






The Italian validation of the University Student Engagement Inventory

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ABSTRACT

Student Engagement (SE) refers to the extent to which a student participates in academic and non-academic activities, invests in and commits to learning, belonging and identification with the educational institution. Despite the relevance of SE for students' success, a few valid and reliable instruments have been developed. This study presents the Italian validation of the University Student Engagement Inventory (USEI), which adopts both a 3 first-order conceptualization of the SE and a second-order construct (engagement). The paper reports the psychometric analyses (test–retest reliability, construct, convergent, discriminant validities, internal consistency) on a validation sample of 628 Italian university students from 2 areas of study (psychology and biology). Criterion validity was assessed in relation to students' drop-out intention, academic achievements, Grade Point Average (GPA) and motivation. Invariance analysis was performed for gender and area of studies. Results showed that the USEI presented a good test–retest reliability and factorial construct validity (both for the three-factor and one-factor models), it positively predicted students' academic motivation, GPA and academic achievements, and negatively intention to drop out. The results indicate that the USEI can produce valid data on SE in the Italian context and may have implications for assessing SE and implementing intervention programs.

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The term Engagement refers to the personal involvement and participation in social and institutional context, representing a pivotal construct for social processes of development and innovation. Thus this construct is widely studied in several contexts, such as job and organizational sector (Bakker et al. 2008), psychotherapeutic setting (Holdsworth et al. 2014), school (Fredricks, Blumenfeld, and Paris 2004) and university context (Hu and Kuh 2002). In the school context the term 'school engagement' is mainly used in a psychosocial perspective, while in the university context is mainly used the term 'student engagement' (SE). Literature on SE is extremely varied (Trowler 2010) and, although

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its importance is widely shared, SE and its nature are still subjects of debate and a great number of different definitions has been proposed over the years, based on the different perspective adopted to study it, and sometimes even among scholars that referred to the same approach. According to Kahu (2013), there are four main approaches to the study of SE in the university context: (a) behavioural, which focuses on the students' effort and behaviour in academic activities; (b) psychological, which focuses on the intraindividual and psychological aspects of engagement; (c) socio-cultural, which focuses on the impact of the social context on the university experiences and (d) holistic, which attempts to merge the previous approaches. The most widely acknowledged perspective on SE is the behavioural approach (Kuh 2009; Krause and Coates 2008). As stated, the behavioural approach focuses on students' behaviour and teaching practice and it refers to students' participation in educational practice at universities or college (McCormick, Kinzie, and Gonyea 2013). According to this perspective, SE is the extent to which students dedicate themselves to activities that contribute to fulfil educational purposes (Hu and Kuh 2002) and it is primarily an intersection of students' behaviour and conditions generated by the university institutions that foster and support students' learning. Nevertheless, despite its relevance in the literature, the behavioural approach tends to overlook and neglect the emotional aspects of the relationship that the students establish with the university context, which is seen by students themselves as the predominant facet of SE (Solomonides and Martin 2008). An attempt to overcome this limited conceptualization of SE was made by the psychological approach, which originally concerned the school context. In the psychological perspective, that we embrace in this study, SE is conceived as a complex and multifaceted 'meta-construct' that offers crucial explanations to academic success (Fredricks, Blumenfeld, and Paris 2004). SE has a pivotal role in influencing achievement and learning and it is defined as the extent to which a student participates in academic and non-academic activities, invests in and commits to learning, belonging and identification with the educational institution (Audas and Willms 2001; Christenson et al. 2008). In general, psychological literature on SE enlightened three overarching features. First, SE is a multifaceted construct, which refers to students' thoughts, feelings and behaviour (Fredricks, Blumenfeld, and Paris 2004). Second, SE is a contextual and personal concept (Kahu 2013), embedded in and influenced by the socio-cultural context. Finally, it is a dynamic process (Lawson and Lawson 2013), which can fluctuate along with the interactional and contextual factors.

Over the years, within the psychological perspective, many definitions of engagement and conceptualizations on its dimensions have been developed (for a review, see Alrashidi, Phan, and Ngu 2016). Among the numerous models, a major approach, also known as the North American model, was developed by Fredrick et al. (2004) for studying engagement in the educational contexts and specifically in the school environment. According to this model, on which our study is based, engagement is a multidimensional construct characterized by emotional, behavioural and cognitive dimensions. The behavioural dimension refers to positive class behaviours, such as attending class, participating in classroom activities, respecting the university rules. The emotional dimension concerns positive and negative emotions related to the learning process, class activities, peers and teachers, but also to a sense of belonging to the university contexts. Finally, the cognitive dimension refers to students' thoughts and strategies related to the learning process and to the development of competences to academic activities. Each of these

dimensions can be conceived as a continuum with both ‘positive’ and ‘negative’ poles. Thus engagement can be positive or negative in terms of behaviour, cognition and emotion (Trowler 2010). Despite it was developed initially within the school context, the Fredrick et al. (2004) model on engagement may be profitably adopted to study SE in the university context for its focus on the psychological dimensions of students’ cognition, emotion and behaviour. Zhoc et al. (2019) extended the tridimensional model and proposed a new five-factor model of SE in university context rooted in Finn and Zimmer’s four-factor approach (Finn and Zimmer 2012). According to this model, in addition to the well-known dimensions of cognitive, affective and behavioural engagement, the social engagement is considered an important facet of SE. Social engagement refers to the interactions with peers (Social Engagement with Peers dimension) and with faculty staff (Social Engagement with Teachers dimension). Moreover, the behavioural dimension, which in this model is named Academic Engagement, comprises both academic learning behaviours, such as attendance, persistence and performance, and online engagement, which is related to the use of technologies for educational purposes.

