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10 Development and Initial Validation of the Life Skills Scale for Sport

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## 25 Abstract

26 Objectives: The aim of this research was to develop a measure of life skills development  
27 through sport.

28 Method: Four studies were conducted to develop the Life Skills Scale for Sport (LSSS).

29 Study 1 developed items for the scale and included 39 reviewers' assessment of content  
30 validity. Study 2 included 338 youth sport participants and used exploratory factor analysis  
31 (EFA) and descriptive statistics to reduce the number of items in the scale and explore the  
32 factor structure of each subscale and the whole scale. Study 3 included 223 youth sport  
33 participants and assessed the factor structure and reliability of the scale using confirmatory  
34 factor analysis (CFA), exploratory structural equation modeling (ESEM) and bifactor  
35 modeling. Study 4 investigated the test-retest reliability of the scale over a two-week period  
36 with 37 youth sport participants.

37 Results: Study 1 resulted in the development of the initial 144-item LSSS and provided  
38 content validity evidence for all items. Study 2 refined the scale to 47 items and provided  
39 preliminary evidence for the unidimensional factor structure of each subscale. Study 3  
40 supported the factorial validity of the scale, with ESEM solutions providing the best fit and  
41 resulting in more differentiated factors. Study 4 provided evidence for the test-retest  
42 reliability of the scale.

43 Conclusions: Collectively, these studies provided initial evidence for the validity and  
44 reliability of the LSSS; a measure which can be used by researchers and practitioners to  
45 assess participants' perceived life skills development through sport.

46 *Keywords:* positive youth development; psychosocial development; psychosocial  
47 assets; youth sport; exploratory structural equation modeling; bifactor modeling

48

49           To succeed in our competitive and ever-changing global economy young people must  
50 develop an abundance of life skills (Gould & Carson, 2010). Such life skills are defined as  
51 the skills required to deal with the demands and challenges of everyday life (Hodge &  
52 Danish, 1999). In line with the definitions of several researchers (e.g., Cashmore, 2002;  
53 Danish, Forneris, & Wallace, 2005), we view skills as behavioral, cognitive, interpersonal, or  
54 intrapersonal competencies that can be learned, developed, and refined. Examples of life  
55 skills include teamwork, goal setting, interpersonal communication, and leadership. These  
56 ‘life’ skills can be applied to various aspects of a person’s life (e.g., schoolwork, a part time  
57 job, friendships, sport). Additionally, the World Health Organization (1999) has suggested  
58 that such life skills are important for preparing adolescents for the future and ensuring their  
59 healthy development. But where do young people develop their life skills? Research  
60 suggests that young people develop their life skills through extracurricular activities such as  
61 music, drama, and sport (Larson, 2000). According to Marsh (1992), sport has the greatest  
62 number of positive effects of any extracurricular activity. In particular, it has been proposed  
63 that the interactive, emotional, and social aspects of sport make it a promising setting for  
64 young peoples’ development (Danish, Forneris, Hodge, & Heke, 2004; Hellison, Martinek, &  
65 Walsh, 2008; Fraser-Thomas, Côté, & Deakin, 2005). As such, the development of life skills  
66 forms a key aspect of positive youth development through sport (Jones, Dunn, Holt, Sullivan,  
67 & Bloom, 2011). Positive youth development (PYD) is a general term which refers to  
68 strength-based and asset-building approaches to developmental research in which young  
69 people are viewed as ‘resources to be developed’ rather than ‘problems to be solved’ (Holt,  
70 Sehn, Spence, Newton, & Ball, 2012). Qualities and competencies such as participants’  
71 health and well-being (King et al., 2005; Park, 2004) and their life skills development (Jones  
72 et al., 2011) are proposed to indicate or enhance PYD.

73           Several frameworks, models and theories have recently been applied to the area of  
74 PYD through sport. Examples include Benson and Saito's (2001) conceptual framework for  
75 youth development theory and research (Cronin & Allen, 2015), Bronfenbrenner's (1999)  
76 bioecological model of human development (Strachan, Côté, & Deakin, 2009), Bass's (1999)  
77 transformational leadership theory (Vella, Oades, & Crowe, 2013), and Ryan and Deci's  
78 (2000) self-determination theory (Inoue, Wegner, Jordan, & Funk, 2015). Common among  
79 these frameworks, models, and theories is that they include young peoples' development as  
80 an outcome variable. Furthermore, they all highlight that researchers should investigate how  
81 key aspects of the youth sport environment (e.g., the coaching climate, peer relationships) can  
82 impact young peoples' development. In particular, self-determination theory (Ryan & Deci,  
83 2000) seems a promising theory for investigating the mechanisms by which young people  
84 develop their life skills through sport. Self-determination theory suggests that autonomy  
85 support, satisfaction of the three basic needs (autonomy, competence, and relatedness), and  
86 self-determined motivation all relate to a person's development and well-being (Ryan &  
87 Deci, 2000). Aspects of this causal sequence have been investigated extensively in relation to  
88 well-being (e.g., Standage & Gillison, 2007; Smith, Ntoumanis, & Duda, 2007) but much less  
89 attention has been given to the mechanisms of personal development. According to Hodge,  
90 Danish, and Martin's (2012) conceptual framework for life skills interventions, the basic  
91 needs of autonomy, competence, and relatedness are the underlying psychological  
92 mechanisms that contribute to personal development within all life skills programs.  
93 Nevertheless, it is important to acknowledge that life skills need to be intentionally taught  
94 (Theokas, Danish, Hodge, Heke, & Forneris, 2008) in order for the development of life skills  
95 to actually occur. To further our understanding of young people's development and explore  
96 the mechanisms that lead to PYD, a critical step is to establish valid and reliable tools to  
97 assess indicators of PYD (i.e., life skills).

98           As the most popular leisure activity for young people (Hansen & Larson, 2007), sport  
99 has been proposed as an ideal setting for the development of life skills. Research suggests  
100 that through sport young people develop: teamwork (Holt, 2007), goal setting (Holt, Tink,  
101 Mandigo, & Fox, 2008), time management (Fraser-Thomas & Côté, 2009), emotional skills  
102 (Brunelle, Danish, & Forneris, 2007), communication (Gould, Collins, Lauer, & Chung,  
103 2007), social skills (Gould, Flett, & Lauer, 2012), leadership (Camiré, Trudel, & Forneris,  
104 2009), and problem solving and decision making (Strachan, Côté, & Deakin, 2011). The  
105 majority of these studies relied on qualitative research methods (e.g., interviews) to  
106 investigate sports participants' life skills development. In fact, only two of the eight life  
107 skills listed above (goal setting and social skills) can presently be assessed using a suitable  
108 sport-specific measure – the Youth Experiences Survey for Sport (YES-S; MacDonald, Côté,  
109 Eys, & Deakin, 2012). Without the availability of alternative measures to comprehensively  
110 assess the range of life skills young people are purported to develop through sport,  
111 researchers are unable to test and refine the theories, frameworks, and models which describe,  
112 explain, and predict youth development. Furthermore, programme development and  
113 evaluation that is theoretically grounded remains limited.

114           Despite calls for new measures to be developed (Gould & Carson, 2008), only one  
115 sport-specific measure is currently available to assess life skills development through sport  
116 (i.e., the YES-S; MacDonald et al., 2012). This survey is an adaptation of the Youth  
117 Experience Survey 2.0 (Hansen & Larson, 2005) and measures personal and social skills,  
118 cognitive skills, goal setting, initiative, and negative experiences. Several recent studies have  
119 used the YES-S when investigating life skills development through sport (e.g., Bruner, Eys,  
120 Wilson, & Côté, 2014; Cronin & Allen, 2015; Vella, Oades, & Crowe, 2013). Nonetheless,  
121 these studies have only provided evidence for the internal consistency reliability of each  
122 subscale, with evidence of other forms of reliability and validity yet to be established.

123 Despite the YES-S being a promising measure, there are several other life skills that young  
124 people are purported to develop through sport.

125         Using content analysis, Johnston, Harwood, and Minniti (2013) identified the key  
126 assets or what others would term life skills (e.g., Danish, Petitpas, & Hale, 1992; Gould &  
127 Carson, 2008) that young people develop through sport. These life skills were: teamwork,  
128 goal setting, time management, emotional skills, interpersonal communication, social skills,  
129 leadership, and problem solving and decision making. Johnston et al. (2013) analyzed 34  
130 papers on PYD through sport and showed that these eight life skills were cited a total of 95  
131 times across these publications. These particular life skills are important as they are related  
132 to a range of positive outcomes including: workplace productivity and success (Locke &  
133 Latham, 1984; Rubin & Morreale, 1996), academic achievement (Britton & Tesser, 1991;  
134 Humphrey et al., 2011), sport and exercise performance (Burton, Naylor, & Holliday, 2001),  
135 overall health (Claessens, van Eerde, Rutte, & Roe, 2007), and psychological well-being  
136 (Brackett & Mayer, 2003; Judge, Bono, Erez, & Locke, 2005). However, there is presently  
137 no suitable measure to comprehensively assess the development of these key life skills within  
138 sport. Therefore, our aim in developing and validating the LSSS was to provide a much  
139 needed measure to comprehensively assess the eight key life skills that young people are  
140 purported to develop through sport.

141         Developing such a measure would allow researchers and practitioners to further  
142 investigate whether young people are developing these life skills through sport and pave the  
143 way for theory-based research concerned with the antecedents and consequences of life skills  
144 development. As youth development is best studied longitudinally (García-Bengoechea &  
145 Johnson, 2001), the scale would allow researchers and practitioners to track young peoples'  
146 development of these life skills over time and determine the mechanisms of development.  
147 Finally, this scale would help researchers to investigate the efficacy of existing programs

148 designed to teach young people life skills through sport (e.g., Sport United to Promote  
149 Education and Recreation, SUPER; Danish, 2002) and further promote the development of  
150 theory-led life skills interventions.

151 Overall, the purpose of the present research was to develop a scale which could assess  
152 the extent to which young people perceived they were developing the eight life skills through  
153 sport. In line with previous research on PYD and life skills development through sport, this  
154 survey was developed for youth sport participants in the 11–21 years age range (Holt, 2008).  
155 In total, a series of four studies were conducted to develop and provide initial validity (i.e.,  
156 content, factorial, convergent, and discriminant validity) and reliability (i.e., internal  
157 consistency and test-retest reliability) evidence for the LSSS.

### 158 **Study 1 – Initial Development of the Scale**

159 The aim of this study was to create a scale to measure participants' perceived  
160 development of the eight life skills within sport. This involved defining the life skills,  
161 selecting components which best represented each life skill, and developing items to assess  
162 the life skills. After developing the initial item pool, academics with expertise in one  
163 individual life skill reviewed items related to that particular life skill. Based on experts'  
164 ratings, items were selected for the initial version of the scale. A thorough approach to  
165 developing the scale was important because several researchers have highlighted content  
166 validity as an area which has been neglected when developing measures for sport psychology  
167 (Gunnell et al., 2014; Zhu, 2012).

## 168 **Method and Results**

### 169 **Selecting Definitions and Components**

170 The first step when developing a scale is to define the construct/s being measured and  
171 decide on the components which comprise the construct/s (Clark & Watson, 1995). A clear  
172 definition and components should ensure that items created fit with the definition adopted

173 and represent all components of the construct. This is an important process as “any measure  
174 must adequately capture the specific domain of interest yet contain no extraneous content”  
175 (Hinkin, 1995, p. 969). An extensive review of literature relating to each life skill was  
176 conducted to identify how life skills and components of the life skills have been defined in  
177 theory and research. A university search engine which searches across all the major search  
178 engines (e.g., psycARTICLES, psychINFO, SPORTDiscus) was used to locate relevant  
179 journal articles. A range of search terms were used to find articles which defined the life  
180 skills and outlined their components. For example, we searched for articles using the  
181 following types of search terms in combination (e.g., teamwork and defined, teamwork and  
182 components, teamwork and scale, teamwork and questionnaire, teamwork and survey, etc.).  
183 In total, we found 103 articles which contained relevant definitions and components of the  
184 eight life skills. From these articles, a list of 22 definitions (2–3 per life skill) and 20 sets of  
185 components (2–4 per life skill) was drawn up and reviewed to establish our definition and  
186 components for the life skills. The definitions and components we selected for each life skill  
187 are outlined in Table A (see supplementary materials).

### 188 **Developing Items**

189 To help develop items, 38 measures and 34 sources of literature (e.g., journal articles  
190 and book chapters) were consulted. When writing items, we sought to create items that  
191 represented every component of the eight life skills. In line with the advice of MacKenzie,  
192 Podsakoff, and Podsakoff (2011), global items representing the overall life skill were also  
193 created (e.g., an item assessing overall teamwork skills). Similar to other scale development  
194 studies (e.g., Eys, Loughhead, Bray, & Carron, 2009), we sought to develop an item pool  
195 which would be considerably larger than the final scale. In total, we developed 452 items  
196 which represented the eight life skills. Due to the large number of items, we reviewed all  
197 items and removed items which were too vague, too lengthy, too complicated, or lacked



198 relevance for the target population (DeVellis, 2011). After removing items, 270 items were  
199 left representing the eight life skills and all the life skills components.

### 200 **Providing Content Validity Evidence**

201 To assess content validity evidence, a panel of experts were consulted. Due to the  
202 number of items, expert reviewers who had published at least one journal article on one  
203 particular life skill were invited to participate. In total, 202 potential reviewers were  
204 contacted and 39 reviewers participated in the item review process which was conducted  
205 using an online survey. The number of reviewers for each life skill was as follows: teamwork  
206 ( $n = 4$ ), goal setting ( $n = 7$ ), time management ( $n = 5$ ), emotional skills ( $n = 5$ ), interpersonal  
207 communication ( $n = 4$ ), social skills ( $n = 7$ ), leadership ( $n = 5$ ), and problem solving and  
208 decision making ( $n = 2$ ). Reviewers had the following professional roles: full professor ( $n =$   
209 19), associate/assistant professor ( $n = 9$ ), professor emeritus ( $n = 2$ ), lecturer ( $n = 2$ ), reader ( $n$   
210 = 1), associate dean ( $n = 1$ ), dean ( $n = 1$ ), head of department ( $n = 1$ ), teaching assistant ( $n =$   
211 1), assessment coordinator ( $n = 1$ ), and sport psychologist ( $n = 1$ ). The countries where  
212 reviewers worked were: America ( $n = 20$ ), Canada ( $n = 7$ ), United Kingdom ( $n = 5$ ),  
213 Australia ( $n = 3$ ), the Netherlands ( $n = 2$ ), Norway ( $n = 1$ ), and Israel ( $n = 1$ ).

214 Within the online survey, reviewers were told the purpose of the item review process  
215 (e.g., to develop a scale to assess the development of teamwork skills through sport) and  
216 provided with both the definition and components of the life skill. Reviewers were asked to:  
217 (a) rate each item from 'poor' (1) to 'excellent' (5) on its ability to measure the life skill, (b)  
218 select what component of the life skill the item related to, and (c) comment on the suitability  
219 of the item (e.g., item wording and clarity, suitable for the sport domain, relates more to  
220 another construct, etc.). Finally, each reviewer was asked: "Have you any other comments or  
221 suggestions for improving the scale"? This methodology for providing content validity  
222 evidence has been advocated by researchers (e.g., Beck & Gables, 2001; Haynes, Richards, &

223 Kubany, 1995) and used in previous sport and exercise psychology studies (e.g., Dunn,  
224 Bouffard, & Rogers, 1999; Lonsdale, Hodge, & Rose, 2008).

225         After the expert review process, items were selected for the initial version of the scale  
226 based on the following criteria: (1) the item must have scored well (above 3.0) on its ability  
227 to measure the life skill, (2) the majority of reviewers (above 50%) must have agreed that the  
228 item referred to a particular component of the life skill, and (3) reviewers' comments were  
229 taken into account (e.g., negative comments about an item were considered when selecting  
230 items). A 50% agreement among reviewers for retaining items has been used in previous  
231 sport and exercise psychology studies (e.g., Pope & Hall, 2014). During this process, the  
232 number of items was reduced from 270 to 144 items. The breakdown of the number of items  
233 for each life skill is contained within Table 1. Mean scores for selected subscale items on the  
234 'poor' (1) to 'excellent' (5) reviewer rating scale were: teamwork (4.2), goal setting (3.7),  
235 time management (3.4), emotional skills (4.5), interpersonal communication (4.3), social  
236 skills (3.9), leadership (4.1), and problem solving and decision making (5.0). Of the 144  
237 items, only four items scored below the 3.0 criteria but these items were retained to ensure  
238 adequate content coverage. Within their subscale, the frequency with which items were  
239 assigned to the correct component was as follows: teamwork (85%), goal setting (75%), time  
240 management (74%), emotional skills (83%), interpersonal communication (90%), social skills  
241 (73%), leadership (89%), and problem solving and decision making (100%). Only 10 items  
242 were assigned to the correct component less than 50% of the time, but as this was still an  
243 initial stage of scale development these items were retained to ensure content coverage.  
244 Reviewer comments such as "does not reflect any component", "will not give you much  
245 variance in responses", "too general" were also taken into account when selecting items.  
246 Specific reviewer feedback also helped to improve the wording of 23 items (e.g., "set goals  
247 so that I can stay focused" was changed to "set goals so that I can stay focused on



273 work of Johnston et al. (2013), this study developed an initial 144-item scale which  
274 assessed the eight key life skills that young people are purported to develop through  
275 sport. The expert review process outlined in this study provided content validity  
276 evidence for the items selected for the initial version of the scale. This was important  
277 as both Gunnell et al. (2014) and Zhu (2012) suggested that content validity is  
278 frequently neglected during scale development in sport and exercise psychology.  
279 Given the large number of items in the initial version of the scale, the next study used  
280 EFA and descriptive statistics to further refine the scale and assess the factor structure  
281 of each subscale and the whole scale.

