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

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

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

Introduction

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

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

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

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

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

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

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

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

Study 1

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

Method and materials

Participants

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

Life Skills Ability Scale (LSAS)

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

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

Procedures

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

Data analyses

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

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

Results

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

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

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

Study 2

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

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

Method and materials

Participants

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

Life skills ability

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

Psychological well-being

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

Academic self-efficacy and performance

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

Health-related quality of life

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

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

Procedures

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

Data analyses

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

Results

Factorial validity and reliability analyses

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

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

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

Correlations

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

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

Study 3 – Test-retest reliability

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

Method

Participants

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

Measures and procedures

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

Data analysis

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

Results

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

Overall discussion

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

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

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

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

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

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

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

Limitations and future directions

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

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

Conclusion

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

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

Disclosure statement

No potential conflict of interest was reported by the authors

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Table 1. Model fit and information criteria for the Life Skills Ability Scale in studies 1 and 2.

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

Note: N = 445 in Study 1. N = 423 in Study 2. RMSEA = Root mean square error of approximation; CFI = Comparative fit index; TLI = Tucker Lewis index; AIC = Akaike information criterion; BIC = Bayesian information criterion; ABIC = Sample size adjusted BIC.
***p < .001

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

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

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

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

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

Note: $N = 423$. Problem solving = Problem solving & decision making.
*$p < .05$, **$p < .01$, ***$p < .001$

Supplementary Materials

Appendix A

Life Skills Questions

Directions:

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

Teamwork

I am able to…	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Work well within a team/ group.	1	2	3	4	5
Help another team/ group member perform a task.	1	2	3	4	5
Accept suggestions for improvement from others.	1	2	3	4	5
Work with others for the good of the team/ group.	1	2	3	4	5
Help build team/ group spirit.	1	2	3	4	5
Suggest to team/ group members how they can improve their performance.	1	2	3	4	5
Change the way I perform for the benefit of the team/ group.	1	2	3	4	5

Goal Setting

I am able to…	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Set goals so that I can stay focused on improving.	1	2	3	4	5
Set challenging goals.	1	2	3	4	5
Check progress towards my goals.	1	2	3	4	5
Set short-term goals in order to achieve long-term goals.	1	2	3	4	5
Remain committed to my goals.	1	2	3	4	5
Set goals for my activities (e.g., practice, studies).	1	2	3	4	5
Set specific goals.	1	2	3	4	5

