Development and primary validation of the School Health Assessment Tool for Primary Schools (SHAT-PS) in Tehran

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Background. School health programs need to target all aspects of physical, psychological, and social well-being. Using a slightly modified version of the COSMIN Risk of Bias checklist, the first validation of the School Health Assessment Tool for Primary Schools (SHAT-PS) was conducted.

Method. The exploratory sequential mixed method was used in this study. In the first phase, scientific databases were systematically searched to find school health models and instruments and 65 interviews were conducted with school stakeholders. Then, a pool of items was created, which were then rechecked by psychometric experts. In the second phase, classical test theory was utilized to analyze the validity and reliability of the resulting items from phase 1 among 400 individuals working at primary schools.

Results. The SHAT-PS items were tested using maximum likelihood exploratory factor analysis and confirmatory factor analysis. The results showed that the 8-factor model was the best (chi-square/df=2.41, CFI=.98, TLI=.97, RMSEA=.06). The discriminant and convergent validity of the SHAT-PS were evaluated as satisfactory, the scale had high internal consistency (Cronbach's alpha for all subscales >.93). The test-retest reliability was satisfactory—the intraclass correlation coefficient pooled was .95 (99% CI: .91-.98). Moreover, the standard error of measurement resulted in an SEM pooled equal to 4.4. No discrepancy was found between subgroups of gender and subgroups of staffs' positions at schools.

Conclusion. SHAT-PS is a valid and reliable tool that may facilitate school staff, stakeholders and researchers, to evaluate the presence of the factors that promote health at primary schools.

1   **Development and primary validation of the School Health Assessment Tool for Primary**

2   **Schools (SHAT-PS) in Tehran**

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33 **Authors' contributionship**

34 Maryam Kazemitabar conceived, designed, and performed the experiments, analyzed the data,

35 prepared figures and tables, authored and reviewed drafts of the paper, and approved the final

36 draft.

37 Danilo Gracia designed the experiments, prepared figures and tables, authored and reviewed

38 drafts of the paper, and approved the final draft.

39 JohnBosco Chika Chukwuorji, Ricardo Sanmartin, Franco Lucchese, Kaveh Khoshnood, and

40 Kevin M. Cloninger reviewed drafts of the paper and approved the final draft.

42   **Abstract**

43 *Background.* School health programs need to target all aspects of physical, psychological, and

44 social well-being. Using a slightly modified version of the COSMIN Risk of Bias checklist, the

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48   scientific databases were systematically searched to find school health models and instruments

49   and 65 interviews were conducted with school stakeholders. Then, a pool of items was created,

50   which were then rechecked by psychometric experts. In the second phase, classical test theory

51   was utilized to analyze the validity and reliability of the resulting items from phase 1 among 400

52   individuals working at primary schools.

53   *Results.* The SHAT-PS items were tested using maximum likelihood exploratory factor analysis

54   and confirmatory factor analysis. The results showed that the 8-factor model was the best (chi-

55   square/df=2.41, CFI=.98, TLI=.97, RMSEA=.06). The discriminant and convergent validity of

56   the SHAT-PS were evaluated as satisfactory, the scale had high internal consistency (Cronbach's

57   alpha for all subscales >.93). The test-retest reliability was satisfactory—the intraclass

58   correlation coefficient pooled was .95 (99% CI: .91-.98). Moreover, the standard error of

59   measurement resulted in an SEM pooled equal to 4.4. No discrepancy was found between

60   subgroups of gender and subgroups of staffs' positions at schools.

61   *Conclusion.* SHAT-PS is a valid and reliable tool that may facilitate school staff, stakeholders

62   and researchers to evaluate the presence of the factors that promote health at primary schools.

63   *Keywords:* School Health; Psychometrics; Well-Being; Factor Analysis; COSMIN Risk of Bias

64   checklist

65

66   **Introduction**

67   The World Health Organization (WHO) defines a health-promoting school as "a school

68   that is constantly strengthening its capacity as a healthy setting for living, learning, and working"

69   (WHO, 2020). WHO's Global School Health Initiative was established in 1995 and endeavors to

70   improve the health of students, school staff, families, and all the community members. In this

71   context, school health programs have been led to several positive outcomes, such as

72   improvement in academic achievement (Ashok & Patha, 2019; Minkinen et al., 2017) and

73   physical activity (McLoughlin et al., 2019); the prevention of obesity and chronic diseases

74   (Centeio et al., 2018); improvement in healthy behaviors (Storey et al., 2016) and mental health

75   (Dassanayake et al., 2017); healthy eating (Graham et al., 2008) and decrease in bullying and

76   victimization (Lewis et al., 2015).

77   In other words, school health programs target all aspects of physical, psychological, and

78   social well-being. School health promotion programs have been widely studied across the world.

79   There are a wide variety of programs, but the models are mostly identical. For instance, the

80   Focusing Resources on Effective School Health program, in partnership with UNESCO,

81   UNICEF, the World Bank, WHO, and Education International (1990), aims to improve learning

82   outcomes by promoting health and good nutrition (UNESCO, 2020); the Coordinated School

83   Health Program, introduced by the U.S. Centers for Disease Control and Prevention (CDC) since

84   1987, aims to improve health and academic achievement (King & Lederer, 2019); the Whole

85   School, Whole Community, Whole Child model developed by the CDC and Association for

86   Supervision and Curriculum Development aims to ensure keeping children healthy, safe,

87   engaged, supported, and challenged (CDC, 2020). All of these models and approaches include

88   the following school health factors: health education, physical education and physical activity,

89   community involvement, nutrition, physical environment, health services, psychological and

90   counseling services, employee wellness, family engagement, and school health policies

91   (Kazemitabar et al., 2020). Although there is research on the factors which promote school

92   health, there is little to no research examining the psychometric properties of measures

93 examining the prevalence of health factors in the primary literature. This gap is concerning given

94 that children and teachers who struggle with illness and ill-being will be ill-equipped to benefit

95 from the work of education. Having good measures of school health is an essential cornerstone in

96 promoting discussion around issues of ill-being in schools and the consequences this has in the

97 community and the society-at-large. Moreover, having a good understanding of the factors which

98 promote or prevent school health is essential for effective health promotion and will help

99 increase the knowledge-base for stakeholders such as health specialists at schools, school nurses,

100 school principals, teachers, parents, policymakers, and the pupils themselves (Kazemitabar et al.,

101 2020).

