

1 **Development and Initial Validation of the Life Skills Ability Scale for** 2 **Higher Education Students**

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Development and Initial Validation of the Life Skills Ability Scale for Higher Education Students

51 This research developed a scale to assess the following life skills in higher
52 education students: teamwork, goal setting, time management, emotional skills,
53 interpersonal communication, social skills, leadership, and problem solving and
54 decision making. Study 1 adapted an existing scale for the purposes of this
55 research and provided evidence for the factorial validity of the new scale with
56 445 students. Study 2 included 423 students and supported the predictive
57 validity of the scale in relation to students' psychological well-being, academic
58 self-efficacy/performance, and health-related quality of life. Study 3 provided
59 evidence for the test-retest reliability of the scale with 49 students. All three
60 studies supported the internal consistency reliability of the scale. Combined,
61 these studies suggest that the scale is a valid and reliable measure that
62 researchers, policymakers and educators could use to assess and potentially
63 enhance higher education students' life skills. Future research directions and
64 uses of the scale are discussed.

65 Keywords: life skills; employability skills; transferable skills; competencies;
66 higher education.

Introduction

69 Life skills are defined as the 'skills or abilities individuals need in order to achieve success in
70 life' (Murray, Clermont, and Binkley 2005, 51). Examples of life skills include teamwork,
71 communication, time management, and leadership skills. Previously, terms such as 'core',
72 'key', 'soft', 'generic', 'transferable', 'employability' and 'life' skills have been used
73 interchangeably within the research literature (Atkins 1999; Dacre Pool and Sewell 2007;
74 Robles 2012; Tsitskari et al. 2017). In particular, the term 'employability skills' has been

75 used extensively in the research literature to refer to ‘personal, social, and transferable skills
76 seen as relevant to all jobs’ (Blades, Fauth, and Gibb 2012, 3). However, we use the term
77 ‘life skills’ as skills like teamwork, goal setting, leadership, and social skills are used in
78 education, sports, extracurricular activities, and social relationships – along with being used
79 within employment. Highlighting this point, a report published by the Higher Education
80 Academy (Artes, Hooley, and Mellors-Bourne 2016) proposed that such skills have
81 relevance for education, family life, citizenship, and the workplace. Similarly, research by
82 Steptoe and Wardle (2017) showed that life skills play a role in promoting young people’s
83 health, educational achievement and occupational success. The importance of life skills is
84 further highlighted by the Bologna Declaration (1999) and its accompanying policies,
85 processes and principles, which promote the development of skills which students require for
86 European citizenship and employment (Yerevan Communiqué 2015). This illustrates that
87 political and economic leaders are particularly focused on improving the skills of future
88 workers to promote economic prosperity (Wolf, Zahner, and Benjamin 2015). In fact, it
89 would be fair to say that one of the main aims of higher education is to equip students with
90 the skills required for the workplace (Britton et al. 2017).

91 But what specific life skills do higher education students need for the workplace?
92 Through her review of the research literature, Jackson (2010) highlighted the importance of
93 the following skills across industries and countries: problem solving, decision management,
94 oral communication, team-working, interpersonal skills, leadership, and emotional
95 intelligence. Research specific to different industries or degree programmes has also
96 highlighted the importance of such skills. For instance, Azevedo, Apfelthaler, and Hurst
97 (2012) surveyed 900 business graduates and employers in four European countries and
98 highlighted that teamwork, leadership, and communication are key skills required within
99 business. Within the sports sector, Baker et al. (2017) surveyed 1,132 sports graduates and

100 327 employers across six European countries and identified teamwork, communication,
101 social skills, leadership, and problem solving as crucial skills for sports graduates.

102 Despite research suggesting that graduates require such skills, many employers
103 believe that today's graduates are lacking in these skills. For example, the British Chamber
104 of Commerce (2014) suggested that 54% of businesses consider graduates to lack work-
105 appropriate skills. Other researchers have suggested that degree programmes may not be
106 equipping students with the skills needed within employment (Cranmer 2006) and raises the
107 question of what can be done to promote the development of students' life skills. In this
108 regard, the Bologna Declaration (1999) – which has greatly shaped higher education policies
109 in Europe – proposed that we require university-wide practices for embedding, developing,
110 assessing and reporting non-technical competencies (Jackson and Chapman 2012). Such a
111 proposition aligns with competence or skills-based higher education (Bergsmann et al. 2018),
112 which entails the student developing certain skills during their degree programme. Two
113 approaches that Cranmer (2006) suggested for skills development are to embed skills within
114 the curriculum or ensure they are taught parallel to the curriculum – with the latter seen as the
115 best approach. Other researchers have suggested that key aspects of a degree programme
116 which help students develop their life skills are work experience and volunteering
117 opportunities (Baker et al. 2017; Dacre Pool and Sewell 2007).

118 Despite life skills being important within higher education, few valid and reliable
119 measures exist to track students' life skills. Although, it must be noted that some recent
120 efforts have been made to start assessing higher education students' skills and competencies
121 (for an overview, see Zlatkin-Troitschanskaia, Pant, and Coates 2016). Nonetheless, several
122 researchers (e.g., Blades et al. 2012; Riebe and Jackson 2014; Zlatkin-Troitschanskaia et al.
123 2016) have suggested that new measures are required to assess students' skills and
124 competencies. This is particularly the case as previous measurement efforts have focused

125 primarily on students' knowledge and cognitive skills (Zlatkin-Troitschanskaia, Shavelson,
126 and Kuhn 2015) as opposed to their broader life skills. Importantly, developing a life skills
127 measure would allow researchers to investigate whether students are developing life skills
128 during their degree programme and allow for theory-based research concerned with the
129 antecedents and consequences of life skills development in higher education. Porter (2013)
130 has further recommended that measures be used to assess students' skills at the beginning and
131 throughout their degree programme, which would allow educators to investigate the
132 effectiveness of degree programmes in developing students' life skills. Finally, a new
133 measure to assess students' life skills would help when investigating if elements of a degree
134 programme/curriculum (e.g., teaching content, assessments, and work placements) promote
135 students' life skills development.

136 Heeding the call for new life skills measures to be developed, the current research
137 focused on developing a scale to assess the following life skills in higher education students:
138 teamwork, goal setting, time management, emotional skills, interpersonal communication,
139 social skills, leadership, and problem solving and decision making. In line with the guidance
140 provided by *The Standards for Educational and Psychological Testing* (AERA, APA, and
141 NCME 2014), three studies were conducted to develop and provide validity and reliability
142 evidence for this new scale.

143 **Study 1**

144 The aim of this study was to develop a scale to measure students' life skills ability.
145 This involved adapting an existing measure for use as a life skills ability scale and testing the
146 factorial validity and internal consistency reliability of the measure with a sample of higher
147 education students.

148 **Method and materials**

149 *Participants*

150 The sample included 445 students from three UK universities ($M_{age} = 21.77$, $SD =$
151 5.49 , age range = 17–50 years). Both male ($n = 227$) and female ($n = 216$) students were
152 included (two students did not indicate their gender). Students were predominantly from
153 undergraduate degree programmes in sports ($n = 193$), psychology ($n = 153$), and computer
154 game design ($n = 83$). The following year groups were included: foundation year ($n = 22$),
155 first year ($n = 165$), second year ($n = 208$), third year ($n = 41$), and year one of an MSc ($n =$
156 5).

157 *Life Skills Ability Scale (LSAS)*

158 In this study, we adapted the Life Skills Scale for Sport (LSSS; Cronin and Allen,
159 2017) to develop a Life Skills Ability Scale (LSAS) for higher education students. This new
160 scale (see Appendix A of the supplementary materials for the complete scale) assesses
161 students' teamwork, goal setting, time management, emotional skills, interpersonal
162 communication, social skills, leadership, and problem solving and decision making abilities.
163 These life skills are commonly cited as skills which young people use in a broad range of
164 settings including sports, education, and the workplace (Artess et al. 2016; Cronin and Allen
165 2017; Jackson 2010). The definitions and components of the life skills are included in Table
166 A of the supplementary materials. The LSSS was adapted by firstly changing the general
167 instructions to fit with the assessment of students' life skills abilities. The item stem was also
168 changed from 'This sport has taught me to...' to 'I am able to...' Finally, the original
169 response format was changed from 1 (*not at all*) to 5 (*very much*) to 1 (*strongly disagree*) to 5
170 (*strongly agree*). For the most part, the 43 items in the LSSS were retained. However, four
171 items were amended to better fit with the measurement of students' life skills (e.g., 'set goals
172 for practice' was changed to 'set goals for my activities'). Examples of items which
173 comprised the new scale included: *teamwork* (7 items; 'work well within a team/group'), *goal*
174 *setting* (7 items; 'set specific goals'), *time management* (4 items; 'manage my time well'),

175 *emotional skills* (4 items; ‘notice how I feel’), *interpersonal communication* (4 items; ‘speak
176 clearly to others’), *social skills* (5 items; ‘interact in various social settings’), *leadership* (8
177 items; ‘be a good role model for others’), and *problem solving and decision making* (4 items;
178 ‘think carefully about a problem’).

179 ***Procedures***

180 The 43-item LSAS was completed by students prior to a teaching session at mid-
181 semester. Before the data collection, ethical approval was granted by the universities ethics
182 committees and informed consent was obtained from all participants. Students completed
183 the scale after the researcher gave an introductory statement which explained the purpose
184 of the study, that there were no right or wrong answers, and that all information provided
185 was confidential. The scale took approximately 5–10 minutes to complete.

186 ***Data analyses***

187 To assess the factorial validity of the scale, confirmatory factor analysis (CFA),
188 exploratory structural equation modelling (ESEM) and bifactor analyses employing
189 maximum likelihood estimation was conducted using Mplus (Version 7.4; Muthén and
190 Muthén 1998–2015). The following models were tested: an eight-factor CFA model, a
191 second-order CFA model, a first-order CFA model, a bifactor CFA model, an ESEM model,
192 a higher-order ESEM model (H-ESEM), and a bifactor ESEM model (B-ESEM). A visual
193 depiction of each of these models can be seen in Appendix B of the supplementary materials.
194 For a complete description of these models and the procedures used to test them, see Cronin
195 and Allen (2017). The following fit indices were used to assess model fit: chi-square statistic
196 divided by degrees of freedom (χ^2/df), Root Mean Square Error of Approximation (RMSEA),
197 Comparative Fit Index (CFI), and the Tucker Lewis Index (TLI). A χ^2/df of less than 3.0 was
198 indicative of adequate fit (Tabachnick and Fidell 2013). In line with Marsh, Hau, and Wen’s
199 (2004) recommendation, an RMSEA value of less than .08 or .05 represented a reasonable or

200 close fit to the data respectively; whereas, CFI and TLI values greater than .90 or .95
201 indicated acceptable and excellent fit respectively. Competing models were also compared
202 using procedures outlined by Morin, Arens, and Marsh (2016). Similar model fit is evident
203 when changes are $< .015$ for the RMSEA, $< .01$ for the CFI, and $< .01$ for the TLI. Lower
204 values for the Akaike Information Criteria (AIC), Bayesian Information Criterion (BIC), and
205 sample size adjusted BIC (ABIC) are also indicative of better model fit (Appleton et al.
206 2016). Along with examining fit indices and information criteria, Morin et al. (2016)
207 suggested that researchers should examine the parameter estimates of the solutions to guide
208 the selection of the best model.