Time Management

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

Emotional Skills

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

Communication

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

Social Skills

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

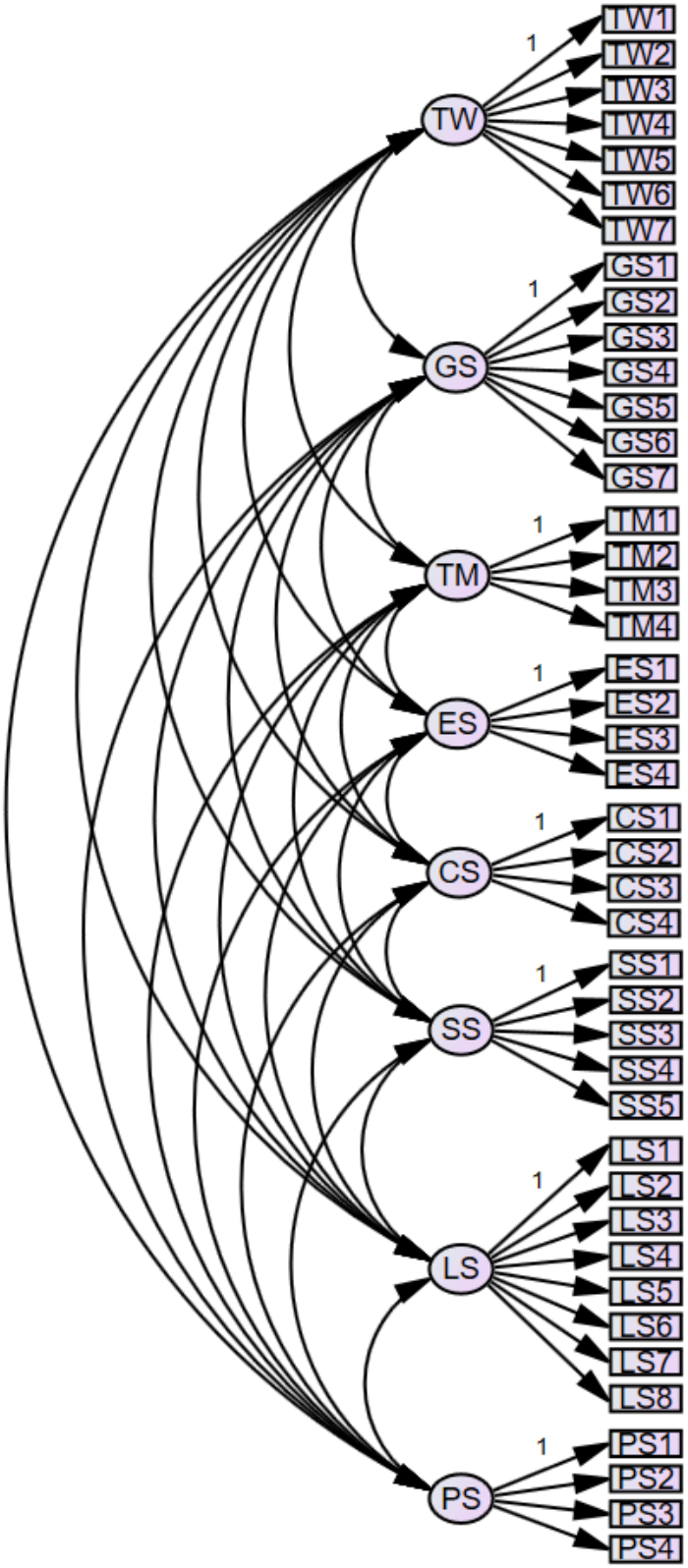
Leadership

I am able to…	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Positively influence a group of individuals.	1	2	3	4	5
Organise team/ group members to work together.	1	2	3	4	5
Motivate others.	1	2	3	4	5
Help others solve their performance problems.	1	2	3	4	5
Consider the individual opinions of each team/ group member.	1	2	3	4	5
Be a good role model for others.	1	2	3	4	5
Set high standards for the team/ group.	1	2	3	4	5
Recognise other peoples' achievements.	1	2	3	4	5

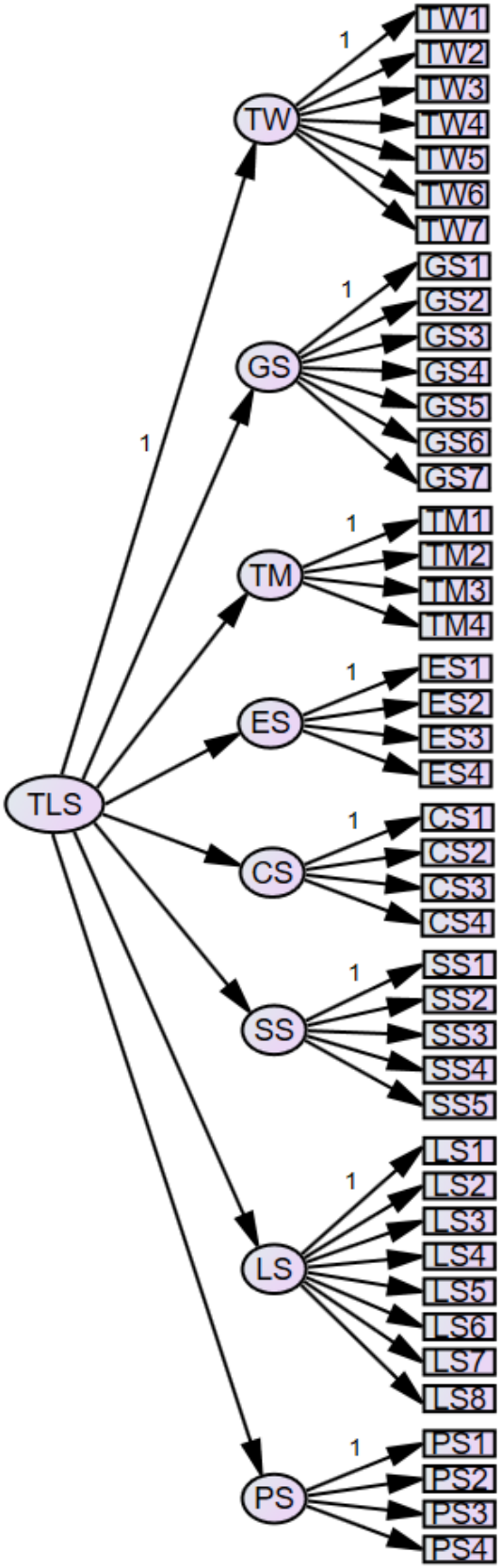
Problem Solving

I am able to…	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Think carefully about a problem.	1	2	3	4	5
Compare each possible solution in order to find the best one.	1	2	3	4	5
Create as many possible solutions to a problem as possible.	1	2	3	4	5
Evaluate a solution to a problem.	1	2	3	4	5