102  Research on school health promotion factors and instruments to evaluate school health do

103 exist (e.g. Andrews & Conte, 2005; Brener et al., 2003; Lee et al., 2014; Pinto et al., 2016;

104 Weintraub & Erez, 2009), but a recent systematic review showed that there are too few

105 measures, and those measures are of poor quality psychometrically (Kazemitabar et al., 2020);

106 few studies did not examine the psychometric properties of the scales. In the same review article,

107 Kazemitabar and colleagues (Kazemitabar et al., 2020) implemented a slightly modified version

108 of the COSMIN Risk of Bias checklist (Prinsen et al., 2018), which includes the following

109 parameters: "tool development"[1], "content validity", "structural validity", "internal consistency",

110 "cross-cultural validity/measurement invariance", "reliability", "measurement error", and

111 "hypothesis testing for construct validity". The checklist highlighted several methodological

112 errors in the existing literature. For example, none of the studies assessed measurement error and

113 only one assessed construct validity. Additionally, most of the studies reported *Cronbach's alpha*

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[1]The "Tool development" substituted the term "Patient Reported Outcome Measure (PROM) development" from the original COSMIN checklist. Moreover, in order to target populations at schools, the term "patient" was changed to "students", "teachers", and "principals" (for more details see Kazemitabar, Moghadamzadeh, Habibi, Hakimzadeh & Garcia, 2020).

114   as a reliability measure, despite the fact that it is a measure of internal consistency. Additionally,

115   there was a lack of cross-cultural validity/measurement invariance and test-retest reliability.

116   Hence, as showed by Kazemitabar and colleagues (2020), the COSMIN Risk Bias checklist can

117   be used as a manual for the selection of both suitable statistical methods for tool development

118   and the evaluation of measurement properties. As this and other research demonstrates, there is a

119   need for the development of cross-cultural school health measures.

120   In Iran, for instance, the school health approach has been applied since 2010. The

121   evaluation of Health School Promotion Programs, however, is still a challenging endeavor, since

122   there are no tools available that are adapted to the underlying characteristics of the country and

123   that are validated for comparison between countries. Therefore, as a first step, the present study

124   aimed to develop and validate a tool to measure school health for primary schools in Iran based

125   on a combination of the WHO's Health-Promoting School programs and CDC's Whole School

126   Whole Community Whole Child models. Importantly, since the components or parameters

127   related to primary schools are different from those applicable for middle and high schools (e.g.,

128   sexual, drug and alcohol, and pregnancy issues), it was necessary to develop an instrument that

129   specifically measures school health in primary schools. Moreover, as suggested in Kazemitabar

130   and colleagues' systematic review (Kazemitabar et al., 2020), the present study applied the

131   COSMIN Risk of Bias checklist as a guide to develop and measure the psychometric properties

132   of what we choose to refer to as the School Health Assessment Tool for Primary Schools

133   (SHAT-PS). A valid and reliable SHAT-PS can be used by policymakers, researchers, and health

134   providers interested in primary schools in order to find and resolve the deficiencies and issues

135   related to important factors that promote health among pupils and staff at primary schools.

136

137   **Method**

138   **Ethical statement**

139   This study received approval from the Ministry of Education of Iran (document number:

140   51241/64) and the University of Tehran, Faculty of Psychology and Educational Sciences. All

141   participants obtained a consent form and were informed about the purpose of the study, they

142   were assured of anonymity and also notified that they could withdraw from the study whenever

143   they desired.

144   **Overview of the procedure**

145   Exploratory sequential mixed method, that is, a combination of qualitative (phase 1) and

146   quantitative (phase 2) research methodology was used in this study. In phase 1, a systematic

147   search was conducted in different scientific databases and used the phenomenological approach

148   to collect qualitative data (i.e., interviews among health experts, principals, teachers, and staff of

149   primary schools). These data were analyzed using Colaizzi's method in order to find, understand,

150   describe, and depict the experiences found in interviews as well as emergent themes and their

151   interwoven relationships. Then, the items were created using the codes of the themes and their

152   content validity was systematically assessed by four experts and ten individuals from the target

153   population. In phase 2, classical test theory was used to analyze the resulting items from phase 1

154   among primary school staff. Intraclass correlation coefficients were measured to assess test-retest

155   reliability in a sub-sample answering to the SHAT-PS two weeks apart. In the following, the

156   procedures used are described in detail, including each of the stages addressing how the SHAT-

157   PS was developed and validated within each phase (see Figure 1 for an overview of the

158   development process behind the SHAT-PS).

159   *Phase 1: Development and content validity of SHAT-PS*

160   *Stage 1: Tool development*. The goal of this stage was to generate straightforward and

161   unbiased items that measured factors promoting school health in primary schools. The items

162   were generated through two sources: a) studying the theoretical literature of school health and b)

163   interviewing primary schools' health experts, principals, teachers, and school nurses/health

164   providers.

165   *Stage 2: Content validity*. Content validity index was employed to determine the

166   comprehensiveness, relevance, and clarity of the items using a panel of experts.

167   **Phase 2: Examination of the SHAT-PS's validity and reliability**

168   *Stage 1: Testing for validity.* The majority of the analyses from the COSMIN Checklist

169   that are necessary to investigate the validity of an instrument were performed. Analyses used

170   included construct validity of the instrument (i.e., structural validity, cross-cultural validity, and

171   hypotheses testing). In this study, the assumptions for exploratory factor analysis, such as

172   parallel analysis, scree plot, eigenvalue higher than 1, Kaiser-Meyer-Olkin, and Bartlett's test of

173   sphericity were tested. Then, exploratory factor analysis with fit indices using maximum

174   likelihood estimation was conducted (Muthén & Muthén, 2012). A total of 22 items with factor

175   loadings less than .5 were removed at this step (Hulland, 1999; Truong & McColl, 2011). Then,

176   confirmatory factor analysis was conducted to test results obtained from the maximum likelihood

177   exploratory factor analyses. These procedures resulted in 47 items that were included in the

178   SHAT-PS.

179   The chi-square value, degrees of freedom (df), root mean square error of approximation

180   (RMSEA), comparative fit index (CFI), Tucker-Lewis index (TLI), and standardized root mean

181   square residual (SRMR) were estimated and reported. Factor loadings for each latent variable

182   plus measurement error, t-value, and p-value were reported. Measurement invariance of the

183   construct was checked across gender groups. Convergent and divergent validity were estimated

184   using the average variance extracted, maximum squared shared variance, and average squared

185   shared variance (Fornell & Larcker, 1981). Finally, known-group validity was estimated to

186   investigate whether the construct differentiates between subgroups of gender and school staff

187   positions.