209 **Results**

210 During the analyses, seven competing models were examined. The fit indices and
211 information criteria for these models are contained in Table 1 [Table 1 near here] and the
212 factor loadings for the models are contained in Tables B, C, and D of the supplementary
213 materials. When tested, the B-ESEM model provided the best representation of the data, as it
214 displayed the best fit indices and lowest AIC and ABIC values when compared to all other
215 models. With the B-ESEM model (see Table D), all items loaded significantly onto the
216 general life skills factor (M factor loading = .49, range = .25–.64) which suggests that a
217 general life skills factor is evident within the data and it would be appropriate to calculate a
218 total life skills ability score. In the B-ESEM model, 41 items also loaded onto their specific
219 life skills factor (M factor loading = .44, range = -.20–.76). Only two items failed to load
220 onto their specific life skills factor (i.e., one teamwork item and one interpersonal
221 communication item), with two of these items having higher cross-loadings on other specific
222 factors. It is important to note that a small number of non-loading and cross-loading items
223 are often seen in studies using B-ESEM models (e.g., Fadda et al. 2017; Morin et al. 2016;
224 Sánchez-Oliva et al. 2017). This is due to the more flexible statistical approach being used

225 (i.e., items are free to load onto multiple factors) and the fact that individual items are never a
226 ‘pure’ indicator of a construct (Morin et al. 2016).

227 Lastly, the internal consistency reliability of each subscale was tested (see Table 2)
228 [Table 2 near here]. For seven of the eight subscales, alpha coefficients were above the .70
229 criterion suggested by Nunnally and Bernstein (1994) to indicate adequate reliability. Only
230 the emotional skills subscale had an alpha coefficient of .66, which was marginally below the
231 .70 criteria. The mean scores on the 1–5 response scale for students’ perceived life skills
232 abilities ranged from 3.45 for time management to 4.16 for teamwork (see Table 2). This
233 indicated that students perceived their life skills abilities to be moderately high.

234 **Study 2**

235 The main aim of this study was to assess the predictive validity of the LSAS. In this
236 regard, past research has suggested that individual life skills – along with total life skills –
237 should be positively related to other important outcomes in young people. For example,
238 emotional skills (Nelis et al. 2011), social skills (Segrin and Taylor 2007), time management
239 (Chang and Nguyen 2011), and problem solving (D’Zurilla and Nezu 2010) have all been
240 positively associated with young peoples’ psychological well-being. Goal setting (Locke and
241 Latham 2002) and time management (Broadbent and Poon 2015) have been positively related
242 to students’ academic achievement. Emotional skills (Nelis et al. 2011) and time
243 management (Claessens et al. 2007) have been positively associated with young peoples’
244 physical functioning and health. Social skills (Smith and Betz 2000) and emotional skills
245 (Nelis et al. 2011) have been positively related to social functioning. Goal setting (Brunstein,
246 Schultheiss, and Grässman 1998) and social skills (Smith and Betz 2000) and have been
247 positively associated with emotional functioning. Finally, teamwork, communication,
248 leadership, and problem solving and decision making have been positively related to
249 students’ work functioning (Waldman and Korbar 2004). Regarding total life skills, Benson

250 (2006) proposed that the more strengths or life skills a young person possesses, the better off
251 they will be on a range of positive outcomes – which has been termed the ‘pile-up’ effect.
252 Scales et al.’s (2016) review of the youth development literature supported this idea, with the
253 total number of strengths a young person possesses being positively associated with
254 psychological, academic, and behavioural outcomes. Based on the above research, we
255 predicted that some of the individual life skills and total life skills would be positively related
256 to students’ psychological well-being, academic self-efficacy, predicted academic
257 performance, and health-related quality of life (physical, social, emotional, and work/school
258 functioning). It was difficult to hypothesize which of our eight life skills would be positively
259 associated with our seven outcome variables as past research has only explored a limited
260 number of these potential relationships.

261 **Method and materials**

262 *Participants*

263 The sample included 423 students from two UK universities ($M_{age} = 20.42$, $SD =$
264 2.56 , age range = 18–53 years). Both male ($n = 236$) and female ($n = 187$) students were
265 represented. Students were from undergraduate degree programmes in sports and exercise
266 science ($n = 129$), sports therapy ($n = 111$), sports studies ($n = 94$), sports development and
267 coaching ($n = 41$), sport and exercise psychology ($n = 18$), coach education ($n = 15$), sports
268 development and management ($n = 14$), and human kinetics ($n = 1$). First year ($n = 150$),
269 second year ($n = 112$), third year ($n = 110$), and fourth year ($n = 48$) students were
270 included.

271 *Life skills ability*

272 The 43-item LSAS was used to assess students’ life skills abilities. This scale was
273 described in Study 1 and can be seen in Appendix A of the supplementary materials.

274 *Psychological well-being*

275 Psychological well-being was assessed using the 8-item Flourishing Scale (Diener et
276 al. 2010). This scale asks participants to respond to statements related to their psychological
277 well-being. Example items include: 'I lead a purposeful and meaningful life' and 'I am
278 optimistic about the future'. Participants respond to items on a 1 (*strongly disagree*) to 7
279 (*strongly agree*) scale. Past research has supported the validity and internal consistency
280 reliability of the scale with university students (Diener et al. 2010). With the current sample,
281 the internal consistency reliability of the scale was supported ($\alpha = .86$).

282 *Academic self-efficacy and performance*

283 Academic self-efficacy was assessed using the 8-item Academic Self-Efficacy Scale
284 (Chemers, Hu, and Garcia 2001). This scale asks participants to disagree or agree with
285 statements that assess their academic self-efficacy. Example items include: 'I am a very good
286 student' and 'I am very capable of succeeding at university'. Participants respond to items on
287 a 1 (*very untrue*) to 7 (*very true*) scale. Past research has supported the content validity and
288 internal consistency reliability of this measure with university students (Chemers et al. 2001).
289 With the present sample, the internal consistency reliability of the scale was supported ($\alpha =$
290 $.89$). Along with rating their academic self-efficacy, the students were asked to predict their
291 academic performance by responding to the following item: 'Please indicate (in percentage
292 terms) what you believe your overall average grade will be at the end of the current academic
293 year?'

294 *Health-related quality of life*

295 Health-related quality of life was assessed using the 23-item Paediatrics Quality of
296 Life Inventory - Young Adult Version (Varni and Limbers 2009). This inventory assesses
297 quality of life in four domains: physical functioning, emotional functioning, social
298 functioning, and work/school functioning. Example items include: *physical functioning* ('It
299 is hard for me to run'), *emotional functioning* ('I feel sad or blue'), *social functioning* ('I have

300 trouble getting along with other adults’), and *work/school functioning* (‘I have trouble
301 keeping up with my work or studies’). Participants respond to items on a scale ranging from
302 1 (*never*) to 5 (*almost always*). Research has provided evidence for the reliability and
303 validity of this measure with students (Varni and Limbers 2009). With the current sample,
304 the internal consistency reliability of each subscale was supported (α range = .75–.80).

305 ***Procedures***

306 The same procedures regarding ethical approval, informed consent, participant
307 instructions, and data collection as Study 1 were adopted in the present study. The survey
308 took approximately 15–20 minutes to complete.

309 ***Data analyses***

310 As validity and reliability are ongoing processes which should be continually assessed
311 (DeVellis 2011), the same procedures used to analyse the factorial validity and internal
312 consistency reliability of the scale in Study 1 were replicated in this study. To assess
313 predictive validity, Pearson’s product moment correlations were calculated to investigate the
314 relationships between the LSAS subscales and students’ psychological well-being, academic
315 self-efficacy, predicted academic performance, and health-related quality of life.

316 **Results**

317 ***Factorial validity and reliability analyses***

318 The fit indices and information criteria for the seven models examined are contained
319 in Table 1 and the factors loadings for the models are included in Tables E, F, and G of the
320 supplementary materials. As can be seen in Table 1, the B-ESEM model provided a better fit
321 than the other models as evidenced by improved fit indices and lower AIC and ABIC values.
322 With the B-ESEM model (see Table G of the supplementary materials), all items loaded
323 significantly onto the general life skills factor (M factor loading = .45, range = .29–.65). Like
324 Study 1, this indicated the presence of a well-defined general life skills factor – justifying the

325 calculation of a total life skills score. In the B-ESEM model, 36 items also loaded onto their
326 specific life skills factor (M factor loading = .46, range = -.18–.78). However, four items had
327 higher cross-loadings on other specific factors as compared to their own specific factor (i.e.,
328 one teamwork, one social skills, and two leadership items) and seven items failed to load onto
329 their specific factor (i.e., one interpersonal communication, one social skills, and five
330 leadership items). Again, some non-loading and cross-loading items are often seen in B-
331 ESEM models (e.g., Fadda et al. 2017; Sánchez -Oliva et al. 2017) due to the more flexible
332 statistical approach being used and the fact that items are never a ‘pure’ indicator of a
333 construct (Morin et al. 2016).

334 The internal consistency reliability for each subscale was also tested in this study (see
335 Table 2). For all eight life skills, the internal consistency reliability of the subscales was
336 supported. From Table 2, we can see that the mean scores for students’ perceived life skills
337 abilities were moderately high: teamwork (4.12), social skills (4.10), interpersonal
338 communication (4.04), leadership (3.94), problem solving and decision making (3.85), goal
339 setting (3.76), emotional skills (3.71), and time management (3.40).

340 ***Correlations***

341 The correlations between the life skills and the dependent variables can be seen in
342 Table 3 [Table 3 near here]. The correlations between all of the life skills and participants’
343 psychological well-being were significant and positive (r range = .32–.62). The relationships
344 between all of the life skills and academic self-efficacy were also significant and positive (r
345 range = .23–.54). In contrast, only goal setting, time management, leadership, and total life
346 skills were positively associated with predicted academic grade (r range = .17–.28). Time
347 management, emotional skills, leadership, and total life skills were related to students’
348 physical functioning (r range = .10–.14). All life skills, except for leadership, were positively
349 associated with students’ emotional functioning (r range = .11–.26). With the exception of

350 goal setting/problem solving and decision making, all life skills were positively related to
351 students' social functioning (r range = .13–.31). Lastly, the correlations between all of the life
352 skills and students' work/school functioning were significant and positive (r range = .17–.38).
353 In sum, these findings provided evidence for the predictive validity of the LSAS by showing
354 that the eight life skills – along with total life skills – were positively associated with students'
355 psychological well-being, academic self-efficacy, predicted academic grade, physical
356 functioning, emotional functioning, social functioning, and school/work functioning.

357 **Study 3 – Test-retest reliability**

358 A second form of reliability to be examined during the scale validation process was
359 test-retest reliability. Essentially, test-retest reliability is a method used to assess how
360 constant scores remain from one occasion to another (DeVellis 2011). Thus, the aim of this
361 study was to assess the test-retest reliability of the LSAS using a one-week test-retest
362 analysis. A one-week timeframe was chosen as students' life skills were unlikely to change
363 over this short time and past test-retest reliability studies with university students have used
364 this timeframe (e.g., Lewis, Cruise, and McGuckin 2005).

365 **Method**

366 *Participants*

367 The sample included 49 UK university students ($M_{age} = 21.53$, $SD = 4.17$, age range
368 = 18–39) who completed the LSAS on two occasions. The sample included more males ($n =$
369 34) than females ($n = 15$). Students were from undergraduate degree programmes in sports
370 therapy ($n = 28$), sport and exercise science ($n = 11$), and sport science and coaching ($n = 10$).
371 Using Bonett's (2002) procedures for calculating the required sample size for estimating
372 intraclass correlation coefficients (ICCs) in reliability studies, we found that our sample size
373 was above the minimum sample size of 43 required to calculate ICCs in the present study.

374 *Measures and procedures*

375 The LSAS was used to measure students' life skills abilities after teaching sessions
376 which were one week apart. The LSAS was described in Study 1 and can be seen in
377 Appendix A of the supplementary materials. The same procedures regarding ethical
378 approval, informed consent, participant instructions, and data collection as Study 1 were
379 adopted in this study. The scale took 5–10 minutes to complete on each occasion.