Many studies emphasized the association between SE, successful achievements (Phan 2014) and students’ willingness to exert effort towards learning (Alrashidi, Phan, and Ngu 2016).

Regarding the adverse outcomes of low student engagement both inside and outside the school context, Fiorilli et al. (2017) investigated the relationship between students’ levels of school burnout, school engagement and depressive symptoms. In line with previous findings (Nolen-Hoeksema and Girgus 1994; Chow, Tan, and Buhrmester 2015), the results of this study showed a positive association between school burnout and depressive symptoms, in turn both negatively associated with students’ engagement. It is worth noting that students that were highly engaged showed fewer depressive symptoms and better scholastic achievement than disengaged ones. Moreover, students’ engagement seems to mediate the negative effects of burnout and depression on students’ academic achievement.

Some scholars have also proven that SE is associated with the students’ motivation (e.g. Senior et al. 2018) and other studies suggested some motivational antecedents that may encourage SE, such as task value (Wang and Eccles 2013) and mastery goal orientation (Wang and Holcombe 2010). Overall, the studies carried on the university context have widely demonstrated that SE improves university students’ disaffection and boredom, enhances their motivation and involvement in university-related activities, prevents the intention to drop-out, supports the academic achievements and the learning process (Chapman et al. 2011; Gilardi and Guglielmetti 2011; Klem and Connell 2004).

With the increase of studies in this field, great attention has been dedicated to the measurement of SE in the university context. Schaufeli et al. (2002) developed an adaptation of the Utrecht Work Engagement Scale, the Utrecht Work Engagement Scale – Student version (UWES-SS), to measure SE at university in three dimensions of vigour, absorption and dedication. Nevertheless, some concerns have been raised about simply rephrasing items for the work to the university contexts (Mills, Culbertson, and Fullagar 2012). Other examples of measures are the National Survey of Student Engagement (NSSE 2016), which collects information to evaluate the educational experiences of bachelor students, and the Beginning College Survey of Student Engagement (BCSSE 2013) which examines engagement in secondary school and students’ expectations for the first-year college. The NSSE is one of the most used survey on SE in

the USA and Canada and responds to the need for validated measures for research in psychology and education and for planning *ad hoc* interventions in the area of university students' success, motivation and risk to drop-out. It is composed of 20 main questions with a total of 87 items, organized in four themes: (a) academic challenge; (b) learning with peers; (c) experiences with faculty; (d) campus environment. Although the NSSE has proved to be dependable (Fosnacht and Gonyea 2018), it has also been criticized for its focus on students' habits more than on the psychological features that underline the engagement construct (Wefald and Downey 2009). Moreover, the NSSE assesses some markers of SE, such as involvement in collaborative, reflective and integrative learning, and other indicators that are not properly SE markers, but specifically facilitating contextual factors (or facilitators), such as supportive environment and teaching techniques. The lack of distinction between proper SE markers and facilitators makes difficult for researchers to have a greater degree of theoretical accuracy and to evaluate the impact of contextual factors on SE (Zhoc et al. 2019). Therefore, NSSE may be considered an evaluation of students' educational experiences more than a measure capable of explain theoretically SE (Steele and Fullagar 2009).

Recently, a new measure of the SE in the university context has been developed by Marôco et al. (2016), the University Student Engagement Inventory (USEI). The USEI, according to Fredricks's conceptualization (2015), draws both on a 3 first-order conceptualization of engagement as a multidimensional construct that includes behavioural, emotional and cognitive dimensions, and a second-order construct (engagement) that is reflected in the three first-order dimensions. Validation studies which analysed the psychometric properties of the USEI in Portuguese samples (Marôco et al. 2016; Sinval et al. 2018) and in nine different countries from Europe, North and South America, Africa and Asia (Assunção et al. 2020) demonstrated that the USEI can produce reliable and valid data on SE of university students, with an adequate item sensitivity, factor validity (both if we consider the three-factor and the second-order models), reliability and convergent-discriminant validity for the three dimensions. Furthermore, USEI presents a strong measurement invariance for gender and areas of study and it significantly predicts students' drop-out intention, academic achievements, course approval rate, and students' burnout. Overall, these findings demonstrated that the USEI presents adequate internal structure validity and that its scores are significantly related to some important aspects of university life. Nevertheless, some need for improvement emerged from previous studies. For example, the behavioural dimension dominates the variance attributed to the USEI's global score and some items produce low factor loadings (Assunção et al. 2020); furthermore, the convergent and discriminant validity was suboptimal for the behavioural and emotional dimension (Sinval et al. 2018).

In the Italian context, SE has been studied by some authors, especially in the school environment (Kozan et al. 2014), but only a few studies have been conducted in the university context. For example, Gilardi and Guglielmetti (2011) investigated SE by analysing two dimensions: (a) a behavioural level (e.g. attendance of lectures/classes, interaction with faculty members and students, the degree of use of services) and (b) a psychological level (e.g. students' perceptions of social integration, meaningfulness of the learning experience). Nevertheless, as far as we know, most studies carried out in the Italian university context have assessed SE through *ad hoc* survey and no valid and reliable measures have been developed yet for the Italian population. Although the European Credit Transfer System (ECTS)

gives some common structural basis to the European Higher Education, there are some important specificities of the Italian Higher Education System regarding both the language and contextual features that may influence the level of students' engagement and suggest the need for validated tools also in the Italian context.

