The soft skills of higher education students: An exploratory study with SSI-55

Jacinto Jardim[1], Anabela Pereira[2], Paula Vagos[3], Inês Direito[4], Sónia Galinha[5]

1 Universidade Aberta, Portugal, jacinto.jardim@uab.pt
2 Departamento de Educação e Psicologia, Universidade de Aveiro, Portugal, anabelapereira@ua.pt
3 Departamento de Educação e Psicologia, Universidade de Aveiro, Portugal, pvagos@upt.pt
4 UCL Centre for Engineering Education, UK, i.direito@ucl.ac.uk
5 Instituto Politécnico de Santarém, Portugal, sonia.galinha@ese.ipsantarem.pt

Contact author: jacinto.jardim@uab.pt; Phone: 00351968069643

Abstract: Attending Higher Education means facing several personal, social, and work-related challenges, which may increase the risk of developing several psychopathological symptomatology. Still, no instrument exists that grasps the skills that may prepare Higher Education students to face these challenges. We intended to develop and psychometrically evaluate such an instrument. It was developed based on theoretical and empirical findings on the skills associated with academic and professional success, and on students' perception (via focus groups) on that subject. An initial item pool was phrased to address these skills and continuously trimmed based on content analyses. The Social Skills Inventory-55 (SSI-55) was then applied to 2030 Higher Education Students (77.1% female). Forty-five out of 100 items were dropped following preliminary item correlation analysis and loading values found via exploratory factor analyses. The remaining 55 items organized into six-factors addressing self-determination, assertiveness, social support, prosocial attitudes, openness to novelty, and coping; all achieved good internal consistency values (α between .73 and .89). This measurement model was partially invariant across gender. Latent mean comparisons showed that men cope better and are more open to novelty then women; in turn, women endorsed more self-determination, social support and engaging in teamwork. The SSI-55 seems to reliably and validly evaluate relevant intra, interpersonal, and professional skills. So, it may be a useful and relevant tool for evaluating the vulnerabilities of students, in preparing them for coping with adversities associated with the Higher Education living experience.

Keywords: soft skills, assessment, higher education, young adults, psychometrics

Introduction

Defining skills, and soft skills in particular, has been a continuous challenge faced by several areas of the social sciences. Still, the literature has found some consensus in defining skills as a set of technical, methodological, and practical knowledge that is dynamically activated and hence manifested in performance (Jardim, 2010; Malglaive, 1995). That is to say those skills may be defined as the combined instigation of a set of knowledge and attitudes in any given situation, in such a way as to be successful in managing its demands (Jardim, 2012). So, skills represent either an observable action or a mental operation that is detectable only as it is expressed in actions, thinking, words, or relationships (Tavares, 2003). It follows that the quality of ones' performance (i.e., ones' observable actions) in a given task is closely determined by ones' attitudes, personal traits, motivations, or knowledge (i.e., of ones' skill).

The UNESCO (2012) presented an important typology of skills, in trying to organize the several domains on which they may be activated. They refer to foundational skills, to transferable skills, and to technical and vocational skills. Foundational skills are those basic skills required for the learning of any other skill (e.g., reading and writing). In turn, transferable skills, which are generally acquired outside the school context, are useful for a successful performance in more widespread situations, whereas technical and vocational skills refer to technical knowledge related to an instrumental or technical performance, namely professional, and are, therefore, mainly learnt through formal education. So, while the last are particularly applicable to specific and predetermined contexts, the former are more elusive and applicable to facing more diverse demands, namely intra and interpersonal ones, in addition to being applicable in a more diverse range of professional occupations.

Within these transferable skills (i.e., transversal to several interpersonal and professional contexts), the European Skills/ Competences, Qualifications and Occupations (ESCO, 2014), has recently suggested the following five categorical groups of transversal skills relevant to labor market, education, and training perspectives: 1) attitudes and values at work; 2) applications of knowledge; 3) social skills and competences; 4) language and communication; 5) thinking skills and competence. Each one of these groups is further detailed into specific skills (e.g., within the social skills and competences group, one may find working with others, which

further specify, for example, into working as part of a team or exercise responsibility, which again are made precise into, namely, sharing opinions and foster quality).Thus, there is a clear understanding nowadays that becoming a good professional is more than merely knowing how to perform; it is also necessary to possess and apply a set of skills that set the tone for more specific professional skills to be recognized and valued within occupation contexts that are, evermore, interpersonal ones.

The concept of transferable skills seem to be intertwined with that of soft skills, which are defined as intrapersonal skills, such as one's skill to manage oneself, as well as interpersonal skills, such as how one handles one's interactions with others, as opposed to hard skills, which refer to the technical skills that involve working with equipment, data, software, etc. (Heckman & Kautz, 2012). Soft skills may be thought of, therefore, as transferable skills that the individual can take to a wide range of personal and professional situations. They make that individual able to manage personal attributes and put them to the use of improving personal performance and sustaining intrapersonal relationships with others; in other words, of perform professionally and relate successfully with others (Jardim & Pereira, 2006). The assumption that these skills can promote more efficient workers reinforces the importance of better understanding them, as they have been defined as a set of personal qualities, attributes, talents, or the level of commitment that an individual can bring to the workplace that set him or her apart from other individuals who may have similar technical skills and professional experience (Perreault, 2004).