188   *Stage 2: Testing for reliability.* In this stage, the reliability was examined by looking at

189   internal consistency, reliability (test-rest, inter-rater, or intra-rater), and standard error of

190   measurement (Mokkink et al., 2018). The internal consistency of the factors was measured by

191   Cronbach's alpha and composite reliability.

192   The test-retest method was also used to measure reliability. Here the intraclass correlation

193   coefficient (ICC) was estimated for both test and retest administrations using the two-way

194   random effect model and then the ICC-pooled was calculated and reported. The test-retest

195   interval was two weeks, which is considered long enough for participants to fail to recall their

196   answers and short enough to certify stability. The test-retest respondents were a subgroup who

197   volunteered to take the test for a second time two weeks apart from the first administration. The

198   standard error of measurement (SEM) was estimated by a formula for each administration and

199   finally, the SEM-pooled was calculated.

200   **Participants**

201   In phase 1, the study population consisted of school health experts, principals, teachers,

202   and staff at primary schools in Tehran. The sample size for interviews and panels was 65

203   individuals including 4 school health experts, 10 principals, 20 teachers, 15 staff, and 16

204   students. In phase 2, the sample size for tool administration needed to be at least seven times the

205   number of items (cf. Mokkink et al., 2018). 47 items remained after item screenings, and thus

206   400 respondents were considered sufficient for the psychometric study based on the COSMIN

207   checklist criteria. Half of the participants (50%) were females and the other half (50%) were

208   males. The participants' average age was 42.8 years old (*SD*=4.61) with a range between 34 and

209   55. A total of 62 respondents, participated in test-retest administrations of the SHAT-PS to test

210   reliability of the scale.

211   **Measures in Phase 2**

212   ***School Health Assessment Tool for primary schools (SHAT-PS)***

213   The SHAT-PS is a self-report measure designed to be distributed to primary school

214   principals, teachers, and staff (e.g., health experts, school nurses, school physicians, etc.). It is a

215   47-item tool measuring 8 factors of school health policies (7 items), community connections (4

216   items), health education (3 items), physical activity (4 items), health services (6 items), nutrition

217   (5 items), psychological services (5 items), and physical environment (13 items). The response

218   format is based on a 4-point Likert scale including "*not any*", "*a bit*", "*a lot*", and "*so much*" and

219   are scored from 1 ("*not any*") to 4 ("*so much*"). A 4-point Likert scale was used in order to

220   prevent neutral answers that may affect the validity of the results, in addition, it is difficult to

221   semantically represent the idea of neutrality (Asún et al., 2016). None of the items has reversed

222   scoring.

223   **Results**

224   **Phase 1: Tool development**

225   The databases of EBSCOhost, ProQuest, PubMed, Wiley, OpenGrey, and Google

226   Scholar were systematically searched to find all school health models and instruments. School

227   health's factors were extracted from the selected studies. Second, semi-structured interviews

228   were performed with school health experts, and primary schools' principals, teachers, and staff in

229   order to investigate any additional factors not present in the primary literature. The interview

230   questions were validated by experts. Interviews continued until saturation was reached and there

231   was no new information provided by the participants. A total of 65 individuals including 5

232   professors of educational psychology from the University of Tehran, 5 principals, 18 teachers, 17

233   school staff, and 20 students were selected from five areas in Tehran: north, south, east, west,

234   and center. The sampling was purposive and the inclusion criteria were:

235   1- Participants except for students should have at least five years of experience in their job;

236   2- Participants except for students should have been employed by the school site for at least three

237   years;

238   3- Students should be selected from the 4th, 5th, and 6th grades.

239   Exclusion criteria were individuals with less than five years of job experience and those

240   who did not intend to participate in the research.

241   After selection of participants, each individual received informed consent forms and was

242   made aware of the goals of study. Participants were also enlightened about how their personal

243   information would be used and assured of anonymity.

244   The interviews were conducted and recorded, the recorded interviews were transcribed in

245   MAXQDA 2020 software and studied and coded independently by two trained researchers.

246   Colaizzi's method was used to code the qualitative data, which led to ten themes including school

247   health policies, community connections, health education, physical activity, health services,

248   nutrition, psychological services, physical environment, equipment and facilities, and school

249   staff's health. The themes were named based on the theoretical literature review. Codes of the

250   themes are displayed in Table 1. Then, items were created using the theme codes. For example,

251   for the code "classroom lighting" of the theme "physical environment", the item "classroom

252   lighting is sufficient" was devised. The items were rechecked by psychometric experts, and

253   finally, an initial 76-item tool was devised. The 76-item version of SHAT-PS is provided in the

254   Appendix.

255   **Phase 1: Content validity**

256   Content validity index (Waltz & Bausell, 1981) was used to investigate the content

257   validity of the initial 76 items. Four experts and ten individuals from the target population

258   answered content validity index questions regarding relevance, clarity, and comprehensiveness

259   of the items using a four-point scale (1=not relevant/comprehensible/clear, 2=somewhat

260   relevant/comprehensible/clear, 3=quite relevant/comprehensible/clear, and 4=highly

261   relevant/comprehensible/clear). The items with a content validity index of less than .70 were

262   removed, those between .70 to .79 were revised and those higher than .79 were considered

263   acceptable (Zamanzadeh et al., 2015). Seven items were removed as a result of content validity

264   assessment and 69 items remained at this stage.

265   **Phase 2: Structural validity**

266   *Parallel Analysis*. Determining the number of retained factors in exploratory factor

267   analysis (EFA) entails performing parallel analysis since the Kaiser criteria is not sufficient for

268   this purpose (Horn, 1965). The parallel analysis was conducted by comparison between the

269   actual eigenvalues and the average eigenvalues extracted from the syntax provided by Hayton

270   and colleagues (Hayton et al., 2004). Then, the retained factors were those actual eigenvalues

271   higher than the average eigenvalues calculated. Finally, eight factors were considered valid for

272   further analysis.

