Accepted refereed manuscript of:

Cronin LD & Allen J (2017) Development and initial validation of the Life Skills Scale for Sport, *Psychology of Sport and Exercise*, 28, pp. 105-119.

doi:10.1016/j.psychsport.2016.11.001

Development and Initial Validation of the Life Skills Scale for Sport

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Abstract

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

Method: Four studies were conducted to develop the Life Skills Scale for Sport (LSSS). Study 1 developed items for the scale and included 39 reviewers' assessment of content validity. Study 2 included 338 youth sport participants and used exploratory factor analysis (EFA) and descriptive statistics to reduce the number of items in the scale and explore the factor structure of each subscale and the whole scale. Study 3 included 223 youth sport participants and assessed the factor structure and reliability of the scale using confirmatory factor analysis (CFA), exploratory structural equation modeling (ESEM) and bifactor modeling. Study 4 investigated the test-retest reliability of the scale over a two-week period with 37 youth sport participants.

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

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

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

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

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

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

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

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

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

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

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

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

Study 1 – Initial Development of the Scale

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

Method and Results

Selecting Definitions and Components

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

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

Developing Items

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

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

Providing Content Validity Evidence

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

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

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

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

improving") and led to the inclusion of one additional item. Finally, as readability is an important consideration when conducting research with younger participants, all 144 items were assessed for readability using the Flesch-Kincaid readability assessment (Harrison, 1980). Results showed that these items required a grade 4.9 reading level, which means that the average 10–11 year old would be able to read the items.

After selecting items to include within the scale, three elements of the scale had to be decided upon: (1) the directions given to respondents, (2) the item stem, and (3) the response format. The present authors - with the help of five doctoral students - decided on these three elements of the scale. The directions to be given to respondents were: "Young people have all kinds of experiences and can learn a lot from playing sport. These questions ask about the skills you may have learned through playing your chosen sport. Please answer the questions by circling the number to the right of each question. There are no right or wrong answers, so please answer as honestly as possible. Please rate how much your sport has taught you to perform the skills listed below." The item stem decided upon was: "This sport has taught me to…" After reviewing some of the methodological literature on response scales (e.g., Hinkin, 1995), we decided on the following response scale: not at all (1), a little (2), some (3), a lot (4), and very much (5). A five-point response scale was chosen as it offered enough choice without overwhelming respondents with too many response options – an important consideration given the age range of participants (11–21 years). In his review of response scales, Cox (1980) suggested that five response options is adequate for most measures. Other measures within youth sport have also used this 1 (not at all) to 5 (very much) response format (e.g., the Sources of Enjoyment in Youth Sport Questionnaire; Wiersma, 2001).

Discussion

The purpose of Study 1 was to develop a scale which adequately assessed the life skills participants' perceived they developed within youth sport. Informed by the

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

Study 2 – Scale Refinement and EFA

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

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

Method

Participants

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

Measures

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

Procedures

Following approval from the university's ethics committee, participants were recruited by contacting physical education teachers from local schools. Initial contact was made via email, telephone, or face-to-face meetings and permission to survey the school was granted. Prior to completing the scale, informed consent was obtained from either the youth sport participant or the participant's parent or guardian if under 16 years. Participants 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 would be confidential. The scale took approximately 20–25 minutes to complete.

Data Analyses

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

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

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

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

Results

Preliminary Analyses

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

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

EFA Results

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

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

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

Item Selection Results

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

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

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

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

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

Discussion

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

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

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

Study 3 – CFA, ESEM & Bifactor Analysis

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

Method

Participants

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

Measures and Procedures

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

Data Analyses

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

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

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

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

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

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

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

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

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

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

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

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

Results

Preliminary Analysis

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

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

Subscale Results

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

Model Testing Results

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

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

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

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

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

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

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

Discussion

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

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

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

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

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

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

Study 4 – Test-Retest Reliability

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

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

Method

Participants

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

Measures and Procedures

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

Data Analysis

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

Results

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

Discussion

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

Overall Discussion

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

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

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

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

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

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

Limitations and Future Directions

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

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

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

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

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

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

	Study 1 (*N* = 39)		Study 2 (*N* = 338)				Study 3 (*N* = 223)				Study 4 (*N* = 37)						
	Stage 1[a]	Stage 2[b]									Time 1				Time 2		
Life Skill/s	Items	Items	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.
[a]Prior to the expert review process. [b]After the expert review process.