380 ***Data analysis***

381 ICCs were used to assess test-retest reliability. ICCs are a measure of reliability that
382 can range from 0 (indicating no reliability) to 1 (indicating perfect reliability), with values
383 above .70 providing evidence of adequate reliability (Mitchell and Jolley 2001).

384 **Results**

385 As can be seen in Table 2, the ICCs in this study were all above the .70 criterion
386 needed to demonstrate adequate test-retest reliability (range = .77 to .92). From Table 2, we
387 can also see that students perceived their life skills abilities to be moderately high.

388 **Overall discussion**

389 The purpose of the present research was to develop a scale to assess higher education
390 students' perceptions of their life skills abilities. During this research, we developed and
391 provided validity and reliability evidence for the 43-item LSAS which measures students'
392 teamwork, goal setting, time management, emotional skills, interpersonal communication,
393 social skills, leadership, and problem solving and decision making skills. Specifically, across
394 three studies we provided evidence for the factorial validity, predictive validity, test-retest
395 reliability and internal consistency reliability of the LSAS. This research is an important
396 development in the assessment of students' life skills as ensuring scales are valid and reliable
397 is the first stage of the research process (Schutz 1994). Our findings suggest that researchers
398 using the LSAS can be confident in the accuracy of the scores they obtain, the relationships
399 they find with other variables, their interpretation of such relationships, and the implications

400 for both educators and students. Additionally, the scale will be an important tool for higher
401 education practitioners as the life skills it measures are cited as skills young people require
402 within the workforce and beyond (e.g., Artess et al. 2016; Azevedo et al. 2012; Baker et al.
403 2017; Jackson 2010; Steptoe and Wardle 2017), but few robust measures exist to assess them
404 (Riebe and Jackson 2014).

405 From a theoretical standpoint, the LSAS will allow researchers to test various theories
406 that may explain the processes by which young people develop their life skills. For example,
407 self-determination theory (SDT; Ryan and Deci 2017) proposes that the following causal
408 sequence could be investigated in relation to students' life skills development: instructor
409 autonomy support – students' basic need satisfaction – self-determined motivation – life
410 skills ability. Using the LSAS and self-determination theory, researchers can begin to
411 examine the social/environmental determinants and underlying psychological mechanisms of
412 life skills development in higher education. Through theory testing, researchers may be able
413 to provide educators and policymakers with theory-based evidence, explanations, and
414 guidance on how they can develop students' life skills.

415 Within the present research, the three studies indicated that students perceived their
416 life skills abilities to be moderately high. Interestingly, the mean scores for the life skills and
417 the ordering of the life skills from highest to lowest was similar across Studies 1 and 2 (i.e.,
418 the large-scale data collections). These studies highlighted that the students scored highest on
419 teamwork, interpersonal communication, social skills, and problem solving and decision
420 making; whereas, they scored lowest on time management, emotional skills, goal setting, and
421 leadership. Building on these cross-sectional findings, future research could track students'
422 life skills abilities to investigate changes that may occur over time, why and how these
423 changes may occur, and to assess the long-term impact of life skills obtained during a degree
424 programme. Based on such findings, higher education institutions could seek to improve

425 their policies/curriculum to promote students' life skills. Specifically, the teaching, learning,
426 and assessment strategies within degree programmes could focus on helping students to
427 develop particular life skills. For example, group work within seminar sessions may be used
428 to enhance students' teamwork skills; whereas, individual presentation assessments may
429 promote their communication skills. Future studies could also investigate the impact that co-
430 curricular activities (e.g., work experience, volunteering, and study abroad programmes) and
431 extra-curricular activities (e.g., club or student council membership) have on students' life
432 skills. Another area of research would involve using the LSAS to examine the efficacy of
433 existing programs designed to teach students life skills. The learning/career services
434 departments of many universities conduct programs aimed at teaching students' life skills
435 such as goal setting and time management, and using the LSAS, the success of such programs
436 ought to be examined. Lastly, given the popularity of online and hybrid courses within the
437 United States (Chingos et al. 2017), it would be interesting to assess students' life skills
438 development during such courses. Overall, greater knowledge of students' life skills abilities
439 and how to enhance them would be particularly important given the role that life skills play in
440 promoting young peoples' educational and occupational success – along with their health
441 (Steptoe and Wardle 2017).

442 Our findings from Study 2 clearly highlighted that individual life skills and total life
443 skills are positively associated with educational and health outcomes such as students'
444 psychological well-being, academic self-efficacy and performance, and health-related quality
445 of life. This is a significant finding as it illustrates the broader importance of life skills in
446 predicting other positive outcomes in students' lives. Specifically, our results highlight that
447 the eight life skills measured by the LSAS could be the focus of future intervention studies
448 aimed at enhancing students' academic performance, health and well-being. For instance,
449 given the strong positive relationship between students' total life skills and their

450 psychological well-being, future intervention studies teaching students the eight life skills
451 may help to enhance their psychological well-being. Research focused on enhancing
452 students' health and well-being through the development of their life skills is particularly
453 important given that university is often the first time that young people take responsibility for
454 their own health and well-being (Ridner et al. 2016). Moreover, given the growing levels of
455 psychological distress reported in university students (Bewick et al. 2010), studies assessing
456 how certain life skills may impact upon students' mental health are warranted. In terms of
457 educational outcomes, the growing interest in how non-cognitive or psychosocial skills can
458 affect students' academic performance (Olivera-Aguilar, Rikoon, and Robbins 2017)
459 suggests that future research should assess how particular life skills may impact students'
460 performance on different types of assessments. For example, do students with better problem
461 solving skills perform better on case study assessments (e.g., a client case study in
462 psychology); whereas, students with better leadership skills may perform better on practical
463 assessments (e.g., a coaching practical in sport science)? Another question that remains
464 unanswered within the literature is how life skills learned within higher education are
465 transferred and used in other settings. In this regard, Jackson and Chapman (2012)
466 emphasized that it can be challenging for skills learned in university to be transferred to the
467 workplace. Future studies incorporating the ideas of 'near' and 'far' transfer of skills
468 (Bennett, Dunne, and Carré 2000) – along with the notion that life skills can be 'explicitly' or
469 'implicitly' developed and transferred (Bean et al. 2018) – could shed light on how life skills
470 can be developed in students and transferred to other aspects of their lives.

471 *Limitations and future directions*

472 Addressing the limitations of the current research (i.e., a focus on UK university
473 students and Studies 2–3 only including sports degree students), future studies should
474 examine the LSAS in other countries/cultures and test the psychometric properties of the

475 scale across different degree programmes. Given that the emotional skills subscales
476 displayed a reliability coefficient marginally less than the .70 criteria (Nunnally and
477 Bernstein 1994) in two of four data collections, it is important to re-assess the internal
478 consistency reliability of this subscale with another sample. Additionally, given that some
479 cross-loading and non-loading items were evident across our B-ESEM models in Studies 1–2,
480 it would be important to re-assess these items during future studies. Regarding our predictive
481 validity assessment in Study 2, future research could take a more fine-grained or theory-
482 driven approach to exploring the relationships between the life skills and specific outcome
483 variables. For instance, research could further assess if time management and goal setting are
484 related to predicted academic grades through the mediator of academic self-efficacy. In
485 relation to Study 3, future studies should assess the test-retest reliability of the LSAS over
486 different periods of time (e.g., 2 to 6 weeks) and with larger sample sizes. Another limitation
487 of the present research is that the LSAS relies on participants' perceptions of their life skills
488 abilities. With any self-report measure, there are always concerns with social desirability and
489 the accuracy of responses (Zilvinskis et al. 2017; Zlatkin-Troitschanskaia et al. 2015). Thus,
490 we would encourage future studies to gain others' perspectives on students' life skills
491 abilities (e.g., teaching staff, work experience supervisors, graduate employers) to assess the
492 accuracy of students' ratings. This is especially the case as higher achieving students tend to
493 underestimate their abilities, lower achievers tend to overestimate their abilities (Leach
494 2012), and students in general overrate their performance in comparison to teaching staff
495 (Britton et al. 2017).

496 ***Conclusion***

497 The present research provided initial evidence for the validity and reliability of the
498 LSAS which can be used to thoroughly assess students' life skills abilities. Researchers can
499 use the LSAS to test theories investigating the mechanisms that lead to students' life skills

500 development in higher education. The transfer of life skills to other settings and the impact
501 of life skills on students' academic performance, health and well-being could also be assessed
502 using the scale. Moreover, teaching and learning services staff may use the scale to examine
503 whether their efforts to develop certain life skills in students are effective or not. Ultimately,
504 it is hoped that the LSAS proves a useful tool for researchers, policymakers, and educators
505 interested in the promotion of life skills in higher education.

506 **Disclosure statement**

507 No potential conflict of interest was reported by the authors

508

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511 Psychological Association, and National Council on Measurement in Education).
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Table 1. Model fit and information criteria for the Life Skills Ability Scale in studies 1 and 2.

Model	χ^2	<i>df</i>	χ^2 / df	RMSEA	CFI	TLI	AIC	BIC	ABIC
Study 1									
CFA – Eight-factor model	2123.12***	832	2.55	.06	.86	.85	37876	38519	38021
CFA – Second-order model	2371.92***	852	2.78	.06	.83	.82	38085	38646	38211
CFA – First-order model	5193.58***	860	6.04	.11	.52	.50	40890	41419	41010
CFA – Bifactor model	2015.52***	817	2.47	.06	.87	.85	37798	38503	37957
ESEM model	1197.04***	587	2.04	.05	.93	.90	37440	39087	37812
H-ESEM model	1182.21***	607	1.95	.05	.93	.89	37470	39035	37823
B-ESEM model	993.35***	552	1.80	.04	.94	.91	37346	39137	37750
Study 2									
CFA – Eight-factor model	2076.87***	832	2.50	.06	.84	.83	36087	36723	36225
CFA – Second-order model	2249.39***	852	2.64	.06	.83	.81	36220	36774	36340
CFA – First-order model	5117.27***	860	5.95	.11	.47	.44	39072	39594	39184
CFA – Bifactor model	2030.31***	817	2.49	.06	.84	.83	36071	36767	36221
ESEM model	1163.88***	587	1.98	.05	.93	.89	35664	37291	36016
H-ESEM model	1159.78***	607	1.91	.05	.92	.88	35667	37201	35998
B-ESEM model	1020.18***	552	1.85	.05	.93	.89	35589	37358	35971

Note: $N = 445$ in Study 1. $N = 423$ in Study 2. RMSEA = Root mean square error of approximation; CFI = Comparative fit index; TLI = Tucker Lewis index; AIC = Akaike information criterion; BIC = Bayesian information criterion; ABIC = Sample size adjusted BIC.

*** $p < .001$

Table 2. Mean scores, standard deviations, and reliability coefficients across the three studies.

	Study 1 (<i>N</i> = 445)			Study 2 (<i>N</i> = 423)			Study 3 (<i>N</i> = 49)						
	<i>M</i>	<i>SD</i>	α	<i>M</i>	<i>SD</i>	α	<i>Time 1</i>			<i>Time2</i>			ICCs
Life Skills							<i>M</i>	<i>SD</i>	α	<i>M</i>	<i>SD</i>	α	
Teamwork	4.16	0.47	.82	4.12	0.43	.77	4.28	0.43	.80	4.27	0.43	.84	.77
Goal setting	3.78	0.65	.89	3.76	0.65	.89	3.71	0.63	.86	3.69	0.69	.91	.90
Time mgmt.	3.45	0.79	.87	3.40	0.81	.87	3.48	0.93	.89	3.49	0.84	.90	.85
Emotional skills	3.76	0.64	.66	3.71	0.66	.70	3.83	0.58	.60	3.89	0.63	.79	.77
Communication	4.07	0.61	.78	4.04	0.62	.76	4.16	0.62	.81	4.12	0.61	.81	.81
Social skills	4.03	0.65	.82	4.10	0.59	.80	4.19	0.59	.80	4.25	0.59	.86	.88
Leadership	3.90	0.51	.84	3.94	0.50	.84	4.19	0.44	.85	4.18	0.39	.82	.78
Problem solving	3.94	0.65	.85	3.85	0.61	.81	3.97	0.74	.88	3.93	0.68	.87	.87
Total life skills	3.90	0.42	.94	3.89	0.39	.92	4.01	0.38	.92	4.00	0.40	.94	.92

Note: *M* = Mean score; *SD* = Standard deviation; α = Cronbach's alpha coefficient; ICCs = Intraclass correlation coefficients; Time mgmt. = Time management; Communication = Interpersonal communication; Problem solving = Problem solving & decision making.