Aims and hypotheses

This paper aims to analyse the psychometric properties (test–retest reliability, construct, convergent–discriminant validities and internal consistency), the invariance analysis for gender and area of studies, and criterion validity analyses in relation to students' drop-out intention, academic motivation, Grade Point Average (GPA) and academic achievements.

We expect to find, in the Italian sample, the same adequate psychometric findings documented in previous studies on the USEI in other countries.

Method

Participants

We collected a first sample of 93 Italian bachelor university psychology students for the initial test–retest reliability analysis. This sample was constituted mostly by female students (72%). Students were mainly between 21 and 23 years old (82.8%), then they were >23 years old (11.8%), and between 18 and 20 years old (5.4%). They were mostly enrolled in the third year of degree course (90.3%), the remaining students were not regular and enrolled in the first, second and third years beyond their course study (Italian 'fuoricorsi'). Most students (61.8%) declared to be not late with examinations. Furthermore, most students referred to have not any intention of drop-out from university (70%); other students declared to have thought to drop-out sometimes (25.6%), and often (4.4%).

We also collected a second validation sample constituted by 628 Italian university students. The typical participant was female (76.1%), doing a bachelor's degree (96.7%) in psychology (51%) and biology (45.7%). A smaller percentage (3.3%) was doing a master's degree in psychology. Range age was 18–20 years for most students (49.1%), followed by 21–23 (43.4%) and >23 (7.5%). Bachelor students were enrolled in the first (38.2%), second (11.7%) and third years (39.7%). A smaller percentage was 'fuoricorsi' and enrolled in the first, second and third years beyond their course study (7%), while only 3.4% was enrolled in the first year of the master's degree. The sample was quite balanced regarding the university delay, with 50.8% of students who referred to be late in making examinations. Most students referred to have not any intention of drop-out from university (72.1%); other students declared to have thought to drop-out sometimes (25%), often (2.2%) and always (0.7%).

Measures

A questionnaire was built containing the following measures: the Italian versions of the University Student Engagement Inventory (USEI) and the Academic Motivation Scale (AMS). It also contained a survey with questions on a set of socio-demographic and academic variables.

University Student Engagement Inventory (USEI)

The University Student Engagement Inventory (USEI; Marôco et al. 2016) was used as a measure of student engagement. In the USEI, student engagement is conceptualized both as a three-factor construct constituted by behavioural, emotional and cognitive dimensions and a second-order factor construct that is reflected in such dimensions. The USEI consists of 15 self-report items rated with a five-point Likert scale from '1 – never' to '5 – always'. Each of the three first-order factors is composed of five items which were possible responses to the affirmation 'Looking at your relationship with the university, we ask you to read the following statements and to assign a score ranging from 1 ('never') to 5 ('always')'. The behavioural dimension (e.g. I pay attention in class) assesses students' participation in classroom tasks and school-related extracurricular activities. The emotional dimension (e.g. I like being at university) measures both the positive and negative feelings related to professor and classmate interactions, as well as feelings of belonging to the university. Finally, the cognitive dimension (e.g. I try to integrate the acquired knowledge in solving new problems) assesses the students' investment and willingness to exert the necessary efforts for the comprehension and mastering of complex ideas and difficult skills. The USEI has previously been assessed for factorial validity, reliability, measurement invariance across genders and areas of study in Portuguese speaking students (Marôco et al. 2016; Sinal et al. 2018) and in nine different countries from Europe, North and South America, Africa and Asia (Assunção et al. 2020).

Academic Motivation Scale (AMS)

The Academic Motivation Scale (AMS) was originally developed by Vallerand et al. (1992, 1993) according to the Self-Determination Theory (SDT), which claims that individuals have a psychological need for autonomy and that there are different styles of regulation for student academic motivation which reflect differences in their relative levels of autonomy. These types of regulation can be placed along a self-determination continuum ranging from amotivation to intrinsic motivation. The Italian validated version of the AMS (Alivernini and Lucidi 2008) consists of five subscales; each scale includes four items which were possible responses to the affirmation 'Now think about the reasons why you enrolled in university'. Responses choices were rated on a 7-points Likert scale from 1 (does not correspond at all) to 7 (corresponds exactly). The five subscales are: (a) amotivation, the lowest level of autonomy characterized by a lack of intention to act and the belief that actions are beyond the students' control (e.g. Honestly, I don't know; I really feel that I am wasting my time at university); (b) external regulation, the second least self-determined behaviour which is performed to satisfy an external demand or obtain an externally imposed reward contingency (e.g. in order to obtain a more prestigious job later on); (c) introjected regulation, a 'borderline' level positioned in the middle of the continuum, where behaviours are controlled by internal reward/punishment contingencies, such as ego enhancement, guilt, or anxiety (e.g. because of the fact that when I succeed in university I feel important); (d) identified regulation, a more autonomous form of motivation which entails the student attributing personal importance to the behaviour (e.g. because I think that university will help me better prepare for the career I have chosen) and (e) intrinsic motivation, the most autonomous form of motivation

which occurs when identified regulations have been assimilated to the self as doing activities is related to an inherent satisfaction rather than to separable consequences (e.g. because I experience pleasure and satisfaction while learning new things) (Deci and Ryan 2000). Finally, the AMS allows calculating an index of one's own self-determined motivation, the Relative Autonomy Index (RAI), that serves as an indicator of an individual's overall motivational orientation with positive scores representing more autonomous regulation and negative scores representing more controlling regulation (Vallerand and Ratelle 2002). The AMS has previously been assessed for factorial validity, reliability, measurement invariance across genders and areas of study in English- and French-speaking students (Grouzet, Otis and Pelletier 2006) and also in Italian-speaking students (Alivernini and Lucidi 2008).