### 282 **Study 2 – Scale Refinement and EFA**

283 The purpose of this study was to reduce the number of items in the LSSS to 47 items  
284 and provide initial evidence for the unidimensional factor structure of the subscales.  
285 Reducing the amount of items to a more manageable number was considered necessary so  
286 that the scale could be practically implemented by researchers and practitioners. A minimum  
287 of 47 items was needed so that every component of each life skill would be represented in the  
288 LSSS. Specifically, each life skill would have 4–8 items depending on how many  
289 components comprised the life skill. Four items was the minimum for any subscale as  
290 researchers have suggested at least four items are needed to describe a construct and ensure  
291 adequate internal consistency reliability (Watson & Clark, 1997). Providing preliminary  
292 evidence for the unidimensional structure of the subscales was important as several  
293 methodologists propose that ensuring the unidimensionality of subscales is a key aspect of  
294 developing a scale (Anderson & Gerbing, 1988; Clark & Watson, 1995; Kline, 2000; Reise,  
295 Waller, & Comrey, 2000). In sum, the focus of this study was to refine the scale further in  
296 order to develop the strongest possible measure in terms of both validity and reliability.

297 EFA was chosen at this stage so initial evidence for the factor structure of the  
298 subscales and the whole scale could be assessed and the number of items in the scale could be  
299 reduced prior to conducting CFA, ESEM and bifactor modeling with another sample. EFA  
300 was conducted firstly at the subscale level and later for the whole scale due to the large  
301 number of items involved ( $N = 144$ ) and to ensure the refinement of each subscale before  
302 proceeding to CFA, ESEM and bifactor analysis. Several methodologists and researchers  
303 agree that EFA is preferable to CFA in the early stages of survey development (e.g., Brown,  
304 2006; Kelloway, 1995). In particular, EFA is considered a useful method of data reduction  
305 when developing or refining a scale (Anderson & Gerbing, 1988; Conway & Huffcut, 2003;  
306 Floyd & Widaman, 1995), whereas model modification should be done sparingly within CFA  
307 (MacCallum, 1995). Past studies in sport psychology have used EFA to refine a scale in a  
308 similar manner (e.g., Eys et al., 2009).

## 309 Method

### 310 Participants

311 The sample comprised of 338 British youth sports participants ( $M_{age} = 14.71$ ,  $SD =$   
312  $2.42$ , age range = 11–21) who participated in a range of sports. Reviews of EFA studies  
313 across various psychology journals has shown such a sample size to be in line with other  
314 published research (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Henson & Roberts,  
315 2006). The main sports represented were football ( $n = 87$ ), swimming ( $n = 40$ ), dance ( $n =$   
316  $34$ ), field hockey ( $n = 27$ ), basketball ( $n = 21$ ), athletics ( $n = 18$ ), golf ( $n = 15$ ), and rugby ( $n$   
317  $= 12$ ). The sample included 84 respondents who participated in 30 other sports (e.g., tennis,  
318 netball, badminton, horse riding, boxing, etc.). The sample had slightly more males ( $n =$   
319  $189$ ) than females ( $n = 149$ ). Participants played their sport for an average of 5.34 hours per  
320 week ( $SD = 4.79$ ) and had an average of 6.24 years ( $SD = 3.93$ ) playing experience.

### 321 Measures

322           **Life skills development.** The 144-item LSSS was used to measure the extent to  
323 which youth sport participants perceived they were developing the eight life skills through  
324 their chosen sport. This scale asks participants to “rate how much your sport has taught you  
325 to perform the skills listed below”. Participants responded on a five-point scale ranging  
326 from 1 (*not at all*) to 5 (*very much*). Example items are contained in Table 2.

### 327 **Procedures**

328           Following approval from the university’s ethics committee, participants were  
329 recruited by contacting physical education teachers from local schools. Initial contact was  
330 made via email, telephone, or face-to-face meetings and permission to survey the school  
331 was granted. Prior to completing the scale, informed consent was obtained from either the  
332 youth sport participant or the participant’s parent or guardian if under 16 years. Participants  
333 completed the scale after the researcher gave an introductory statement which explained the  
334 purpose of the study, that there were no right or wrong answers, and that all information  
335 provided would be confidential. The scale took approximately 20–25 minutes to complete.

### 336 **Data Analyses**

337           The main purpose of the data analyses was to reduce the LSSS from 144 to 47 items  
338 and assess the factor structure of the subscales. Reducing the number of items involved two  
339 steps: (1) conducting an EFA on each subscale, and (2) examining the descriptive statistics  
340 for individual items. EFA was conducted using SPSS 19.0 (IBM Corp., 2010). Principal  
341 components analysis was used as we wanted an empirical summary of the dataset  
342 (Tabachnick & Fidell, 2007). An unrotated factor solution was specified as we sought to  
343 explore each subscale and decide how many factors were evident. Based on expert  
344 recommendations (e.g., Fabrigar et al., 1999), Kaiser’s criterion (Kaiser, 1960), the scree  
345 test (Cattell, 1966) and parallel analysis (Horn, 1965) were used when deciding the number  
346 of factors in each subscale. Additionally, the amount of variance explained, interpretability,

347 scientific utility, and replicability of a given factor were considered when deciding to retain  
348 a factor (Brown, 2006; Tabachnick & Fidell, 2007). Assessing the factor structure at this  
349 early stage of scale development would allow us to ensure the unidimensional structure of  
350 the life skills subscales and create additional components of the life skills if necessary.

351         After deciding the number of factors in each subscale, the next step was to select  
352 items for the next version of the scale. The following information was collated and used to  
353 decide on items to retain: (1) factor loadings, (2) cross-loadings, (3) mean scores, (4)  
354 standard deviations, and (5) skewness and kurtosis values. First, we selected items with the  
355 highest possible factor loading during EFA. Comrey and Lee (1992) propose that loadings  
356 greater than .71 are considered excellent, .63 very good, .55 good, .45 fair, and .32 poor.  
357 This criteria was used to help select items. Second, we chose items which did not cross-load  
358 substantially with other potential factors. Where possible, this meant selecting ‘pure’ items  
359 which are correlated highly with only one factor (Tabachnick & Fidell, 2007). Third, we  
360 selected items with a mean score closer to the mid-point (3) on the 1–5 scale. This was in  
361 line with the proposition that items convey little information if respondents simply agree  
362 with them by circling the endpoint of the response scale (Clark & Watson, 1995). Fourth,  
363 we chose items with a higher standard deviation in order to ensure variability in responses.  
364 This meant that items would have the ability to detect both high responders (i.e., those who  
365 perceive they learned ‘a lot’ about a life skill) and low responders (i.e., those who perceive  
366 they learned ‘a little’ about a life skill). Fifth, we looked to select items with values closer  
367 to zero for both skewness and kurtosis. This would help ensure that items display a normal  
368 distribution, which is a fundamental assumption of most statistical tests (Tabachnick &  
369 Fidell, 2007). In line with our overall approach, several researchers recommend using factor  
370 loadings, cross loadings, mean scores, standard deviations, skewness and kurtosis values to  
371 evaluate items when developing a scale (e.g., Clark & Watson, 1995; DeVellis, 2011;

372 Hinkin, 1995; MacKenzie et al., 2011; Stanton, Sinar, Balzer, & Smith, 2002).

## 373 **Results**

### 374 **Preliminary Analyses**

375 Prior to the main analyses, the data were screened for normality. Skewness values  
376 ranged from -1.30 to -.02 and kurtosis values ranged from -1.32 to 1.47, indicating  
377 reasonable normality (Tabachnick & Fidell, 2007). Of the 144 items in the LSSS,  
378 participants failed to respond to an average of 3.76 items ( $SD = 2.32$ ; range = 0–11).  
379 Missing data analysis revealed no pattern to these missing values, rather the data was  
380 missing at random. As the percentage of missing data was low (2.6%), a mean substitution  
381 was performed. Mean substitution is a valid approach for dealing with missing data in a  
382 moderately sized data set (Tabachnick & Fidell, 2007).

383 Preliminary tests were carried out to assess the suitability of the data for EFA.  
384 Bartlett's (1937) test statistic was significant for each of the eight life skills: teamwork,  
385  $\chi^2(253) = 3,765.07, p < .001$ ; goal setting,  $\chi^2(91) = 2,917.35, p < .001$ ; time management,  
386  $\chi^2(66) = 2,654.54, p < .001$ ; emotional skills,  $\chi^2(325) = 5,430.98, p < .001$ ; interpersonal  
387 communication,  $\chi^2(78) = 2,805.25, p < .001$ ; social skills,  $\chi^2(153) = 3,492.07, p < .001$ ;  
388 leadership,  $\chi^2(253) = 5,477.90, p < .001$ ; and problem solving and decision making,  $\chi^2(105)$   
389  $= 3,861.38, p < .001$ . The KMO measure of sampling adequacy for each of the subscales  
390 ranged from .93–.96, indicating superb sampling adequacy (Hutcheson & Sofroniou, 1999).  
391 The majority of off-diagonal elements on the anti-image covariance matrix were less than .1.  
392 Combined, these tests indicated that the correlation matrix was suitable for EFA (Dziuban &  
393 Shirkey, 1974).

### 394 **EFA Results**

395 **Teamwork.** The teamwork subscale had four factors with eigenvalues above 1.0  
396 (see Table B in supplementary materials). In contrast, both the scree plot and parallel



397 analysis suggested retaining two factors. To aid in the interpretation of these two factors, a  
398 further oblique (direct oblimin;  $\delta = 0$ ) rotation was performed as the factors were thought to  
399 be correlated rather than orthogonal (Conway & Huffcut, 2003). Factor one contained 11  
400 items (e.g., “work well within a team/group” and “help build team/group spirit”) with factor  
401 loadings above .55 which is considered ‘good’ (Comrey & Lee, 1992). Factor two only  
402 contained three items with factor loadings above .55. These items were difficult to interpret  
403 as a separate teamwork factor that would have scientific utility; thus, we interpreted  
404 teamwork as involving one factor and excluded these three items from the first version of  
405 the scale.

406 **Other seven life skills.** For the other life skills, despite some eigenvalues suggesting  
407 additional factors, the scree plots and parallel analyses suggested retaining one factor only  
408 (see Table B in supplementary materials). Therefore, we interpreted goal setting, time  
409 management, emotional skills, interpersonal communication, social skills, leadership, and  
410 problem solving and decision making as each having one factor.

#### 411 **Item Selection Results**

412 To aid in the selection of items, results tables containing factor loadings, cross-  
413 loadings, mean scores, standard deviations, skewness and kurtosis values were created for  
414 each of the life skills. Table C (see supplementary materials) provides an example of one of  
415 the eight tables used for comparing items. Using these results tables allowed the researchers  
416 to compare individual items for each life skill and decide on the items to retain for the first  
417 version of the scale. In total, 47 items were selected for the scale (see Table 1 for the  
418 number of items per life skill).

419 To investigate potential cross-loadings of these items on non-intended life skills, a  
420 further EFA with oblique (direct oblimin;  $\delta = 0$ ) rotation was conducted on the 47 items as  
421 the factors were thought to be correlated (Conway & Huffcut, 2003). The resulting pattern

422 matrix can be seen in Table D. From the pattern matrix, we can see that 46 of the 47 items  
423 loaded onto their intended life skill. Only one teamwork item (“accept suggestions for  
424 improvement from others”) did not load on its intended factor and instead loaded on an  
425 unintended life skill (i.e., problem solving and decision making). However, we decided to  
426 retain this item to ensure that the ‘accepting suggestions or criticism’ component of  
427 teamwork was represented in the final scale and the content validity of the teamwork  
428 subscale was not compromised. The pattern matrix also shows that one emotional skills  
429 item (“help someone control their emotions when something bad happens”) and two  
430 problem solving items (“think carefully about a problem” and “create as many possible  
431 solutions to a problem as possible”) cross-loaded significantly on non-intended life skills.  
432 Given that these items primary factor loadings were of a higher value than their secondary  
433 factor loadings, we decided to retain both items.

434         Within their subscales, the factor loadings for retained items ranged from .44–.85  
435 (see Table 2). The majority of items had ‘excellent’ factor loadings (above .71,  $n = 41$ ) with  
436 a small number of items displaying ‘very good’ factor loadings (above .63,  $n = 5$ ). Only one  
437 item displayed a factor loading less than .63. This item was from the teamwork subscale  
438 (“accept suggestions for improvement from others”) and displayed a factor loading of .44.  
439 As none of the other items representing the ‘accepting suggestions and criticism’ component  
440 of teamwork had higher factor loadings, we retained this item to ensure content coverage.  
441 Within the component matrix for their subscales, only 11 of the 47 items selected displayed  
442 any tendency to cross-load with other potential factors. Ten of these items had cross  
443 loadings of .30–.39 on a potential second factor. These values were considerably lower than  
444 the first factor loading and as such were not problematic. Only one item from the teamwork  
445 subscale (“accepting suggestions for improvement from others”) had a cross-loading which  
446 was higher than its first factor loading. Mean scores for the selected items ranged from 3.33

447 to 4.13 indicating that participants learned between ‘some’ and ‘a lot’ about the life skills.  
448 The standard deviation of the retained items ranged from .86–1.24. Both the mean scores  
449 and standard deviations indicated that the items would ensure a certain level of variability  
450 amongst responses, which would allow the survey to discriminate between high and low  
451 responders. Lastly, skewness values ranged from -1.18 to -.25 and kurtosis values ranged  
452 from -.86 to 1.55, indicating reasonable normality (Tabachnick & Fidell, 2007). With the  
453 retained items, we calculated Cronbach’s alpha coefficients for each of the eight subscales  
454 (see Table 1). All were above the .70 value deemed adequate for the psychological domain  
455 (Nunnally & Bernstein, 1994).

### 456 **Discussion**

457 It has been proposed that researchers should pay greater attention to front-end  
458 processes such as scale refinement when developing a new scale (MacKenzie et al., 2011).  
459 In keeping with this recommendation, the main purpose of Study 2 was to reduce the LSSS  
460 to a more practical number of items that had both statistical and conceptual integrity. Based  
461 on criteria recommended by several researchers (e.g., Clark & Watson, 1995; DeVellis,  
462 2011; Hinkin, 1995; MacKenzie et al., 2011), a rigorous process of item selection guided our  
463 choice of the 47 items included in the first version of the scale. EFA helped identify items  
464 which displayed high factor loadings on a first factor and did not cross-load with other  
465 potential factors. Analysing the descriptive statistics meant that we chose items which not  
466 everyone agreed with, ensured a reasonable level of variability, and would produce a normal  
467 distribution in future studies. Combined, using both EFA and descriptive statistics ensured  
468 the best items were selected for the next version of the scale.

469 This second study also provided preliminary support for the factor structure and  
470 internal consistency reliability of the eight subscales and the whole scale. However, as  
471 validity is an ongoing process (DeVellis, 2011), it was important to confirm the factor

472 structure of each subscale and the full scale with another sample. Evidence for convergent  
473 and discriminant validity would also need to be assessed during the subsequent study.

### 474 **Study 3 – CFA, ESEM & Bifactor Analysis**

475 The aim of the third study was to assess the eight-factor structure of the 47-item  
476 LSSS. Building on the previous study, we tested the factor structure of each subscale and  
477 the whole-model using a model testing approach. For this task, another independent sample  
478 of youth sport participants completed the scale. This allowed for the assessment of factorial,  
479 convergent, and discriminant validity evidence for the LSSS. To replicate the findings of  
480 the previous study, the internal consistency reliability of each subscale was also tested.

### 481 **Method**

#### 482 **Participants**

483 The sample included 223 British youth sports participants ( $M_{age} = 15.01$ ,  $SD =$   
484  $2.81$ , age range = 10–21 years). A sample size greater than 200 is considered adequate for  
485 CFA (e.g., Barrett, 2007; Brown, 2006; Myers, Ahn, & Jin, 2011) and approximates the  
486 five-year median sample size for correlational studies across the major sport and exercise  
487 psychology journals (Schweizer & Furley, 2016). It must be noted that parameters for  
488 adequate sample size have yet to be determined in relation to ESEM or bifactor analysis  
489 (Ntoumanis, Mouratidis, Ng, & Viladrich, 2015). The main sports represented in the  
490 sample were football ( $n = 82$ ), dance ( $n = 25$ ), swimming ( $n = 22$ ), field hockey ( $n = 16$ ),  
491 rugby ( $n = 15$ ), and basketball ( $n = 10$ ). In total, 63 respondents participated in 23 other  
492 sports (e.g., track and field, golf, horse riding, etc.). The sample comprised more males ( $n$   
493  $= 131$ ) than females ( $n = 92$ ), with participants having an average of 6.87 years ( $SD = 4.08$ )  
494 playing experience. Participants played their sport for an average of 5.35 hours per week  
495 ( $SD = 4.08$ ).