Table 3. Summary of intercorrelations between all study variables in study 2.

	Teamwork	Goal setting	Time management	Emotional skills	Interpersonal communication	Social skills	Leadership	Problem solving	Total life skills
Psychological well-being	.40***	.37***	.36***	.40***	.42***	.48***	.50***	.32***	.62***
Academic self-efficacy	.24***	.37***	.54***	.23***	.28***	.28***	.36***	.35**	.51***
Predicted academic grade	.09	.17**	.28***	-.02	.05	.10	.17**	.07	.19***
Physical functioning	.08	.06	.11*	.10*	.09	.08	.12*	.08	.14**
Emotional functioning	.11*	.15**	.13**	.26***	.15**	.14**	.06	.16**	.21***
Social functioning	.20***	.09	.13**	.20***	.26***	.31***	.25***	.09	.28***
Work & school functioning	.17***	.23***	.38***	.20***	.24***	.21***	.22***	.25***	.36***

Note: $N = 423$. Problem solving = Problem solving & decision making.

* $p < .05$, ** $p < .01$, *** $p < .001$

Supplementary Materials

Appendix A

Life Skills Questions

Directions:

Young people have the ability to perform a range of different life skills. These questions ask about your own ability to perform eight particular life skills. Please circle a number from 1–5 to show how much you agree or disagree with each statement included below. There are no right or wrong answers, so please answer as honestly as possible.

<u>Teamwork</u>					
I am able to...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Work well within a team/ group.	1	2	3	4	5
Help another team/ group member perform a task.	1	2	3	4	5
Accept suggestions for improvement from others.	1	2	3	4	5
Work with others for the good of the team/ group.	1	2	3	4	5
Help build team/ group spirit.	1	2	3	4	5
Suggest to team/ group members how they can improve their performance.	1	2	3	4	5
Change the way I perform for the benefit of the team/ group.	1	2	3	4	5
<u>Goal Setting</u>					
I am able to...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Set goals so that I can stay focused on improving.	1	2	3	4	5
Set challenging goals.	1	2	3	4	5
Check progress towards my goals.	1	2	3	4	5
Set short-term goals in order to achieve long-term goals.	1	2	3	4	5
Remain committed to my goals.	1	2	3	4	5
Set goals for my activities (e.g., practice, studies).	1	2	3	4	5
Set specific goals.	1	2	3	4	5

Time Management

I am able to...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Manage my time well.	1	2	3	4	5
Assess how much time I spend on various activities.	1	2	3	4	5
Control how I use my time.	1	2	3	4	5
Set goals so that I use my time effectively.	1	2	3	4	5

Emotional Skills

I am able to...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Notice how I feel.	1	2	3	4	5
Deal with my emotions.	1	2	3	4	5
Understand that I behave differently when emotional.	1	2	3	4	5
Use my emotions to stay focused.	1	2	3	4	5

Communication

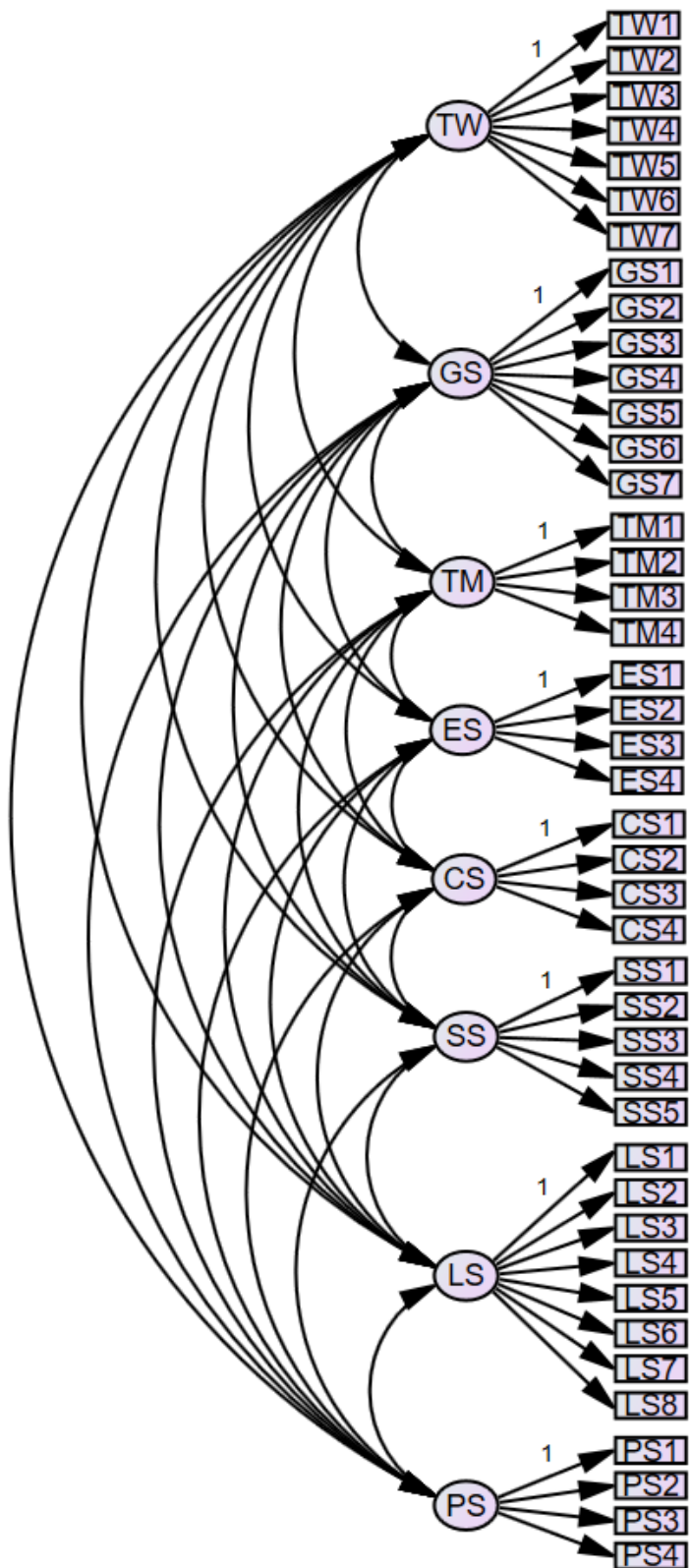
I am able to...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Speak clearly to others.	1	2	3	4	5
Pay attention to what someone is saying.	1	2	3	4	5
Pay attention to peoples' body language.	1	2	3	4	5
Communicate well with others.	1	2	3	4	5

Social Skills

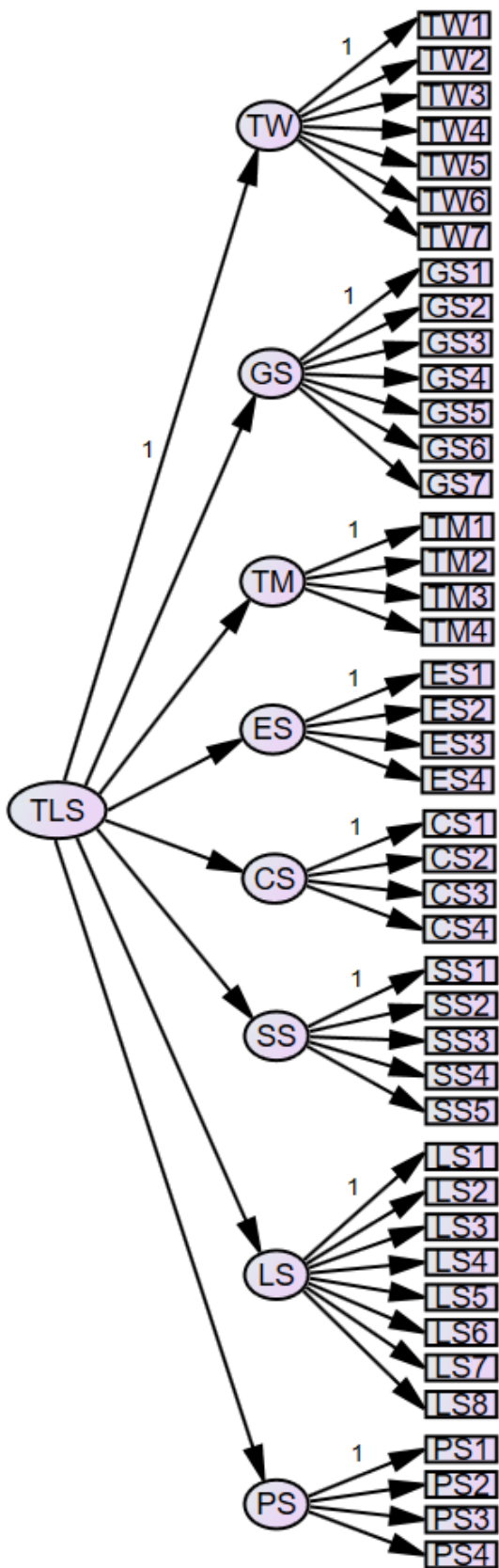
I am able to...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Start a conversation.	1	2	3	4	5
Interact in various social settings.	1	2	3	4	5
Help others without them asking for help.	1	2	3	4	5
Get involved in group activities.	1	2	3	4	5
Maintain close friendships.	1	2	3	4	5

<u>Leadership</u>					
I am able to...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Positively influence a group of individuals.	1	2	3	4	5
Organise team/ group members to work together.	1	2	3	4	5
Motivate others.	1	2	3	4	5
Help others solve their performance problems.	1	2	3	4	5
Consider the individual opinions of each team/ group member.	1	2	3	4	5
Be a good role model for others.	1	2	3	4	5
Set high standards for the team/ group.	1	2	3	4	5
Recognise other peoples' achievements.	1	2	3	4	5
 <u>Problem Solving</u>					
I am able to...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Think carefully about a problem.	1	2	3	4	5
Compare each possible solution in order to find the best one.	1	2	3	4	5
Create as many possible solutions to a problem as possible.	1	2	3	4	5
Evaluate a solution to a problem.	1	2	3	4	5