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

Factors and Items	Study 2 (*N* = 338) EFA Factor Loadings[a]	Study 3 (*N* = 223) CFA Factor Loadings[a]
Teamwork		
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
Goal setting		
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
Time management		
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
Emotional skills		
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.
[a]Factor loadings for items within their life skill subscale.

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

Model	χ^2	*df*	χ^2 / *df*	RMSEA	CFI	TLI	AIC	BIC	ABIC
Teamwork	19.67	14	1.41	.04 (.00, .08)[c]	.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[a]	2.49	2	1.25	.03 (.00, .14)	1.00	1.00	2376	2417	2379
Others' emotions[a]	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[b]	1341.12***	832	1.61	.05 (.05, .06)	.91	.90	22523	23057	22560
CFA – Second-order model[b]	1434.83***	852	1.68	.06 (.05, .06)	.90	.89	22576	23043	22609
CFA – First-order model[b]	2916.02***	860	3.39	.10 (.10, .11)	.63	.62	24041	24481	24072
CFA – Bifactor model[b]	1335.84***	817	1.64	.05 (.05, .06)	.91	.90	22547	23133	22588
ESEM[b]	852.22***	587	1.45	.05 (.04, .05)	.95	.93	22524	23893	22619
H-ESEM[b]	853.83***	607	1.41	.04 (.04, .05)	.95	.92	22512	23813	22603
ESEM – Bifactor model[b]	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.
*$p < .05$. **$p < .01$. ***$p < .001$.
[a]These two aspects of emotional skills were tested after obtaining less than adequate fit indices for the overall emotional skills subscale.
[b]43-item models after the removal of the others' emotions items.
[c]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)	1. Providing suggestions or criticisms 2. Accepting suggestions or criticisms 3. Cooperation 4. Coordination 5. Team spirit and morale 6. Adaptability (Morgan, Glickman, Woodward, Blaiwes, & Salas, 1986)
Goal setting	"the process by which people establish desirable objectives for their actions" (Moran, 2004, p. 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, van Eerde, Rutte, & Roe, 2007, p. 262)	1. Time assessment 2. Planning 3. Monitoring (Claessens et al., 2007)
Emotional skills[a]	"the processes involved in the recognition, use, understanding, and management of one's own and others emotional states" (Salovey, Brackett, & Mayer, 2004, p. i)	1. Perception of emotions 2. Use of emotions 3. Understanding of emotions 4. Management of emotions (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)	1. Speaking 2. Listening 3. Non-verbal communication (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)	1. Social assertiveness 2. Performance in public situations 3. Participation in social groups 4. Friendship and intimacy 5. Giving or receiving help (Smith & Betz, 2000)
Leadership	"process whereby an individual influences a group of individuals to achieve a common goal" (Northouse, 2010, p. 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, 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)	1. Problem definition and formulation 2. Generation of alternative solutions 3. Decision making 4. Solution implementation and verification (D'Zurilla & Goldfried, 1971)

[a]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.

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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
PPS	**6**	**Interact in various social settings**	**.77**	**No**	**3.93**	**0.94**	**-0.63**	**0.04**
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
FI	**10**	**Maintain close friendships**	**.72**	**No**	**4.10**	**1.00**	**-1.13**	**0.91**
H	11	Help others when they need it	.66	No	4.11	0.86	-0.81	0.35
SA	**12**	**Start a conversation**	**.77**	**No**	**3.94**	**1.10**	**-0.91**	**0.09**
PPS	13	Conduct myself properly when I am around others	.67	No	3.98	0.99	-0.94	0.64
PSG	**14**	**Get involved in group activities**	**.78**	**No**	**4.11**	**0.97**	**-0.98**	**0.44**
FI	15	Talk to friends about personal things	.61	Yes	3.46	1.32	-0.45	-0.86
H	**16**	**Help others without them asking for help**	**.67**	**No**	**3.85**	**1.05**	**-0.86**	**0.33**
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 #	Factor							
	1	2	3	4	5	6	7	8
TW2								.30
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	.33			.45				
LS6	.57							
LS10	.75							
LS11	.73							
LS12	.69							
LS13	.68							
LS15	.72							
LS16	.80							
LS17	.70							