Evermore employers are looking for professionals who possess soft skills, considering that hard skills are more easily applied to the workplace when based upon soft skills (Washer, 2007). Considering that men are still highly more prevalent than women in professions that are associated with greater success (e.g. CEO; Hansen, Ibarra, Peyer, 2010), one would expect that men possess more ideal combinations of hard and soft skills. Accordingly, men were found to report an overall higher level of softs skills, when compared to women (Alpay & Walsh, 2008; Nabi & Bagley, 1998; Whittle & Eaton, 2001). Still, women seem to consider these skills as more important (Nabi & Bagley, 1998) and work harder to acquire them (De Juan-Vígaraz et al., 2012); also, an equal prevalence of male and female collaborators seems to be essential for the so called collective intelligence, associated with better professional group performance (Woolley, Chabris, Pentland, Hashmi & Malone, 2010). So, it may be the case that men excel in some of these skills, while women surpass on others. Such an assumption has been supported by findings of men and women endorsing diverse specific dimensions of self-efficacy leadership (Javidan, Bullough & Dibble, 2015), and of women scoring higher on specific personal skills such as team working, time management, planning/ organizing, and prioritizing skills (Nabi & Bagley, 1998).

To better classify and train soft skills according to potential gender-specific vulnerabilities (given specific gender differences that were found in previous experiences of the kind; Alpay & Walsh, 2008; De Juan-Vígaraz et al., 2012), there is an evident need of designing ways of multidimensionality assessing soft skills, as relevant to the academic preparation and future insertion into the labor market. Soft skills play an important role in young adults' personal, social, and professional development, and may come to be determinant in their future employability and professional performance (Washer, 2007; Fallows & Steven, 2000). Still, there is a notorious lack of assessment instruments aiming to assess soft skills. Alpay and Walsh (2008) developed an instrument versing soft skills, which they intended specifically to be used to evaluate the efficacy of their soft skills training initiative. Concordantly, it used 33 items grouped into four scales addressing the specific contents to be trained (i.e., group work, communication, project planning, and management of personal awareness). Only exploratory factor analysis on each of the scales and Cronbach alpha values as representative of internal consistency are presented as demonstrative of the psychometric value of this instrument. Another example would be the work of Chamorro-Premuzic, Arteche, Bremmer, Greven, and Furnham (2010) who studied the relevance students attributed to a list of soft skills (i.e., self-management, communicational, interpersonal, team-working skills, the ability to work under pressure, imagination/creativity, critical thinking, willingness to learn, attention to detail, taking responsibility, planning and organizing skills, insight, maturity, professionalism and emotional intelligence) in relation to their academic and expected professional success. Soft skills were, in this case, presented as a list towards which students judged the importance in relation to academic achievement, desirable job after graduating, and skills in need of improving. So, each student's individual perception/ understanding of each enumerated soft skill were relied upon, making it so that this method for assessing soft skills may be credited only for face validity.

Alternatively, contemporary society still places great value on standardized achievement tests to sift and sort people, to evaluate schools, and to assess the performance of nations. Despite their widespread use, such achievement tests miss, or better said, do not adequately capture, soft skills (i.e., the set of personality traits, goals, motivations, and preferences that are valued in the labor market, in school, and in many other domains; Heckman & Kautz, 2012). Because these skills refer to an eminently personal process, which is not visible/ observable unless manifested in behaviors, it seems appropriate to address this construct through self-report questionnaires. Also, this methodology allows for a subjective and personal standing on one's own skills, so long

as items are appropriately developed to grasp the (competent) behavioral expressions that may represent such skills and the psychometric properties of such an instrument are thoroughly investigated.

The current work intends to present the developmental process and psychometric analyses on the scores of a self-report questionnaire intending to evaluate soft skills in young adults. The development process included several stages aimed at establishing face validity, understandability, and usability of the items within the targeted population. The psychometric analyses included exploring the internal structure of the instrument, and then investigating the internal consistency and measurement invariance across gender of the resulting measurement model. Such an analysis will demonstrate the usefulness of the instrument for assessing gender-based skill profiles and allow gathering evidence on the construct validity of the instrument. If gender differences are in line with what has been previously found in the literature concerning each of the specific soft skills to be assessed, then it is more likely that the instrument is, in fact, addressing its proposed construct. As a way of further providing preliminary evidence on the construct validity of the instrument in relation to other variables, its scores were associated with the subjective perceptions of one's own academic success, as well as personal, social, and professional skills.

Method

Participants

Participants for this study were 2030 undergraduate and master students attending several Portuguese Higher Education institutions, with ages ranging from 18 to 26 years old (M = 21.11, SD = 2). Regarding gender, 465 participants were male (22.9%) and 1565 were female (77.1%)[1]. Men were significantly older than women ($t(2028) = 5.6521$, $p < .001$). Similarly, men and women were not randomly distributed in relation to being a full time student or holding a job at the same time ($\chi 2(1) = 11.63$, $p = .001$), or attending a private versus public teaching institution ($\chi 2(1) = 12.60$, $p < .001$); women were full time students and attended private teaching institutions more frequently than expected. Alternatively men and women were randomly distributed by level of education ($\chi 2(1) = 2.07$, $p = .15$). See Table 1 for a description of the sample's age and educational characteristics by gender.

[Insert Table 1]

Instruments

Subjective perception form

Prior to being presented with the self-report assessment instrument, students were asked to rate their subjective perception on: 1) their academic success during the last academic year and 2) the development of their personal, social, and professional skills throughout the same time frame. These ratings were done using an ordinal answer scale ranging from 1 (weak) to 5 (excellent).

Soft Skills Inventory.

A preliminary study was conducted intending to ascertain if 1st year Higher Education students perceived personal, social, and professional skills as relevant to better cope with transitioning from secondary school into Higher Education. They stated the importance of such skills, and stressed how Higher Education institutions should be more invested not only in promoting technical knowledge but also in forming personally and socially apt professionals. In particular, they referred to self-realization, self-regulation and self-confidence, to the skill to engage in productive, cooperative and friendly relationships with others, to autonomy, initiative, responsibility, and persistence, to the willingness to be exposed to new and diversified experiences, and to the skill to cope with the varied outcomes of such experiences, as relevant and necessary skills that might help them make the best out of their current academic experience. These descriptions are in line with what has been posited in the literature as personal and social transversal aptitudes associated with success in Higher Education (e.g., Bennet, Dunne & Carré, 1999). So, they were taken as the starting point for developing items intended to evaluate this diversified set of soft skills.