273   *Exploratory factor analysis (EFA) with goodness of fit indices*. The EFA was conducted

274   with an estimator permitting goodness of fit indices (like ML, Truong & McColl, 2011), for

275   deciding whether a factor solution could be regarded as a special structural equation modeling

276   case (Brown, 2015; p.26). The EFA was conducted in Mplus v7.4 through maximum likelihood

277   estimation and oblique Geomin rotation. The results showed that the 8-factor solution had the

278   best fit for the data. These factors have eigenvalues greater than 1 (Kaiser Criteria) and explained

279   83.36% of the total variance. Of the total 69 items, 22 items were removed due to low factor

280   loadings. The EFA suggested 7 items for factor 1 (school health policies), 4 items for factor 2

281   (community connections), 3 items for factor 3 (health education), 4 items for factor 4 (physical

282   education and activity), 6 items for factor 5 (health services), 5 items for factor 6 (nutrition), 5

283   items for factor 7 (psychological services), and 13 items for factor 8 (physical environment). In

284   addition, the Kaiser-Meyer-Olkin coefficient indicated that the sample size was adequate

285   (*KMO*=0.939) (Kaiser, 1970; Kaiser, 1958), and also Bartlett's test of sphericity (Bartlett, 1951)

286   showed that the variables were sufficiently correlated (*chi-square*=22139.573, *df* =1081,

287   *p*<.001). Table 2 shows the model fit information for 1 to 8-factor models. The indices of chi-

288   square goodness of fit statistic, comparative fit index (CFI), Tucker-Lewis index (TLI), the root

289   mean square error of measurement (RMSEA), and the standardized root mean square residual

290   (SRMR) were all estimated and compared for all 8 models. All the fit indices suggested that the

291   8-factor solution is the best fit to the observed data (χ^2 =1739.370, df =733, p<.001, CFI=.954,

292   TLI=.933, RMSEA=.059, SRMR=.013). See also Figure 2.

293   Moreover, the indices of χ^2/df=2.37 were less than 3 (Kline, 2015), CFI=.95, TLI=.933,

294   RMSEA=.059, and SRMR=.013, thus, indicating a good fit (Hooper et al., 2008; Hu & Bentler,

295   1999). The RMSEA was very close to the cut point of RMSEA<.059 (Hu & Bentler, 1999). The

296   results from ML-EFA also showed that the 8-factor model had the best fit to the data.

297   *Confirmatory factor analysis (CFA).* To verify these results, a confirmatory factor

298   analysis with weighted least squares – mean and variance adjusted estimation method (WLSMV;

299   Mplus version 7.4) was conducted. The WLSMV estimation method was used due to the ordinal

300   nature of our data (Li, 2016; DiStefano & Morgan, 2014). The CFA fit indices showed again a

301   good fit for the 8-factor model (chi-square=2432, df=1006, chi-square/df=2.41, CFI=.98,

302   TLI=.97, RMSEA=.06, WRMR=1.22). A Pearson correlation between factors showed that most

303   of the factors were correlated to each other and that they had strong correlations with the whole

304   construct (Table 3). Table 4 shows the standardized factor loading and t-value for each item in

305   the 8-factor model, which ranged from .88 to .98 and from 44.708 to 178.740 respectively. This

306   shows that the items had high correlations to their factors. Moreover, the t-values were higher

307   than 2.33 with *p*<.01 (Bartlett, 1951), hence, the items can be assumed to measure a common

308   construct.

309
310   **Phase 2: Convergent and discriminant validity**

311   As a means to verify the convergent validity of a scale, Fornell and Larcker (1981)

312   suggest that the average variance extracted (AVE) should be greater than .5 and lower than the

313   composite reliability (CR). In addition, to confirm the discriminant validity of the scale, the AVE

314   should be greater than the maximum shared variance (MSV) and the average squared shared

315   variance (ASV). Table 5 shows the values estimated for CR, AVE, MSV, and ASV for the 8-

316   factor solution of the SHAT-PS, which suggest that the SHAT-PS items have the required

317   correlation with the latent variables (i.e., good convergent validity) and that the latent variables

318   are distinctly different, thus, suggesting good discriminant validity (cf. Adedeji et al., 2017; Zaiţ

319   & Bertea, 2011). More specifically, the values of AVE for all the factors are higher than .5 and

320   the CRs are higher than AVEs, therefore, the convergence validity of the instrument was

321   considered acceptable. Besides, the AVEs are higher than the MSVs and ASVs, hence, the

322   discriminant validity was also confirmed.

323   **Phase 2: Internal consistency**

324   Cronbach's alpha and ordinal alpha coefficients were calculated and reported for each

325   subscale of the 8-factor solution independently. The Cronbach's alpha and ordinal alpha

326   coefficients were .96 and .97 respectively for school health policy .95 and .97 for community

327   connections, .95 and .98 for health education, .93 and .96 for physical education and activities,

328   .95 and .97 for health services, .94 and .96 for nutrition, .94 and .97 for psychological services,

329   and .96 and .97 for physical environment. The Cronbach's alpha and ordinal alpha for the whole

330   SHAT-PS scale were .95 and .97, respectively. The estimated values for internal consistency

331   affirm high internal reliability among subscales, that is, high correlations between items with

332   their respective subscales.

333   **Phase 2: Measurement invariance**

334   Measurement invariance was examined using multi-group confirmatory factor analysis,

335   and changes in goodness of fit were inspected across gender groups in three invariance models:

336   configural, metric, and scalar. Both females and males were similar in different characteristics of

337   age, position, and district that school was located. Table 6 shows that the difference between

338   CFA and RMSEA in the different models was less than .01 and the comparison between the

339   models yielded *p*-values higher than .05. Hence, the school health construct does not vary across

340   gender.

341   **Phase 2: Reliability**

342   Test-retest reliability was measured using intraclass correlation coefficient (ICC) analysis

343   and a two-way random effect model in order to examine the reliability of the SHAT-PS. Two

344   administrations were conducted with two weeks intervals on the same participants under similar

345   conditions. The sample size for test-retest reliability (*n*=62) was estimated by PASS v15. The

346   ICC coefficient for the first administration was .97 (99% CI:.95-.98) and for the second

347   administration was equal to .94 (99% CI:.91-.96). The ICC-pooled was .95 (99% CI:.91-.98),

348   thus, only a very small alteration was found across administrations.