#### 496 **Measures and Procedures**

497           **Life skills development.** The 47-item LSSS refined in Study 2 was used to  
498 measure the extent to which youth sport participants perceived they were developing life  
499 skills through their chosen sport (see Table 2 for example items). Prior to collecting any  
500 data, approval was granted by the university's ethics committee. Following the same  
501 procedures for recruitment, informed consent, and questionnaire administration as Study 2,  
502 participants completed the scale in approximately 10 minutes.

### 503 **Data Analyses**

504           To begin with, CFA employing maximum likelihood estimation was conducted using  
505 Mplus (Version 7.4; Muthén & Muthén, 1998–2015). When conducting CFA, the first step  
506 was to examine each subscale for fit. After ensuring that the subscales displayed an adequate  
507 fit, a series of models were tested. The following fit indices were used to assess model fit:  
508 chi-square ( $\chi^2$ ), chi-square statistic divided by degrees of freedom ( $df$ ), RMSEA (Stieger &  
509 Lind, 1980), CFI (Bentler, 1990), and TLI (Tucker & Lewis, 1973). Biddle, Markland,  
510 Gilbourne, Chatzisarantis, and Sparkes (2001) suggest that the principal means of assessing a  
511 good fit is a non-significant chi-square ( $p > .05$ ). However, with a large sample size ( $N >$   
512 200), models rarely fit via the chi-square test statistic (Barrett, 2007). Consequently,  
513 Jöreskog and Sörbom (2003) have recommended that large chi-square values relative to  $df$   
514 indicate a poor fit, and small values indicate a good fit. Researchers suggest that the chi-  
515 square value relative to  $df$  ratio should be 3:1 or lower (e.g., Tabachnick & Fidell, 2007). Hu  
516 and Bentler's (1999) criteria was used for assessing the RMSEA, CFI and TLI values. An  
517 RMSEA of equal or less than .06 indicates a close fit, less than .08 a reasonable fit, and  
518 greater than .10 a poor fit. For the CFIs and TLIs,  $>.90$  indicates adequate fit and  $>.95$   
519 indicates excellent fit.

520           To assess convergent validity evidence, we checked to see whether items loaded  
521 significantly onto their hypothesized factor by displaying a  $p$ -value less than .01 (Anderson &

522 Gerbing, 1988). To evaluate discriminant validity evidence for the eight subscales,  
523 competing models where the unconstrained model was compared to a series of models where  
524 the correlation between pairs of factors was constrained to 1.00 were performed. For  
525 discriminant validity to be evident, the unconstrained models chi-square value has to be  
526 significantly less than the constrained model (cf. Anderson & Gerbing, 1988). Competing  
527 models were compared using the  $\chi^2$  difference test. This involved subtracting the  $\chi^2$  value of  
528 the constrained model from the  $\chi^2$  value of the unconstrained model, and subtracting the *df* of  
529 the constrained model from the *df* of the unconstrained model. The resulting  $\chi^2$  difference  
530 value and its associated *df* are then compared against the *Critical Values of Chi-Square* table  
531 (see Tabachnick & Fidell, 2007, p. 949). If the  $\chi^2$  difference value and its associated *df* are  
532 significant, the unconstrained model would fit the data best. It must be noted that some  
533 researchers agree with Anderson and Gerbing's (1988) method of assessing convergent and  
534 discriminant validity evidence within an overall scale (e.g., John & Benet-Martínez, 2000;  
535 Brown, 2006) whereas others disagree (e.g., Gunnell et al., 2014). Given the breadth and size  
536 of the scale (eight life skills and 47 items), we felt it was necessary to assess convergent and  
537 discriminant validity evidence within the overall scale. A similar approach has been taken by  
538 other researchers during scale development (e.g., Lonsdale, Hodge, & Rose, 2008).

539         When developing a scale, it is important to test other plausible models which can be  
540 compared to the fit of the original model (Jackson, Gillaspy, & Purc-Stephenson, 2009). To  
541 achieve this aim, we tested several models using the procedures outlined by Appleton,  
542 Ntoumanis, Quested, Viladrich, and Duda (2016), and Myers, Martin, Ntoumanis, Celimli,  
543 and Bartholomew (2014). We began by testing an eight-factor CFA model which allowed all  
544 eight life skills factors to correlate but restricted items to load only on their intended life skill  
545 factor. We then compared the original eight-factor CFA model to a second-order model (i.e.,

546 eight factors composing a higher-order factor) and a first-order model (i.e., one factor  
547 representing all 47 items).

548         Recent research suggests several limitations to the CFA approach. Firstly, CFA relies  
549 on the highly restrictive Independent Cluster Model (ICM), which means that items are only  
550 permitted to load on their intended factor and possible cross-loadings with other factors are  
551 restricted to zero (Tomás, Marsh, González-Romá, Valls, & Nagengast, 2014). This is  
552 problematic as items within multidimensional measures are rarely ‘pure’ indicators of only  
553 one factor (Morin, Arens, & Marsh, 2016). Another limitation of CFA is the inflated  
554 correlations between factors that result from the highly restrictive ICM-CFA model (see  
555 Asparouhov & Muthén, 2009; Tomás et al., 2014). A final limitation is that it is quite  
556 common to obtain a poor fit via CFA with no clear sources of misfit being evident  
557 (Asparouhov & Muthén, 2009).

558         To overcome these limitations, Asparouhov and Muthén (2009) proposed ESEM,  
559 which combines the principles of EFA (i.e., allowing for the cross loading of items) within a  
560 CFA/SEM framework (i.e., fit indices to assess model fit). Within ESEM, items load on their  
561 intended factor, loadings on non-intended factors are freely estimated at non-zero values, and  
562 the factors can be correlated (Ntoumanis et al., 2015). The ESEM approach is thought to  
563 overcome the highlighted limitations of CFA and provide a better representation of data from  
564 multidimensional scales (Morins et al., 2016). Asparouhov and Muthén (2009) maintain that  
565 ESEM is a useful approach following an initial EFA. Furthermore, the advantages of using  
566 ESEM in the development of multidimensional scales has been highlighted by recent studies  
567 in sport and exercise psychology (e.g., Appleton et al., 2016; Myers, 2013). In an extension  
568 to ESEM, research by Morin, Marsh, and colleagues (see Morin, Marsh, & Nagengast, 2013;  
569 Marsh, Morin, Parker, & Kaur, 2014; Marsh, Nagengast, & Morin, 2013) has proposed an  
570 ESEM-within-CFA model, which permits the testing of higher-order models based on ESEM

571 models (H-ESEM). This H-ESEM model is advantageous when testing multidimensional  
572 scales as the inclusion of a higher-order construct ensures the aforementioned cross-loadings  
573 between factors are not inflated (Morin et al., 2016).

574         Along with ESEM and H-ESEM, psychometric experts (e.g., Morin et al., 2016;  
575 Myers et al., 2014; Ntoumanis et al., 2015) have advocated testing the structure of  
576 multidimensional scales using a bifactor CFA model (B-CFA) and a bifactor ESEM model  
577 (B-ESEM). With bifactor models, all items in the scale are viewed as indicators of a general  
578 factor and a specific factor (Ntoumanis et al., 2015). Bifactor models should be tested when  
579 the researcher is investigating multifaceted concepts (Reise, 2012) or when investigating the  
580 presence of a single global factor (Howard, Gagné, Morin, & Forest, 2016). Using the  
581 present research as an example, the B-CFA model would allow items to load onto two  
582 factors: (1) a general life skills factor, and (2) a specific life skill factor the item relates to.  
583 With the B-CFA model, correlations between all factors are constrained to zero and all items  
584 are only permitted to load on their intended factor, with loadings on unintended factors  
585 constrained to zero. Using the B-ESEM framework, researchers can also conduct a bifactor  
586 rotation within an EFA/ESEM framework. Using the current research as an example, the B-  
587 ESEM approach would allow items to load onto a general life skills factor along with all of  
588 the specific life skills factors. With the B-ESEM model, correlations between all factors are  
589 constrained to zero, but all items are allowed to cross-load onto unintended factors.

590         Summarising the information presented above, we tested several competing models  
591 which included: an eight-factor CFA model, a second-order CFA model, a first-order CFA  
592 model, a B-CFA model, an ESEM model, a H-ESEM model, and a B-ESEM model. All  
593 models were tested in Mplus (Version 7.4; Muthén & Muthén, 1998–2015) based on the  
594 robust maximum likelihood (MLR) estimator. When modeling the B-CFA structure, the  
595 global and specific factors were specified as orthogonal to ensure that the interpretability of



596 the solution was in line with bifactor assumptions. For ESEM, a target rotation was utilized  
597 with all cross-loadings “targeted” to be close to zero and all main loadings freely estimated.  
598 A target rotation is purported to lead to better results with larger and more complicated  
599 models (Asparouhov & Muthén, 2009) as is the case with the LSSS. From the ESEM model,  
600 a H-ESEM model was estimated using ESEM-Within-CFA (Morin et al., 2013), with all  
601 eight life skills being specified as related to a higher order life skills factor. For the B-ESEM  
602 model, an orthogonal bifactor target rotation was employed when estimating the model  
603 (Reise, 2012). The eight group factors were defined from the same pattern of target and non-  
604 target factor loadings that was used in the ESEM model and all items were allowed to load  
605 onto a global life skills factor.

606 To compare alternative models, we adopted the procedures of Morin et al. (2016).  
607 When comparing models, similar fit is evident when changes in the CFI are  $< .01$  and  
608 increases in RMSEA are  $< .015$  (Chen, 2007; Cheung & Rensvold, 2002). Changes in the  
609 TLI of  $< .01$  indicate a similar fit with models involving a complex structure (Marsh et al.,  
610 2009; Morin et al., 2013). We also examined the Akaike Information Criteria (AIC; Akaike,  
611 1987), the Bayesian Information Criterion (BIC; Schwartz, 1978), and the sample size  
612 adjusted BIC (ABIC; Sclove, 1987) when comparing models. Lower values for AIC, BIC,  
613 and ABIC are indicative of better model fit (Appleton et al., 2016). Finally, after testing all  
614 models, we tested each of the eight subscales for internal consistency reliability.

## 615 **Results**

### 616 **Preliminary Analysis**

617 Prior to conducting the main analyses, the data were screened for normality.  
618 Skewness values ranged from -1.35 to -.30 and kurtosis values ranged from -.82 to 1.87,  
619 indicating reasonable normality (Tabachnick & Fidell, 2007). Of the 47 items, participants  
620 failed to respond to an average of 2.65 items ( $SD = 2.16$ ; range = 0–10). Missing data

621 analysis revealed no pattern to these missing values, rather the data was missing at random.  
622 Consequently, a mean substitution was performed in SPSS to replace missing data.

### 623 **Subscale Results**

624 CFA results for each of the eight subscales are contained in Table 3. Seven of the  
625 eight subscales demonstrated excellent fit. Only the emotional skills subscale displayed a  
626 less than adequate fit. However, the factor loadings for this subscale did not reveal any items  
627 that were affecting model fit (see Table 2). To further investigate model fit, we separately  
628 assessed the four items that dealt with ‘my emotions’ and the four items that dealt with  
629 ‘others emotions’ to see whether a better fit could be achieved. The ‘my emotions’ subscale  
630 displayed an excellent fit,  $\chi^2 = 2.49(2)$ ,  $p = .29$ ,  $\chi^2/df = 1.25$ , RMSEA = .03, CFI = 1.00, TLI  
631 = 1.00, whereas the ‘others emotions’ subscale displayed a poor fit,  $\chi^2 = 21.04$ ,  $p < .001$ ,  $\chi^2/df$   
632 = 10.52, RMSEA = .21, CFI = .95, TLI = .84. Therefore, we only retained the ‘my emotions’  
633 items for the emotional skills subscale. However, we did test the ‘others emotions’ subscale  
634 across younger (10–14 years,  $n = 114$ ) and older (15–21 years,  $n = 109$ ) participants to  
635 investigate whether age played a role in the inadequate fit of this subscale. The ‘others  
636 emotions’ subscale displayed a poor fit with younger participants,  $\chi^2 = 18.77(2)$ ,  $p < .001$ ,  
637  $\chi^2/df = 9.39$ , RMSEA = .27, CFI = .89, TLI = .66; whereas, it displayed a reasonable fit with  
638 older participants,  $\chi^2 = 5.19(2)$ ,  $p = .07$ ,  $\chi^2/df = 2.60$ , RMSEA = .12, CFI = .99, TLI = .95.

### 639 **Model Testing Results**

640 After removing the four ‘others emotions’ items, the full 43-item model was firstly  
641 tested using CFA. The full eight-factor model displayed an adequate fit (see Table 3).  
642 Providing evidence of convergent validity, results showed that all items loaded significantly  
643 onto their hypothesized factor when tested within the eight-factor model (see Table E of the  
644 supplementary materials). The average factor loading for the 43 items was .73, which is  
645 considered excellent (Comrey & Lee, 1992). Only one teamwork item (“accepting

646 suggestions for improvement from others”) had a factor loading less than .40. Analysis for  
647 discriminant validity between subscales revealed that all 28 unconstrained CFA models had  
648 significantly lower chi-square values than the constrained models, providing evidence for the  
649 discriminant validity between subscales (Anderson & Gerbing, 1988).

650         During the analyses, other competing models were examined. The fit indices and  
651 information criteria for these models are contained in Table 3 and the factors loadings for  
652 these models are contained in Tables E, F, and G (see supplementary materials). When  
653 tested, the first-order CFA model displayed a poor fit. This indicated that one overriding  
654 factor is not appropriate to represent all 43 life skills items. The second-order model  
655 displayed adequate results for fit, with the exception of the .89 TLI value. Given the  
656 closeness of the TFI value to Hu and Bentler’s (1999)  $>.90$  criteria and keeping the  
657 complexity/size of the model in mind (Cheung & Rensvold, 2002), we felt the second-order  
658 CFA model provided a reasonable fit. Furthermore, all eight life skills factors loaded  
659 significantly onto the higher-order factor ( $M$  factor loading = .77, range = .64–.88). When  
660 tested, the B-CFA displayed an adequate model fit with the fit indices being very similar to  
661 the eight-factor and second-order CFA models. Additionally, all items loaded significantly  
662 onto the general life skills factor and their specific life skill factor. The only exception was  
663 one teamwork item which did not load on the specific teamwork factor but was retained to  
664 ensure content coverage. We also tested a series of ESEM solutions. The ESEM, H-ESEM,  
665 and B-ESEM models all displayed an adequate fit with similar fit indices across each  
666 solution. Overall, the ESEM models provided a better fit than the CFA solutions as  
667 evidenced by improved fit indices and lower AIC, BIC, and ABIC values. Both the ESEM  
668 and H-ESEM models appeared to provide the best representation of the data because they  
669 displayed the best fit indices and lowest AIC, BIC, and ABIC values when compared to all  
670 other models.

671           Along with examining fit indices and information criteria, Morin and colleagues  
672 (2016) suggested that researchers should examine parameter estimates and theoretical  
673 conformity of the models to guide the selection of the best model. This initially involves  
674 comparing CFA and ESEM models before comparing all ESEM models (Morin et al., 2016).  
675 It is suggested that an ESEM model should be preferred over a CFA model when the factor  
676 correlations are substantially reduced (Marsh et al., 2009; Howard et al., 2016). In the  
677 current study, the ESEM factor correlations ( $M = .37$ , range = .20–.56) were substantially  
678 smaller than in the eight-factor CFA model ( $M = .59$ , range = .33–.78). Table H of the  
679 supplementary materials contains a complete list of these factor correlations. An examination  
680 of the ESEM parameter estimates (see Table F of the supplementary materials) revealed well  
681 defined factors for the eight life skills. With the exception of one teamwork item (factor  
682 loading = .10,  $p = .28$ ), all items loaded significantly onto their intended factor, with the  
683 average factor loading being .60 (range = .10–.87). Although there were several significant  
684 cross-loadings, they were substantially lower than the primary factor loadings, except for the  
685 one teamwork item. With the B-ESEM model, all items loaded significantly onto the general  
686 factor, with the average factor loading being .57 (range = .23–.71). In contrast, 10 items  
687 failed to load on their specific factor, with the average loading on specific factors being .44  
688 (range = .09–.69). Of the items which failed to load on their intended factor, six items were  
689 from the leadership factor, two from the social skills factor, one from interpersonal  
690 communication, and one from teamwork. Cross-loadings were less evident in the B-ESEM  
691 solution as compared to the ESEM solution, but the ESEM solution was still preferable as it  
692 displayed more defined factors for the eight life skills (i.e., items that loaded significantly  
693 onto their intended factor). With the H-ESEM model, seven of the eight lower-order factors  
694 loaded significantly onto the higher-order factor with loadings ranging from .54–.77 ( $M =$

695 .65). Only the interpersonal communication skills factor failed to load onto the higher-order  
696 factor, as it had a .16 loading ( $p = .40$ ).