Specific items were also developed based on the literature review on the constructs we intended to evaluate, namely its distinct dimensions as well as its specific behavioral markers, and on the characteristics of the targeted population (*i.e.*, Higher Education students). An initial item set of 180 items was thus developed. Their continuous content analysis led to retaining 100 of those items. Such content analysis took into consideration the following criteria: 1) objectively and clearly stating the intended constructs, in such a way as

[1] According to PORDATA statistics concerning students enrolled in Higher Education in Portugal, there has been a stable tendency for a greater proportion of female students in comparison with male students (cf. http://www.pordata.pt/Portugal/Alunos+matriculados+no+ensino+superior+total+e+por+sexo-1048).

to be quickly and easily understood by the respondents, 2) simplicity of phrasing, meaning that each item should refer only to one behavioral unit, and 3) relevance and credibility as probably perceived by the targeted population. The set of 100 items was associated to a likert type answer scale, ranging from 1 (never) to 5 (always) and to an introductory instruction asking respondents to report how frequently they thought in the way portrayed in the item, both presented at the top of the page.

Thus constituted, the instrument was evaluated via thinking aloud with a sample of 22 3rd year students (7 women; 31.81%). Students were instructed to read through the instrument, its instructions and items, and comment on any perceived inconsistencies, doubts or misunderstandings (Boren & Ramey, 2000). Concordantly, students were told that the goal of their participation was to evaluate the instrument concerning its pertinence and understandability, more so than to answer the items themselves.

A specific grid was created for registering the principal verbal and non-verbal behaviors that these students manifested while evaluating the instrument. As for verbal behaviors, doubts on the instructions and contents of the items were considered, in addition to spontaneous commentaries and the interest the respondents expressed for the contents being addressed by the instrument. Non-verbally, the researchers were interested in signs of curiosity, doubt, agreement, boredom, and discomfort.

As a result of this preliminary analysis, the following changes were made to the initial presentation of the instrument: 1) the number associated to the rating scale (1 to 5) were added to each individual item; 2) generic expressions like *I am* were altered to *I consider myself*, in order to provide a more subjective and personal standing on each item. Notwithstanding these comments, the majority of the participants considered the instrument to be clear, easily understood, pertinent, and adequate to the constructs it intended to grasp. Also, most participants demonstrated a facial expression of interest and curiosity towards the instrument while fulfilling it, which took them about 20 minutes.

The final version of the instrument, hence forth designated Social Skills Inventory (SSI-55), was composed of 100 items addressing intra and interpersonal skills, as well as professional skills. It also included specific instructions to the respondent, presenting him/ her with the general goal of the instrument (*i.e.*, to identify intrapersonal, interpersonal, and professional skills of Higher Education students), asking him/her to honestly respond to all items, and guaranteeing the confidentiality of every response. These instructions them direct the respondent to rate each of the 100 items using a five-point likert type scale (see above). This version of the instrument was subjected to further psychometric analyses, in trying to find its more parsimonious and psychometrically adequate form.

Procedure

Sampling procedures

Authorization was sought from several Higher Education institutions' representatives nationwide, to whom the investigation was presented as intending to evaluate the skills associated with academic success and who were asked to randomly select classes that might participate in the study, so long as all academic years (*i.e.*, 1st to 5th graders) were included. Following institutional authorization, individual teachers were also contacted and informed on the goals of the research, in addition to being asked to make class time available for students to participate in the research. After having obtained these authorizations, a total of 4000 protocols were delivered to the collaborating institutions and students filled in the research protocol during class time made available by the teachers. They were verbally assured of the confidentiality and anonymity of their responses and of their participation being volunteer; no student refused to participant. The importance of honest and sincere answering was also stressed out, and no time limit was given.

This protocol included a socio-demographic sheet that asked for the following information: gender, age, being a full time student or not, Higher Education institution being attended, and academic year. Some questions concerning the student's perception of academic success and psychosocial development were also included, but were not considered in the current work. The SSI-55 was subsequently presented, alongside the five-point rating scale. A total of 2640 protocols were returned, of each 2030 were considered valid and used for data analyses on the psychometric characteristics of the instrument; a total of 610 were excluded due to missing values (*i.e.*, a listwise deletion approach was used for handling missing values) or to presenting random answering patterns (*e.g.*, all answers being equal).

Statistical analyses

The statistical analyses were initiated with item evaluation, in order to achieve a final set of items that more accurately reflected the intended constructs. Inter-item and corrected item-total (*i.e.*, correlation of an item with

the total scale[2] excluding the item itself) correlation analyses as well as exploratory factor analyses were consecutively conducted, as to obtain information for item exclusion. Concerning item analyses, items were excluded if they: 1) presented negative or lower than .30 corrected item-total correlation values, or 2) presented negative or lower than .20 inter-item correlation values (Ferketich, 1991). The items that surpassed this initial screening process were then entered in exploratory factor analyses, and further excluded if they: 1) presented loading values lower than .32 for all factors, or 3) presented loading values higher than .32 for more than one factors (*i.e.*, cross-loading; Fabrigar, Wegener, MacCallum, & Strahan, 1999).