349   **Phase 2: Standard error of measurement (SEM)**

350   SEM is an index of reliability and is calculated by the following formula (Harvill, 1991):

351    $\text{SEM} = S\sqrt{1-r}$

352   In which *S* is the standard deviation and *r* is the ICC (i.e., reliability). SEM for the first

353   administration was 4.19 and 4.61 for the second administration. The SEM-pooled was 4.4 with

354   .95 confidence interval, which means that the scores are probably (with 95% confidence)

355   dispersed 4.4 scores around the true score in both administrations.

356   **Phase 2: Known-group validity**

357   Gender and positions of the school staff were studied based on the hypothesis that there

358   were no differences in terms of school health between subgroups. A t-test was used to measure

359   differences between females and males and Levene's analysis of variance was employed to

360   assess differences between principals, teachers, and school health personnel (e.g., nurses). As

361   expected, the results showed that there were no differences in relation to gender (*t*=-.429, *df*

362   =398, *p*=.668) or position (*Levene statistic*=.699, *p*=.498; ANOVA: *F*=1.097, *p*=.335) in the

363   eight factors of school health as measured by the SHAT-PS.

364   **Discussion**

365   In this study, the School Health Assessment Tool for Primary Schools was developed and

366   validated. Findings indicated that the SHAT-PS proved to be a valid and highly reliable tool for

367   the measurement of the prevalence of important school health factors at primary schools in the

368   Iranian context.

369   Nevertheless, in the process of validation, many of the items in the scale related to staff

370   health were eliminated due to poor factor loadings. Obviously, staff health is an important factor

371   in the measurement of school health. It is plausible that since this factor has been neglected in

372   Iran (Charoghchian et al., 2019) along with the strict criteria for validity testing, resulted in the

373   omission of this important factor in SHAT-PS. Indeed, Kaldi and Asgari's (2003) research

374   indicated that the majority of primary schools' teachers are not satisfied with their jobs. In other

375   words, the factor is not irrelevant, it is rather more relevant than any of the other factors. As the

376   matter of fact, all school staff in this study had extremely low scores in these items and their

377   responses had almost no variance at all.

378   Known-group validity findings was aligned with our expectation that the instrument

379   should produce similar scores among gender and position groups and is consistent with the

380   findings from measurement invariance in which SHAT-PS proved to measure school health

381   identically among gender groups. In other words, the perception of the presence or absence of

382   these important factors did not seem to be significantly influenced by either the school staff's

383   gender or position at the school.

384   The examination of participants' responses to the items in the factor "psychological and

385   counseling services", being mainly "*not any*" or "*a bit*", showed that there is a serious need for

386   assigning psychologists at primary schools in Iran. Especially in light of the sensitivity for

387   mental illness and behavioral disorders within this age group (Eslamieh, 2008); but also due to

388   the effect of promoting good mental health and well-being at this age has for functioning later in

389   adulthood. These findings support studies that emphasize the necessity for the availability of

390   psychologists or consultants at primary schools (Shahmoradi et al., 2011).

391   One of the SHAT-PS's strengths is that it was developed specifically for primary schools

392   by considering their particular needs and requisites to promoting health for this age group. We

393   recommend researchers in other countries to evaluate the validity and reliability of the 76-item

394   SHAT-PS version, rather than the 49-item version, if they intend to use this instrument in

395   different cultural and economic settings, infrastructures, ethnic groups, etc. (Beaton et al., 2000;

396   Sperber et al., 1994), please refer to Appendix to find the 76-item version. The cross-cultural

397   study of the SHAT-PS will definitely affect the selection of the appropriate items measuring

398   school health and it will help to understand whether it is applicable in other countries with all

399   these distinctions or not.

400   The frameworks and programs currently used to evaluate school health are still in their

401   infancy. Most of them are looking at optimization of current school conditions to approach or

402   exceed normative standards, but are not focused on developing more expansive visions of well-

403   being in the 21st century. As we enter into a period of increasing difficulty related to climate

404   change, pandemic conditions, social inequities, and global economic difficulties, it is important

405   that we reconsider how we can help children face a future they have not experienced and could

406   never anticipate based on our own experiences in childhood. This study represents a step in that

407   direction. The SHAT-PS is more comprehensive than all current primary school instruments

408   reviewed in this study, since we merged factors from different models and examined the

409   psychometric properties more accurately and comprehensively. Future research will need to

410   examine even more comprehensive views of health and wellness based on our understanding of

411   biological functioning of the human brain and body, our understanding of psychosocial

412   development from developmental and positive psychology, and explore more deeply the impact

413   of pedagogical approaches on staff and student health. All of this will be necessary to confront

414   the real challenges of the 21st century and improving health at schools.

415   **Limitations**

416   The main issue in criterion validity evaluation of questionnaire-based measures is the

417   general absence of gold standards. Certain measures that are considered gold standards might not

418   be able to reliably assess the actual phenomena (Bellamy, 2014). As stated in the introduction,

419   there is a need for the development of cross-cultural school health measurement tools. The

420   SHAT-PS was developed and tested in a Middle Eastern context.

421   **Implications for future studies**

422   Iran is a country with a student population of about 15 million, about 8 million of those

423   were primary school students in 2019 (Ministry of Education, 2020). It was not until 2010-2011

424   academic year that Iran started working on a program called "Health Promoting Schools" as an

425   agreement between the two Ministries of Health and Ministry of Education (Ramezani et al.,

426   2016; Zarei et al., 2017). Iran has detailed and accurate executive orders, assessment processes[1],

427   financial rules and regulations, checklists, guidelines, policy-making, implementation, auditing,

428   and monitoring of health-promoting schools. Hence, the number of health-promoting schools has

429   increased exponentially since the program's inception. The question is, however, has this

430   initiative improved the quality of school health in participating schools? Issues that Iran's health-

431   promoting schools are facing include: lack of adequate funding for these approaches, lack of

432   school nurses, unclear roles and responsibilities, lack of coordination, lack of incentives, lack of

433   clarity and awareness of the importance among school staff to include health promotion in the

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[1] Health-promoting schools are categorized based on the quality of their services with stars.

434   curriculum, lack of student involvement, bad communication, and lack of adequate role models.