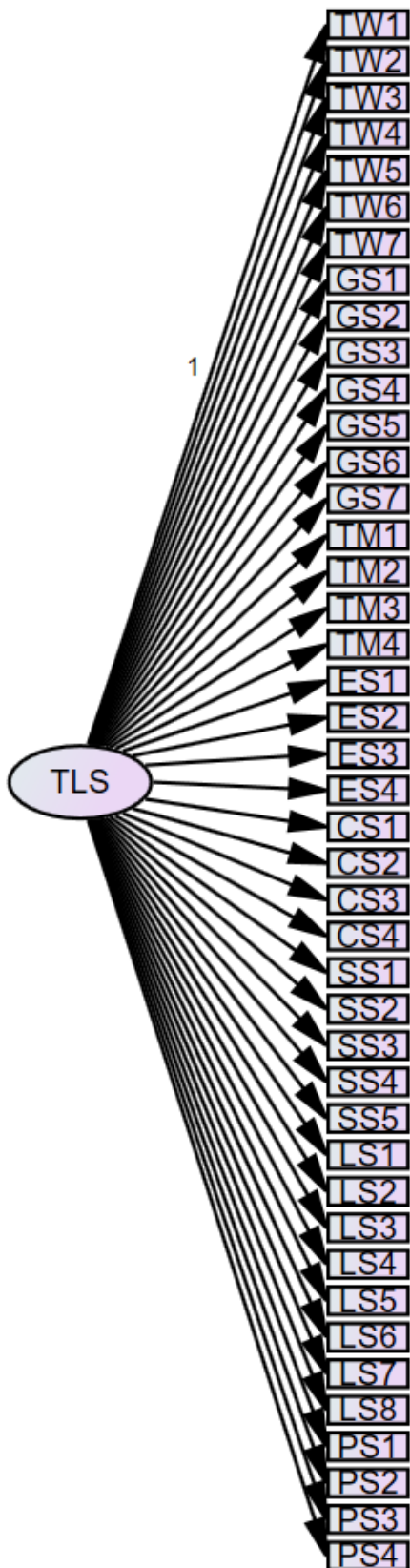
Appendix B



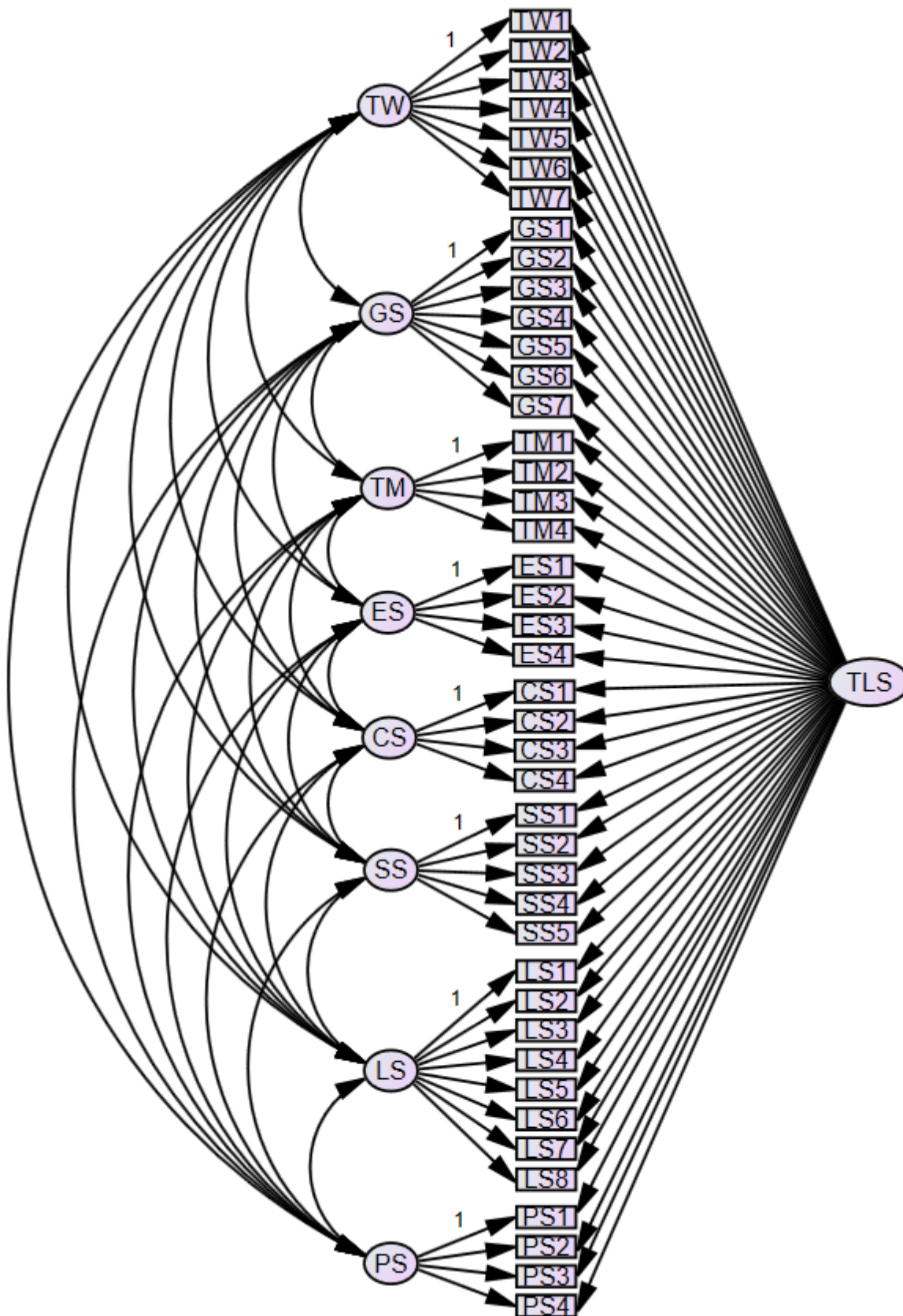
CFA – Eight-factor model: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.



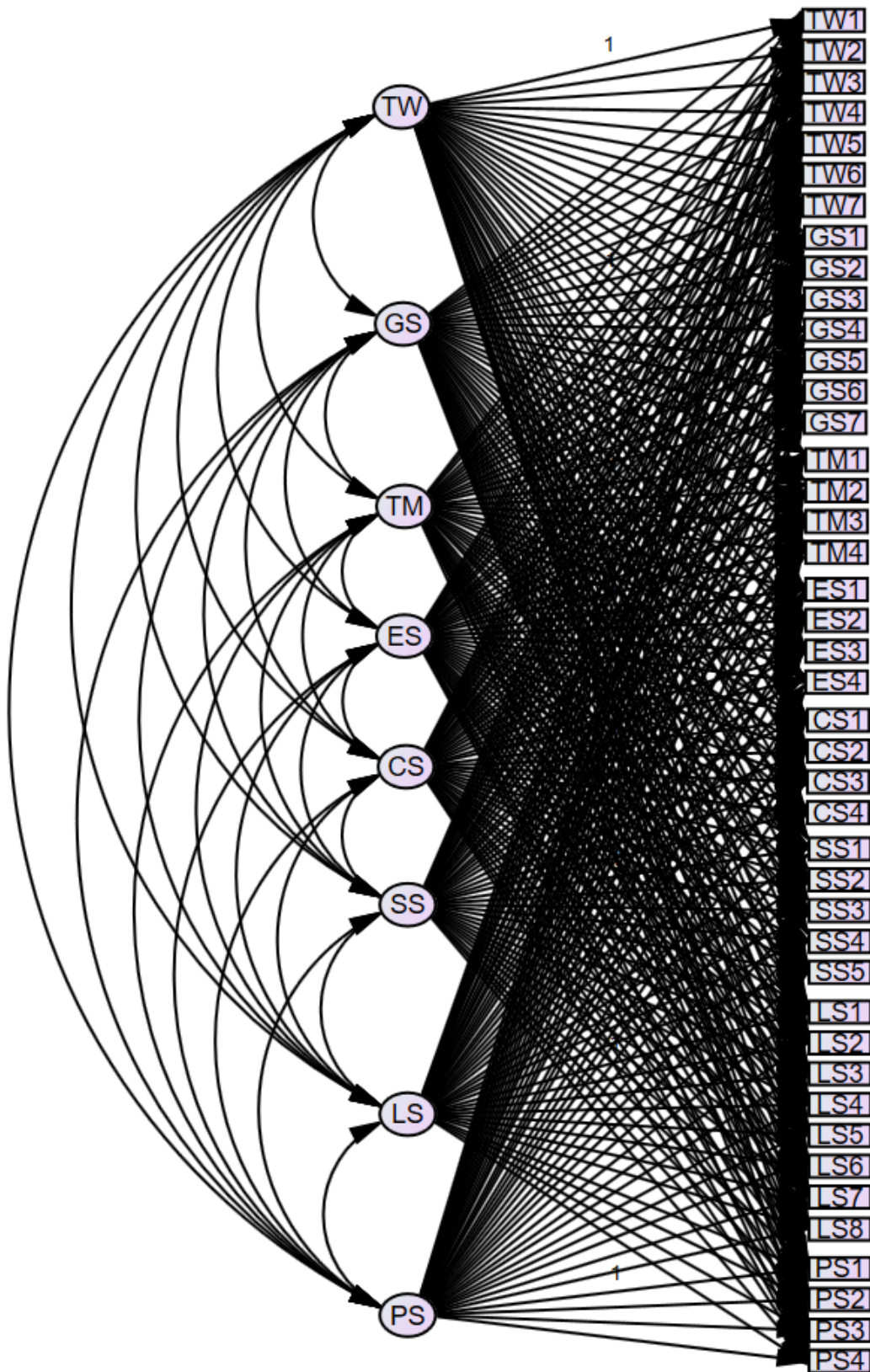
CFA – Second-order model: TLS = Total life skills; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.



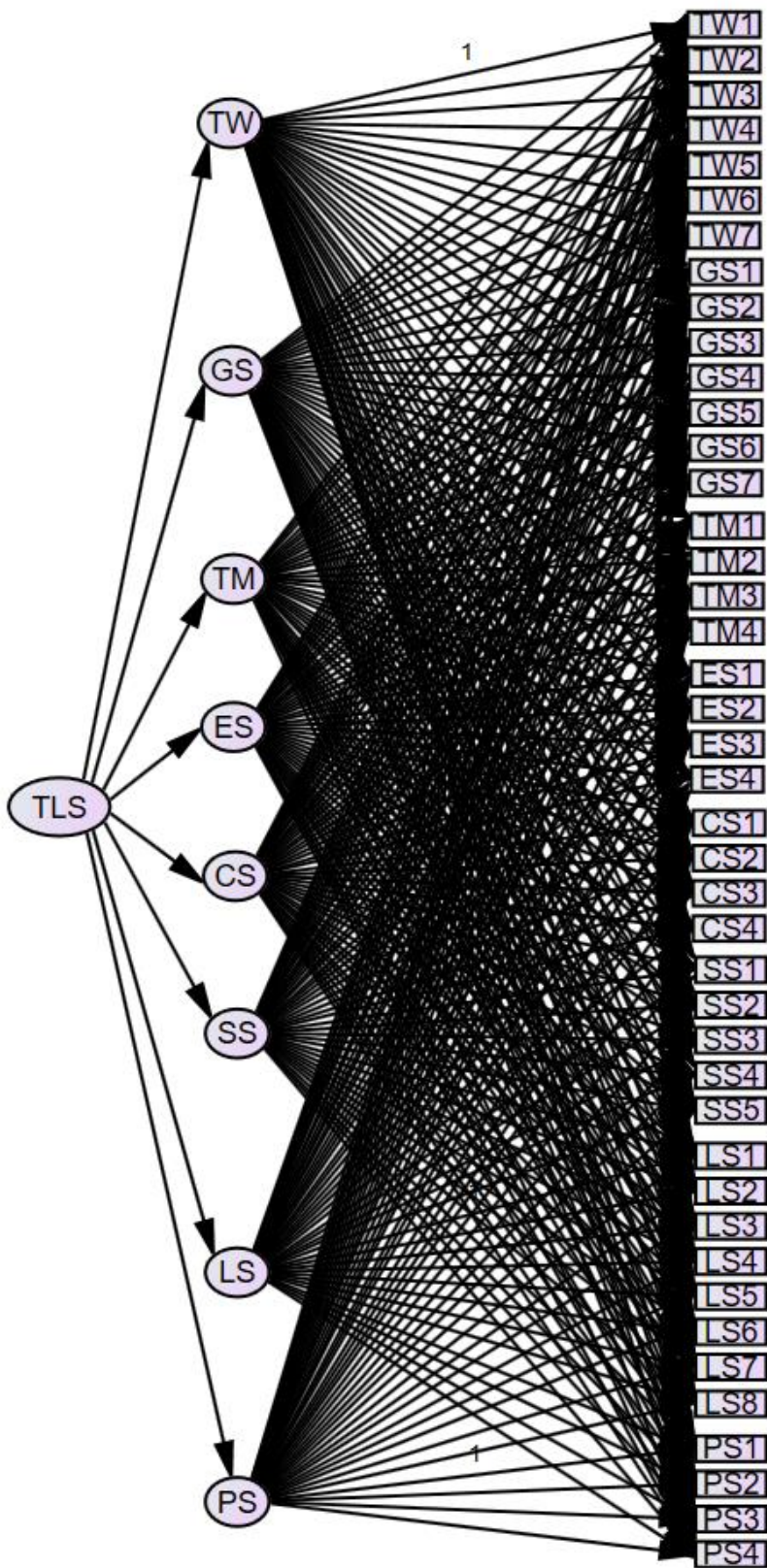
CFA – First-order model: TLS = Total life skills; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.