Socio-demographic and academic-related variables

The socio-demographic variables assessed were gender and age range (18–20, 21–23, <23). The self-reported academic variables were the degree course (psychology and biology), type of degree (bachelor and master), year of enrolment (first, second, third of enrolment or extra year of enrolment beyond the students course), students' state of delay in making examinations ('Are you lagging behind your examinations?'; Yes = 1, No = 2), a four-point Likert scale regarding students' intention to drop out (from never = 1 to always = 4), students' Grade Point Average (GPA) and number of European Credits Transfer System (ECTS) gained. ECTS are a standard for comparing study attainment and performance of students in higher education and for facilitating their transfer and progression throughout the European Union. As many European countries, Italian universities have adopted this standard, which establishes that students must gain 180 ECTS credits for successful completion of a bachelor's degree, and 120 ECTS credits for completing master's degree (60 ECTS credits for each academic year). Each examination corresponds to a specific number of ECTS credits (e.g. 4, 8, 10 or 12, depending on the academic degree course). In order to obtain an indicator of the students' academic achievements based on the ECTS, we computed, for each student, an index of degree completion (hereafter degree completion rate, DCR) (Esposito, Freda and Manzo 2016) that was calculated as a ratio between the number of ECTS gained and the number of ECTS expected to be gained based on the student's year of enrolment and according to the following formula:

$$\text{Degree Completion Rate} = \left(\frac{\text{GAINED ECTS}}{\text{EXPECTED ECTS}} \right) 100$$

From the academic-related variables, we selected DCR, GPA and dropout intention as criterion variables.

Procedures

Two separate procedures were followed, the first with the aim to analyse the USEI test–retest reliability in a first sample, and the second with the aim to verify the psychometric properties of the Italian version of the USEI in a second validation sample:

USEI adaptation and test–retest administration

The Italian translation of the USEI was carried out with the author's authorization of the original Portuguese version. For the translation of the questionnaire and its adaptation to the Italian context, some recommendations from the literature relating to the cross-cultural adaptation of the questionnaires and rating scales were followed (Streiner and Norman 1996). The Italian translation was made by a bilingual researcher and was subsequently subjected to a back-translation procedure by another bilingual researcher. Three independent judges then considered the equivalence of the original and the back-translated versions. The definitive Italian version was then administered in a pilot study to a group of 10 university students randomly selected from some psychology classes in order to identify possible problems of comprehensibility of the items. The entire set of questionnaires (USEI, AMS, and socio-demographic and academic survey) was definitively administered in the Department of Humanities, University of Naples Federico II, Italy, during a class devoted to third-year bachelor psychology students. A total of 93 students filled in the questionnaire 2 times: the first time the students were asked to fill in the entire set of questionnaires, the second time, after about 2 weeks, only the Italian version of the USEI. As the questionnaire was anonymous, identification codes were used to pair the questionnaires for the two administrations. The survey was designed to take about 20 min to complete the first time and about 5 min for the second administration.

Validation sample administration

The second procedure aimed at obtaining the validation sample for other psychometric analyses. The USEI was anonymous and it was administered during some classes mostly frequented by students in the Department of Biology and in the Department of Humanities of the University of Naples Federico II, Italy. A total of 628 students filled in the questionnaire and it took about 20 min.

In both procedures, at the end of the questionnaire, participants answered a series of socio-demographic and academic-related questions. Before administering the questionnaire, participants signed informed consent in accordance with the Italian law on Privacy and Data Protection (No. 196/2003), the ethical principles of the Italian Association of Psychology (AIP), and the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects. Participants gave their informed consent to publish related results in an anonymous form. All data became the property of the University of Naples Federico II, Italy.

Data analysis

Different procedures of data analysis were followed. First, the reliability of the USEI over time was assessed in a sample of 93 students through a test–retest correlation and by using the Pearson Correlation Coefficient. Values ≥ 0.9 were indicative of excellent reliability, $\geq 0.8 < 0.9$ of good reliability, and $\geq 0.7 < 0.8$ of acceptable reliability (Pereira et al. 2020).

Then, summary measures (mean = M ; standard deviation = SD), skewness (sk), kurtosis (ku) and a histogram for each of the 15 items of the USEI were used to verify

distributional properties and psychometric sensitivity on the total validation sample of 628 students. According to Finney and DiStefano (2013), absolute values of sk smaller than 3 and ku smaller than 7 were considered indicative of no strong deviations from the normal distribution.

Factorial, convergent and discriminant related validities of the cognitive, emotional and behavioural dimensions of the USEI were tested. To evaluate the USEI's three-factor model evidence for factorial validity, a confirmatory factor analysis (CFA) was performed and the following CFA indexes were assessed: Comparative fit index (CFI), Tucker–Lewis fit index (TLI), Normed Fit Index (NFI), Standardized root mean square residual (SRMR) and Root mean square error of approximation (RMSEA). The fit was considered good for CFI, NFI and TLI larger than .95 and RMSEA and SRMR smaller than .08 (Byrne 2012; Marôco 2014). To evaluate convergent and discriminant related validity for the three factors, we followed Fornell and Larcker (1981) theoretical framework which was used in other studies on the USEI (Marôco 2014; Marôco et al. 2016). According to this model, convergent validity can be assessed by the Average Variance Extracted (AVE) which measures the level of variance captured by a construct in relation to the amount of variance due to measurement error, whereas discriminant validity can be assessed by comparing the amount of the variance captured by the construct (AVE) and the shared variance with other constructs. Therefore, average variance extracted (AVE) by each factor larger than .5 was considered indicative of convergent validity, while squared correlations between every two factors smaller than each of the factors' AVE was indicative of discriminant validity (Fornell and Larcker 1981; Marôco 2014). According to the theoretical definition of the engagement construct reflected in the USEI, a second-order factor model was also tested by CFA, as described above. Indeed, in order to, empirically, support our theoretical claim of a second-order factor model we firstly performed correlations between first-order factor.