After all items fulfilling these criteria were excluded, the dimensionality of the instrument was investigated, via exploratory factor analysis (EFA) using an oblimin rotation and subsequent confirmatory factor analysis (CFA). Parallel analyses (PA; Glorfeld, 1995) were taken into consideration for determining the number of factors to be retained following EFA, so long as that factorial solution also achieved acceptable fit indicator values. Each factorial solution containing as many factors as indicated by PA was examined for items presenting lower than acceptable loading value, which were consequently excluded. Only after all items loaded acceptably into at least one factor did we proceed with cross-loading analysis, and further excluded all items in that situation. After having thus determined the factorial structure of the instrument, it was tested via CFA using the complete sample. For both EFA and CFA, the fit quality of the overall model was judge based on the guidelines provided by Hair Jr., Black, Babin and Anderson (2005): the model was considered to be an adequate fit for the data if presenting a) a *Comparative Fit Index* (CFI) value higher than .90 combined with a Root *Mean Square Error of Approximation* (RMSEA) value lower .07 or b) a CFI value higher than .92 combined with a *Standardized Root Mean Square Residual* (SRMR) value lower than .08. Gender invariance testing was also completed as well as latent mean comparison between men and women, following the guidelines provided by Dimitrov (2006, 2010). A forward approach was used for measurement invariance analyses, testing for configural (i.e., the measurement model being similarly suitable for men and women considered separately), then metric (i.e., the loading values being similar between men and women), and then scalar invariance (i.e., the loading and intercept values being similar between men and women); invariance is established when each additional constraint on the model does not significantly worsen its fit statistics (Dimitrov, 2010). Each level of invariance was judge based on the guidelines provided by Chen (2007), who recommends that metric invariance be determined if the CFI delta is ≤ -.01, combined with a RMSEA delta ≤ .015 or with a SRMR delta ≤ .03 and that scalar invariance be determined if the CFI delta is ≤ -.01, combined with a RMSEA delta ≤ .015 or with a SRMR delta ≤ .01. For these multi-group analyses, a unit loading constraint on the 1st item of each factor was used for scaling purposes (Kline, 2011). Finally, the internal consistency values of each of the resulting factors were also assessed using the Cronbach Alpha.

Item-analyses, internal consistency analyses and descriptive measures were computed using the IBM SPSS Statistics 21; EFA, CFA, multi-group analyses and latent mean comparisons were analyzed using the Mplus 7.31 (Muthén & Múthen, 1998-2015).

Results

Item evaluation analyses

Inter-item and item-total correlation analyses.

Eight items were excluded[3] due to presenting negative inter-item correlation values with most of the remaining items and/or with the corrected total scale. For example, item 9, reading *I have looked for someone to help me to get to know myself better* might have been interpreted as a sign of weakness and dependency, thus being contrary to the construct of skill the instrument intended to portray. Another eleven items were excluded due to presenting inter-item correlation values lower than .20 with most of the remaining items and/or corrected item-total correlation values lower than .30. For example, item 65 reading *I like to paint and draw* may refer to a specific instrumental/ functional skill, rather than to the realm of personal and social skills the instrument intended to address. Also, item 78 reading *I prefer group to individual evaluation* seems to refer more (*i.e.*, directly) to ones' preferences rather than to ones' skills. Following these preliminary analyses, a total of 81 items were subsequently subjected to exploratory factor analyses.

Exploratory factor analyses.

[2] The total scale was considered as the sum of the initial 100 items. The instrument was intended to evaluate several dimensions of personal and social competences, all positively correlated amongst each other, and so all items were also expected to correlate positively, though only linearly, to one another.

[3] A complete description of the wording of all excluded items may be requested from the first author.

Preliminary analysis indicated that the data taken from the 81 items was not multivariate normal ($\chi 2$ for skewness = 150042.6, $p < .001$; z for kurtosis = 183.61, $p < .001$;Korkmaz, Goksuluk, & Zararsiz, 2014). Therefore the *Maximum Likelihood Robust* estimator was used when conducting all EFA, CFA, and multi-group analyses.

A total of seven sequential exploratory factor analyses were conducted. In all cases, solutions containing 1 to 9 factors were requested. Fit indicators for the factorial solution suggested by PA were acceptable in all cases. A total of twenty-six items were excluded, twenty-five due to presenting loading values lower than .32 and one for presenting cross-loading. The content of the items may justify why they loaded lowly within a measure intending to evaluate intra and interpersonal skills. Item 2, for example, reading *I am aware of my intellectual abilities* refers to recognition of skill (being it either good or bad) rather than to a quantification of that skill. Also, item 10, reading *I feel I know myself well*, refers to self-knowledge, which in turn may or may not be applied into intra and intrapersonal achievements. Item 11 reading *I like myself the way I am*, cross-loaded into the first ($\lambda = .33$) and sixth factor ($\lambda = .44$). Considering the constructs associated with these factors (see next paragraph), this items' content may be referent to a sense of personal thriving but also represent a protective factor when dealing with adversities, thus representing two constructs at once. Bearing a more parsimonious factor solution, item 11 was, hence, excluded.

The seventh EFA, using 55 items and considering the 6-factor solution as suggested by PA, resulted in a statistically acceptable solution (RMSEA = .041, 95% confidence interval for RMSEA = .040; .042; CFI = .899, SRMR = .028). Item loadings are presented in Table 2; all items loaded higher than .32 into one single factor. Additionally, this solution allowed grouping the items into theoretically meaningful factors, namely, self-determination, assertiveness, social support, teamwork, openness to novelty and coping (for a more thorough description of each factor, see the discussion)

[Insert Table 2]

Factorial validity analyses

The 55-item six-factor solution as presented above was subjected to CFA. Fit indicators always suggested an acceptable fit for the data, considering our complete sample (n = 2030; RMSEA = 0.047, 95% confidence interval for RMSEA = 0.046; 0.048; CFI = .839, SRMR = 0.058), and our male (n = 465; RMSEA = 0.052, 95% confidence interval for RMSEA = 0.050; 0.054; CFI = .839, SRMR = 0.067) and female sample separately (n = 1565; RMSEA = 0.046, 95% confidence interval for RMSEA = 0.045; 0.047; CFI = .849, SRMR = 0.057). In addition, loading values were always significant, and the factors' internal consistency values were always very good (Table 3).