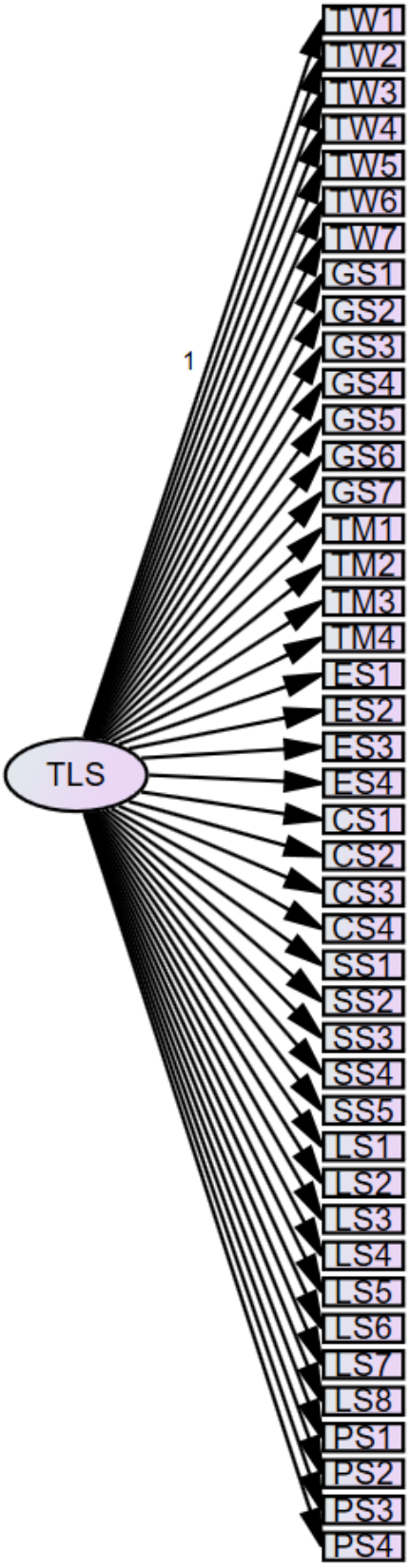
Appendix B



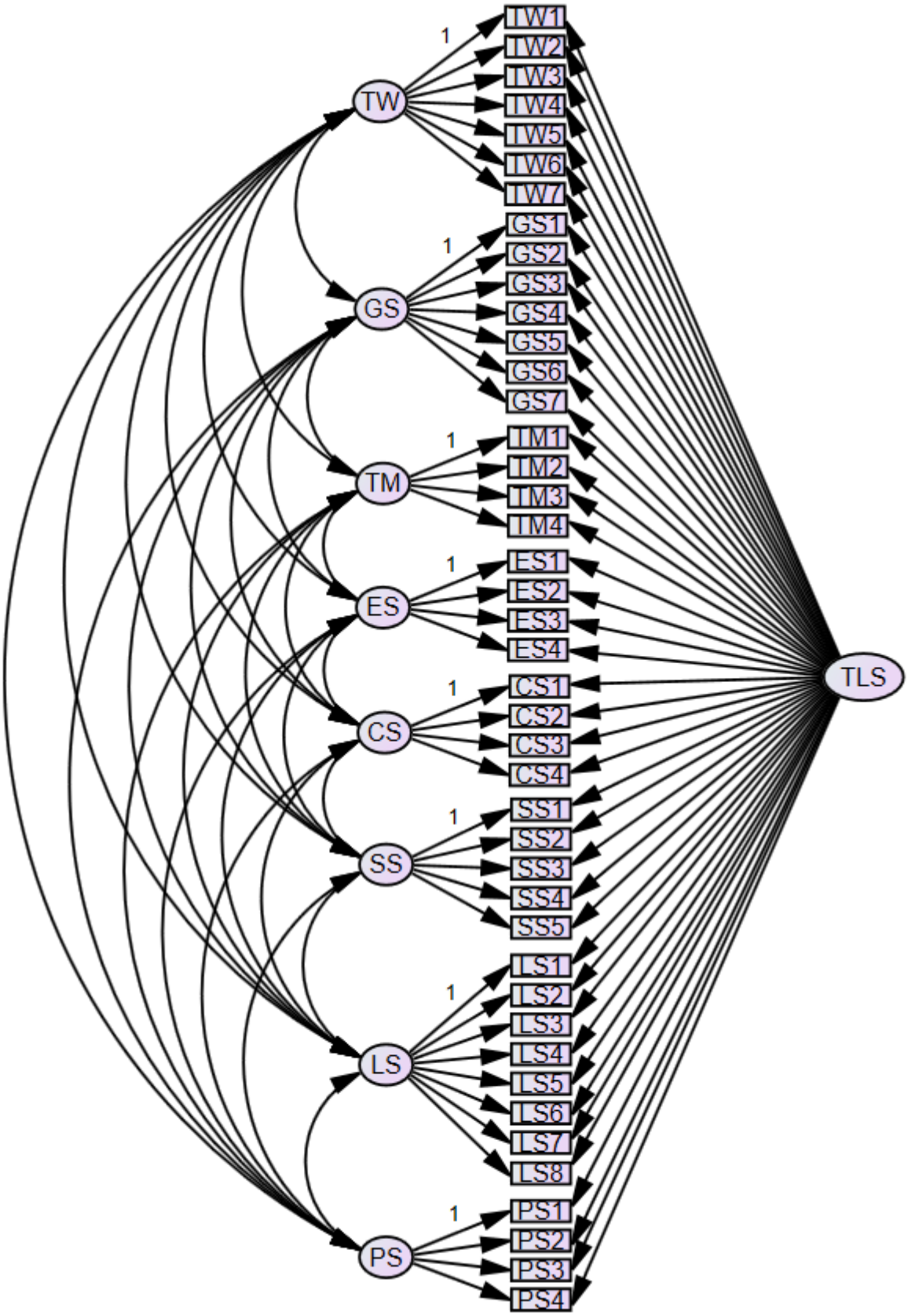
CFA – Eight-factor model: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.