697 In sum, the ESEM models provided a better fit than the CFA models, albeit three of  
698 the four CFA models did provide an adequate fit. Factors were more distinctive in the ESEM  
699 model as compared to the eight-factor CFA model as evidenced by the factor correlations. Of  
700 the ESEM models, both the ESEM and H-ESEM provided a slightly better fit than the B-  
701 ESEM model. Despite some problems with one teamwork item and cross-loadings of some  
702 items, the ESEM and H-ESEM models clearly provided an adequate fit to the data.

703 Lastly, the internal consistency reliability for each subscale was tested (see Table 1).  
704 All alpha coefficients were above the .70 criterion suggested by Nunnally and Bernstein  
705 (1994). Mean scores for the subscales also revealed that participants perceived they were  
706 learning at least ‘some’ and at most ‘a lot’ about the eight life skills. Teamwork,  
707 interpersonal communication, social skills, and leadership were the life skills participants  
708 perceived they learned the most about.

## 709 Discussion

710 The main purpose of this study was to assess the factor structure of the 47-item  
711 LSSS. When tested individually, seven of the eight subscales displayed excellent factorial  
712 validity evidence. Only the emotional skills subscale displayed an inadequate fit. After  
713 removing four items dealing with ‘others emotions’ this subscale displayed an excellent fit.  
714 There may be a specific reason why the ‘others emotions’ subscale did not provide an  
715 adequate fit. Although emotional skills involve dealing with one’s own and others’ emotions  
716 (Gignac, Palmer, Manocha, & Stough, 2005), it is possible that youth sport participants as  
717 young as 11 years may be more familiar in dealing with their own emotions. This hypothesis  
718 was supported by the fact that the fit indices for the ‘others emotions’ subscale were poor for  
719 the younger sample and reasonable for the older sample. Using a larger sample size than the

720 present study (i.e.,  $n = 109$ ), future studies could attempt to develop an ‘others emotions’  
721 scale with older participants who may be more knowledgeable and practiced in dealing with  
722 other peoples’ emotions.

723         Within Study 3, the model testing approach recommended by Jackson et al. (2009)  
724 showed that ESEM solutions were superior to CFA solutions in terms of fit indices,  
725 information criteria, and the distinctiveness of factors. Such a finding supports previous  
726 research within sport and exercise psychology (e.g., Appleton et al., 2016; Tomás et al.,  
727 2014). When comparing the various models, the ESEM and H-ESEM models fitted the data  
728 best. However, with the exception of the first-order model, it must be noted that all other  
729 models provided an adequate fit. Given the reasonable fit of all models, we would  
730 recommend that future studies continue to investigate the factor structure of the LSSS using  
731 CFA, ESEM, and bifactor models. A noteworthy result with the bifactor models was that all  
732 items (with the exception of one teamwork item) loaded onto the general life skills factor.  
733 This suggests that a general life skills factor is evident within the data and it may be  
734 appropriate to calculate a total life skills score comprising of scores for all eight life skills.  
735 However, the eight life skill factors also loaded onto a higher-order factor when tested within  
736 the second-order CFA model and H-ESEM model, with the only exception being the  
737 communication skills factor in the H-ESEM solution. Future research comparing these  
738 models is important, as future studies may seek to investigate the mechanisms that lead to  
739 overall life skills development or to the development of specific life skills – a research goal  
740 best suited to a bifactor solution.

741         Before proceeding, it is important to note that some general considerations in relation  
742 to ESEM and bifactor modelling should be taken into consideration when interpreting the  
743 models tested in the current study. Specifically, some key aspects of ESEM and bifactor  
744 modeling remain somewhat unexplored in the literature. For instance, issues related to

745 sample size and statistical power (Myers et al., 2011), the best choice of rotation (Morin &  
746 Mañano, 2011; Myers et al., 2014), and the performance of fit indices (Marsh et al., 2010)  
747 remain unclear. Furthermore, some researchers would actually debate the need for ESEM  
748 models (e.g., Herman & Pfister, 2013) and others would suggest that bifactor models are  
749 over-interpreted within the literature (Revelle & Wilt, 2013).

750 In sum, the current study provided evidence for the factorial validity, convergent  
751 validity, discriminant validity and internal consistency reliability of the LSSS. Such evidence  
752 is important as establishing the validity and reliability of measures is considered the first  
753 stage of the research process (Schutz, 1994). By providing validity and reliability evidence  
754 for the LSSS, we can be more assured of the accuracy of our measurement of the eight life  
755 skills and thus more confident in our research findings using the scale. However, as validity  
756 and reliability should be continually assessed (DeVellis, 2011), future studies should look to  
757 replicate such findings. A second form of reliability which has yet to be examined during the  
758 scale validation process is test-retest reliability. Therefore, the next study assessed the test-  
759 retest reliability of the scale with an independent sample of youth sport participants.

#### 760 **Study 4 – Test-Retest Reliability**

761 The purpose of this study was to assess the test-retest reliability of the LSSS. Test-  
762 retest reliability is a method used to assess the temporal stability of a scale; that is, how  
763 constant scores remain from one occasion to another (DeVellis, 2011). Zhu (2012)  
764 highlighted that most scale development and validation studies in sport psychology fail to  
765 assess this form of reliability. According to Vaughn, Lee, and Kamata (2012), administering  
766 a test twice to the same set of subjects over a relatively short period of time and correlating  
767 the two measurements is the most straightforward method of assessing reliability. In the  
768 present study, a two-week test-retest analysis was performed to establish the reliability of  
769 each of the LSSS subscales. Two weeks was deemed appropriate as it was unlikely that

770 participants' perceptions of life skills development would change over this time. Thus, if the  
771 LSSS is a reliable measure of life skills development through sport it should produce similar  
772 scores over a two-week period.

## 773 **Method**

### 774 **Participants**

775 The sample included 37 British youth sports participants ( $M_{age} = 18.96$ ,  $SD = 1.25$ ,  
776 age range = 17–21) who completed the scale on two occasions. Participants were recruited  
777 from first year university seminars and met the criteria for being youth sport participants (i.e.,  
778 between 11–21 years and currently taking part in sport). The main sports represented were  
779 football ( $n = 10$ ), rugby ( $n = 5$ ), athletics ( $n = 5$ ), and field hockey ( $n = 3$ ). In total, 14  
780 respondents took part in 10 other sports (e.g., basketball, American football, karate, etc.).  
781 The sample included more males ( $n = 24$ ) than females ( $n = 13$ ), with participants having an  
782 average of 8.47 years ( $SD = 3.87$ ) playing experience. Participants played their sport for an  
783 average of 6.00 hours per week ( $SD = 3.62$ ).

### 784 **Measures and Procedures**

785 **Life skills development.** The revised 43-item LSSS was used to measure the extent  
786 to which youth sport participants perceived they were developing life skills through their  
787 chosen sport (see Table 2 for example items). Participants completed the LSSS after  
788 seminars which were two weeks apart. Before collecting any data, approval was granted by  
789 the university's ethics committee and informed consent was obtained from all participants.  
790 Participants completed the scale after the researcher gave the same introductory statement  
791 described in Study 2. The scale took 5–10 minutes to complete on each occasion and no  
792 incentive for participation was provided.

### 793 **Data Analysis**



794 Intraclass correlation coefficients were used to assess test-retest reliability. Intraclass  
795 correlation coefficients are a measure of reliability which can range from 0, indicating no  
796 reliability, to 1, indicating perfect reliability (Weir, 2005). Values above .70 provide  
797 evidence of adequate reliability (Mitchell & Jolley, 2001).

## 798 **Results**

799 The intraclass correlation coefficients in this study were all above the .70 criterion  
800 needed to provide evidence of adequate reliability: teamwork (.93), goal setting (.93), time  
801 management (.92), emotional skills (.87), interpersonal communication (.89), social skills  
802 (.86), leadership (.93), and problem solving and decision making (.82). For each life skill,  
803 participants rated themselves above 3 (*some*) and generally closer to or above 4 (*a lot*) on the  
804 1–5 scale. The four life skills which participants perceived they learned the most about were  
805 teamwork, interpersonal communication, social skills, and leadership.

## 806 **Discussion**

807 The findings from this study provided evidence for the test-retest reliability of the  
808 LSSS over a two-week period. This was important as it demonstrates that scores obtained  
809 using the LSSS were stable over this timeframe, which provides researchers with greater  
810 confidence that the measure is accurately capturing participants' perceptions of life skills  
811 development in a consistent manner. In assessing test-retest reliability, we also addressed a  
812 common weakness of scale development and validation studies in sport psychology (Zhu,  
813 2012). Like validity, reliability is also an ongoing process (DeVellis, 2011) and, as such,  
814 future studies should assess the test-retest reliability of the LSSS over different periods of  
815 time (e.g., 1–6 weeks) and with younger participants.

## 816 **Overall Discussion**

817 The purpose of the present research was to develop a scale to comprehensively assess  
818 participants' perceptions of life skills development through sport. The studies described led

819 to the development of the 43-item LSSS, which measures teamwork, goal setting, time  
820 management, emotional skills, interpersonal communication, social skills, leadership, and  
821 problem solving and decision making. These are the most frequently cited life skills which  
822 young people are purported to develop through sport (Johnston et al., 2013). Four separate  
823 studies provided evidence for the construct validity of the LSSS. Using 39 expert reviewers,  
824 Study 1 provided evidence for the content validity of items selected for the initial version of  
825 the scale. Study 2 provided evidence for the unidimensional factor structure of the LSSS  
826 subscales and refined the scale to 47 items using EFA and descriptive statistics. Study 3 led  
827 to the reduction of the scale to 43 items and provided evidence for the factorial, convergent  
828 and discriminant validity of the subscales. The model testing approach utilized in this study  
829 suggested that ESEM solutions, particularly ESEM and H-ESEM models, best represented  
830 the data. Using a sample of youth sport participants, Study 4 provided evidence for the test-  
831 retest reliability of the scale over a two-week period. Finally, Studies 2–4 provided evidence  
832 for the internal consistency reliability of the LSSS subscales.

833         The studies in this research paper followed a rigorous process of scale development  
834 and validation which was guided by ‘best practice’ recommendations (e.g., DeVellis, 2011).  
835 Addressing the concerns of Zhu (2012) and Gunnell et al. (2014), this research provided  
836 evidence for both the content validity of items and the test-retest reliability of the subscales.  
837 Such a thorough approach to scale development and validation cannot be underestimated, as  
838 providing both validity and reliability evidence are the cornerstones of accurate measurement  
839 in psychology. As Schutz (1994) suggested, ensuring scales are both valid and reliable  
840 should be the first stage of the research process. Without establishing validity and reliability  
841 evidence for a measure, we cannot study the construct/s in question with any scientific  
842 validity. Validity and reliability evidence from the present research suggests that researchers  
843 who use the LSSS can be confident in the accuracy of the scores they obtain, the relationships

844 they find with other variables, their interpretation of such relationships, and the implications  
845 for both coaches and participants.

846         Having established the validity and reliability of the LSSS, the findings from studies  
847 2–4 also demonstrate that British youth sport participants perceive they are developing a  
848 range of life skills through sport. Consistently, these studies indicated that participants  
849 perceived they learned between ‘some’ and ‘a lot’ about the eight life skills. Such findings  
850 support research with athletes, coaches, and parents which has shown that American (Gould  
851 et al., 2007, 2012), Canadian (Brunelle et al., 2007; Camiré et al., 2009; Fraser-Thomas &  
852 Côté, 2009; Holt, 2007; Holt et al., 2008; Strachan, Côté, & Deakin, 2011) and Australian  
853 (Vella et al., 2013) participants are developing these life skills through sport. From the  
854 current research, one could conclude that British youth sport participants perceived they  
855 learned the most about teamwork, interpersonal communication, social skills, and leadership,  
856 whereas they perceived they learned less about emotional skills, goal setting, problem solving  
857 and decision making, and time management. This novel finding suggests that young people  
858 perceive they learn more about certain life skills as compared to other life skills when  
859 participating in sport. Future research could illuminate the matter further by investigating  
860 possible differences in perceived life skills development across sports (team versus  
861 individual), gender (male versus female), and age groups (younger versus older participants).

862         From a theoretical standpoint, the LSSS will allow researchers to test various theories,  
863 models, and conceptual frameworks that can explain the processes involved in youth  
864 development through sport. In line with recent research (e.g., Cronin & Allen, 2015; Inoue et  
865 al., 2015; Strachan et al., 2009; Vella et al., 2013), self-determination theory (Ryan & Deci,  
866 2000), transformational leadership theory (Bass, 1999), the bioecological model of human  
867 development (Bronfenbrenner, 1999), along with Benson and Saito’s (2001) conceptual  
868 framework for youth development theory and research, could all be tested using the LSSS as

869 an outcome variable. With self-determination theory (Ryan & Deci, 2000), the following  
870 causal sequence could be investigated: coach autonomy support – basic need satisfaction –  
871 self-determined motivation – life skills development. Similar causal sequences have been  
872 tested previously with well-being measures such as self-esteem, positive affect, and life  
873 satisfaction as outcome variables (e.g., Standage & Gillison, 2007; Smith, Ntoumanis, &  
874 Duda, 2007). However, self-determination theory's (Ryan & Deci, 2000) predictions about  
875 personal development have never been thoroughly tested using a life skills development  
876 perspective. The LSSS and self-determination theory combined provide the opportunity to  
877 begin examining the social/environmental determinants and underlying psychological  
878 mechanisms of development within youth sport. Through theory testing, researchers could  
879 provide coaches, sports administrators, and parents with theory-based evidence, explanations,  
880 and predictions on how they can promote young peoples' life skills development.

### 881 **Limitations and Future Directions**

882         Although the majority of evidence from Studies 1–4 supports the validity and  
883 reliability of the LSSS, it is important to re-emphasize that validity and reliability are  
884 considered ongoing processes (DeVellis, 2011). Thus, future studies should provide further  
885 evidence for the validity and reliability of the scale. Addressing the limitations of the current  
886 research, the LSSS should be examined in other countries/cultures and the measurement  
887 invariance of the scale should be tested across competitive levels (recreational and elite  
888 athletes), gender (males and females), sport type (individual and team sports), and time. We  
889 would also encourage future research to assess the temporal stability of the LSSS over time  
890 and with different populations (e.g., younger participants than used in Study 4). In the short  
891 term (2–6 weeks), young peoples' perceptions of life skills development through sport would  
892 not be expected to change; whereas, in the long term (1–5 years) one would expect that  
893 young peoples' perceptions of life skills development may increase. Addressing a weakness

894 of the present research, future studies should also provide evidence for the predictive validity  
895 or nomological validity of the scale. One way this could be achieved is by testing the scale in  
896 relation to the casual sequence of self-determination theory outlined earlier. Replicating the  
897 findings of the current research, future studies should provide evidence for the factor  
898 structure and internal consistency reliability of the LSSS. Through further assessment of the  
899 psychometric properties of the scale, the validity and reliability of the LSSS can be  
900 continually assessed, critiqued and improved (DeVellis, 2011). In this regard, future studies  
901 could develop an alternative item to assess the ‘accepting suggestions or criticism’  
902 component of teamwork. The item representing this component of teamwork (i.e., “accept  
903 suggestions for improvement from others”) was the only item which proved problematic  
904 across studies 2–3. This may have been due to the fact that this item displayed a lower  
905 standard deviation (average  $SD = .75$ ) than other teamwork items (average  $SD = 1.00$ ) across  
906 all studies. According to Clark and Watson (1995), items with poor variability are likely to  
907 correlate weakly with other items and perform poorly during structural analysis. A final  
908 limitation of the present research is the fact that the LSSS relies on participants’ perceptions  
909 of whether they developed the eight life skills through their chosen sport. With any self-  
910 report measure there are always concerns with memory recall, social desirability and the  
911 truthfulness of responses (Brenner & DeLamater, 2014). Thus, we would encourage future  
912 studies to gain others’ perspectives on participant’s life skills development (e.g., parents,  
913 coaches, and independent observers) as well as using self-report. Gaining multiple  
914 perspectives - including the participants themselves - will provide more compelling evidence  
915 that participants’ are developing the eight life skills through sport. In addition, future  
916 research could also create knowledge tests or behavioural ratings scales to assess the  
917 development of these life skills (Goudas, 2010).

918           Despite requiring further validity and reliability evidence, the scale developed in the  
919 current series of studies provides a useful measure of life skills development through sport.  
920 In addition to theory testing, future studies could assess whether participants perceive they  
921 learn certain life skills in particular sports. For instance, it could be proposed due to the  
922 nature of sports (e.g., team versus individual) that a rugby player would learn more teamwork  
923 skills than a golfer, whereas a golfer may learn more problem solving and decision making  
924 skills. Such information could help market sports as venues where young people can develop  
925 their life skills and further persuade parents to involve their children in sport. Researchers  
926 could also use the LSSS to examine the efficacy of existing programs designed to teach  
927 young people life skills through sport (e.g., SUPER; Danish, 2002). Given that the SUPER  
928 program's content includes teamwork, goal setting, emotional skills, communication, and  
929 problem solving, the LSSS is an ideal measure to assess this program. For instance,  
930 researchers could use post-test ratings and retrospective pre-test ratings to mitigate against the  
931 'response-shift bias' (Howard, 1982) and accurately assess the effectiveness of this program.  
932 Future studies should also track participants' perceived life skills development to investigate  
933 changes that occur over time, why and how these changes occur, and to assess the long-term  
934 impact of sports participation. Finally, the LSSS could be adapted to assess life skills in other  
935 domains such as physical education and other extracurricular activities. This would enable  
936 researchers to compare and contrast young people's development across the range of  
937 activities they engage in.