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

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

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

CS1	-.02	-.05	.13*	.10	**.55*** **	.04	.26***	.09	.34***
CS2	-.13*	.13*	.03	.12	**.48*** **	.25***	.01	.08	.46***
CS3	.08	-.01	.03	.18**	**.44*** **	-.02	.13*	.23***	.41***
CS4	.07	-.001	.03	-.08	**.41*** **	.21**	.28***	.08	.46***
SS6	.04	-.06	-.004	.18**	.15*	**.49*** **	.12	.04	.44***
SS10	.19**	-.07	.18**	.10	.17**	**.51*** **	-.19**	.03	.45***
SS12	.15**	.02	.07	.08	.03	**.69*** **	-.07	-.02	.34***
SS14	.08	-.02	-.01	-.13*	-.02	**.75*** **	.19**	-.02	.31***
SS16	.05	.03	.04	.11	.01	**.53*** **	.05	.09	.48***
LS6	.14*	.06	.08	.04	.04	.02	**.52*** **	.05	.47***
LS10	.06	-.05	.02	.04	-.07	.15*	**.70*** **	.03	.34***
LS11	.05	.02	.07	.04	-.07	.04	**.47*** **	.29***	.43***
LS12	.06	.04	-.02	.04	-.01	.002	**.55*** **	.19**	.47***
LS13	.01	.02	.16**	.04	.02	-.01	**.59*** **	.05	.45***
LS15	.07	.12	.01	.09	.31***	-.04	**.45*** **	-.17*	.56***
LS16	-.01	.14*	.003	-.06	.22***	.20**	**.56*** **	-.04	.38***
LS17	.22***	.10	-.003	.07	.28***	-.12	**.41*** **	.004	.50***
PS1	.07	.14**	.003	.21***	.01	.06	-.02	**.56*** **	.32***
PS2	.05	.01	.03	-.02	.06	-.01	.03	**.86*** **	.16***
PS3	.04	.03	.08	.05	.07	-.02	.10	**.68*** **	.29***
PS9	-.06	.10	.17**	.05	.16**	.09	.10	**.44*** **	.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	**.09**	.21*	-.03	-.004	.06	.17	.17	-.09	.23*	.83***
TW5	**.44****	-.13	-.01	-.05	-.11	.13	.17	-.07	.44***	.53***
TW7	**.69*****	-.04	-.09	-.10	.13	.17	-.09	.01	.41**	.28
TW8	**.39*****	.09	.05	.10	-.18	.07	.26	.07	.42***	.55***
TW11	**.35*****	-.05	-.06	.05	.22	.06	-.03	.03	.33**	.71***
TW13	**.51****	-.08	-.02	.02	-.14	-.04	.07	-.11	.42***	.53***
TW18	**.48***	-.05	-.06	-.06	-.07	.09	-.11	-.04	.46**	.52
GS1	-.03	**.52*****	.21**	.01	-.05	-.05	-.05	-.07	.50***	.42***
GS4	.08	**.60*****	.12	.02	.06	-.10	.09	-.03	.52***	.33***
GS6	.08	**.69*****	.11*	.05	.06	.01	.07	.13	.42***	.30***
GS7	-.04	**.62*****	.10	.09	-.09	-.05	.01	.003	.52***	.31***
GS8	-.09	**.63*****	-.05	-.04	-.02	-.07	-.06	.01	.51***	.33***
GS9	-.09	**.58*****	-.01	.02	-.10	-.03	-.03	.03	.57***	.32***
GS14	-.10	**.52*****	.000	.001	-.04	-.06	-.03	-.03	.61***	.34***
TM4	.04	.04	**.66*****	-.10	.07	-.03	-.05	.04	.54***	.26***
TM5	.01	.17**	**.60*****	.08	.07	.09	.07	.08	.56***	.26***
TM7	-.13*	.11*	**.63*****	.03	-.10	-.03	-.03	-.05	.55***	.25***
TM10	-.15*	.22**	**.38*****	-.05	-.13	.03	-.09	.04	.61***	.39***
ES6	-.01	.17**	.09	**.49*****	-.04	.08	-.04	.09	.59***	.35***
ES8	-.06	.01	-.08	**.52*****	.11	-.06	-.004	.02	.54***	.41***
ES10	-.02	.002	.01	**.50*****	.06	.01	-.12	.05	.59***	.39***
ES21	-.04	-.003	-.09	**.21***	-.18	-.10	-.02	.07	.69***	.42***

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

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