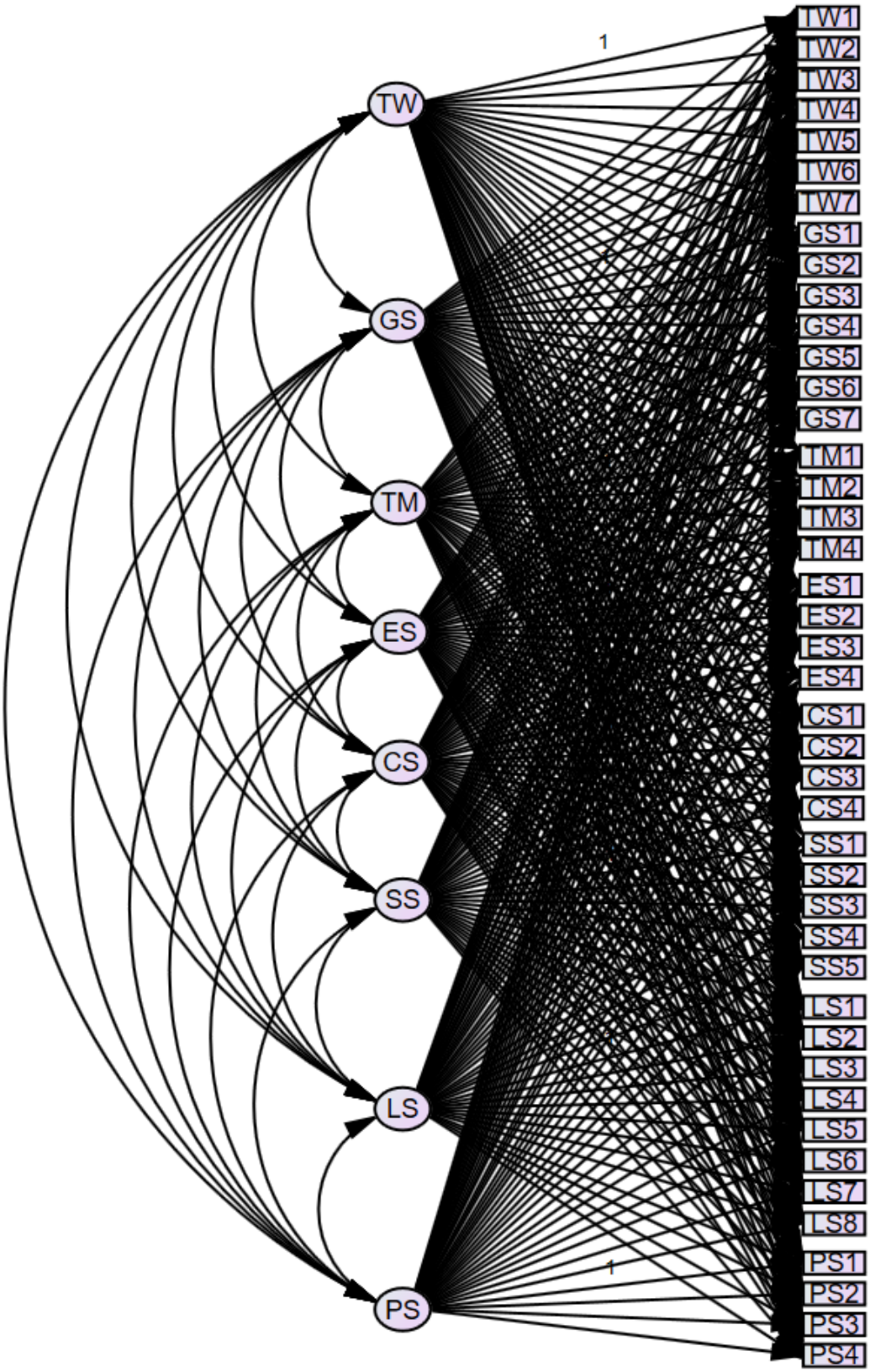
CFA – Second-order model: TLS = Total life skills; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.