938           In conclusion, the studies in this paper provided initial evidence for the validity and  
939 reliability of the LSSS. Using this scale, researchers can thoroughly assess the degree to  
940 which youth sport participants perceive they are developing these eight life skills across  
941 sports, competitive levels, and coaching environments. Researchers can also use the LSSS to  
942 test theories investigating the mechanisms that lead to life skills development and the

943 consequences of life skills development (e.g., transfer of life skills to other settings).  
944 Practitioners could use the scale to examine whether their efforts to develop these life skills  
945 in young people are effective or not. Ultimately, it is hoped that the LSSS proves a useful  
946 tool for researchers and practitioners interested in the promotion of PYD through sport.

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## 968 References

- 969 Akaike, H. (1987). Factor analysis and AIC. *Psychometrika*, *52*, 317–332.  
970 doi: 10.1007/BF02294359
- 971 Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A  
972 review and recommended two-step approach. *Psychological Bulletin*, *103*, 411–423.  
973 doi:10.1037/0033-2909.103.3.411
- 974 Appleton, P. R., Ntoumanis, N., Quested, E., Viladrich, C., & Duda, J. L. (2016). Initial  
975 validation of the coach-created Empowering and Disempowering Motivational  
976 Climate Questionnaire (EDMCQ-C). *Psychology of Sport and Exercise*, *22*, 53–65.  
977 doi:10.1016/j.psychsport.2015.05.008
- 978 Asparouhov, T., & Muthén, B. O. (2009). Exploratory structural equation modeling.  
979 *Structural Equation Modeling*, *16*, 397–438. doi:10.1080/10705510903008204
- 980 Barrett, P. (2007). Structural equation modeling: Adjudging model fit. *Personality and*  
981 *Individual Differences*, *42*, 815–824. doi:10.1016/j.paid.2006.09.018
- 982 Bartlett, M. S. (1937). Properties of sufficiency and statistical tests. *Proceedings of the Royal*  
983 *Society of London, Series A*, *160*(901), 268–282. doi:10.1098/rspa.1937.0109
- 984 Bass, B. M. (1999). Two decades of research and development in transformational  
985 leadership. *European Journal of Work and Organizational Psychology*, *8*(1), 9–32.  
986 doi:10.1080/135943299398410
- 987 Beck, C. T., & Gable, R. K. (2001). Ensuring content validity: An illustration of the process.  
988 *Journal of Nursing Measurement*, *9*, 201–215. PMID:11696942
- 989 Benson, P. L., & Saito, R. N. (2001). The scientific foundations of youth development. In P.  
990 L. Benson & K. J. Pittman (Eds.), *Trends in youth development: Visions, Realities and*  
991 *Challenges* (pp. 135–154). Norwell, MA: Kluwer Academic. doi:10.1007/978-1-  
992 4615-1459-6\_5



- 993 Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*,  
994 103, 411–423. doi:10.1037/0033-2909.107.2.238
- 995 Biddle, S. J., Markland, D., Gilbourne, D., Chatzisarantis, N. L., & Sparkes, A. (2001).  
996 Research methods in sport and exercise psychology: Quantitative and qualitative  
997 issues. *Journal of Sports Sciences*, 19, 777–809. doi:10.1080/026404101317015438
- 998 Brackett, M. A., & Mayer, J. D. (2003). Convergent, discriminant, and incremental validity  
999 of competing measures of emotional intelligence. *Personality and Social Psychology*  
1000 *Bulletin*, 29(9), 1147–1158. doi:1177/0146167203254596
- 1001 Brenner, P. S., & DeLamater, J. D. (2014). Social desirability bias in self-reports of physical  
1002 activity: Is an exercise identity the culprit? *Social Indicators Research*, 117(2), 489–  
1003 504. doi:10.1007/s11205-013-0359-y
- 1004 Britton, B. K., & Tesser, A. (1991). Effects of time-management practices on college grades.  
1005 *Journal of Educational Psychology*, 83(3), 405–410. doi:10.1037/0022-0663.83.3.405
- 1006 Bronfenbrenner, U. (1999). Environments in developmental perspective: Theoretical and  
1007 operational models. In S. L. Friedman & T. D. Wachs (Eds.), *Measuring environment*  
1008 *across the life span: Emerging methods and concepts* (pp. 3–28). Washington DC:  
1009 American Psychological Association. doi:10.1037/10317-001
- 1010 Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York, NY:  
1011 Guilford Press. doi:10.1080/00036810600603377
- 1012 Brunelle, J., Danish, S. J., & Forneris, T. (2007). The impact of a sport-based life skill  
1013 program on adolescent prosocial values. *Applied Developmental Science*, 11(1), 43–  
1014 55. doi:10.1080/10888690709336722
- 1015 Bruner, M. W., Eys, M. A., Wilson, K. S., & Côté, J. (2014). Group cohesion and positive  
1016 youth development in team sport athletes. *Sport, Exercise, and Performance*  
1017 *Psychology*, 3(4), 219–227. doi:10.1037/spy0000017

- 1018 Burton, D., Naylor, S., & Holliday, B. (2001). Goal setting in sport: Investigating the goal  
1019 effectiveness paradox. In R. Singer, H. Hausenblas, & C. Janelle (Eds.), *Handbook of*  
1020 *sport psychology* (2nd ed., pp. 497–528). New York, NY: Wiley.
- 1021 Camiré, M., Trudel, P., & Forneris, T. (2009). High school athletes' perspectives on support,  
1022 communication, negotiation and life skill development. *Qualitative Research in Sport*  
1023 *and Exercise, 1*(1), 72–88. doi: 10.1080/19398440802673275
- 1024 Cashmore, E. (2008). *Sport and exercise psychology: The key concepts* (2nd ed.). London,  
1025 UK: Routledge. PMCID:PMC2442434
- 1026 Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral*  
1027 *Research, 1*, 629–637. doi:10.1207/s15327906mbr0102\_10
- 1028 Chen, F. F. (2007). Sensitivity of goodness of fit indices to lack of measurement invariance.  
1029 *Structural Equation Modeling, 14*, 464–504. doi:10.1080/10705510701301834
- 1030 Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing  
1031 measurement invariance. *Structural Equation Modeling, 9*(2), 233–255.  
1032 doi:10.1207/S15328007SEM0902\_5
- 1033 Claessens, B. J., van Eerde, W., Rutte, C. G., & Roe, R. A. (2007). A review of time  
1034 management literature. *Personnel Review, 36*(2), 255–276.  
1035 doi:10.1108/00483480710726136
- 1036 Clark, L. E., & Watson, D. (1995). Constructing validity: Basic issues in objective scale  
1037 development. *Psychological Assessment, 7*(3), 309–319. doi:10.1037/1040-  
1038 3590.7.3.309
- 1039 Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed.). Hillsdale, NJ:  
1040 Erlbaum. PMID:11639968

- 1041 Conway, J. M., & Huffcutt, A. I. (2003). A review and evaluation of exploratory factor  
1042 analysis practices in organizational research. *Organizational Research Methods*, 6(2),  
1043 147–168. doi:10.1177/1094428103251541
- 1044 Cox, E. P. (1980). The optimal number of response alternatives for a scale: A review. *Journal*  
1045 *of Marketing Research*, 27, 407–422.
- 1046 Cronin, L. D., & Allen, J. (2015). Developmental experiences and well-being in sport: The  
1047 importance of the coaching climate. *The Sport Psychologist*, 29, 62–71.  
1048 doi:10.1123/tsp.2014-0045
- 1049 Danish, S. J. (2002). *SUPER (Sports United to Promote Education and Recreation) program*  
1050 *leader manual and student activity book* (3rd ed.). Richmond, VA: Virginia  
1051 Commonwealth University.
- 1052 Danish, S. J., Forneris, T., Hodge, K., & Heke, I. (2004). Enhancing youth development  
1053 through sport. *World Leisure*, 3, 38–49. doi:10.1080/04419057.2004.9674365
- 1054 Danish, S. J., Forneris, T., & Wallace, I. (2005). Sport-based life skills programming in the  
1055 schools. *Journal of Applied School Psychology*, 21(2), 41–62.  
1056 doi:10.1300/J370v21n02\_04
- 1057 Danish, S. J., Petitpas, A. J., & Hale, B. D. (1992). A developmental-educational intervention  
1058 model of sport psychology. *The Sport Psychologist*, 6, 403–415.  
1059 doi:10.1123/tsp.6.4.403
- 1060 DeVellis, R. F. (2011). *Scale development: Theory and applications* (Vol. 26). London, UK:  
1061 Sage.
- 1062 Dunn, J. G., Bouffard, M., & Rogers, W. T. (1999). Assessing item content-relevance in sport  
1063 psychology scale-construction research: Issues and recommendations. *Measurement*  
1064 *in Physical Education and Exercise Science*, 3(1), 15–36.  
1065 doi:10.1207/s15327841mpee0301\_2

- 1066 Dziuban, C. D., & Shirkey, E. S. (1974). When is a correlation matrix appropriate for factor  
1067 analysis? Some decision rules. *Psychological Bulletin*, *81*, 358–361.  
1068 doi:10.1037/h0036316
- 1069 Eys, M. A., Loughead, T. M., Bray, S. R., & Carron, A. V. (2009). Development of a  
1070 cohesion questionnaire for youth: The youth sport environment questionnaire. *Journal*  
1071 *of Sport & Exercise Psychology*, *31*, 390–408. PMID:19799000
- 1072 Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the  
1073 use of exploratory factor analysis in psychological research. *Psychological Methods*,  
1074 *4*, 272–299. doi:10.1037/1082-989X.4.3.272
- 1075 Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of  
1076 clinical assessment instruments. *Psychological Assessment*, *7*(3), 286–299.  
1077 doi:10.1037/1040-3590.7.3.286
- 1078 Fraser-Thomas, J., & Côté, J. (2009). Understanding adolescents' positive and negative  
1079 developmental experiences in sport. *The Sport Psychologist*, *23*, 3–23.  
1080 doi:10.1123/tsp.23.1.3
- 1081 Fraser-Thomas, J. L., Côté, J., & Deakin, J. (2005). Youth sport programs: An avenue to  
1082 foster positive youth development. *Physical Education and Sport Pedagogy*, *10*(1),  
1083 19–40. doi:10.1080/1740898042000334890
- 1084 García-Bengoechea, E., & Johnson, G. M. (2001). Ecological systems theory and children's  
1085 development in sport: Toward a process-person-context-time research paradigm.  
1086 *Avante*, *7*, 20–31.
- 1087 Gignac, G. E., Palmer, B. R., Manocha, R., & Stough, C. (2005). An examination of the  
1088 factor structure of the Schutte self-report emotional intelligence (SSREI) scale via  
1089 confirmatory factor analysis. *Personality and Individual Differences*, *39*, 1029–1042.  
1090 doi:10.1016/j.paid.2005.03.014

- 1091 Goudas, M. (2010). Prologue: A review of life skills teaching in sport and physical education.  
1092 *Hellenic Journal of Psychology*, 7, 241–258.
- 1093 Gould, D., & Carson, S. (2008). Life skills development through sport: Current status and  
1094 future directions. *Sport & Exercise Psychology Review*, 1, 58–78.  
1095 doi:10.1080/17509840701834573
- 1096 Gould, D., & Carson, S. (2010). The relationship between perceived coaching behaviours and  
1097 developmental benefits of high school sports participation. *Hellenic Journal of*  
1098 *Psychology*, 7, 298–314.
- 1099 Gould, D., Collins, K., Lauer, L., & Chung, Y. (2007). Coaching life skills through football:  
1100 A study of award winning high school coaches. *Journal of Applied Sport Psychology*,  
1101 19(1), 16–37. doi:10.1080/10413200601113786
- 1102 Gould, D., Flett, R., & Lauer, L. (2012). The relationship between psychosocial  
1103 developmental and the sports climate experienced by underserved youth. *Psychology*  
1104 *of Sport and Exercise*, 13(1), 80–87. doi:10.1016/j.psychsport.2011.07.005
- 1105 Gunnell, K. E., Schellenberg, B. J., Wilson, P. M., Crocker, P. R., Mack, D. E., & Zumbo, B.  
1106 D. (2014). A review of validity evidence presented in the Journal of Sport & Exercise  
1107 Psychology (2002–2012): Misconceptions and recommendations for validation  
1108 research. In B. D. Zumbo & E. K. Chan (Eds.), *Validity and validation in social,*  
1109 *behavioral, and health sciences. Social Indicators Research Series 54* (pp. 137–156).  
1110 Switzerland: Springer. doi:10.1007/978-3-319-07794-9\_8
- 1111 Hansen, D. M., & Larson, R. W. (2005). *The Youth Experience Survey 2.0: Instrument*  
1112 *revisions and validity testing*. Unpublished manuscript, University of Illinois at  
1113 Urbana-Champaign, Illinois.
- 1114

- 1115 Hansen, D. M., & Larson, R. W. (2007). Amplifiers of developmental and negative  
1116 experiences in organized activities: Dosage, motivation, lead roles, and adult-youth  
1117 ratios. *Journal of Applied Developmental Psychology*, 28, 360–374.  
1118 doi:10.1016/j.appdev.2007.04.006
- 1119 Haynes, S. N., Richard, D., & Kubany, E. S. (1995). Content validity in psychological  
1120 assessment: A functional approach to concepts and methods. *Psychological*  
1121 *Assessment*, 7(3), 238–247. doi:10.1037/1040-3590.7.3.238
- 1122 Harrison, C. (1980). *Readability in the classroom*. Cambridge, UK: Cambridge University  
1123 Press.
- 1124 Hellison, D., Martinek, T., & Walsh, D. (2008). Sport and responsible leadership among  
1125 youth. In N. L. Holt (Ed.), *Positive youth development through sport* (pp. 49–60).  
1126 New York, NY: Routledge.
- 1127 Henson, R. K., & Roberts, J. K. (2006). Use of exploratory factor analysis in published  
1128 research: Common errors and some comment on improved practice. *Educational and*  
1129 *Psychological Measurement*, 66(3), 393–416. doi:10.1177/0013164405282485
- 1130 Herman, A. and Pfister, H-R. (2013). Simple measures and complex structures: Is it worth  
1131 employing a more complex model of personality in Big Five inventories? *Journal of*  
1132 *Research in Personality*, 47, 599–608. doi: 10.1016/j.jrp.2013.05.004
- 1133 Hinkin, T. R. (1995). A review of scale development practices in the study of organizations.  
1134 *Journal of Management*, 21(5), 967–988. doi:10.1177/014920639502100509
- 1135 Hodge, K., & Danish, S. (1999). Promoting life skills for adolescent males through sport. In  
1136 A. M. Horne & M. S. Kiselica (Eds.), *Handbook of counseling boys and adolescent*  
1137 *males: A practitioner's guide* (pp. 55–71). Thousand Oaks, CA: Sage.  
1138 doi:10.4135/9781452220390.n4

- 1139 Hodge, K., Danish, S., & Martin, J. (2012). Developing a conceptual framework for life skills  
1140 interventions. *The Counseling Psychologist, 41*(8), 1125–1152.  
1141 doi:10.1177/0011000012462073
- 1142 Holt, N. L. (2007). An ethnographic study of positive youth development on a high school  
1143 soccer team. Paper presented at Society for Research in Child Development  
1144 conference, Boston, MA.
- 1145 Holt, N. L. (2008). Introduction: Positive youth development through sport. In N. L. Holt  
1146 (Ed.), *Positive youth development through sport* (pp. 1–5). New York, NY:  
1147 Routledge. PMID:17943489
- 1148 Holt, N. L., Sehn, Z. L., Spence, J. C., Newton, A. S., & Ball, G. D. (2012). Physical  
1149 education and sport programs at an inner city school: Exploring possibilities for  
1150 positive youth development. *Physical Education and Sport Pedagogy, 17*(1), 97–113.  
1151 doi:10.1080/17408989.2010.548062
- 1152 Holt, N. L., Tink, L. N., Mandigo, J. L., & Fox, K. R. (2008). Do youth learn life skills  
1153 through their involvement in high school sport? A case study. *Canadian Journal of*  
1154 *Education, 31*(2), 281–304.
- 1155 Horn, J. (1965). A rationale and test for the number of factors in factor analysis.  
1156 *Psychometrika, 30*(2), 179–185. doi:10.1007/BF02289447
- 1157 Howard, G. S. (1982). Improving methodology via research on research methods. *Journal of*  
1158 *Counseling Psychology, 29*(3), 318–326. doi:10.1037/0022-0167.29.3.318
- 1159 Howard, J. L., Gagné, M., Morin, A. J., & Forest, J. (Accepted 23 March, 2016). Using  
1160 Bifactor Exploratory Structural Equation Modeling to Test for a Continuum Structure  
1161 of Motivation. *Journal of Management*. doi:10.1177/0149206316645653