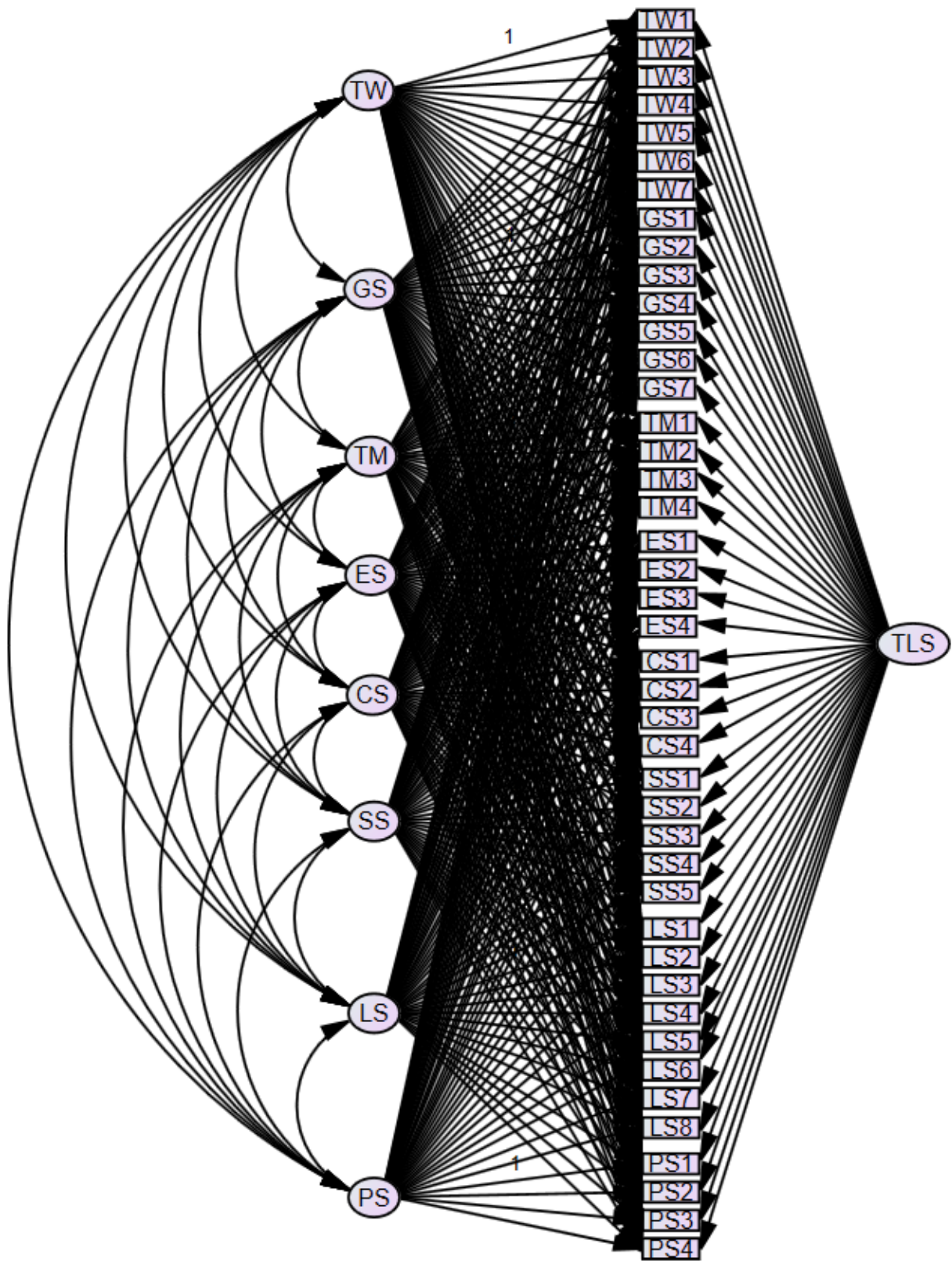
CFA – Bifactor model: TLS = Total life skills; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.



ESEM model: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership skills; PS = Problem solving & decision making. Latent variables for each life skill are loading on all 43 LSAS items in this figure.



H-ESEM model: TLS = Total life skills; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making. Latent variables for each life skill are loading on all 43 LSAS items in this figure.



B-ESEM model: TLS = Total life skills; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making. Latent variables for each life skill and total life skills are loading on all 43 LSAS items in this figure.

Table A. Selected definitions and components for the life skills.

Life Skill	Definition	Components
Teamwork	“people working together to achieve something beyond the capabilities of individuals working alone” (Marks, Mathieu, and Zaccaro 2001, 356)	<ol style="list-style-type: none"> 1. Providing suggestions or criticisms 2. Accepting suggestions or criticisms 3. Cooperation 4. Coordination 5. Team spirit and morale 6. Adaptability (Morgan et al. 1986)
Goal setting	“the process by which people establish desirable objectives for their actions” (Moran 2004, 55)	<ol style="list-style-type: none"> 1. Make goals specific and measurable 2. Identify time constraints 3. Use moderately difficult goals 4. Write goals down and monitor progress 5. Use a mix of process, performance, and outcome goals 6. Use short-range goals to achieve long-range goals 7. Set goals for practice and competition 8. Make sure goals are internalised by the athlete (Cox 2012)
Time management	“behaviours that aim at achieving an effective use of time while performing certain goal-directed activities” (Claessens et al. 2007, 262)	<ol style="list-style-type: none"> 1. Time assessment 2. Planning 3. Monitoring (Claessens et al. 2007)
Emotional skills	“the processes involved in the recognition, use, understanding, and management of one’s own and others emotional states” (Salovey, Brackett, and Mayer 2004, i)	<ol style="list-style-type: none"> 1. Perception of emotions 2. Use of emotions 3. Understanding of emotions 4. Management of emotions (Latimer, Rench, and Brackett 2007)

Interpersonal communication	“the process by which people exchange information, feelings, and meaning through verbal and non-verbal messages: it is face-to-face communication” (Interpersonal Communication Skills 2011)	<ol style="list-style-type: none"> 1. Speaking 2. Listening 3. Non-verbal communication <p>(Dunbar, Brooks, and Kubicka-Miller 2006; Henry, Reed, and McAllister 1995)</p>
Social skills	“learned behaviours that allow one to interact and function effectively in a variety of social contexts” (Sheridan and Walker 1999, 687)	<ol style="list-style-type: none"> 1. Social assertiveness 2. Performance in public situations 3. Participation in social groups 4. Friendship and intimacy 5. Giving or receiving help <p>(Smith and Betz 2000)</p>
Leadership	“process whereby an individual influences a group of individuals to achieve a common goal” (Northouse 2010, 3)	<ol style="list-style-type: none"> 1. Individual consideration 2. Inspirational motivation 3. Intellectual stimulation 4. Fostering acceptance of team goals and promoting teamwork 5. High performance expectations 6. Appropriate role modeling 7. Contingent reward <p>(Callow et al. 2009)</p>
Problem solving and decision making	“the activities by which a person attempts to understand problems in everyday living and to discover effective solutions” (D’Zurilla and Nezu 2010, 200)	<ol style="list-style-type: none"> 1. Problem definition and formulation 2. Generation of alternative solutions 3. Decision making 4. Solution implementation and verification <p>(D’Zurilla and Goldfried 1971)</p>

Note: References for the citations in the table are contained on the next page.

References for Table A

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Table B. Standardized factor loadings and uniqueness of items for all CFA models in study 1.

Item	Eight-Factor Model		Second-Order Model		First-Order Model		Bifactor Model		
	FL	Uniqueness	FL	Uniqueness	FL	Uniqueness	Specific FL	General FL	Uniqueness
TW1	.73***	.47***	.73***	.47***	.54***	.70***	.48***	.54***	.47***
TW2	.73***	.46***	.73***	.47***	.53***	.73***	.53***	.53***	.44***
TW3	.48***	.77***	.49***	.76***	.36***	.87***	.40***	.33***	.73***
TW4	.71***	.50***	.72***	.49***	.48***	.77***	.66***	.46***	.36***
TW5	.69***	.53***	.68***	.54***	.58***	.67***	.30***	.60***	.55***
TW6	.56***	.68***	.56***	.69***	.56***	.69***	.11*	.58***	.65***
TW7	.57***	.68***	.57***	.67***	.50***	.75***	.26***	.50***	.68***
GS1	.78***	.39***	.79***	.38***	.54***	.71***	.67***	.41***	.38***
GS2	.69***	.53***	.69***	.53***	.58***	.66***	.49***	.48***	.53***
GS3	.73***	.47***	.72***	.48***	.50***	.75***	.63***	.37***	.46***
GS4	.66***	.57***	.66***	.57***	.47***	.78***	.55***	.36***	.57***
GS5	.73***	.47***	.73***	.47***	.56***	.69***	.57***	.45***	.48***
GS6	.78***	.39***	.78***	.39***	.55***	.70***	.66***	.43***	.39***
GS7	.75***	.44***	.75***	.44***	.57***	.67***	.58***	.47***	.45***
TM1	.78***	.40***	.78***	.40***	.44***	.81***	.70***	.34***	.40***
TM2	.71***	.50***	.70***	.50***	.41***	.83***	.62***	.34***	.51***
TM3	.86***	.26***	.88***	.23***	.48***	.77***	.79***	.39***	.23***
TM4	.83***	.31***	.81***	.34***	.48***	.78***	.73***	.36***	.34***
ES1	.60***	.64***	.60***	.64***	.35***	.88***	.47***	.32***	.67***
ES2	.76***	.42***	.75***	.44***	.36***	.87***	.75***	.34***	.33**
ES3	.36***	.87***	.37***	.86***	.17***	.97***	.29***	.18***	.89***
ES4	.58***	.67***	.58***	.66***	.42***	.82***	.43***	.39***	.67***
CS1	.80***	.36***	.78***	.39***	.60***	.64***	.55***	.59***	.36***

CS2	.61***	.63***	.64***	.59***	.58***	.67***	.23***	.58***	.61***
CS3	.51***	.74***	.53***	.72***	.46***	.79***	.21***	.46***	.74***
CS4	.83***	.32***	.82***	.33***	.62***	.61***	.55***	.64***	.29***
SS1	.81***	.34***	.80***	.36***	.54***	.71***	.65***	.52***	.31***
SS2	.83***	.31***	.82***	.33***	.53***	.72***	.77***	.53***	.13*
SS3	.60***	.64***	.61***	.63***	.56***	.68***	.17***	.60***	.61***
SS4	.71***	.50***	.72***	.48***	.62***	.62***	.26***	.65***	.51***
SS5	.52***	.73***	.53***	.72***	.48***	.77***	.16***	.50***	.73***
LS1	.73***	.48***	.73***	.47***	.61***	.63***	.56***	.64***	.28***
LS2	.70***	.51***	.70***	.52***	.62***	.62***	.34***	.64***	.48***
LS3	.70***	.51***	.70***	.51***	.61***	.63***	.30***	.64***	.49***
LS4	.64***	.59***	.64***	.59***	.58***	.66***	.16**	.61***	.61***
LS5	.49***	.76***	.48***	.77***	.50***	.75***	-.16**	.54***	.69***
LS6	.63***	.60***	.63***	.61***	.60***	.64***	.04	.62***	.61***
LS7	.66***	.57***	.66***	.56***	.61***	.63***	.18**	.61***	.59***
LS8	.51***	.74***	.51***	.74***	.52***	.73**	-.17**	.56***	.66***
PS1	.73***	.47***	.73***	.48***	.49***	.77***	.58***	.43***	.49***
PS2	.82***	.33***	.82***	.33***	.46***	.79***	.72***	.40***	.33***
PS3	.79***	.37***	.80***	.37***	.40***	.84***	.75***	.33***	.33***
PS4	.75***	.44***	.74***	.45***	.48***	.77***	.62***	.40***	.45***

Note: FL = Factor Loading; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table C. Standardized factor loadings and uniqueness of items for the ESEM model in study 1.