[Insert Table 3]

All the factors correlated significantly amongst each other (Table 4).

[Insert Table 4]

Having established configural invariance for the six-factor solution (in as much as this measurement model was a good fit for the male and female samples considered separately), we proceeded with metric and scalar invariance analysis. Full metric invariance was found (ΔCFI = .000, ΔRMSEA = -.001, ΔSRMR = -.004) but not full scalar invariance (ΔCFI = -.011, ΔRMSEA = .001, ΔSRMR = -.003). Partial scalar invariance (ΔCFI = -.009, ΔRMSEA = .001, ΔSRMR = -.002) was achieved after allowing the intercept of 23 items to differ between groups.

Descriptive analyses

Only partial scalar invariance was achieved, representing the variance of several items' intercepts between men and women. For that reason, latent mean comparison results were analyzed and compared when total invariance was forced versus when partial scalar invariance was allowed; men were taken as the reference group, and so their latent mean was fixed to 0. Results were all in all very similar in either condition: latent mean for women in self-determination for total invariance = .15 ($p = .01$) versus partial invariance = .17 ($p = .006$); latent mean for women in assertiveness for total invariance = -.09 ($p = .01$) versus partial invariance = -.02 ($p = .68$); latent mean for women in social support for total invariance = .35 ($p < .001$) versus partial invariance = .37 ($p < .001$); latent mean for women for team work in total invariance = .33 ($p < .001$) versus partial invariance = .39 ($p < .001$); latent mean for women in openness to novelty for total invariance = .49 ($p < .001$) versus partial invariance = .48 ($p < .001$); and latent mean for women in coping for total invariance = .50 ($p < .001$) versus partial invariance = .56 ($p < .001$). This allows for more confidence when interpreting gender differences based on the composite scores of the factors. Table 5 presents the descriptive measures for each of these scores, obtained from the sum of each participants' responses to the items composing each factor. The descriptive data presented follow the same direction as that concerning the latent mean analyses.

[Insert Table 5]

Correlation with subjective perceptions

All factors achieved significant and positive correlation values with perceptions of academic success, and of personal, social and professional skills (Table 4). For the perception of academic success, of personal skills and of professional skills, the highest correlation values were found with self-realization, followed by openness to novelty and resilience; for the perception of social skills, the highest correlation values were found with assertiveness, teamwork, and openness to novelty.

Discussion

This work set out to explore the measurement model of a new assessment instrument developed to assess intra and interpersonal skills, as well as professional skills that may be associated to the academic success of Higher Education students. The instrument was developed taking into account the perceptions of such students on what skills they thought might better help them cope with the demands they faced as new Higher Education Students. Their perceptions were, in turn, in line with what the literature suggests as an inherent task of Higher Education institutions: forming personally, socially and professionally apt citizens (Tavares, 2003; Jardim & Pereira, 2006). An initial item pool was trimmed considering theoretical and practical guidelines; that is, items that better reflected the constructs and were more easily understood were kept. A final item pool was then subjected to psychometric preliminary analyses, including inter-item, corrected item-total correlation, and exploratory factor analyses, which lead to the exclusion of 45 of the original 100 item pool. The remaining 55 items organized into a six-factor model that proved to be a good fit for the data via exploratory and confirmatory factor analyses. All factors refer to the self-perception of the individual on the degree to which he/ she possesses a given skill.

Self-determination was considered as the ability to operationalize ones' personal tendency for autonomous and proactive (e.g., item 10) expansion, development and realization of personal, social and professional potentialities and goals (e.g., item 11; Gagné & Deci, 2005). Looking into the items that compose the assertiveness measure, they portray both certain non-verbal components of assertiveness (Alberti & Emmons, 2008; e.g., making eye contact with ones' interaction partner – item 24 or speaking in an audible tone of voice – item 23) as well as specific behaviors associated with the negative assertive dimension in particular (Arrindell, Sanderman, Vandermolen, Vanderende, & Mersch, 1988), namely the expression of negative feelings (such as disagreement or dislike – item 21), the refuse of requests that are considered unreasonable (e.g., item 20), or the standing up for personal rights (e.g., item 19). Though social support has been thought of as being able to gather and provide support, when needed, within social networks (Pereira, 2005), the SSI-55 seems to specifically address social support received (and not given) by others, friends in particular (e.g. item 27) but also family members (e.g., item 31). As for team work, is has been conceived as the joint activity of people looking for the achievement of a common goal (e.g. item 45), by which the strength and knowledge of each person is combined through cognitive, affective, and behavioral investment in the group (e.g., item 46; Comoglio & Cardoso, 1996; Pereira, 2005). Openness to novelty refers to being receptive to non-traditional ideas or solutions (e.g. item 37). Finally, coping has been portrayed has activating resources to prevent, minimize or overcome the negative effects of crisis or adversities (e.g., item 52; Grotberg, 2003).