- 1162 Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure  
1163 analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*,  
1164 6, 1–55. doi:10.1080/10705519909540118
- 1165 Humphrey, N., Kalambouka, A., Wigelsworth, M., Lendrum, A., Deighton, J., & Wolpert, M.  
1166 (2011). Measures of social and emotional skills for children and young people: A  
1167 systematic review. *Educational and Psychological Measurement*, 71(4), 617–637.  
1168 doi:10.1177/0013164410382896
- 1169 Hutcheson, G. D., & Sofroniou, N. (1999). *The multivariate social scientist: Introductory*  
1170 *statistics using generalized linear models*. London, UK: Sage.  
1171 doi:10.4135/9780857028075
- 1172 IBM Corp. (2010). SPSS Statistics for Windows (Version 19.0). Armonk, NY: IBM Corp.
- 1173 Inoue, Y., Wegner, C. E., Jordan, J. S., & Funk, D. C. (2015). Relationships between self-  
1174 determined motivation and developmental outcomes in sport-based positive youth  
1175 development. *Journal of Applied Sport Psychology*, 27, 371–383.  
1176 doi:10.1080/10413200.2015.1010662
- 1177 Jackson, D. L., Gillaspay Jr., J. A., & Purc-Stephenson, R. (2009). Reporting practices in  
1178 confirmatory factor analysis: An overview and some recommendations. *Psychological*  
1179 *Methods*, 14(1), 6–23. doi:10.1037/a0014694
- 1180 John, O. P., & Benet-Martínez, V. (2000). Measurement: Reliability, construct validation,  
1181 and scale construction. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research*  
1182 *methods in social and personality psychology* (pp. 339–369). New York, NY:  
1183 Cambridge University Press.
- 1184 Johnston, J., Harwood, C., & Minniti, A. M. (2013). Positive youth development in  
1185 swimming: Clarification and consensus of key psychosocial assets. *Journal of Applied*  
1186 *Sport Psychology*, 25(4), 392–411. doi:10.1080/10413200.2012.747571



- 1187 Jones, M. L., Dunn, J. G., Holt, N. L., Sullivan, P. J., & Bloom, G. A. (2011). Exploring the  
1188 '5Cs' of positive youth development in sport. *Journal of Sport Behavior*, 34(3), 250–  
1189 267.
- 1190 Jöreskog, K. G., & Sörbom, D. (2003). *LISREL 8.54: Structural equation modeling with the*  
1191 *Simplis command language*. Lincolnwood, IL: Scientific Software International.
- 1192 Judge, T. A., Bono, J. E., Erez, A., & Locke, E. A. (2005). Core self-evaluations and job and  
1193 life satisfaction: The role of self-concordance and goal attainment. *The Journal of*  
1194 *Applied Psychology*, 90(2), 257–268. doi:10.1037/0021-9010.90.2.257
- 1195 Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational*  
1196 *and Psychological Measurement*, 20, 141–151. doi:10.1177/001316446002000116
- 1197 Kelloway, K. E. (1995). Structural equation modeling in perspective. *Journal of*  
1198 *Organizational Behavior*, 16, 215–224. doi:10.1002/job.4030160304
- 1199 King, P. E., Schultz, W., Mueller, R. A., Dowling, E. M., Osborn, P., Dickerson, E., & Lerner,  
1200 R. M. (2005). Positive youth development: Is there a nomological network of  
1201 concepts used in the adolescent development literature? *Applied Developmental*  
1202 *Psychology*, 9(4), 216–228. doi:10.1207/s1532480xads0904\_4
- 1203 Kline, P. (2000). *A psychometrics primer*. London, UK: Free Association Books. doi:  
1204 10.1007/BF02296338
- 1205 Larson, R. W. (2000). Toward a psychology of positive youth development. *American*  
1206 *Psychologist*, 55(1), 170–183. doi:10.1037/0003-066X.55.1.170
- 1207 Locke, E. A., & Latham, G. P. (1984). *Goal setting: A motivational technique that works!*  
1208 Englewood Cliffs, NJ: Prentice Hall. PMCID:PMC1454867
- 1209 Lonsdale, C., Hodge, K., & Rose, E. A. (2008). The Behavioral Regulation in Sport  
1210 Questionnaire (BRSQ): Instrument development and initial validity evidence. *Journal*  
1211 *of Sport & Exercise Psychology*, 30, 323–355. PMID:18648109

- 1212 MacCallum, R. C. (1995). Model specification: Procedures, strategies, and related issues. In  
1213 R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications*  
1214 (pp. 16–36). Thousand Oaks, CA: Sage.
- 1215 MacDonald, D. J., Côté, J., Eys, M., Deakin, J. (2012). Psychometric properties of the youth  
1216 experience survey with young athletes. *Psychology of Sport and Exercise, 13*, 332–  
1217 340. doi:10.1016/j.psychsport.2011.09.001
- 1218 MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and  
1219 validation procedures in MIS and behavioral research: Integrating new and existing  
1220 techniques. *Management Information Systems Quarterly, 35*(2), 293–334.
- 1221 Marsh, H. W. (1992). Extracurricular activities: Beneficial extension of the traditional  
1222 curriculum or subversion of academic goals? *Journal of Educational Psychology,*  
1223 *84*(4), 553–562. doi:10.1037/0022-0663.84.4.553
- 1224 Marsh, H. W., Lüdtke, O., Muthén, B., Asparouhov, T., Morin, A. J., Trautwein, U., &  
1225 Nagengast, B. (2010). A new look at the big five factor structure through exploratory  
1226 structural equation modeling. *Psychological Assessment, 22*(3), 471–491. doi:  
1227 10.1037/a0019227
- 1228 Marsh, H. W., Morin, A. J., Parker, P. D., & Kaur, G. (2014). Exploratory structural equation  
1229 modeling: An integration of the best features of exploratory and confirmatory factor  
1230 analyses. *Annual Review of Clinical Psychology, 10*, 85–110. doi:10.1146/annurev-  
1231 clinpsy-032813-153700
- 1232 Marsh, H. W., Muthén, B., Asparouhov, T., Lüdtke, O., Robitzsch, A., Morin, A. J., &  
1233 Trautwein, U. (2009). Exploratory structural equation modeling, integrating CFA and  
1234 EFA: Application to students' evaluations of university teaching. *Structural Equation*  
1235 *Modeling: A Multidisciplinary Journal, 16*(3), 439–476. doi:  
1236 10.1080/10705510903008220

- 1237 Marsh, H. W., Nagengast, B., & Morin, A. J. (2013). Measurement invariance of big-five  
1238 factors over the life span: ESEM tests of gender, age, plasticity, maturity, and La  
1239 Dolce Vita effects. *Developmental Psychology, 49*, 1194–1218.  
1240 doi:10.1037/a0026913
- 1241 Mitchell, M., & Jolley, J. (2001). *Research design explained* (4th ed.). Belmont, CA:  
1242 Wadsworth-Thomson Learning.
- 1243 Morin, A. J., Arens, A. K., & Marsh, H. W. (2016). A bifactor exploratory structural equation  
1244 modeling framework for the identification of distinct sources of construct-relevant  
1245 psychometric multidimensionality. *Structural Equation Modeling: A Multidisciplinary*  
1246 *Journal, 23*(1), 116–139. doi:10.1080/10705511.2014.961800
- 1247 Morin, A. J., & Mañano, C. (2011). Cross-validation of the short form of the physical self-  
1248 inventory (PSI-S) using exploratory structural equation modeling (ESEM).  
1249 *Psychology of Sport and Exercise, 12*, 540–554.  
1250 doi:10.1016/j.psychsport.2011.04.003
- 1251 Morin, A. J., Marsh, H. W., & Nagengast, B. (2013). Exploratory structural equation  
1252 modeling. In Hancock, G. R. & Mueller, R. O. (Eds.). *Structural equation modeling:*  
1253 *A second course* (2nd ed., pp. 395–436). Charlotte, NC: Information Age Publishing,  
1254 Inc.
- 1255 Muthén, L. K., & Muthén, B. O. (1998 –2015). *Mplus user's guide* (7th ed.). Los Angeles,  
1256 CA: Muthén & Muthén. Retrieved from <http://www.statmodel.com/ugexcerpts.shtml>
- 1257 Myers, N. D. (2013). Coaching competency and (exploratory) structural equation modeling:  
1258 A substantive-methodological synergy. *Psychology of Sport and Exercise, 14*, 709–  
1259 718. doi:10.1016/j.psychsport.2013.04.008
- 1260

- 1261 Myers, N. D., Ahn, S., & Jin, Y. (2011). Sample size and power estimates for a confirmatory  
1262 factor analytic model in exercise and sport: A Monte Carlo approach. *Research*  
1263 *Quarterly for Exercise and Sport*, 82(3), 412–423.  
1264 doi:10.1080/02701367.2011.10599773
- 1265 Myers, N. D., Martin, J. J., Ntoumanis, N., Celimli, S., & Bartholomew, K. J. (2014).  
1266 Exploratory bifactor analysis in sport, exercise, and performance psychology: A  
1267 substantive-methodological synergy. *Sport, Exercise, and Performance Psychology*,  
1268 3, 258–272. doi:10.1037/spy0000015
- 1269 Ntoumanis, N., Mouratidis, T., Ng, J., & Viladrich, C. (2015). Advances in quantitative  
1270 analyses and their implications for sport and exercise psychology research. In S.  
1271 Hanton & S. D. Mellalieu (Eds.), *Contemporary advances in sport psychology: A*  
1272 *review*. (pp. 226–257). London, UK: Routledge.
- 1273 Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory*. New York, NY: McGraw-  
1274 Hill.
- 1275 Park, N. (2004). The role of subjective well-being in positive youth development. *The Annals*  
1276 *of the American Academy of Political and Social Science*, 591(1), 25–39.  
1277 doi:10.1177/0002716203260078
- 1278 Pope, J. P., & Hall, C. R. (2014). Initial development of the Coach Identity Prominence  
1279 Scale: A role identity model perspective. *Journal of Sport & Exercise Psychology*,  
1280 36(3), 244–257. doi: 10.1123/jsep.2013-0039
- 1281 Reise, S. P. (2012). The rediscovery of bifactor measurement models. *Multivariate*  
1282 *Behavioral Research*, 47, 667–696. doi:10.1080/00273171.2012.715555
- 1283 Reise, S. P., Waller, N. G., & Comrey, A. L. (2000). Factor analysis and scale revision.  
1284 *Psychological Assessment*, 12(3), 287–297. doi:10.1037/1040-3590.12.3.287

- 1285 Revelle, W., & Wilt, J. (2013). The general factor of personality: A general critique. *Journal*  
1286 *of Research in Personality*, 47, 493–504. doi: 10.1016/j.jrp.2013.04.012
- 1287 Rubin, R. B., & Morreale, S. P. (1996). Setting expectations for speech communication and  
1288 listening. In E. A. Jones (Ed.), *Preparing competent college graduates: Setting new*  
1289 *and higher expectations for student learning. New directions for higher education*  
1290 (Vol. 96, pp. 19–29). San Francisco, CA: Jossey-Bass. doi:10.1002/he.36919969604
- 1291 Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic  
1292 motivation, social development, and well-being. *American Psychologist*, 55(1), 68–  
1293 78. doi:10.1037/0003-066X.55.1.68
- 1294 Schutz, R. W. (1994). Methodological issues and measurement problems in sport psychology.  
1295 In S. Serpa, J. Alves, & V. Pataco (Eds.), *International perspectives on sport and*  
1296 *exercise psychology* (pp. 35–57). Morgantown, WV: Fitness Information Technology.  
1297 PMID:7734789
- 1298 Schwartz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, 6, 461–  
1299 464. doi:10.1214/aos/1176344136
- 1300 [Schweizer, G., & Furley, P. \(2016\). Reproducible research in sport and exercise psychology:](#)  
1301 [The role of sample sizes. \*Psychology of Sport and Exercise\*, 23, 114–122.](#)  
1302 [doi:10.1016/j.psychsport.2015.11.005](#)
- 1303 Sclove, L. (1987). Application of model-selection criteria to some problems in multivariate  
1304 analysis. *Psychometrika*, 52, 333–343. doi:10.1007/BF02294360
- 1305 Smith, A., Ntoumanis, N., & Duda, J. (2007). Goal striving, goal attainment, and wellbeing:  
1306 Adapting and testing the self-concordance model in sport. *Journal of Sport &*  
1307 *Exercise Psychology*, 29, 763–782. PMID:18089903
- 1308

- 1309 Standage, M., & Gillison, F. (2007). Students' motivational responses toward school physical  
1310 education and their relationship to general self-esteem and health-related quality of  
1311 life. *Psychology of Sport and Exercise*, 8(5), 704–721.  
1312 doi:10.1016/j.psychsport.2006.12.004
- 1313 Stanton, J. M., Sinar, E. F., Balzer, W. K., & Smith, P. C. (2002). Issues and strategies for  
1314 reducing the length of self-report scales. *Personnel Psychology*, 55(1), 167–194.  
1315 doi:10.1111/j.1744-6570.2002.tb00108.x
- 1316 Stieger, J. H., & Lind, J. M. (1980). *Statistically based tests for the number of common*  
1317 *factors*. Paper presented at the annual meeting of the Psychometric Society, Iowa  
1318 City, IA. PMID:7421032
- 1319 Strachan, L., Côté, J., & Deakin, J. (2009). An evaluation of personal and contextual factors  
1320 in competitive youth sport. *Journal of Applied Sport Psychology*, 21(3), 340–355.  
1321 doi:10.1080/10413200903018667
- 1322 Strachan, L., Côté, J., & Deakin, J. (2011). A new view: Exploring positive youth  
1323 development in elite sport contexts. *Qualitative Research in Sport, Exercise and*  
1324 *Health*, 3(1), 9–32. doi:10.1080/19398441.2010.541483
- 1325 Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston,  
1326 MA: Pearson Education Inc. PMID:PMC2724990
- 1327 Theokas, C., Danish, S., Hodge, K., Heke, I., & Forneris, T. (2008). Enhancing life skills  
1328 through sport for children and youth. In N. L. Holt (Ed.), *Positive youth development*  
1329 *through sport* (pp. 71–81). New York, NY: Routledge.
- 1330 Tomás, I., Marsh, H. W., González-Romá, V., Valls, V., & Nagengast, B. (2014). Testing  
1331 measurement invariance across Spanish and English versions of the physical self-  
1332 description questionnaire: An application of exploratory structural equation modeling.  
1333 *Journal of Sport & Exercise Psychology*, 36(2), 179–188. doi:10.1123/jsep.2013-0070

- 1334 Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor  
1335 analyses. *Psychometrika*, 38, 1–10. doi:10.1007/BF02291170
- 1336 Vaughn, B. K., Lee, H. Y., & Kamata, A. (2012). Reliability. In G. Tenenbaum, R. C.  
1337 Eklund, & A. Kamata (Eds.), *Measurement in sport and exercise psychology* (pp. 25–  
1338 32). Champaign, IL: Human Kinetics. PMID:22330864
- 1339 Vella, S. A., Oades, L. G., & Crowe, T. P. (2013). The relationship between coach leadership,  
1340 the coach–athlete relationship, team success, and the positive developmental  
1341 experiences of adolescent soccer players. *Physical Education and Sport Pedagogy*,  
1342 18(5), 549–561. doi:10.1080/17408989.2012.726976
- 1343 Watson, D., & Clark, L. A. (1997). Measurement and mismeasurement of mood: Recurrent  
1344 and emergent issues. *Journal of Personality Assessment*, 68, 267–296.  
1345 doi:10.1207/s15327752jpa6802\_4
- 1346 Weir, J. P. (2005). Quantifying test-retest reliability using the intraclass correlation  
1347 coefficient and the SEM. *The Journal of Strength and Conditioning Research*, 19(1),  
1348 231–240. PMID:15705040
- 1349 Wiersma, L. D. (2001). Conceptualization and development of the sources of enjoyment in  
1350 youth sport questionnaire. *Measurement in Physical Education and Exercise Science*,  
1351 5(3), 153–177. doi:10.1207/S15327841MPEE0503\_3
- 1352 World Health Organization. (1999). *Partners in life skills education: Conclusions for a*  
1353 *United Nations inter-agency meeting*. Retrieved from the World Health Organisation  
1354 website: [http://www.who.int/mental\\_health/media/en/30.pdf](http://www.who.int/mental_health/media/en/30.pdf)
- 1355 Zhu, W. (2012). Measurement practice in sport and exercise psychology: A historical,  
1356 comparative, and psychometric view. In G. Tenenbaum, R. C. Eklund, & A. Kamata  
1357 (Eds.), *Measurement in sport and exercise psychology* (pp. 9–21). Champaign, IL:  
1358 Human Kinetics. PMCID:PMC3746351

Table 1  
*Number of Items, Mean Scores, Standard Deviations and Alpha Coefficients Across the Four Studies*

Life Skill/s	Study 1 (N = 39)		Study 2 (N = 338)				Study 3 (N = 223)				Study 4 (N = 37)						
	Stage 1 <sup>a</sup>	Stage 2 <sup>b</sup>	Items	M	SD	α	Items	M	SD	α	Items	M	SD	α	M	SD	α
Full scale	270	144	47				43				43						
Teamwork	43	23	7	3.98	0.71	.84	7	4.08	0.61	.78	7	3.96	0.73	.85	4.05	0.77	.92
Goal setting	29	14	7	3.81	0.83	.89	7	3.67	0.95	.92	7	3.67	0.98	.93	3.65	1.11	.96
Time mgmt.	26	12	4	3.48	1.03	.89	4	3.41	1.01	.88	4	3.39	0.98	.90	3.34	1.03	.93
Emotional skills	41	26	8	3.63	0.83	.89	4	3.68	0.88	.83	4	3.73	0.72	.70	3.86	0.68	.78
Communication	35	13	4	4.06	0.84	.88	4	4.07	0.76	.83	4	4.14	0.78	.84	4.24	0.66	.85
Social skills	36	18	5	3.98	0.80	.85	5	3.99	0.82	.86	5	3.95	0.74	.83	3.97	0.77	.90
Leadership	31	23	8	3.92	0.78	.92	8	3.97	0.68	.89	8	3.96	0.72	.91	3.87	0.78	.94
Problem solving	29	15	4	3.67	0.92	.88	4	3.61	0.92	.89	4	3.52	0.93	.90	3.48	0.80	.89

*Note.* No means, standard deviations or alpha coefficients are provided in Study 1 as the scale was being developed during this study.