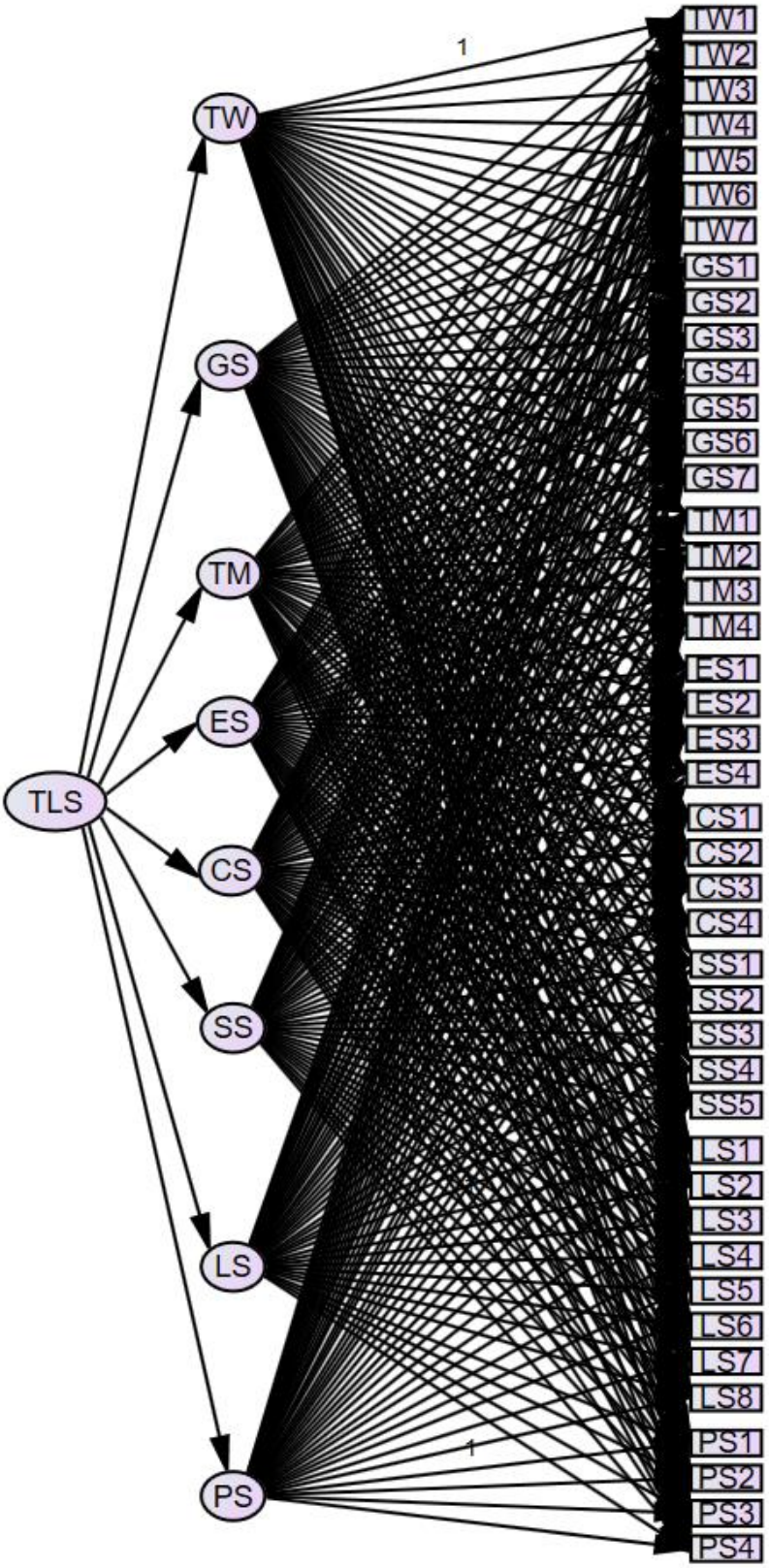
CFA – First-order model: TLS = Total life skills; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.