435   Hence, the school health situation in Iran is different from that of Western societies, for example.

436   At the same time, the promotion of school health is a global concern and one of the

437   challenges of the 21st century, thus, Iran and other countries are in equal need of validated

438   methods for the promotion of well-being and also the prevention, identification, and treatment of

439   mental illness in different populations and situations. Similar to Iran, many countries have

440   launched school health initiatives, but have not necessarily had much success in their

441   implementation. In Italy, the Miur-Directorate General for students integration and participation

442   has launched various activities and collaborations over the years, aimed at schools of all levels,

443   to protect the right to health, raise awareness on prevention issues and promote correct styles of

444   life. In Spain, the term Health Promotion and Education in Schools appeared in 1990 in the *Ley*

445   *Orgánica General del Sistema Educativo* (LOGSE) (Boletín Oficial del Estado, 1990). In this

446   law, the Health Promotion and Education topic was a cross-curricular element that must be

447   present in all the curricular areas. After this law, the *Ley Orgánica 2/2006 de Educación* (LOE)

448   (Boletín Oficial del Estado, 2006) established that in all the educational stages the Health

449   Promotion and Education topic must be worked in the areas of environmental knowledge, natural

450   sciences, physical education, and citizenship education. As a result, Health Promotion and

451   Education should be integrated with projects inside the school environment. In Nigeria, for

452   example, the National School Health Policy was approved and adopted in 2006. It describes a 5-

453   component model: (1) school health service, (2) skill based health education, (3) healthful school

454   environment, (4) school feeding service, and (5) school, home, and community relationship

455   (Dania & Adebayo, 2019). Unfortunately, much of the efforts related to school health have been

456   limited to policy directives without much work on the implementation of such programs.

457 Investigations of the school health situation in Nigeria have shown that children in Nigerian

458 primary schools were not provided with basic health examination services and pre-entrance

459 medical examinations, thus, there was the absence of essential baseline health information.

460 Routine medical examinations that would have identified deviations from normal and made early

461 referrals possible are not conducted in Nigerian schools (Ojugo, 2005; Ola & Oyeledun, 1999;

462 Kuponiyi et al., 2016; Ademokun et al., 2014). In sum, implementation of the National School

463 Health Policy is still grossly suboptimal in Nigeria.

464   In these various contexts, the challenges are similar, but still unique to the specific

465 cultural, economic, and historical conditions. What is certain, the promotion of school health

466 requires adequate funding, training for participants at every level, improved communication,

467 strong communication among all parties involved, and an awareness of the importance of the

468 initiative. Absent these crucial ingredients, school health programs promote school health in

469 name only, with most programs remaining just an intention to try to do better regarding student

470 health within the status quo or "business-as-usual" approaches to modern education. There is no

471 shortcut, schools, communities, and governments have to put a high value on child health and

472 work on their own health in order to be good models of the health they hope to see in their

473 children. Our work on the SHAT-PS is merely a small step in that global direction, and much

474 more work will need to be done to help schools achieve the lofty goal of health-promoting

475 institutions, especially when we consider that health involves an integrated biopsychosocial

476 model to be sustainable.

477   Ultimately, there is a need for the promotion of school health at a global level. This is one

478 of the challenges of the 21st century. We need to work with the validation of methods for the

479 prevention, identification, and treatment of mental illness in different populations and situations;

480   but also for the promotion, validation, and maintenance of well-being. In this framework,

481   although the SHAT-PS was developed in a Middle East context, it seems to mirror the most

482   important factors behind school health. Future studies, however, need to validate the original

483   items generated in the interviews in new cultural contexts and consider how to expand the

484   models to account for the changes to lifestyle in the 21st century that current school conditions

485   are not built for. As Plato said, "If a man neglects education, he walks lame to the end of his

486   life."

487   **Availability of data and materials**

488   The study's data will be available by request through email to Dr. Maryam Kazemitabar

489   (maryam_kazemitabar@yahoo.com) or Dr. Danilo Garcia (danilo.garcia@icloud.com). The

490   requests will be inquired by the research team and will be granted upon their final decision.

491   **Acknowledgments**

492   We kindly thank all the participants in this study including students, principals, teachers, and

493   staff of the primary schools in various districts of Tehran who have shared their thoughts and

494   experiences on the phenomena under study in interviews and also replied to the items of the

495   instruments patiently and honestly.

496   **Ethical approval and consent to participate**

497   This study received ethical approval and license from the Ministry of Education of Iran

498   (document number: 51241/64) and the University of Tehran, Faculty of Psychology and

499   Education. Informed Consent was obtained from all the participants for the study. The

500   participants were informed about the aims of the study, they were assured of anonymity and also

501   advised that they could withdraw from the study whenever they intended to. All protocols and

502   methods were conducted aligned and in accordance with the relevant guidelines and regulations.

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Themes extracted from interviews and their codes

2 **Table 1:**

3 **Themes extracted from interviews and their codes**

Themes	Codes
School health policies	Health education tools, monitoring camera, student-centered school, educational facilities, school amenities, single-shifted school, out-of-school activities, expert teachers for each lesson, token instead of money for students, talent identification, training for families and staff for student psychological and physical health, life skill training, using experienced staff.
Community connections	Media and TV cooperation, family engagement, Ministry of Education support, budget and funding, community engagement.
Health education	Course and syllabus for health education, health and hygiene culture, school nurse, student cooperation in school hygiene, health workshops and programs, enough health training hours per week.
Physical activity and education	Experienced physical education teacher, sport facilities, enough time for sports and play, sports competitions, teaching sports professionally.
Health services	Student health monitoring, health screening, student's health records, equipped room for school nurse, vaccination check
Nutrition	Education about healthy eating, lunchroom hygiene, attention to students' taste for meals, suitable buffet/restaurant, healthy and nutritious foods, safe and clean water.
Psychological services and counseling	Family parenting education, family economic problems, positive thinking education, addiction in family, parental conflict, psychological education to staff and parents, healthy and efficient interactions, student joy and happiness, calmness and tranquility for students, bullying control, psychological counseling for students, keep records for students' mental health, attention to students with special needs, happy climate at school, teachers' mental health, teachers' gentle interaction with students.
Physical environment	Hygiene and cleanliness of school, heating and cooling systems, joyful physical environment, proportional area of school and classroom to the number of students, the safety of school.
Equipment and facilities	Standardization of lighting, ventilation, desks, and chairs, etc., double glazed windows, green space, equipped library and laboratory.
School staff's health	Staff's health, teachers' job satisfaction, adequate assistance staff (e.g. teacher's assistants), sport facilities for staff, psychological counseling for staff, teachers' salary.