Further evidence on the construct validity of the instrument may be taken from its constructs being closely linked to the transferable skills proposed by the European Skills, Competences, Qualifications and Occupations (ESCO, 2014). Namely: 1) Self-determination may be reflected in the managing the learning self and the learning process, included in the thinking skills and competences group; 2) Assertiveness may be part of the use of culturally appropriate gesture and language, accepting and giving constructive criticism, argue cases, seek consensus and compromise, and propose options, which are part of the social skills and competences group; 3) Social support may concern the fostering of social networks, sharing opinions and resources, and collaborate in tasks, also part of the social skills and competences group; 4) Team work consists of working with others, especially as part of a team, of negotiating, and of displaying intercultural competence, again part of the social skills and competences; 5) Openness to novelty may refer to the generation of new ideas and turning them into action, included in the thinking skills and competences group; and 6) Coping may concern the handling of challenges, which is part of the attitudes and values at work group. Some of these constructs also relate to those addressed by previous tentative instruments in the area (Alpay & Walsh, 2008; Chamorro et al., 2010), namely self-determination, teamwork and openness to novelty.

The fact that all these dimensions correlated low to moderately concurs to considering them as relevant aspects of the global construct this instrument was designed to address, and thus contribute to a more precise and global knowledge and understanding of the respondents' skills. These measures furthermore correlated with the subjective perception on ones' academic success, as well as personal, social and professional skills. Most noteworthy were the findings that reporting to be more self-determined was most strongly associated to

perceiving academic, personal and professional achievement, whereas reporting to be more assertive, able to work in teams and open to novelty associated more strongly with self-attributed ratings of social skills. Such findings add evidence to the apparent construct validity of the SSI-55, because they are in line with previous theorizing on the subject. On the one hand, self-determination has been found to have a positive impact on social and personal well-being (Ryan & Deci, 2000) and in the managing of work-related demands (Fernet, Guay, Senécal, 2004). On the other hand, teamwork and assertiveness have for long been posited as social skills, which is to say they are included in the vast set of skills that help an individual adapt to his social and cultural contexts (Del Prette & Del Prette, 1999). In turn, socially well-adjusted individuals (particularly assertive ones) should be flexible enough to adapt to diverse contexts and thus continuously secure long-term social gains (Marchezini-Cunha & Tourinho, 2010; Vagos & Pereira, 2016). In other words, to maintain their status of well-adjusted, they should be open to novelty.

Moreover, this measurement model proved to be a partially invariant tool to compare men and women on these relevant skills. Significant gender differences were found for all but the assertiveness measure. The finding that adult men and women report similar levels of assertive behavior is not uncommon (Arrindell et al., 2001; Bridges, Sanderman, Breukers, Ranchor, & Arrindell, 1991). In turn, women reported significantly higher scores in the self-realization, social support and teamwork measures. This is in line with previous findings indicating that women, compared to men, tend to resort more to social support when facing stressful situations, particularly emotional support (Day & Livingstone, 2003). Women have also been found to endorse more prosocial attitudes (León, Finkelsten, & Castien, 2011) that may be conductive to teamwork. Alternatively, men reported significantly higher scores in the openness to novelty and resilience measures, concurring with previous findings (Lehmann, Denissen, Allemand, & Penke, 2013; Matud, 2004). Hence, the sex mean differences found with the current work contribute with preliminary evidence on the construct validity of the Soft Skills Inventory. Further works should consider validity evidence in relation to other external constructs, and possibly predictive validity. A relevant validity criterion would be how well these tests predict meaningful outcomes, such as educational attainment, labor market success, crime, and health (Heckman & Kautz, 2012), and this should be carefully considered in the future.

Other limitations to the current work should be noticed. First of all, we set out to investigate a construct that is, in itself, extremely broad and controversial. So, ours is one proposal of framing some skills (particularly intra and interpersonal ones) that by no means intends to be exhaustive. Relatedly, the current work used a Portuguese sample, and so generalization of the findings on the psychometric properties of the scores of the SSI-55, as well as indications on mean scores based on the SSI-55, should be contemplated with due caution. For example, findings with Portuguese adolescent samples concerning assertiveness have not entirely been in line with findings with north-American samples, pointing to some cultural specificities in need of further consideration (Vagos, Pereira, & Arrindell, 2014). Given the large sample size used in the current work, it may be safe to use the SSI-55 with Portuguese samples and further recommend that it be adapted to other languages and cultures. Finally, the applicability and usefulness of the instrument within populations other than Higher Education students (namely across the life span) should be investigated. For example, the set of soft skills assessed by the SSI-55 held some similarities with the skills required for executive professionals (Robles, 2012), and may be pertinent as a way of characterizing those already employed as they try or plan for their career development.

The current work proposes a self-report assessment instrument of intra and interpersonal soft skills, specifically those concerning to self-determination, social support, teamwork, assertiveness, openness to novelty, and coping, fulfilling an existing gap on what such instruments are concerned. The skills the Soft Skills Inventory addresses may be important in as much as they associate with the accomplishment of developmental tasks characteristic of young adulthood and to the requirements that may characterize a more desirable and successful worker. So, it may be a useful tool not only for research purposes but also for the screening of skills that Higher Education institutions need to be attentive of in trying to train fully skilled citizens.

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Table 1:

Samples' age and educational characteristics by gender

	Men	Women	Complete sample
Age	21.63 (2.26)	20.95 (1.89)	21.11 (2)
Student status			
Full time student	394 (84.7)	1414 (90.4)	1808 (89.1)
Working student	71 (15.3)	151 (9.6)	222 (10.9)
Teaching institution			
Private	101 (21.7)	472 (30.2)	573 (28.2)
Public	364 (78.3)	1093 (69.8)	1457 (71.8)
Level of education			
Undergraduate	346 (74.4)	1111 (71.0)	1457 (71.8)
Master	119 (25.6)	454 (29.0)	573 (28.2)

Note: Age values are presented as M (SD); student status, teaching institution and level of education are presented as n (%).