<sup>a</sup>Prior to the expert review process. <sup>b</sup>After the expert review process.

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Table 2  
*Factor Loadings for the Life Skills Scale for Sport Items*

Factors and Items	Study 2 ( <i>N</i> = 338) EFA Factor Loadings <sup>a</sup>	Study 3 ( <i>N</i> = 223) CFA Factor Loadings <sup>a</sup>
<b>Teamwork</b>		
Accept suggestions for improvement from others	.44	.22
Help build team/group spirit	.73	.69
Work well within a team/group	.75	.75
Suggest to team/group members how they can improve their performance	.69	.54
Help another team/group member perform a task	.70	.45
Change the way I perform for the benefit of the team/group	.73	.66
Work with others for the good of the team/group	.74	.71
<b>Goal setting</b>		
Set goals so that I can stay focused on improving	.68	.73
Set challenging goals	.77	.80
Check progress towards my goals	.75	.78
Set short-term goals in order to achieve long-term goals	.77	.83
Remain committed to my goals	.81	.80
Set goals for practice	.82	.81
Set specific goals	.76	.80
<b>Time management</b>		
Manage my time well	.84	.82
Assess how much time I spend on various activities	.82	.83
Control how I use my time	.85	.86
Set goals so that I use my time effectively	.82	.73
<b>Emotional skills</b>		
Know how to deal with my emotions	.67	.71
Understand that I behave differently when emotional	.66	.64
Notice how I feel	.71	.73
Use my emotions to stay focused	.76	.72

Understand other peoples' emotions	.71	.73
Notice how other people feel	.75	.74
Help others use their emotions to stay focused	.81	.72
Help other people control their emotions when something bad happens	.80	.73
Interpersonal communication		
Speak clearly to others	.78	.84
Pay attention to what someone is saying	.80	.72
Pay attention to peoples' body language	.75	.75
Communicate well with others	.80	.67
Social skills		
Interact in various social settings	.77	.73
Maintain close friendships	.72	.70
Start a conversation	.77	.84
Get involved in group activities	.78	.75
Help others without them asking for help	.67	.70
Leadership		
Set high standards for the team/group	.78	.73
Know how to motivate others	.77	.79
Help others solve their performance problems	.77	.72
Be a good role model for others	.76	.72
Organise team/group members to work together	.77	.74
Recognise other peoples' achievements	.73	.59
Know how to positively influence a group of individuals	.81	.73
Consider the individual opinions of each team/group member	.76	.65
Problem solving and decision making		
Think carefully about a problem	.77	.82
Create as many possible solutions to a problem as possible	.81	.89
Compare each possible solution in order to find the best one	.82	.86
Evaluate a solution to a problem	.79	.74

*Note.* All factor loadings are standardized.

<sup>a</sup>Factor loadings for items within their life skill subscale.

Table 3  
*Indices of Model Fit for the Life Skills Scale for Sport*

Model	$\chi^2$	<i>df</i>	$\chi^2 / df$	RMSEA	CFI	TLI	AIC	BIC	ABIC
Teamwork	19.67	14	1.41	.04 (.00, .08) <sup>c</sup>	.98	.98	3843	3915	3848
Goal setting	23.48	14	1.68	.06 (.00, .09)	.99	.99	3888	3960	3893
Time management	3.57	2	1.79	.06 (.00, .16)	1.00	.99	2355	2396	2358
Emotional skills	127.35***	20	6.37	.16 (.13, .18)	.88	.83	4556	4638	4562
My emotions <sup>a</sup>	2.49	2	1.25	.03 (.00, .14)	1.00	1.00	2376	2417	2379
Others' emotions <sup>a</sup>	21.04***	2	10.52	.21 (.13, .29)	.95	.84	2299	2340	2302
Communication	.25	2	.13	.00 (.00, .07)	1.00	1.02	2093	2134	2096
Social skills	4.66	5	.93	.00 (.00, .09)	1.00	1.00	2766	2817	2770
Leadership	44.22**	20	2.21	.07 (.04, .10)	.97	.96	3968	4050	3974
Problem solving	2.21	2	1.11	.02 (.00, .14)	1.00	1.00	2109	2150	2112
CFA – Eight-factor model <sup>b</sup>	1341.12***	832	1.61	.05 (.05, .06)	.91	.90	22523	23057	22560
CFA – Second-order model <sup>b</sup>	1434.83***	852	1.68	.06 (.05, .06)	.90	.89	22576	23043	22609
CFA – First-order model <sup>b</sup>	2916.02***	860	3.39	.10 (.10, .11)	.63	.62	24041	24481	24072
CFA – Bifactor model <sup>b</sup>	1335.84***	817	1.64	.05 (.05, .06)	.91	.90	22547	23133	22588
ESEM <sup>b</sup>	852.22***	587	1.45	.05 (.04, .05)	.95	.93	22524	23893	22619
H-ESEM <sup>b</sup>	853.83***	607	1.41	.04 (.04, .05)	.95	.92	22512	23813	22603
ESEM – Bifactor model <sup>b</sup>	865.41***	552	1.57	.05 (.04, .06)	.93	.89	22513	24002	22617

*Note.*  $N = 223$ . 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.

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

<sup>a</sup>These two aspects of emotional skills were tested after obtaining less than adequate fit indices for the overall emotional skills subscale.

<sup>b</sup>43-item models after the removal of the others' emotions items.

<sup>c</sup>90 percent confidence intervals for RMSEA values.

### Supplementary Materials

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, & Zaccaro, 2001, p. 356)	<ol style="list-style-type: none"> <li>1. Providing suggestions or criticisms</li> <li>2. Accepting suggestions or criticisms</li> <li>3. Cooperation</li> <li>4. Coordination</li> <li>5. Team spirit and morale</li> <li>6. Adaptability</li> </ol> (Morgan, Glickman, Woodward, Blaiwes, & Salas, 1986)
Goal setting	“the process by which people establish desirable objectives for their actions” (Moran, 2004, p. 55)	<ol style="list-style-type: none"> <li>1. Make goals specific and measurable</li> <li>2. Identify time constraints</li> <li>3. Use moderately difficult goals</li> <li>4. Write goals down and monitor progress</li> <li>5. Use a mix of process, performance, and outcome goals</li> <li>6. Use short-range goals to achieve long-range goals</li> <li>7. Set goals for practice and competition</li> <li>8. Make sure goals are internalised by the athlete</li> </ol> (Cox, 2012)
Time management	“behaviours that aim at achieving an effective use of time while performing certain goal-directed activities” (Claessens, van Eerde, Rutte, & Roe, 2007, p. 262)	<ol style="list-style-type: none"> <li>1. Time assessment</li> <li>2. Planning</li> <li>3. Monitoring</li> </ol> (Claessens et al., 2007)
Emotional skills <sup>a</sup>	“the processes involved in the recognition, use, understanding, and management of one’s own and others emotional states” (Salovey, Brackett, & Mayer, 2004, p. i)	<ol style="list-style-type: none"> <li>1. Perception of emotions</li> <li>2. Use of emotions</li> <li>3. Understanding of emotions</li> <li>4. Management of emotions</li> </ol> (Latimer et al., 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"> <li>1. Speaking</li> <li>2. Listening</li> <li>3. Non-verbal communication</li> </ol> (Dunbar, Brooks, & Kubicka-Miller, 2006; Henry, Reed, & McAllister, 1995)
Social skills	“learned behaviours that allow one to interact and function effectively in a variety of social contexts” (Sheridan & Walker, 1999, p. 687)	<ol style="list-style-type: none"> <li>1. Social assertiveness</li> <li>2. Performance in public situations</li> <li>3. Participation in social groups</li> <li>4. Friendship and intimacy</li> <li>5. Giving or receiving help</li> </ol> (Smith & Betz, 2000)
Leadership	“process whereby an individual influences a group of individuals to achieve a common goal” (Northouse, 2010, p. 3)	<ol style="list-style-type: none"> <li>1. Individual consideration</li> <li>2. Inspirational motivation</li> <li>3. Intellectual stimulation</li> <li>4. Fostering acceptance of team goals and promoting teamwork</li> <li>5. High performance expectations</li> <li>6. Appropriate role modeling</li> <li>7. Contingent reward</li> </ol> (Callow, Smith, Hardy, Arthur, & Hardy, 2009)
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 & Nezu, 2010, p. 200)	<ol style="list-style-type: none"> <li>1. Problem definition and formulation</li> <li>2. Generation of alternative solutions</li> <li>3. Decision making</li> <li>4. Solution implementation and verification</li> </ol> (D’Zurilla & Goldfried, 1971)

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<sup>a</sup>As emotional skills involves dealing with one’s own and other’s emotional states, there were eight components of emotional skills which dealt with: perception of my emotions, perception of other’s emotions, use of my emotions, use of other’s emotions, understanding of my emotions, understanding of other’s emotions, management of my emotions, and management of other’s emotions.

## References for Table A

- Callow, N., Smith, M., Hardy, L., Arthur, C. A., & Hardy, J. (2009). Measurement of transformational leadership and its relationship with team cohesion and performance level. *Journal of Applied Sport Psychology, 21*, 395–412.  
doi:10.1080/10413200903204754
- Claessens, B. J., van Eerde, W., Rutte, C. G., & Roe, R. A. (2007). A review of time management literature. *Personnel Review, 36*(2), 255–276.  
doi:10.1108/00483480710726136
- Cox, R. H. (2012). *Sport psychology: Concepts and applications* (7th ed.). New York, NY: McGraw-Hill.
- Dunbar, N. E., Brooks, C. F., & Kubicka-Miller, T. (2006). Oral communication skills in higher education: Using a performance-based evaluation rubric to assess communication skills. *Innovative Higher Education 31*(2) 115–128.  
doi:10.1007/s10755-006-9012-x
- D’Zurilla, T. J., & Goldfried, M. R. (1971). Problem solving and behavior modification. *Journal of Abnormal Psychology, 78*(1), 107–126. doi:10.1037/h0031360
- D’Zurilla, T. J., & Nezu, A. M. (2010). Problem-solving therapy. In K. S. Dobson (Ed.), *Handbook of cognitive-behavioral therapies* (pp. 197–225). New York, NY: Guilford Publications.
- Henry, F. M., Reed, V. A., & McAllister, L. L. (1995). Adolescents’ perceptions of the relative importance of selected communication skills in their positive peer relationships. *Language, Speech, and Hearing Services in Schools, 26*(3), 263–272.  
doi:10.1044/0161-1461.2603.263

Interpersonal Communication Skills. (2011). *Skills you need: Helping you develop life skills*.

Retrieved from the Skills You Need website:

[http://www.skillsyouneed.co.uk/IPS/Interpersonal\\_Communication.html](http://www.skillsyouneed.co.uk/IPS/Interpersonal_Communication.html)

Latimer, A. E., Rench, T. A., & Brackett, M. A. (2007). Emotional intelligence: A framework for examining emotions in sport and exercise groups. In M. R. Beauchamp & M. A. Eys (Eds.), *Group dynamics in exercise and sport psychology: Contemporary themes* (pp. 3–24). Oxon, UK: Routledge.

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*, 26(3), 356–376. doi: 10.2307/259182

Moran, A. P. (2004). *Sport and exercise psychology: A critical introduction*. East Sussex, UK: Routledge. doi:10.4324/9780203380246

Morgan, B. B., Glickman, A. S., Woodward, E. A., Blaiwes, A. S., & Salas, E. (1986). *Measurement of team behaviors in a navy environment* (Technical report, Contract DAH 19-78-C-0001). Retrieved from Online Information for the Defence Community website: <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA185237>

Northouse, P. (2010). *Leadership: Theory and practice*. London, UK: Sage.

Salovey, P., Brackett, M., & Mayer, J. (2004). *Emotional intelligence: Key readings on the Mayer and Salovey model*. New York, NY: National Professional Resources Inc. doi:10.1017/cbo9780511806582.019

Sheridan, S. M., & Walker, D. (1999). Social skills in context: Considerations for assessment, intervention, and generalization. In C. R. Reynolds & T. B. Gutkin (Eds.), *The handbook of school psychology* (3rd ed., pp. 686–708). New York, NY: Wiley and Sons.

Smith, H. M., & Betz, N. E. (2000). Development and validation of a scale of perceived social self-efficacy. *Journal of Career Assessment, 8*(3), 283–301.

doi:10.1177/106907270000800306



Table B  
*EFA Results for Each Subscale of the Life Skills Scale for Sport*

Subscale & Factors	Eigenvalue from real dataset	Percentage of variance explained	Average eigenvalue from parallel analysis	95th percentile eigenvalue from parallel analysis
Teamwork				
1	8.87	38.55	1.51	1.59
2	2.01	8.74	1.42	1.48
3	1.39	6.06	1.35	1.41
4	1.32	5.75	1.30	1.34
Goal Setting				
1	7.60	54.27	1.36	1.44
2	1.14	8.11	1.27	1.33
Time Management				
1	7.05	58.78	1.32	1.40
Emotional Skills				
1	12.47	47.97	1.55	1.62
2	1.50	5.78	1.46	1.52
3	1.07	4.13	1.40	1.45
Communication				
1	7.44	57.20	1.34	1.42
2	1.01	7.74	1.25	1.32
Social Skills				
1	8.95	49.73	1.42	1.50
2	1.33	7.41	1.34	1.40
Leadership				
1	12.75	55.43	1.51	1.59
2	1.02	4.44	1.42	1.48
Problem Solving				
1	9.00	60.00	1.38	1.46
2	1.03	6.83	1.29	1.35

*Note.* During parallel analysis 1,000 random datasets were generated. Only factors with eigenvalues above 1.0 are displayed.

Table C

*Comparison Table for Social Skills Items*

Component	Item #	Item	FL	CL	Mean	SD	Skewness	Kurtosis
FI	1	Make friends	.73	Yes	4.29	0.94	-1.31	1.23
PPS	2	Behave appropriately in social situations	.64	Yes	4.04	0.98	-1.07	1.01
PSG	3	Participate in social groups	.77	No	4.11	1.00	-1.10	0.85
SA	4	Introduce myself to others	.68	Yes	4.09	1.00	-1.06	0.61
H	5	Ask for help when I need it	.68	Yes	3.90	1.01	-0.74	-0.02
<b>PPS</b>	<b>6</b>	<b>Interact in various social settings</b>	<b>.77</b>	<b>No</b>	<b>3.93</b>	<b>0.94</b>	<b>-0.63</b>	<b>0.04</b>
SA	7	Arrange to meet with others	.71	No	3.78	1.15	-0.61	-0.61
PPS	8	Get others to laugh	.69	No	4.14	1.02	-1.09	0.54
SA	9	Join in on a conversation	.77	No	4.21	0.93	-1.13	0.85
<b>FI</b>	<b>10</b>	<b>Maintain close friendships</b>	<b>.72</b>	<b>No</b>	<b>4.10</b>	<b>1.00</b>	<b>-1.13</b>	<b>0.91</b>
H	11	Help others when they need it	.66	No	4.11	0.86	-0.81	0.35
<b>SA</b>	<b>12</b>	<b>Start a conversation</b>	<b>.77</b>	<b>No</b>	<b>3.94</b>	<b>1.10</b>	<b>-0.91</b>	<b>0.09</b>
PPS	13	Conduct myself properly when I am around others	.67	No	3.98	0.99	-0.94	0.64
<b>PSG</b>	<b>14</b>	<b>Get involved in group activities</b>	<b>.78</b>	<b>No</b>	<b>4.11</b>	<b>0.97</b>	<b>-0.98</b>	<b>0.44</b>
FI	15	Talk to friends about personal things	.61	Yes	3.46	1.32	-0.45	-0.86
<b>H</b>	<b>16</b>	<b>Help others without them asking for help</b>	<b>.67</b>	<b>No</b>	<b>3.85</b>	<b>1.05</b>	<b>-0.86</b>	<b>0.33</b>
SA	17	Stand up for myself	.59	No	4.21	0.94	-1.13	0.85
PSG	18	Socialise with others	.76	No	4.24	0.92	-1.22	1.21

*Note.* Items selected are in boldface. FI = Friendship and intimacy; PPS = Performance in public situations; PSG = Participation in social groups; SA = Social assertiveness; H = Helping behavior; FL = Factor Loading; CL = Cross loading.