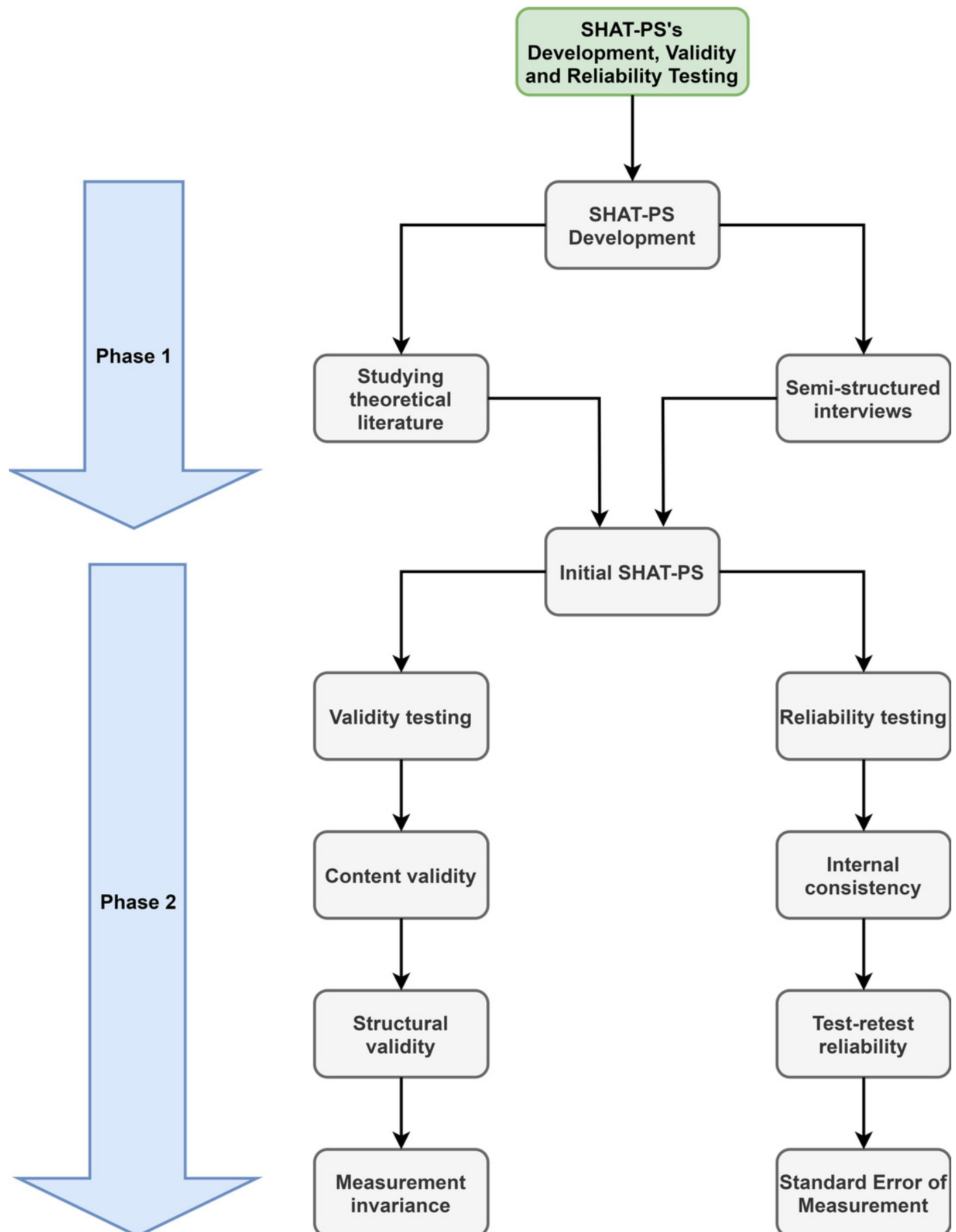
Summary of the model fit information

2 **Table 2:**

3 **Summary of model fit information**

Model	chi-square	df	*p*-value	CFI TLI	RSMEA SRMR
1-factor	16242.397	1034	>0.001	.311 .280	.192 .191
2-factor	12550.233	988	>0.001	.476 .427	.171 .134
3-factor	10174.097	943	>0.001	.582 .521	.156 .108
4-factor	8372.146	899	>0.001	.661 .593	.144 .085
5-factor	6305.625	856	>0.001	.753 .688	.126 .077
6-factor	4891.427	814	>0.001	.815 .755	.112 .056
7-factor	2980.151	773	>0.001	.900 .860	.084 .034
8-factor	1739.370	733	>0.001	.954 .933	.059 .013

Figure 1

Flowchart of the development and validation of the School Health Assessment Tool - Primary Schools