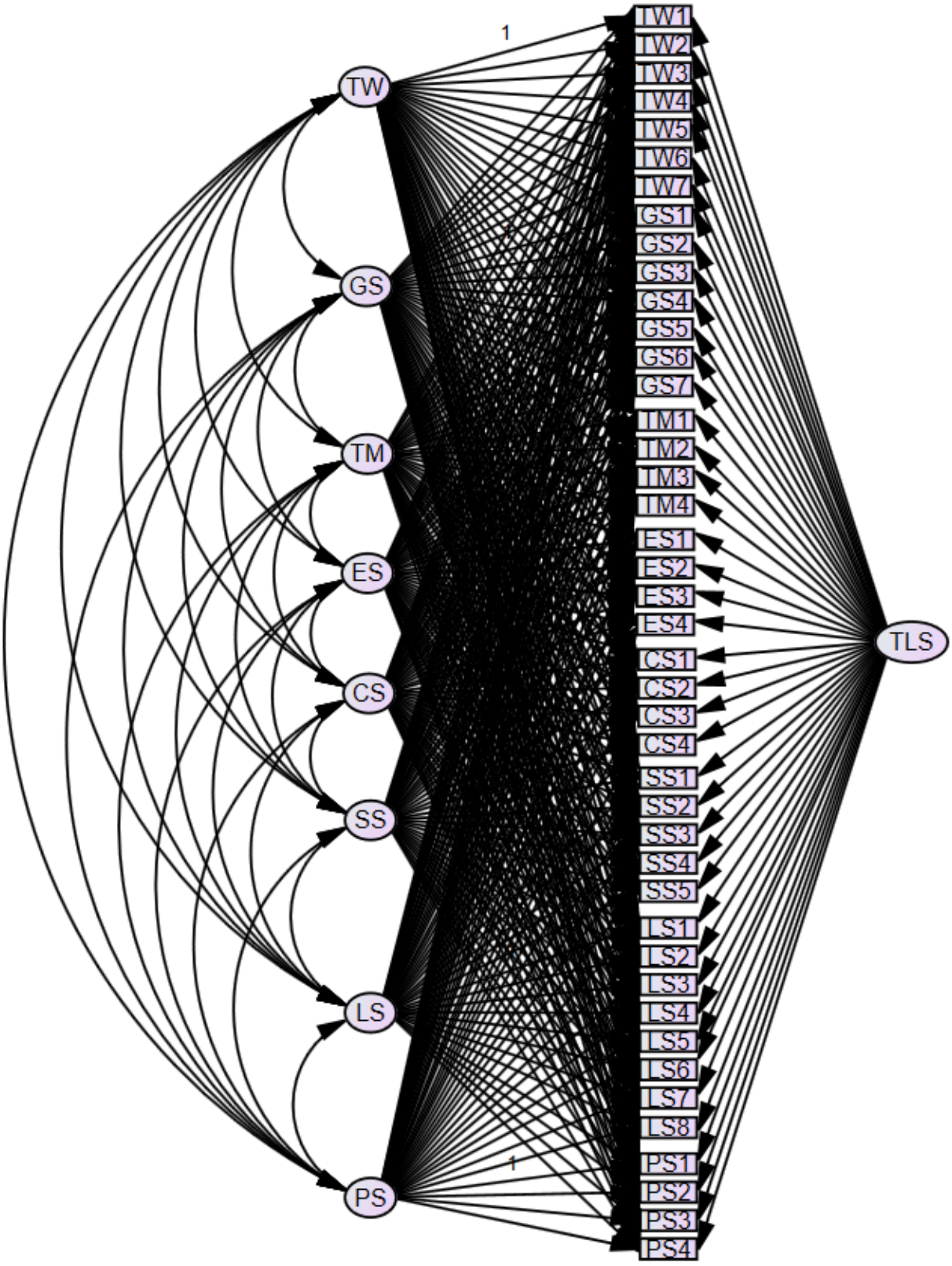
CFA – Bifactor model: TLS = Total life skills; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication skills; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.