Table 2: Loading and cross-loading values taken from exploratory factor analyses on 55 items

		Self-Determination	Assertiveness	Social Support	Prosocial Attitudes	Openness to Novelty	Coping
1(4)	I have enough will power (…)	.46	.12	.05	.02	.07	.08
2(6)	I know what profession I would like to pursue (…)	.38	.04	.04	.16	.00	.02
3(12)	I think I have skills (…)	.34	.10	.03	-.06	.20	.22
4(17)	School performance positively influences (…)	.35	.01	.02	.19	.08	-.16
5(20)	(…) I have a good self-esteem.	.27	.08	.10	.11	.14	.38
6(21)	I feel accomplished (…)	.49	.03	.10	-.06	.10	.19
7(22)	I feel my teachers contribute to the development (…)	.47	-.03	.02	.12	.04	-.04
8(23)	My basic needs are met.	.49	.06	.09	-.03	-.03	.14
9(24)	I feel motivated (…)	.68	.04	.04	.00	.05	.08
10(25)	(…) I am increasingly developing my skills.	.55	.01	.06	.11	.07	.07
11(26)	(…) I have achieved my personal goals.	.59	.05	.09	-.04	-.06	.13
12(27)	I feel accomplished (…)	.66	-.03	.06	-.01	.00	.06
13(28)	I make use of all my abilities (…)	.48	.05	-.02	.14	.09	-.04
14(29)	I have clear goals (…)	.44	.15	.04	.14	.07	-.02
15(31)	I usually listen attentively (…)	.14	.07	.03	.35	.01	-.02
16(32)	When someone is introduced to me, I try to welcome this person (…)	.12	.05	.04	.36	.06	-.02
17(41)	I usually express my ideas.	.06	.52	.03	-.01	.18	.01
18(42)	(…) I usually know when to be firm (…)	.05	.52	-.00	.01	.04	.15
19(43)	I usually defend my rights.	.08	.59	.06	.06	.05	.03
20(44)	(…) I know how to refuse.	-.03	.54	.01	-.07	-.02	.12
21(45)	When I disagree with someone, I express it (…)	-.05	.75	.01	-.01	.04	.02

22(46)	(…) I use the necessary time to expose my views.	.03	.62	.04	.06	.07	.04
23(47)	I tend to speak in a clear and audible voice.	.08	.51	.02	.08	.01	.03
24(48)	When I speak, I look at my interlocutor (…)	.04	.38	.06	.09	.01	.04
25(49)	When I feel offended, I convey it directly (…)	-.05	.62	.08	-.01	-.01	.00
26(51)	Currently I feel supported (…)	.19	.03	.51	.06	-.02	.02
27(52)	When (…) feeling stressed, my friends support me.	.03	.05	.78	.03	.00	-.09
28(53)	When insecure, (…) my friends will convey security.	-.03	-.01	.86	-.00	.01	-.01
29(54)	When I am sad (…) I have friends who will help me.	-.02	-.01	.86	.01	-.02	.04
30(55)	I feel appreciated and accepted (…)	.05	.08	.65	.08	.06	.05
31(56)	I know that my family supports me (…)	.24	.00	.64	.05	-.02	.01
32(57)	I know who to turn to (…)	.18	.08	.42	.08	.07	.01
33(58)	My network of social contacts is large enough (…)	.05	.04	.55	-.01	.13	.15
34(61)	I consider myself a creative person.	.00	-.02	-.01	-.02	.85	-.04
35(62)	(…) I have original ideas.	.05	-.00	.01	-.00	.86	.03
36(63)	I feel that my teachers appreciate my creative (…)	.24	.01	.04	-.02	.38	-.00
37(64)	(…) I have to face unforeseen situations.	.03	.15	-.04	-.02	.36	.28
38(71)	(…) I enjoy collaborating with my colleagues.	.09	.09	.07	.64	-.02	-.03
39(72)	(…) cooperation helps develop new ideas.	.07	.04	.05	.64	-.02	-.03
40(74)	(…) the contribution of each person is important.	.02	-.01	.06	.64	-.05	.03
41(75)	I enjoy teamwork (…)	-.11	.11	.12	.53	.01	.16
42(76)	The more I work together with my colleagues (…)	-.08	.10	.18	.49	.00	.17
43(77)	Group study makes me enjoy (…)	-.03	.16	.11	.34	.05	.19
44(83)	I often recognize my friends' skills.	-.04	.14	.08	.48	.08	.07
45(84)	(…) I like everyone to collaborate in finding solutions.	.04	.11	.04	.64	-.00	-.06

46(85)	I appreciate the unity (…) between people (…)	.03	-.06	.05	.73	.00	.03
47(86)	To achieve a goal, I try to have an overview (…)	.08	.11	-.04	.49	.12	.03
48(87)	(…) I promote communication and understanding among all.	.04	.19	.00	.47	.18	-.03
49(88)	(…) I publicly praise the members of the team for their effort.	-.02	.17	.05	.41	.18	.02
50(92)	(…) I keep my calm.	-.04	-.05	.01	-.01	.06	.71
51(93)	I have complete confidence in my abilities (…)	.09	.12	.01	-.04	.11	.64
52(94)	I have been able to overcome the adversities (…)	.15	.15	.06	.05	-.00	.44
53(95)	I can minimize the negative effects of adversity.	.07	.06	-.01	-.01	.06	.64
54(96)	I accept my problems (…)	.05	.09	.00	.11	-.01	.60
55(97)	When a situation will not change, I accept (…)	-.02	-.04	.01	.08	-.04	.57

Note: Item numbers appearing in parenthesis and superscript represent the original numbering of the item. Short and paraphrased versions of the items are presented.