To detect whether the second-order latent USEI model holds across genders and areas of study (biology and psychology), an analysis of invariance was conducted, by creating a group of nested models for the two genders and areas of studies, following the recommendations of Millsap and Yun-Tein (2004) and Wu and Estabrook (2016). A set of hierarchical models for group comparison were set with increased restrictions on factors (configural), factor loadings (loadings), items' intercepts (intercepts), factor intercepts (means), second-order factor loadings (regressions), structural coefficients (structural) and residual variances (residuals) were compared to no constrained models. Model invariance was assessed by comparison of the fit of the constrained vs. unconstrained models using the Cheung and Rensvold ΔCFI criterion ($|\Delta CFI| < .01$) and the Rutkowski and Svetina $\Delta RMSEA$ criterion ($|\Delta RMSEA| < .01$). Weak factorial or metric invariance was assumed when factor loadings were invariant between groups. Metric invariance means that the contribution of each item to the factor remains constant across different groups. Strong or scalar invariance was assumed when factor loadings and intercepts were invariant across groups. Scalar invariance enables comparisons between group means. When factor loadings, intercepts and second-order factor loadings (regressions), structural regression coefficients and residual variances were invariant across groups, full invariance was assumed.

To assess criterion-related validity, dropout intention, DCR, GPA and academic motivation scores were simultaneously regressed on student engagement. Evidence of

criterion predictive validity was obtained with MLR or probit regression (for ordinal outcomes) using the *lavaan* package (Rosseel 2012).

Finally, the internal consistency for the three factors of USEI was assessed by the McDonald's omega coefficient (ω ; McDonald 2013). Values of omega ≥ 0.7 were indicative of acceptable internal consistency (Marôco 2014).

Results

Test-retest reliability

To detect a measure of the strength of linear association between USEI's items at Times 1 and 2, Pearson's coefficient was calculated and it showed good reliability ($r = .82$) in the sample of 93 students. These findings indicate that USEI is a reliable measure of SE over time.
















Items' distributional properties

The descriptive statistics related to mean (M), standard deviation (SD), skewness (sk), kurtosis (ku) and histogram for each of the 15 items of the USEI are given in Table 1. The overall mean response was 3.75 ($SD = 0.90$). As absolute values of ku were smaller than 7 and sk smaller than 3, no item showed sk and ku values that were suggestive of a severe deviation from the normal distribution (Finney and DiStefano 2013). Indeed, the items' distributional coefficients are indicative of appropriate psychometric sensitivity as they are expected to follow an approximately normal distribution in the population under study.

Evidence for construct related validity

The hypothesized three-factor model fit with the data was good as shown in Figure 1 which reports the correlations among latent variables and factor loadings for each item. There is also a good overall goodness-of-fit indices ($\chi^2/84 = 259.76$; $CFI = 0.95$; $NFI = 0.93$; $TLI = 0.94$; $RMSEA = 0.06$; $SRMR = 0.05$). Overall, the factor loadings

Table 1. Distributional properties of the USEI's items ($n = 628$).

Item	M	SD	Sk	ku	Histogram
Item 1	4.10	0.63	-0.73	2.51	
Item 2	4.53	0.69	-1.51	2.30	
Item 3	3.54	0.84	-0.47	0.23	
Item 4	2.58	1.15	0.37	-0.59	
Item 5	3.67	1.09	-0.62	-0.36	
Item 6	3.51	1.20	-0.38	-0.77	
Item 7	3.40	0.88	-0.32	0.02	
Item 8	3.87	0.88	-0.72	0.64	
Item 9	3.83	0.87	-0.41	-0.19	
Item 10	3.20	0.99	-0.34	-0.21	
Item 11	4.07	0.94	-1.03	0.86	
Item 12	3.64	0.95	-0.49	0.12	
Item 13	4.33	0.82	-1.23	1.27	
Item 14	3.96	0.78	-0.48	0.22	
Item 15	3.98	0.79	-0.47	-0.07	