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



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



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

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

Life Skill	Definition	Components
Teamwork	"people working together to achieve something beyond the capabilities of individuals working alone" (Marks, Mathieu, and Zaccaro 2001, 356)	1. Providing suggestions or criticisms 2. Accepting suggestions or criticisms 3. Cooperation 4. Coordination 5. Team spirit and morale 6. Adaptability (Morgan et al. 1986)
Goal setting	"the process by which people establish desirable objectives for their actions" (Moran 2004, 55)	1. Make goals specific and measurable 2. Identify time constraints 3. Use moderately difficult goals 4. Write goals down and monitor progress 5. Use a mix of process, performance, and outcome goals 6. Use short-range goals to achieve long-range goals 7. Set goals for practice and competition 8. Make sure goals are internalised by the athlete (Cox 2012)
Time management	"behaviours that aim at achieving an effective use of time while performing certain goal-directed activities" (Claessens et al. 2007, 262)	1. Time assessment 2. Planning 3. Monitoring (Claessens et al. 2007)
Emotional skills	"the processes involved in the recognition, use, understanding, and management of one's own and others emotional states" (Salovey, Brackett, and Mayer 2004, i)	1. Perception of emotions 2. Use of emotions 3. Understanding of emotions 4. Management of emotions (Latimer, Rench, and Brackett 2007)

Interpersonal communication	"the process by which people exchange information, feelings, and meaning through verbal and non-verbal messages: it is face-to-face communication" (Interpersonal Communication Skills 2011)	1. Speaking 2. Listening 3. Non-verbal communication (Dunbar, Brooks, and Kubicka-Miller 2006; Henry, Reed, and McAllister 1995)
Social skills	"learned behaviours that allow one to interact and function effectively in a variety of social contexts" (Sheridan and Walker 1999, 687)	1. Social assertiveness 2. Performance in public situations 3. Participation in social groups 4. Friendship and intimacy 5. Giving or receiving help (Smith and Betz 2000)
Leadership	"process whereby an individual influences a group of individuals to achieve a common goal" (Northouse 2010, 3)	1. Individual consideration 2. Inspirational motivation 3. Intellectual stimulation 4. Fostering acceptance of team goals and promoting teamwork 5. High performance expectations 6. Appropriate role modeling 7. Contingent reward (Callow et al. 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 and Nezu 2010, 200)	1. Problem definition and formulation 2. Generation of alternative solutions 3. Decision making 4. Solution implementation and verification (D'Zurilla and Goldfried 1971)

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

References for Table A

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

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

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

Note: FL = Factor Loading; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.
*$p < .05$. **$p < .01$. ***$p < .001$.

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

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

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

Note: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.
*$p < .05$. **$p < .01$. ***$p < .001$.

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

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

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

Note: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.
*$p < .05$. **$p < .01$. ***$p < .001$.

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

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

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

Note: FL = Factor Loading; TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.
*$p < .05$. **$p < .01$. ***$p < .001$.

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

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

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

Note: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.
*$p < .05$. **$p < .01$. ***$p < .001$.

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

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

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

Note: TW = Teamwork; GS = Goal setting; TM = Time management; ES = Emotional skills; CS = Interpersonal communication; SS = Social skills; LS = Leadership; PS = Problem solving & decision making.
*$p < .05$. **$p < .01$. ***$p < .001$.