Item	TW	GS	TM	ES	CS	SS	LS	PS	Uniqueness
TW1	.76***	.04	-.01	.04	-.19***	.19***	-.004	-.03	.38***
TW2	.74***	.01	-.04	-.04	-.01	-.09*	.07	-.06	.42***
TW3	.54***	.04	.05	.13**	.10	-.15**	-.16**	.02	.66***
TW4	.86***	-.04	.03	-.03	-.04	.03	-.15**	.05	.39***
TW5	.46***	-.01	-.04	.01	-.10	.19***	.29***	.01	.49***
TW6	.19**	.01	.03	-.02	.06	-.06	.46***	.11*	.59***
TW7	.42***	.20***	-.03	.01	.25***	-.03	.002	-.09	.61***
GS1	-.04	.80***	.06	-.02	.04	.05	-.03	-.05	.36***
GS2	.04	.59***	-.03	.05	-.05	.07	.07	.14**	.50***
GS3	.04	.70***	.01	.01	-.04	-.05	-.05	.08*	.45***
GS4	.03	.65***	-.01	.02	-.01	-.02	-.03	.03	.56***
GS5	-.05	.66***	.04	.11**	.02	.004	.06	.002	.46***
GS6	.001	.74***	.11**	-.01	.04	-.03	.02	-.08*	.40***
GS7	.08	.67***	.03	-.10*	-.05	-.01	.10*	.06	.43***
TM1	-.07	.04	.77***	-.05	.02	.08*	.01	.004	.38***
TM2	-.07	-.03	.69***	.02	.06	-.10*	.09*	.06	.48***
TM3	.03	-.02	.90***	.04	-.05	.03	.01	-.06	.22***
TM4	.04	.17***	.73***	-.004	-.08*	.03	-.10*	.05	.31***
ES1	.02	.02	.02	.49***	.19**	-.01	-.09	.04	.66***
ES2	-.04	-.11**	.06	.88***	-.04	.03	-.03	.04	.26**
ES3	.02	-.01	-.09	.30***	.22**	-.12*	-.002	.01	.85***
ES4	.03	.22***	-.03	.53***	-.13*	-.08	.16**	-.02	.60***
CS1	.000	.06	-.01	.14**	.29**	.47***	.06	.08	.44***

CS2	.001	.001	.14**	.12**	.55***	.004	.12*	.07	.47***
CS3	.01	.10	-.05	.04	.50***	.08	.04	.08	.63***
CS4	.11*	.01	-.02	.14**	.31***	.38***	.14**	.01	.43***
SS1	-.003	.09**	.02	-.05	.12**	.87***	-.05	.03	.20***
SS2	-.04	.02	.01	.05	.15***	.78***	.03	.01	.27***
SS3	.13*	-.08	.07	-.08	.23***	.23***	.28***	.13**	.58***
SS4	.29***	-.06	.10*	.06	.02	.38***	.23***	-.03	.47***
SS5	.17**	.006	.04	.25***	.06	.22***	.07	.000	.70***
LS1	.03	.09*	-.09*	.08*	-.05	.11**	.70***	-.02	.38***
LS2	.09	.02	.08	-.04	.01	.14**	.56***	.03	.48***
LS3	.08	.04	.01	.05	.06	.09*	.58***	-.02	.49***
LS4	.01	.06	.01	.07	.08	-.06	.55***	.13**	.56***
LS5	.31***	.09	-.004	.02	.34***	-.07	.05	.04	.62***
LS6	.15**	-.02	.22***	.09	.05	-.02	.41***	-.01	.58***
LS7	-.06	.15**	.07	-.02	.06	.002	.56***	.08	.53***
LS8	.24***	.05	.08	-.04	.35***	-.03	.09	.08	.64***
PS1	-.04	.05	.04	.05	.04	.03	.01	.66***	.47***
PS2	-.02	-.02	-.003	.05	-.05	-.02	.02	.84***	.32***
PS3	.04	-.03	-.01	-.03	-.03	-.02	-.08	.86***	.34***
PS4	.01	.10*	.02	-.03	.01	.02	-.01	.69***	.45***

Note: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table D. Standardized factor loadings and uniqueness of items for the bifactor ESEM model in study 1.

Item	TW	GS	TM	ES	CS	SS	LS	PS	General Factor	Uniqueness
TW1	.62***	.03	-.04	.02	.08	.14**	.11	-.07	.47***	.35***
TW2	.52***	-.03	-.09**	-.06	-.03	-.10**	-.01	-.01	.53***	.42***
TW3	.33***	.01	-.01	.11	-.06	-.14**	-.23***	-.02	.39***	.65***
TW4	.60***	-.04	-.04	-.04	-.04	-.001	-.12**	-.02	.47***	.40***
TW5	.33***	-.07	-.10*	-.03	-.04	.17***	.21***	-.06	.56***	.49***
TW6	.12	-.04	-.02	-.08	.06	-.10	.26**	.05	.56***	.58***
TW7	.25***	.07	-.07	-.01	.05	-.07	-.15*	-.12*	.52***	.61***
GS1	-.02	.65***	.17***	-.02	.11*	-.03	-.01	.04	.44***	.34***
GS2	.05	.49***	.08	.03	.09	.01	.10	.16**	.48***	.49***
GS3	-.002	.58***	.12**	.02	-.13**	-.05	-.07	.13**	.42***	.43***
GS4	-.02	.51***	.07	.04	-.17**	-.004	-.09	.07	.41***	.52***
GS5	-.07	.52***	.12**	.09*	-.05	-.02	-.01	.05	.49***	.46***
GS6	-.02	.58***	.19***	-.01	.01	-.07	-.03	-.01	.47***	.40***
GS7	.05	.53***	.12**	-.10*	-.03	-.06	.06	.11*	.49***	.43***
TM1	-.08	.19***	.68***	-.04	.11*	-.004	.03	.04	.36***	.36***
TM2	-.13**	.09*	.57***	.02	-.11*	-.11**	-.03	.06	.40***	.47***
TM3	-.02	.15***	.76***	.04	-.06	-.01	.002	-.02	.42***	.23***
TM4	-.01	.31***	.66***	.02	-.001	-.02	-.04	.09**	.39***	.31***
ES1	-.05	-.01	-.01	.44***	.14**	.02	-.20***	-.01	.38***	.62***
ES2	-.01	-.04	.07	.76***	-.12	.08*	.03	.02	.33***	.28**
ES3	-.08	-.08	-.13*	.27*	.03	-.07	-.20**	-.04	.25***	.77***
ES4	.06	.19***	.03	.46***	.20***	-.04	.17**	.003	.36***	.59***
CS1	.000	-.02	-.04	.08	.54**	.29***	.05	.02	.56***	.29***

CS2	-.08	-.08	.04	.05	.28*	-.08	-.15*	.01	.63***	.48***
CS3	-.08	-.04	-.11*	.01	.16	.001	-.19**	.01	.52***	.65***
CS4	.07	-.09*	-.09*	.07	.43***	.23***	.05	-.06	.62***	.35***
SS1	-.02	-.01	-.04	-.04	.20***	.68***	.04	-.04	.50***	.24***
SS2	-.08*	-.08*	-.07*	.04	.09	.71***	.02	-.07*	.53***	.19*
SS3	.01	-.15**	-.05	-.12*	.01	.17**	.05	.03	.60***	.57***
SS4	.20**	-.10*	.005	-.02	.08	.31***	.17*	-.09	.59***	.47***
SS5	.10	-.04	-.01	.20**	.03	.20***	.02	-.05	.46***	.69***
LS1	.02	-.03	-.12**	-.01	-.01	.10*	.46***	-.07	.61***	.38***
LS2	.06	-.04	.02	-.10*	.07	.08	.37***	-.02	.60***	.47***
LS3	.001	-.07	-.07	-.01	.10	.07	.29***	-.09	.64***	.47***
LS4	-.05	-.03	-.04	-.002	-.07	-.06	.26***	.06	.61***	.55***
LS5	.14	-.02	-.08	-.01	-.02	-.10	-.20*	-.03	.56***	.61***
LS6	.08	-.04	.13**	.03	-.02	-.02	.20*	-.04	.59***	.58***
LS7	-.07	.07	.04	-.08	-.01	-.02	.30***	.05	.60***	.53***
LS8	.06	-.04	-.02	-.07	-.03	-.06	-.19*	.01	.58***	.61***
PS1	-.08	.11**	.06	.04	-.02	-.01	-.03	.55***	.45***	.47***
PS2	-.05	.09*	.03	.04	-.04	-.04	.02	.70***	.42***	.32***
PS3	-.002	.09*	.03	-.03	.03	-.08	-.03	.72***	.35***	.34***
PS4	-.04	.16***	.05	-.03	.01	-.04	-.02	.58***	.43***	.45***

Note: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table E. Standardized factor loadings and uniqueness of items for all CFA models in study 2.