Table D  
*Pattern Matrix for the Full 47-Item Scale*

Item #	<u>Factor</u>							
	1	2	3	4	5	6	7	8
TW2								<u>.30</u>
TW5			.63					
TW7			.76					
TW8			.70					
TW11			.73					
TW13			.68					
TW18			.69					
GS1		.68						
GS4		.80						
GS6		.62						
GS7		.69						
GS8		.76						
GS9		.75						
GS14		.81						
SS6								-.43
SS10								-.62
SS12								-.75
SS14								-.69
SS16								-.51
TM4								-.79
TM5								-.88
TM7								-.84
TM10								-.73
ES4				.63				
ES6				.62				
ES8				.70				
ES10				.72				
ES16				.52				
ES20				.50				
ES21				.62				
ES26	<u>.33</u>			.45				
LS6	.57							
LS10	.75							
LS11	.73							
LS12	.69							
LS13	.68							
LS15	.72							
LS16	.80							
LS17	.70							

PS1	<u>-.37</u>	-.54
PS2	<u>-.36</u>	-.57
PS3		-.53
PS9		-.40
CS1	-.72	
CS2	-.77	
CS3	-.67	
CS4	-.72	

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*Note.* Exploratory factor analysis was conducted with a oblique (direct oblimin;  $\delta = 0$ ) rotation. Coefficients  $< .30$  were suppressed and all cross loadings are underlined. TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Communication skills; SS = Social skills; LS = Leadership skills; PS = Problem solving & decision making.

Table E

*Standardized Factor Loadings and Uniqueness of Items for all CFA Models*

Item	Eight-Factor Model		Second-Order Model		First-Order Model		Bifactor Model		
	FL	Uniqueness	FL	Uniqueness	FL	Uniqueness	Specific FL	General FL	Uniqueness
TW2	.26***	.93***	.24**	.94***	.28***	.92***	.07	.27***	.92***
TW5	.70***	.51***	.69***	.53***	.44***	.81***	.54***	.42***	.53***
TW7	.73***	.46***	.73***	.47***	.42***	.83***	.63***	.41***	.44***
TW8	.57***	.68***	.57***	.68***	.47***	.78***	.34***	.46***	.68***
TW11	.46***	.79***	.47***	.78***	.34***	.88***	.30***	.34***	.79***
TW13	.64***	.59***	.65***	.58***	.39***	.85***	.54***	.38***	.57***
TW18	.69***	.52***	.70***	.51***	.44***	.81***	.58***	.41***	.49***
GS1	.74***	.46***	.73***	.46***	.56***	.69***	.54***	.50***	.47***
GS4	.80***	.36***	.80***	.36***	.60***	.64***	.59***	.55***	.36***
GS6	.78***	.40***	.78***	.40***	.54***	.71***	.63***	.47***	.38***
GS7	.83***	.32***	.82***	.32***	.59***	.65***	.64***	.52***	.32***
GS8	.79***	.37***	.80***	.37***	.55***	.70***	.64***	.49***	.36***
GS9	.81***	.34***	.81***	.34***	.62***	.62***	.58***	.57***	.34***
GS14	.80***	.36***	.80***	.36***	.65***	.58***	.54***	.60***	.36***
TM4	.81***	.35***	.82***	.33***	.57***	.67***	.62***	.53***	.33***
TM5	.84***	.29***	.84***	.29***	.65***	.58***	.56***	.62***	.30***
TM7	.84***	.29***	.84***	.30***	.57***	.67***	.68***	.53***	.26***
TM10	.76***	.43***	.74***	.45***	.63***	.61***	.46***	.58***	.45***
ES6	.78***	.40***	.77***	.42***	.64***	.59***	.41***	.63***	.44***
ES8	.71***	.49***	.72***	.49***	.55***	.70***	.55***	.54***	.41***
ES10	.76***	.43***	.76***	.42***	.59***	.65***	.52***	.60***	.38***
ES21	.70***	.51***	.71***	.50***	.66***	.57***	.22**	.66***	.52***

CS1	.81***	.34***	.81***	.34***	.66***	.57***	.53***	.66***	.29***
CS2	.70***	.51***	.71***	.50***	.59***	.65***	.41***	.58***	.49***
CS3	.77***	.41***	.77***	.41***	.66***	.57***	.34***	.67***	.43***
CS4	.70***	.52***	.69***	.53***	.61***	.63***	.28***	.61***	.54***
SS6	.75***	.44***	.75***	.44***	.63***	.60***	.38***	.64***	.46***
SS10	.71***	.50***	.70***	.51***	.55***	.70***	.44***	.54***	.51***
SS12	.81***	.34***	.81***	.34***	.60***	.64***	.62***	.58***	.27***
SS14	.74***	.45***	.74***	.46***	.54***	.71***	.54***	.52***	.44***
SS16	.71***	.49***	.72***	.48***	.62***	.61***	.35***	.62***	.49***
LS6	.73***	.47***	.72***	.48***	.66***	.56***	.38***	.63***	.45***
LS10	.77***	.41***	.77***	.41***	.66***	.57***	.51***	.64***	.34***
LS11	.72***	.48***	.73***	.47***	.69***	.52***	.25***	.69***	.46***
LS12	.72***	.48***	.72***	.48***	.64***	.59***	.35***	.63***	.48***
LS13	.73***	.47***	.74***	.46***	.66***	.57***	.38***	.63***	.46***
LS15	.60***	.64***	.60***	.64***	.54***	.71***	.24**	.53***	.66***
LS16	.74***	.45***	.74***	.46***	.68***	.54***	.28***	.67***	.47***
LS17	.67***	.56***	.66***	.56***	.61***	.62***	.22**	.61***	.58***
PS1	.83***	.31***	.83***	.32***	.73***	.46***	.38***	.72***	.34***
PS2	.86***	.26***	.87***	.25***	.72***	.48***	.56***	.71***	.19***
PS3	.85***	.28***	.85***	.28***	.72***	.48***	.47***	.71***	.27***
PS9	.77***	.41***	.77***	.41***	.73***	.47***	.23***	.73***	.41***

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

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

Table F

*Standardized Factor Loadings and Uniqueness of Items for the ESEM Model*

Item	TW	GS	TM	ES	CS	SS	LS	PS	Uniqueness
TW2	<b>.10</b>	.27**	-.05	-.01	.03	.14	.13	-.17	.85***
TW5	<b>.50***</b>	-.09	.04	.000	-.11	.15*	.23**	-.04	.54***
TW7	<b>.81***</b>	.08	-.08	-.13*	.12*	.12*	-.15*	.07	.30***
TW8	<b>.48***</b>	.07	.07	.13	-.25***	-.04	.20**	.03	.57***
TW11	<b>.43***</b>	-.004	-.04	.06	.23**	-.004	-.07	.06	.71***
TW13	<b>.59***</b>	-.05	.04	.10	-.14*	-.03	.20**	-.07	.56***
TW18	<b>.55***</b>	.07	-.03	-.01	-.05	.19*	-.05	.06	.56***
GS1	.004	<b>.64***</b>	.23***	.02	-.03	.004	.01	-.08	.43***
GS4	.15**	<b>.73***</b>	.11*	-.001	.06	-.16**	.09	-.07	.33***
GS6	.14**	<b>.79***</b>	.04	-.03	.02	-.10	-.10	.07	.36***
GS7	-.001	<b>.76***</b>	.07	.10	-.08	-.02	.01	-.01	.31***
GS8	-.05	<b>.85***</b>	-.12*	-.04	.03	.03	.003	.08	.33***
GS9	-.06	<b>.77***</b>	-.05	.04	-.06	.07	.04	.09	.32***
GS14	-.07	<b>.71***</b>	-.02	.05	.02	.07	.11	.04	.35***
TM4	.10*	-.06	<b>.87***</b>	-.13**	.11*	-.04	-.01	.07	.26***
TM5	.06	.06	<b>.74***</b>	.06	.05	.02	-.03	.03	.29***
TM7	-.11*	.02	<b>.82***</b>	.09	-.06	.04	.08	-.05	.27***
TM10	-.14*	.25***	<b>.50***</b>	-.01	-.07	.17**	.04	.12	.40***
ES6	.04	.14**	.10	<b>.66***</b>	-.06	.09	-.08	.03	.36***
ES8	-.02	-.01	-.07	<b>.75***</b>	.13*	-.03	.07	-.02	.41***
ES10	.04	-.02	.04	<b>.71***</b>	.09	.07	-.08	.04	.39***
ES21	-.01	.07	-.04	<b>.39***</b>	-.10	.09	.26***	.21**	.47***

CS1	-.02	-.05	.13*	.10	<b>.55***</b>	.04	.26***	.09	.34***
CS2	-.13*	.13*	.03	.12	<b>.48***</b>	.25***	.01	.08	.46***
CS3	.08	-.01	.03	.18**	<b>.44***</b>	-.02	.13*	.23***	.41***
CS4	.07	-.001	.03	-.08	<b>.41***</b>	.21**	.28***	.08	.46***
SS6	.04	-.06	-.004	.18**	.15*	<b>.49***</b>	.12	.04	.44***
SS10	.19**	-.07	.18**	.10	.17**	<b>.51***</b>	-.19**	.03	.45***
SS12	.15**	.02	.07	.08	.03	<b>.69***</b>	-.07	-.02	.34***
SS14	.08	-.02	-.01	-.13*	-.02	<b>.75***</b>	.19**	-.02	.31***
SS16	.05	.03	.04	.11	.01	<b>.53***</b>	.05	.09	.48***
LS6	.14*	.06	.08	.04	.04	.02	<b>.52***</b>	.05	.47***
LS10	.06	-.05	.02	.04	-.07	.15*	<b>.70***</b>	.03	.34***
LS11	.05	.02	.07	.04	-.07	.04	<b>.47***</b>	.29***	.43***
LS12	.06	.04	-.02	.04	-.01	.002	<b>.55***</b>	.19**	.47***
LS13	.01	.02	.16**	.04	.02	-.01	<b>.59***</b>	.05	.45***
LS15	.07	.12	.01	.09	.31***	-.04	<b>.45***</b>	-.17*	.56***
LS16	-.01	.14*	.003	-.06	.22***	.20**	<b>.56***</b>	-.04	.38***
LS17	.22***	.10	-.003	.07	.28***	-.12	<b>.41***</b>	.004	.50***
PS1	.07	.14**	.003	.21***	.01	.06	-.02	<b>.56***</b>	.32***
PS2	.05	.01	.03	-.02	.06	-.01	.03	<b>.86***</b>	.16***
PS3	.04	.03	.08	.05	.07	-.02	.10	<b>.68***</b>	.29***
PS9	-.06	.10	.17**	.05	.16**	.09	.10	<b>.44***</b>	.40***

*Note.* TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Communication skills; SS = Social skills; LS = Leadership skills; 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*

Item	TW	GS	TM	ES	CS	SS	LS	PS	General Factor	Uniqueness
TW2	<b>.09</b>	.21*	-.03	-.004	.06	.17	.17	-.09	.23*	.83***
TW5	<b>.44**</b>	-.13	-.01	-.05	-.11	.13	.17	-.07	.44***	.53***
TW7	<b>.69***</b>	-.04	-.09	-.10	.13	.17	-.09	.01	.41**	.28
TW8	<b>.39***</b>	.09	.05	.10	-.18	.07	.26	.07	.42***	.55***
TW11	<b>.35***</b>	-.05	-.06	.05	.22	.06	-.03	.03	.33**	.71***
TW13	<b>.51**</b>	-.08	-.02	.02	-.14	-.04	.07	-.11	.42***	.53***
TW18	<b>.48*</b>	-.05	-.06	-.06	-.07	.09	-.11	-.04	.46**	.52
GS1	-.03	<b>.52***</b>	.21**	.01	-.05	-.05	-.05	-.07	.50***	.42***
GS4	.08	<b>.60***</b>	.12	.02	.06	-.10	.09	-.03	.52***	.33***
GS6	.08	<b>.69***</b>	.11*	.05	.06	.01	.07	.13	.42***	.30***
GS7	-.04	<b>.62***</b>	.10	.09	-.09	-.05	.01	.003	.52***	.31***
GS8	-.09	<b>.63***</b>	-.05	-.04	-.02	-.07	-.06	.01	.51***	.33***
GS9	-.09	<b>.58***</b>	-.01	.02	-.10	-.03	-.03	.03	.57***	.32***
GS14	-.10	<b>.52***</b>	.000	.001	-.04	-.06	-.03	-.03	.61***	.34***
TM4	.04	.04	<b>.66***</b>	-.10	.07	-.03	-.05	.04	.54***	.26***
TM5	.01	.17**	<b>.60***</b>	.08	.07	.09	.07	.08	.56***	.26***
TM7	-.13*	.11*	<b>.63***</b>	.03	-.10	-.03	-.03	-.05	.55***	.25***
TM10	-.15*	.22**	<b>.38***</b>	-.05	-.13	.03	-.09	.04	.61***	.39***
ES6	-.01	.17**	.09	<b>.49***</b>	-.04	.08	-.04	.09	.59***	.35***
ES8	-.06	.01	-.08	<b>.52***</b>	.11	-.06	-.004	.02	.54***	.41***
ES10	-.02	.002	.01	<b>.50***</b>	.06	.01	-.12	.05	.59***	.39***
ES21	-.04	-.003	-.09	<b>.21*</b>	-.18	-.10	-.02	.07	.69***	.42***

CS1	-.05	-.09	.03	.04	<b>.44***</b>	.02	.11	.01	.66***	.34***
CS2	-.13	.02	-.02	.04	<b>.37*</b>	.10	-.11	-.02	.60***	.46**
CS3	.02	-.05	-.03	.12	<b>.37**</b>	-.01	.04	.14	.64***	.42***
CS4	.05	-.12	-.06	-.14	<b>.29</b>	.08	.03	-.07	.65***	.45***
SS6	.05	-.12	-.05	.08	.09	<b>.34</b>	.04	-.01	.64***	.44***
SS10	.17	-.08	.13	.07	.17	<b>.45***</b>	-.07	.04	.52***	.44***
SS12	.16	-.04	.04	.04	.02	<b>.62**</b>	.03	-.01	.57***	.26
SS14	.12	-.17	-.07	-.20	-.10	<b>.45</b>	.01	-.14	.60***	.32**
SS16	.05	-.06	-.01	.01	-.05	<b>.33**</b>	-.06	.000	.64***	.48***
LS6	.10	.02	.001	-.03	.000	-.01	<b>.32*</b>	-.01	.64***	.47***
LS10	.05	-.12*	-.08	-.10	-.15	-.01	<b>.33</b>	-.09	.70***	.34***
LS11	.01	-.02	.002	-.03	-.13	-.04	<b>.24</b>	.15	.69***	.43***
LS12	.04	.01	-.06	-.01	-.04	-.02	<b>.38***</b>	.11	.62***	.45***
LS13	-.01	.05	.10	.01	.02	.05	<b>.53</b>	.06	.60***	.34
LS15	.04	.02	-.07	-.02	.22	-.10	<b>.15</b>	-.22	.57**	.55**
LS16	-.01	.001	-.08	-.15	.11	.05	<b>.24</b>	-.14	.71***	.38***
LS17	.16*	.04	-.06	.01	.23	-.07	<b>.25</b>	-.03	.59***	.50***
PS1	-.01	.10	.004	.17	-.01	.01	-.01	<b>.41***</b>	.69***	.32***
PS2	-.03	-.02	.01	.01	.01	-.05	.001	<b>.59***</b>	.70***	.16*
PS3	-.04	-.01	.04	.03	.002	-.10	-.02	<b>.44***</b>	.71***	.29***
PS9	-.10	.07	.11	.03	.10	.04	.04	<b>.30*</b>	.69***	.40***

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

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

Table H

*Standardized Factor Correlations for the CFA and ESEM Models*

	TW	GS	TM	ES	CS	SS	LS	PS
CFA Model								
TW	–							
GS	.33***	–						
TM	.34***	.63***	–					
ES	.45***	.61***	.57***	–				
CS	.51***	.48***	.55***	.70***	–			
SS	.71***	.38***	.53***	.62***	.72***	–		
LS	.65***	.58***	.58***	.66***	.78***	.71***	–	
PS	.47***	.59***	.63***	.77***	.74***	.61***	.74***	–
ESEM Model								
TW	–							
GS	.22**	–						
TM	.24***	.53***	–					
ES	.29***	.48***	.42***	–				
CS	.26***	.20**	.22**	.32***	–			
SS	.49***	.28***	.38***	.38***	.33***	–		
LS	.43***	.42***	.39***	.42***	.28***	.49***	–	
PS	.28***	.41***	.44***	.56***	.27***	.39***	.49***	–

*Note.* TW = Teamwork; GS = Goal setting; TM = Time management; ES = emotional Skills; CS = Communication skills; SS = Social skills; LS = Leadership skills; PS = Problem solving & decision making.

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