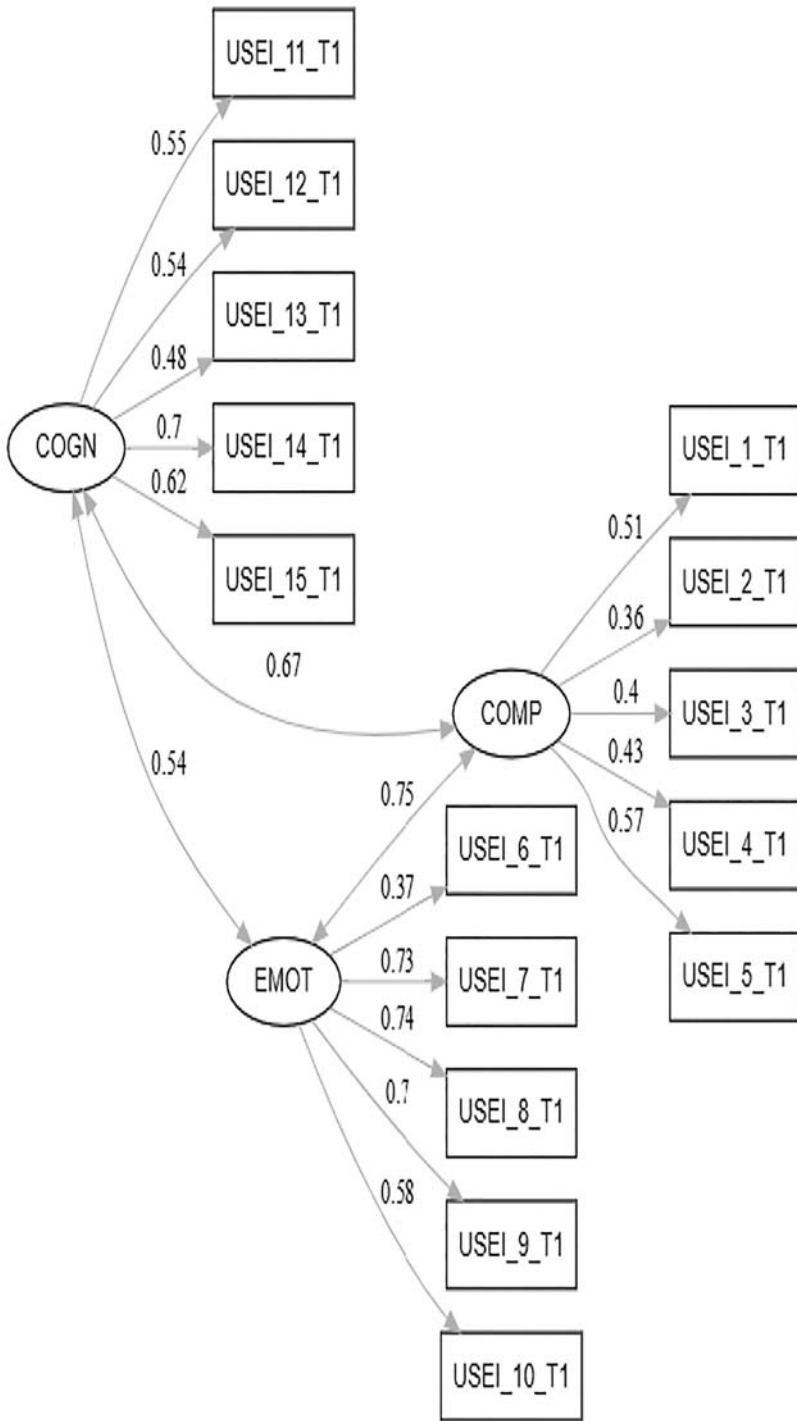


Figure 1. Confirmatory factor analysis of the USEI (three-factor model – 15 items) ($\chi^2(84) = 259.76$; CFI = 0.95; NFI = 0.93; TLI = 0.94; RMSEA = 0.06; SRMR = 0.05).

of each latent variable were statistically significant and above the minimum value (0.32) cited as the minimum acceptable criterion for a factor loading (Tabachnick and Fidell 2006). Nevertheless, it's interesting to note that item 2 and item 6 (the latter is the only reversed item) presented the lowest factor loading values, respectively 0.36 and 0.37.

Regarding the convergent related validity, the AVE was low for behavioural (0.23), emotional (0.40) and cognitive dimensions (0.42), thus convergent validity was weak as AVE was not larger than 0.50 (Fornell and Larcker 1981). The HTMT inter-construct correlations were below the recommended threshold of 0.70 for behavioural vs. cognitive (0.66) and cognitive vs. emotional (0.49) dimensions, but not for the behavioural vs. emotional dimensions (0.76). These results show overall reduced convergent validity and discriminant validity, except for behavioural vs. emotional.

The hypothesized second order factor model, *engagement*, also showed a good overall goodness-of-fit indices ($\chi^2/84 = 259.76$; $\chi^2/df = 3.09$; $CFI = 0.95$; $NFI = 0.93$; $TLI = 0.94$; $RMSEA = 0.06$; $SRMR = 0.05$), as shown in Figure 2 too. Furthermore, university engagement reflects mostly on the behavioural engagement ($\beta = .97$; $p < .001$), but also has strong impact on emotional ($\beta = .77$; $p < .001$) and cognitive engagement ($\beta = .70$; $p < .001$).

Evidence for measurement invariance

Using the ΔCFI and $\Delta RMSEA$ criteria, weak measurement invariance of the USEI was observed for gender ($\Delta CFI = 0.004$; $\Delta RMSEA = -0.003$; see Table 2) and area of studies ($\Delta CFI = 0.009$; $\Delta RMSEA = -0.001$; see Table 3). Scalar invariance (strong measurement invariance) was observed for gender based on the $\Delta RMSEA$ criterion but not on the ΔCFI ($\Delta CFI = -0.022$; $\Delta RMSEA = 0.003$; see Table 2).

Evidence for criterion related validity

The USEI showed negative predictive criterion-related validity with dropout intention, amotivation subscale of the AMS, external subscale of the AMS. The USEI showed positive predictive criterion-related validity with identified motivation subscale of the AMS, intrinsic motivation subscale, RAI index, DCR and GPA. Instead, the USEI did not show any predictive criterion-related validity with the introjected subscale of the AMS (see Table 4).

