instrument for clinical supervision using an expert panel. *Int J Nurs Stud* 2003; 40: 619-625.
16. Rode N. Translation of Measurement Instruments and their Reliability: An Example of Job-Related Affective Well-Being Scale. *Metodoloski zvezki* 2005; 2: 15-26.
17. Carrico G, Meves R, Avanzi O. Cross-cultural adaptation and validity of an adapted Brazilian Portuguese version of Scoliosis Research Society-30 questionnaire. *Spine (Phila Pa 1976)* 2012; 37: E60-63.
18. Moser AM, Traebert J. [Transcultural adaptation of the HIV/AIDS-Target Quality of Life for HIV/AIDS for the evaluation of patients' quality of life]. *Cien Saude Colet* 2011; 16 Suppl 1: 1357-1362.
19. World Health Organization(WHO). Process of translation and adaptation of instruments. 2011 [cited 2011 Nov 29]. Available from: http://www.who.int/substance_abuse/research_tools/translation/en/.
20. Sperber AD. Translation and validation of study instruments for cross-cultural research. *Gastroenterology* 2004; 126: S124-128.
21. Pashandi S, Khaghanizadeh M, Ebadi A. [Review of translation and cultural adaptation process of questionnaires]. *Educational Strategies Journal* 2009; 2: 117-120.
22. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine (Phila Pa 1976)* 2000; 25: 3186-3191.
23. Wild D, Grove A, Martin M, Eremenco S, McElroy S, Verjee-Lorenz A, et al. Principles of Good Practice for the Translation and Cultural Adaptation Process for Patient-Reported Outcomes (PRO) Measures: report of the ISPOR Task Force for Translation and Cultural Adaptation. *Value Health* 2005; 8: 94-104.
24. Juniper EF, Guyatt GH, Streiner DL, King DR. Clinical impact versus factor analysis for quality of life questionnaire construction. *J Clin Epidemiol* 1997; 50: 233-238.
25. Lacasse Y, Godbout C, Series F. Health-related quality of life in obstructive sleep apnoea. *Eur Respir J* 2002; 19: 499-503.
26. Lawshe CH. A quantitative approach to content validity. *Personnel Psychology* 1975; 28: 563-575.
27. Gordis L. *Epidemiology*, 4th Ed. Philadelphia: WB Saunders; 2004.
28. Ahmadi J, Sharifi M, Mohagheghzadeh S, Dehbozorgi G, Farrashbandi H, Moosavinasab M, et al. Pattern of Cocaine and Heroin Abuse in a sample of Iranian Population. *German J Psychiatry* 2004; 8: 1-4.
29. Attari MA, Asgary S, Shahrokhi S, Naderi GA, Shariatirad S. Cannabis and Opium Abuse Patterns and Their Associated Complications in a Sample of Young Iranians. *J Child Adolesc Subst Abuse* 2012; 21: 238-246.
30. Maziak W. The global epidemic of waterpipe smoking. *Addict Behav* 2011; 36: 1-5.
31. Ramezankhani A, Sarbandizaboli F, Zarghi A, Heidari G, Masjedi M. [Pattern of Cigarette Smoking in Adolescent Students in Tehran]. *Pajoohandeh Journal* 2010; 15: 115-122.
32. DeVon HA, Block ME, Moyle-Wright P, Ernst DM, Hayden SJ, Lazzara DJ, et al. A psychometric toolbox for testing validity and reliability. *J Nurs Scholarsh* 2007; 39: 155-164.
33. Karatepe AG, Gunaydin R, Turkmen G, Kaya T, Ozbek G. The validity and reliability of the Turkish version of the Rheumatoid and Arthritis Outcome Score (RAOS) in patients with rheumatoid arthritis. *Clin Rheumatol* 2009; 28: 47-51.
34. Bannigan K, Watson R. Reliability and validity in a nutshell. *J Clin Nurs* 2009; 18: 3237-3243.
35. Polit DF, Beck CT, Owen SV. Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Res Nurs Health* 2007; 30: 459-467.