Table 3: Loading values taken from confirmatory factor analysis for the complete sample and by gender

		Complete sample	Male sample	Female sample
F1: Self-realization		α = .87	α = .87	α = .88
1[4]	I have enough will power (…)	.62	.62	.62
2[6]	I know what profession I would like to pursue (…)	.45	.39	.47
3[12]	I think I have skills (…)	.59	.58	.61
4[17]	School performance positively influences (…)	.35	.38	.34
6[21]	I feel accomplished (…)	.67	.68	.68
7[22]	I feel my teachers contribute to the development (…)	.49	.48	.49
8[23]	My basic needs are met.	.59	.56	.61
9[24]	I feel motivated (…)	.77	.74	.77
10[25]	(…)I am increasingly developing my skills.	.67	.64	.68
11[26]	(…) I have achieved my personal goals.	.66	.62	.67
12[27]	I feel accomplished (…)	.67	.65	.68
13[28]	I make use of all my abilities (…)	.54	.59	.53
14[29]	I have clear goals (…)	.59	.64	.58
F2: Assertiveness		α = .85	α = .84	α = .85
17[41]	I usually express my ideas.	.65	.69	.63
18[42]	(…) I usually know when to be firm (…)	.64	.66	.63
19[43]	I usually defend my rights.	.74	.69	.72
20[44]	(…) I know how to refuse.	.54	.49	.54
21[45]	When I disagree with someone, I express it (…)	.74	.67	.76
22[46]	(…) I use the necessary time to expose my views.	.71	.69	.72.

23[47]	I tend to speak in a clear and audible voice.	.59	.59	59
24[48]	When I speak, I look at my interlocutor (…)	.46	.46	.47.
25[49]	When I feel offended, I convey it directly (…)	.59	.54	61
F3: Social Support		α = .89	α = .88	α = .89
26[51]	Currently I feel supported (…)	.65	.64	.65
27[52]	When (…) feeling stressed, my friends support me.	.78	.68	.78
28[53]	When insecure, (…) my friends will convey security.	.82	.76	.83
29[54]	When I am sad (…) I have friends who will help me.	.84	.84	.84
30[55]	I feel appreciated and accepted (…)	.77	.77	.77
31[56]	I know that my family supports me (…)	.49	.57	.47
32[57]	I know who to turn to (…)	.61	.58	.61
33[58]	My network of social contacts is large enough (…)	.66	.67	.68
Team Work		α = .87	α = .87	α = .87
15[31]	I usually listen attentively (…)	.43	.39	.43
16[32]	When someone is introduced to me, I try to welcome this person (…)	.45	.40	.46
38[71]	(…) I enjoy collaborating with my colleagues.	.70	.68	.71
39[72]	(…) cooperation helps develop new ideas.	.67	.69	.66
40[74]	(…) the contribution of each person is important.	.65	.67	.64
41[75]	I enjoy teamwork (…)	.53	.56	.53
42[76]	The more I work together with my colleagues (…)	.55	.59	.55
43[77]	Group study makes me enjoy (…)	.37	.40	.37
44[83]	I often recognize my friends' skills.	.59	.56	.59
45[84]	(…) I like everyone to collaborate in finding solutions.	.69	.64	.69
46[85]	I appreciate the unity (…) between people (…)	.73	.69	.73

47(86)	To achieve a goal, I try to have an overview (…)	.58	.53	.59
48(87)	(…) I promote communication and understanding among all.	.59	.63	.58
49(88)	(…) I publicly praise the members of the team for their effort.	.54	.58	.54
Openness to novelty		α = .79	α = .73	α = .76
34(61)	I consider myself a creative person.	.80	.81	.79
35(62)	(…) I have original ideas.	.86	.84	.86
36(63)	I feel that my teachers appreciate my creative (…)	.48	.41	.53
37(64)	(…) I have to face unforeseen situations.	.56	.54	.54
Resilience		α = .84	α = .80	α = .84
5(20)	(…) I have a good self-esteem.	.64	.62	.64
50(92)	(…) I keep my calm.	.64	.53	.65
51(93)	I have complete confidence in my abilities (…)	.79	.73	.79
52(94)	I have been able to overcome the adversities (…)	.64	.68	.65
53(95)	I can minimize the negative effects of adversity.	.71	.68	.72
54(96)	I accept my problems (…)	.67	.59	.68
55(97)	When a situation will not change, I accept (…)	.49	.43	.50

Note: Item numbers appearing in superscript represent the original numbering of the item. Short and paraphrased versions of the items are presented.

Table 4: Inter-factor correlations and correlation with external variables

	F1	F2	F3	F4	F5	F6
F1: Self-Realization	-	.57	.58	.46	.44	.66
F2: Assertiveness	-	-	.42	.42	.53	.59
F3: Social Support	-	-	-	.57	.24	.40
F4: Teamwork	-	-	-	-	.24	.31
F5: Openness to Novelty	-	-	-	-	-	.54
Academic success	.29	.08**	.11	.05*	.14	.14
Personal skills	.33	.18	.17	.13	.22	.20
Social skills	.28	.34	.29	.34	.34	.23
Professional skills	.34	.17	.15	.13	.24	24

Note: all correlation values were significant at $p < .001$, unless stated otherwise.

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

Table 5: Descriptive measures for the complete sample and by gender

	Complete sample		Male sample		Female sample	
	M	SD	M	SD	M	SD
Self-realization	49.57	6.72	48.54	7.01	49.87	6.60
Assertiveness	33.47	5.07	33.83	4.97	33.36	5.09
Social Support	32.19	5.07	30.93	5.12	32.57	4.99
Teamwork	57.24	6.57	55.96	6.85	57.63	6.45
Openness to novelty	13.16	2.46	13.96	2.48	13.93	2.40
Resilience	23.80	3.53	24.98	3.41	23.46	3.48