Overall, the USEI showed evidence for concurrent validity with the more autonomous forms of academic motivation, students' DCR and GPA, and negative predictive validity with the less autonomous forms of academic motivation, and intention to drop-out.

Evidence of internal consistency: reliability

McDonald's ω coefficient was low for behavioural (.29) and cognitive (.65) dimensions, and acceptable for emotional (.73) dimension and for USEI's 15 items total (.75). Altogether, these results provide evidence of acceptable internal consistency reliability only for the emotional dimension and for the USEI's 15 items total, while the cognitive and behavioural dimensions are unable to reach the recommended threshold of .70.

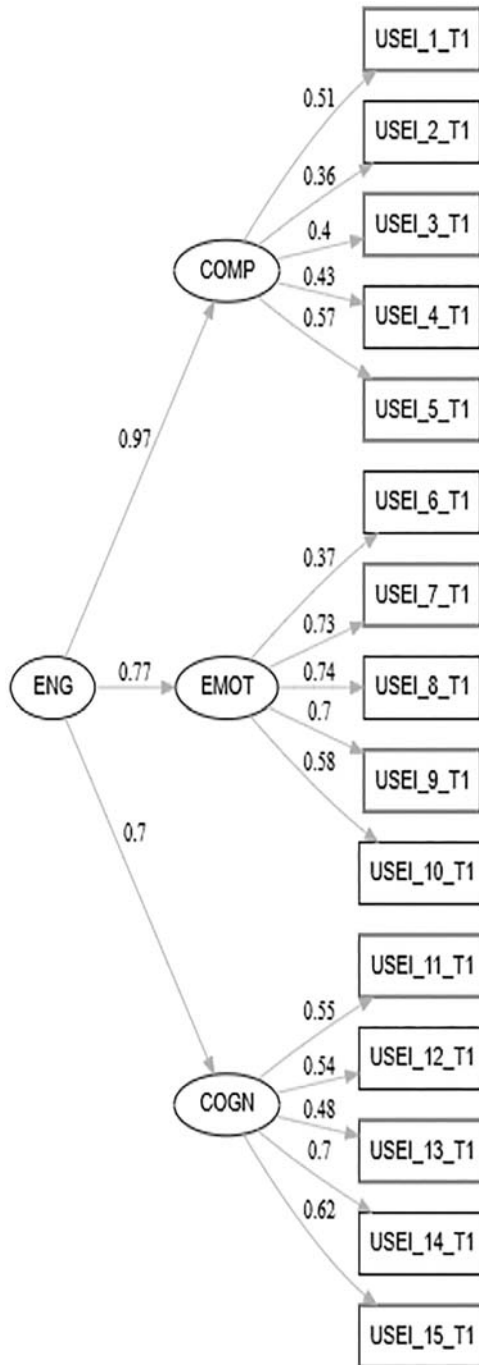


Figure 2. Confirmatory factor analysis of the USEI (second-order model – 15 items) ($\chi^2(84) = 259.76$; CFI = 0.95; NFI = 0.93; TLI = 0.94; RMSEA = 0.06; SRMR = 0.05).

Table 2. USEI's invariance analysis for gender (scaled statistics).

Model	χ^2	df	CFI	RMSEA	D χ^2	Ddf	DCFI	DRMSEA
Configural	366.300	174	.877	.062				
Loadings (metric invariance)	370.439	186	.881	.059	4.139	12	0.004	-0.003
Intercepts (scalar invariance)	418.397	198	.859	.062	47,598	12	-0.022	0.003
Regressions	420.648	200	.859	.062	2.251	2	0.000	.000

Table 3. USEI's model comparison for area of studies (scaled statistics).

Model	χ^2	df	CFI	RMSEA	D χ^2	Ddf	DCFI	DRMSEA
Configural	573.739	261	.830	.075				
Loadings (metric invariance)	596.905	285	.821	.074	23.166	24	-0.009	-0.001
Intercepts (scalar invariance)	817.307	309	.709	.090	220.402	24	-0.112	0.017
Regressions	820.915	313	.709	.090	3.608	4	0.000	-0.001

Discussion

Despite the growing interest in SE and its relevance for students' success, there is a strong need for validated measures for assessing SE in higher education contexts, specifically in the Italian university system where, to date, no valid and reliable instruments have been developed yet.

This study presented the Italian validation of the USEI, a valid and reliable tool recently developed by a Portuguese research team and used in several countries around the world. Overall, these findings showed that the USEI can produce valid data on academic engagement also in the Italian context. Specifically, the USEI presented good reliability test-retest, thus it was demonstrated that it is a reliable measure of SE over time. This finding was a novelty of our study, and it is useful since it enabled us to verify that the USEI resists to many factors (e.g. participants' different moods, external conditions, etc.) which might affect the students' ability to respond accurately over time.

Regarding the construct validity, the USEI presented adequate items' psychometric sensitivity, adequate evidence of factorial validity, both for the three-factor and one-factor models, but a good internal consistency only for the emotional dimension and the USEI's 15 items total. These findings were observed in other studies that obtained acceptable/good overall goodness of fit, as well as with other studies where behavioural dimension obtained lower reliability (Costa et al. 2014; Marôco et al. 2016).

Nevertheless, some weaker findings emerged in the present study: convergent validity was weak for the three dimensions, while discriminant-related validity was acceptable

Table 4. USEI's criterion validity with AMS scales and academic variables.