Item	Eight-Factor Model		Second-Order Model		First-Order Model		Bifactor Model		
	FL	Uniqueness	FL	Uniqueness	FL	Uniqueness	Specific FL	General FL	Uniqueness
TW1	.70***	.51***	.70***	.51***	.45***	.79***	.61***	.44***	.44***
TW2	.68***	.54***	.69***	.53***	.50***	.75***	.54***	.47***	.49***
TW3	.43***	.81***	.45***	.80***	.31***	.91***	.40***	.27***	.77***
TW4	.64***	.60***	.64***	.59***	.44***	.81***	.52***	.42***	.56***
TW5	.67***	.56***	.65***	.57***	.58***	.66***	.26***	.58***	.59***
TW6	.47***	.78***	.46***	.79***	.43***	.81***	.15**	.42***	.80***
TW7	.47***	.78***	.46***	.79***	.44***	.81***	.16**	.46***	.77***
GS1	.82***	.32***	.82***	.32***	.50***	.75***	.73***	.38***	.32***
GS2	.73***	.47***	.73***	.46***	.45***	.80***	.65***	.34***	.46***
GS3	.74***	.46***	.73***	.47***	.48***	.77***	.63***	.37***	.47***
GS4	.64***	.59***	.64***	.59***	.43***	.81***	.53***	.35***	.59***
GS5	.69***	.53***	.68***	.54***	.45***	.80***	.59***	.34***	.54***
GS6	.75***	.43***	.75***	.44***	.48***	.77***	.65***	.37***	.44***
GS7	.77***	.41***	.77***	.40***	.49***	.76***	.68***	.37***	.40***
TM1	.80***	.36***	.81***	.35***	.37***	.86***	.76***	.28***	.34***
TM2	.75***	.43***	.76***	.43***	.39***	.85***	.69***	.32***	.43***
TM3	.85***	.27***	.86***	.26***	.41***	.83***	.80***	.32***	.26***
TM4	.79***	.38***	.77***	.40***	.48***	.77***	.68***	.37***	.41***
ES1	.55***	.70***	.55***	.70***	.31***	.91***	.45***	.28***	.72***
ES2	.72***	.48***	.72***	.48***	.35***	.88***	.69***	.29***	.44***
ES3	.41***	.83***	.40***	.84***	.26***	.93***	.30***	.25***	.85***
ES4	.76***	.43***	.76***	.43***	.41***	.83***	.68***	.34***	.42***
CS1	.77***	.40***	.77***	.40***	.56***	.69***	.63***	.49***	.37***

CS2	.58***	.67***	.59***	.65***	.44***	.80***	.44***	.39***	.65***
CS3	.48***	.77***	.50***	.75***	.46***	.79***	.22***	.46***	.74***
CS4	.84***	.30***	.82***	.32***	.59***	.66***	.62***	.54***	.33***
SS1	.79***	.37***	.78***	.39***	.51***	.74***	.79***	.43***	.19**
SS2	.79***	.37***	.79***	.38***	.55***	.70***	.64***	.50***	.35***
SS3	.63***	.60***	.64***	.59***	.57***	.67***	.28***	.58***	.58***
SS4	.72***	.49***	.73***	.48***	.61***	.63***	.34***	.62***	.50***
SS5	.41***	.83***	.41***	.84***	.39***	.84***	.14**	.41***	.81***
LS1	.71***	.50***	.71***	.49***	.62***	.61***	.42***	.63***	.42***
LS2	.75***	.44***	.75***	.44***	.64***	.59***	.48***	.66***	.34***
LS3	.70***	.51***	.71***	.50***	.59***	.65***	.34***	.63***	.48***
LS4	.57***	.68***	.57***	.68***	.48***	.77***	.20**	.52***	.69***
LS5	.54***	.71***	.53***	.72***	.50***	.75***	-.02	.55***	.70***
LS6	.62***	.61***	.63***	.61***	.54***	.71***	.02	.61***	.63***
LS7	.66***	.56***	.66***	.57***	.62***	.62***	.06	.65***	.58***
LS8	.52***	.73***	.52***	.73***	.53***	.72***	-.20*	.61***	.59***
PS1	.65***	.58***	.64***	.59***	.49***	.76***	.44***	.47***	.59***
PS2	.76***	.42***	.77***	.41***	.41***	.83***	.69***	.37***	.39***
PS3	.73***	.46***	.74***	.45***	.39***	.85***	.68***	.35***	.42***
PS4	.72***	.48***	.71***	.49***	.44***	.81***	.58***	.40***	.50***

Note: FL = Factor Loading; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table F. Standardized factor loadings and uniqueness of items for the ESEM model in study 2.

Item	TW	GS	TM	ES	CS	SS	LS	PS	Uniqueness
TW1	.75***	-.05	-.05	.000	.02	.12**	-.03	-.12**	.42***
TW2	.69***	.02	.02	.03	-.02	.02	.02	-.06	.51***
TW3	.61***	.02	.05	-.01	.04	-.02	-.31***	.18***	.64***
TW4	.72***	.001	.01	.03	.05	-.03	-.08	-.04	.53***
TW5	.38***	.07	-.05	.10*	-.09	.12*	.33***	-.09	.54***
TW6	.29***	.14**	-.02	-.02	-.18**	-.01	.28***	.03	.72***
TW7	.38***	.04	.01	.02	-.14*	-.10	.16**	.23***	.67***
GS1	.02	.81***	.06	-.05	-.03	.06	-.05	.03	.31***
GS2	-.06	.77***	-.12**	.003	-.03	.10*	.02	.04	.43***
GS3	.09*	.67***	.08*	.03	-.07	-.09*	.03	.01	.45***
GS4	.04	.62***	-.06	.05	.07	-.12**	.06	.04	.57***
GS5	-.05	.64***	.13**	.07	.03	-.03	.01	-.03	.51***
GS6	.04	.72***	.09*	-.08	.09*	-.06	.000	.002	.42***
GS7	.000	.80***	-.05	-.03	.04	.06	-.03	.000	.39***
TM1	.08*	-.01	.85***	-.04	-.01	.01	-.03	-.09**	.31***
TM2	-.06	-.09**	.75***	.05	-.01	-.02	.12**	.04	.42***
TM3	-.04	-.05	.86***	.01	.03	.03	-.01	.07*	.26***
TM4	-.04	.25***	.68***	.06	-.07	.04	.01	-.01	.33***
ES1	.09	.06	.01	.47***	.15**	-.06	.000	-.001	.71***
ES2	.001	.01	.03	.74***	.04	-.03	-.06	-.002	.45***
ES3	.09	-.14**	.09	.29***	.18**	-.06	-.05	.18**	.78***
ES4	-.01	.07	.03	.75***	-.03	-.08	.02	.06	.41***
CS1	.08	.12**	-.02	.17***	.29***	.42***	.03	-.03	.49***

CS2	.000	.10*	.09*	.16**	.62***	.05	-.01	-.02	.48***
CS3	-.03	.01	-.06	.09	.43***	.03	.21***	.18***	.63***
CS4	.07	-.008	.05	.15**	.35***	.43***	.15**	-.09*	.39***
SS1	-.03	.04	.04	.01	.16***	.83***	-.06	.06	.26***
SS2	.05	.03	.03	.03	.10*	.73***	.02	.04	.33***
SS3	.22***	-.03	.06	-.12*	.15**	.33***	.21***	.11*	.57***
SS4	.23***	-.05	.06	-.01	.10*	.41***	.24***	.02	.48***
SS5	.11	.002	-.08	.19**	.26***	.06	.17**	-.05	.75***
LS1	.05	.01	-.02	.11**	-.19***	.27***	.58***	.03	.39***
LS2	.13**	.01	.10**	.05	-.18***	.08*	.66***	-.01	.39***
LS3	-.03	-.03	-.02	.08	-.03	.05	.71***	.06	.45***
LS4	-.04	.01	.06	-.02	.03	-.10	.63***	.05	.62***
LS5	.17**	.04	-.01	-.10	.22***	-.07	.35***	.14**	.64***
LS6	-.06	.04	.06	-.10*	.25***	-.02	.60***	.01	.56***
LS7	.01	.18***	.08	.03	.07	.02	.51***	-.01	.56***
LS8	.19**	.04	.05	-.07	.33***	-.12*	.31***	.12*	.59***
PS1	.08	.05	.06	.10*	.18***	-.08	.09	.47***	.55***
PS2	-.05	.004	.05	.01	.04	.05	.02	.73***	.43***
PS3	-.04	-.01	-.01	-.003	-.12**	.16***	-.002	.83***	.36***
PS4	.07	.11**	-.02	.09*	-.09*	-.01	.04	.64***	.48***

Note: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table G. Standardized factor loadings and uniqueness of items for the bifactor ESEM model in study 2.

Item	TW	GS	TM	ES	CS	SS	LS	PS	General Factor	Uniqueness
TW1	.58***	-.10*	-.09*	-.03	.15*	.10	.01	-.11*	.43***	.41***
TW2	.53***	-.02	-.01	-.01	.08	.01	.03	-.04	.46***	.50***
TW3	.43***	-.004	.03	.06	-.09	.03	-.29**	.13	.30**	.62***
TW4	.50***	-.05	-.04	.04	-.03	.02	-.14*	-.06	.44***	.52***
TW5	.31**	.04	-.07	.01	.08	.07	.30***	-.07	.52***	.52***
TW6	.25**	.14*	-.02	-.07	-.03	-.04	.28**	.06	.36***	.70***
TW7	.25***	.04	-.01	.01	-.20*	-.08	.06	.19**	.43***	.67***
GS1	-.001	.72***	.13**	-.03	-.02	.03	.004	.04	.38***	.31***
GS2	-.06	.67***	-.04	.01	-.04	.07	.06	.04	.34***	.43***
GS3	.06	.61***	.13**	.03	-.07	-.08	.04	.05	.37***	.46***
GS4	.01	.53***	.01	.04	.02	-.13*	-.003	.07	.36***	.57***
GS5	-.07	.57***	.17***	.08	-.02	-.03	-.02	-.01	.36***	.50***
GS6	.002	.63***	.15***	-.06	.04	-.09	-.05	.03	.39***	.42***
GS7	-.01	.69***	.03	-.01	.03	.03	-.002	.02	.37***	.39***
TM1	.02	.10*	.76***	.01	-.05	.01	-.08	-.07	.32***	.31***
TM2	-.07	.03	.66***	.05	-.02	-.05	.03	.06	.35***	.42***
TM3	-.05	.08*	.78***	.03	.06	-.03	-.04	.09*	.35***	.25***
TM4	-.03	.33***	.64***	.07	.01	.01	.06	.04	.37***	.33***
ES1	.04	-.07	.01	.42***	.09	.001	-.09	-.02	.32***	.70***
ES2	-.01	.03	.06	.67***	.10	.05	-.01	.01	.31***	.44***
ES3	.02	-.13*	.06	.28***	.04	-.03	-.18*	.13	.29**	.77***
ES4	-.01	.10	.07	.67***	.05	-.01	.06	.07	.36***	.40***
CS1	.10	.05	-.02	.10*	.54***	.28***	.08	-.03	.48***	.38***

CS2	-.06	-.01	.06	.12	.44**	-.02	-.29***	-.04	.47***	.48***
CS3	-.08	-.08	-.09	.05	.22	-.03	-.12	.11	.51***	.65***
CS4	.06	-.08*	.01	.06	.55***	.28***	.08	-.11*	.55***	.29***
SS1	-.02	-.02	-.003	.03	.24***	.70***	.03	-.06	.45***	.25**
SS2	.03	-.03	-.02	.04	.15*	.64***	.06	-.07	.50***	.31***
SS3	.11	-.10*	-.03	-.11	-.02	.28***	-.03	-.004	.59***	.54***
SS4	.13**	-.10*	-.02	-.03	.05	.34***	.09	-.07	.61***	.47***
SS5	.03	-.08	-.12	.14*	.14	.05	-.05	-.09	.43***	.74***
LS1	.05	.01	-.06	.01	-.03	.19**	.47***	.01	.58***	.39***
LS2	.09	.01	.04	-.05	-.08	.03	.46***	-.01	.62***	.38***
LS3	-.04	-.05	-.07	-.05	.05	-.04	.44***	.04	.60***	.43***
LS4	-.08	-.02	-.004	-.09	-.10	-.12	.25	.02	.52***	.63***
LS5	.04	-.04	-.08	-.11	-.08	-.08	-.07	.06	.58***	.63***
LS6	-.18	-.06	-.04	-.15**	-.09	-.05	.05	-.09	.65***	.50**
LS7	-.09	.12	.02	-.02	-.13	.003	.15	-.07	.64***	.52***
LS8	.02	-.06	-.03	-.08	-.06	-.12*	-.18	.03	.63***	.55***
PS1	.02	.04	.05	.08	.06	-.14*	-.10	.41***	.50***	.55***
PS2	-.05	.04	.07	.01	.01	-.06	-.04	.65***	.39***	.42***
PS3	-.03	.04	.02	.01	-.10	.04	.04	.70***	.35***	.37***
PS4	.05	.14*	.01	.07	-.06	-.08	.05	.58***	.39***	.48***

Note: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.

* $p < .05$. ** $p < .01$. *** $p < .001$.