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                    ┌─────────────────────┐
                    │      SHAT-PS's      │
                    │  Development, Validity │
                    │ and Reliability Testing │
                    └─────────────────────┘
                                │
                                ▼
                    ┌─────────────────────┐
            ┌───────│      SHAT-PS        │───────┐
            │       │    Development      │       │
            │       └─────────────────────┘       │
            ▼                                      ▼
   ┌─────────────┐                        ┌─────────────┐
   │  Studying   │                        │Semi-structured│
   │ theoretical │────┐          ┌────────│  interviews  │
   │ literature  │    │          │        │             │
   └─────────────┘    │          │        └─────────────┘
                      ▼          ▼
                    ┌─────────────────────┐
            ┌───────│   Initial SHAT-PS   │───────┐
            │       └─────────────────────┘       │
            ▼                                      ▼
   ┌─────────────┐                        ┌─────────────┐
   │  Validity   │                        │ Reliability │
   │  testing    │                        │  testing    │
   └─────────────┘                        └─────────────┘
            │                                      │
            ▼                                      ▼
   ┌─────────────┐                        ┌─────────────┐
   │   Content   │                        │  Internal   │
   │  validity   │                        │ consistency │
   └─────────────┘                        └─────────────┘
            │                                      │
            ▼                                      ▼
   ┌─────────────┐                        ┌─────────────┐
   │ Structural  │                        │ Test-retest │
   │  validity   │                        │ reliability │
   └─────────────┘                        └─────────────┘
            │                                      │
            ▼                                      ▼
   ┌─────────────┐                        ┌─────────────┐
   │ Measurement │                        │ Standard Error of │
   │ invariance  │                        │ Measurement │
   └─────────────┘                        └─────────────┘
```

Phase 1

Phase 2

Pearson correlation coefficients between the factors in the SHAT-PS and the whole construct

Table 3:

Pearson correlation coefficients between the factors in the SHAT-PS and the whole

construct

Factors	1	2	3	4	5	6	7	8	9
School health policy (1)	1								
Community connections (2)	.184**	1							
Health education (3)	.377**	.019	1						
Physical education and activity (4)	.411**	.051	.108*	1					
Health services (5)	.509**	.271**	.288**	.198**	1				
Nutrition (6)	.358**	.209**	.368**	.312**	.060	1			
Psychological services (7)	.456**	.118*	.124*	.228**	.444**	.135**	1		
Physical environment (8)	.458**	.113*	.308**	.377**	.311**	.313**	.118*	1	
School health construct (9)	.806**	.357**	.499**	.548**	.641**	.544**	.505**	.754**	1

Factor loadings and t-values for the items in the SHAT-PS

2 **Table 4:**

3 **Factor loadings and t-values for the items in the SHAT-PS**

Factors and items	Loading	*t*-value
School health policies		
1- The school has specific rules for the rights and duties of individuals.	.919	76.641
2- There is a health organization at school (such as health care providers, health pioneers, and health promoters).	.944	94.433
3- School's educational facilities are adequate.	.893	70.715
4- School's amenities are adequate.	.920	78.400
5- School has the necessary facilities in case of unexpected events (such as fire, earthquake, etc.).	.951	105.598
6- School has regular programs for out-of-school recreational and educational activities for students.	.950	98.999
7- School staff are satisfied with their job.	.969	108.715
Community connections		
8- Families work with the school to improve students' health.	.975	178.740
9- Supportive and charitable organizations work with the school to promote school health.	.942	84.987
10- Media and TV provide educational programs to promote school health.	.974	166.555
11- The Ministry and the Department of Education allocate sufficient budget and funds to schools.	.964	125.250
Health education		
12- School organizes health-related educational workshops, conventions, and programs for students.	.985	166.473
13- Health educational posters, stands, and boards have been installed in classrooms, hallways, and halls.	.979	140.966
14- First aid training is provided to students.	.961	129.928
Physical activity		
15- At least one sport is taught professionally at school, such as volleyball, basketball, handball, football, and so on.	.964	87.634
16- Sports competitions are held at the school.	.964	95.383
17- Adequate hours of the week are devoted to sport at school.	.942	82.810
18- School has enough sport facilities.	.957	105.955
Health services		
19- There is a skilled nurse at school.	.968	125.388
20- Students' health status is assessed and registered in their health records.	.973	171.674
21- There are enough first aid kits for students and school staff.	.966	149.167
22- School nurses provide emergency health services to students and school staff.	.955	129.417
23- Teachers share students' health/educational issues with their parents.	.973	126.613

24- The vaccination status of students is checked.	.950	101.255
Nutrition		
25- School meals are prepared according to hygienic principles.	.948	97.004
26- School offers healthy and nutritious foods.	.960	116.484
27- Adequate information about healthy eating is provided to students.	.944	101.005
28- Healthy and safe drinking water is available.	.956	114.282
29- Buffet hygiene is monitored.	.956	85.569
Psychological services		
30- Students are encouraged to be active in learning the lessons.	.974	137.851
31- Bullying and violence among students are prevented.	.965	131.023
32- Students with special problems (behavioral and learning) are identified and referred to the relevant specialists.	.977	148.340
33- Necessary psychological training is provided to school staff and parents.	.954	106.277
34- Students enjoy attending school.	.949	107.527
Physical environment		
35- Restrooms are clean.	.904	63.640
36- The number of restrooms is sufficient.	.922	89.032
37- Drinking fountains/water coolers are clean.	.913	78.920
38- The number of drinking fountains/water coolers is sufficient.	.900	71.599
39- Classroom lighting is sufficient.	.929	89.014
40- The heating system in the classrooms is appropriate and sufficient.	.891	61.519
41- The cooling system in the classrooms is appropriate and sufficient.	.913	76.431
42- School is regularly inspected for the safety of buildings, windows, and equipment.	.915	77.447
43- Classroom desks and chairs are standard and comfortable.	.932	80.085
44- The area of the school is proportional to the number of students.	.889	44.708
45- The area of the classrooms is proportional to the number of students.	.954	66.651
46- School's physical environment is happy (colors, decorations, layouts, etc.).	.908	63.270
47- There is sufficient green space at school.	.914	62.561

4 Note: The Persian version of the instrument will be available by request through email to the
5 corresponding authors.

The values for CR, AVE, MSV, and ASV for the 8-factor solution of the SHAT-PS

2 **Table 5:**

3 **The values for CR, AVE, MSV, and ASV for the 8-factor solution of the SHAT-PS**

Factors	CR	AVE	MSV	ASV
School health policies	.962	.781	.276	.180
Community connections	.955	.842	.081	.029
Health education	.955	.877	.158	.076
Physical education and activity	.931	.771	.189	.083
Health services	.959	.798	.276	.117
Nutrition	.950	.793	.152	.082
Psychological services	.946	.779	.229	.083
Physical environment	.966	.687	.231	.105

Invariance testing of the SHAT-PS using configural, metric, and scalar models

2 **Table 6:**

3 **Invariance testing of the SHAT-PS using configural, metric, and scalar models**

Model	chi-square	df	p-value	CFI	RMSEA
Configural	4469.675	2012	.0000	.886	.078
Metric	4503.263	2051	.0000	.886	.077
Scalar	4557.663	2090	.0000	.886	.077
Models compared	chi-square	df	p-value		
Metric against configural	33.588	39	.7147		
Scalar against configural	87.987	78	.2059		
Scalar against metric	54.400	39	.0516		

Figure 2

Path diagram of the 8-factor solution of the SHAT-PS