Academic variables and motivation subscales	USEI β	R^2
Drop out intention	-0.191*	0.036
Degree completion rate	0.246**	0.061
Grade point average	0.232**	0.054
Amotivation subscale of the AMS	-0.500**	0.250
External subscale of the AMS	-0.311**	0.096
Introjected subscale of the AMS	-0.075	0.006
Identified motivation subscale of the AMS	0.511**	0.261
Intrinsic motivation subscale of the AMS	0.638**	0.406
RAI index	0.615**	0.378

* $p < 0.005$; ** $p < 0.001$.

only for the behavioural vs. emotional dimensions. These results, together with the ones regarding the weak internal consistency of behavioural and cognitive dimensions, showed that, despite the adequate evidence of factorial validity, the three first-order dimensions of engagement are not strongly correlated, and the USEI dimensions may differ from each other by measuring different factors of the engagement construct. On one hand, these findings are consistent with previous studies which showed that the convergent and discriminant validities were suboptimal for the behavioural and emotional dimension (Sinval et al. 2018); on the other, these findings diverged from other studies where both good convergent and discriminant validity were found (Assunção et al. 2020). A possible explanation to these results is that, in the present study, some specific items maybe not good manifestations of the factors they load onto. For example, item 2 ('I follow the university rules') and 6 ('I do not feel very accomplished at this university') presented the lowest factor loading values, respectively 0.36 and 0.37. We hypothesize that item 2 may have created some problems in terms of comprehensibility: for example, the concept of 'rule' is quite generic and in the Italian sample may have been interpreted variously by students, as someone may have referred to institutional and formal rules (e.g. paying university taxes), others, to conventional social rules (e.g. respecting professors or classmates). Furthermore, item 6 is the only reversed item and may have created problems in the response set of the participants or it could be indicative of straight-lining by respondents which suggests a failure to carefully read the questions. This may suggest a need both to rephrase item 2 and to present item 6 in the same direction as the other items in future studies. Moreover, in order to contrast straight-lining in future studies, it could be taken into account the possibility to present in a different graphic presentation the items (e.g. avoiding grid or tab presentation; providing questions with different rating scales). Overall, considering all the results emerged by the psychometric analyses, it seems that there are some needs for improvement of some items.

Regarding the invariance analysis, we chose to perform these analyses also on gender given that male and female students may have different perspectives on higher education and these discrepancies may impact differently on their engagement regarding the course work, academic rules and regulations, etc. (Vincent-Lancrin 2008). The findings of the present study showed a weak invariance both for genders and areas of studies. These results are not aligned with previous studies on Portuguese students (Marôco et al. 2016; Sinval et al. 2018), but they seem more aligned with studies which compared invariance among different countries/regions where it was found a weak invariance among different cultural groups (Assunção et al. 2020). This may have depended on different reasons: for example, only biology and psychology students were considered in this study while previous findings were based on university students coming from different areas of study (e.g. mathematics and health sciences); but it is also plausible to hypothesize that the USEI's items were interpreted in a conceptually dissimilar manner by the Italian students and that they conceptualized the construct in different ways. According to some scholars, studies translating measures into other languages have found similar factor structures but not evidence for scalar (strong) measurement invariance (Thalmayer and Rossier 2019). Again, this may have depended both on some items that may have been interpreted in different ways or by the reversed modality of other items. For example, prior research had indicated that the reversed-coded items caused

problems for 10–20% of the raters, who did not seem to rate them accurately (Jozsa and Morgan 2017) and the measurement invariance conducted only on positively worded items was confirmed among different cultural samples. This is an area that deserves more research when doing cross-cultural adaptations.

Finally, with regard to the criterion validity, findings showed that the USEI positively predicted the most autonomous forms of motivation (intrinsic and identified motivation), the individual's overall motivational orientation (the RAI index), the students' academic achievements (DCR) and the students' GPA, while it negatively predicted the students' intention to drop-out and the less autonomous forms of motivation (amotivation and external motivation). It is also interesting to note that the USEI did not show any predictive criterion-related validity with the introjected subscale of the AMS. As this is a 'borderline' subscale positioned in the middle of the self-determination continuum, it was plausible to expect neither relation with the USEI scores. It is important to underline that a novelty of the present study was to analyse the relationship between SE and students' motivation. As stated, many studies have proven that SE is associated with the students' motivation (e.g. Appleton et al. 2008; Senior et al. 2018) and that some motivational antecedents may encourage SE (Wang and Eccles 2013; Wang and Holcombe 2010). This implies the possibility to adopt the USEI for evaluating university interventions aimed at improving SE and students' retention, by also assessing if such interventions promote more autonomous forms of students' motivation. Overall, these are very important findings as they showed that SE works as a relevant variable with a strong impact on many academic variables.

Conclusion

This study has shown that the USEI may be considered a valid tool to assess SE in the Italian university context, but its reliability needs further investigations, since it showed that one dimension works better than the others. Results showed that the USEI presented both a good test-retest reliability and factorial construct validity, positively predicted students' academic motivation, academic achievements and GPA, and negatively predicted students' intention to drop out.

Nevertheless, compared with previous studies, some differences emerged due to the cultural university diversities and some room for improvement are needed especially in terms of items' rephrasing. Some dimensions did not present the expected convergent validity evidence, appearing to be somehow related to the dimensions content and to the different meanings attributed by Italian participants.

Overall, the findings of the present study showed that the USEI can become an interesting inventory for education and psychology researchers to analyse the relationship between the different types of academic engagement and other academic variables important for student adjustment and academic achievement.

This study may have some theoretical implications. For example, findings showed that SE is a multidimensional construct and that the three-factor structure is indicative of a higher-order construct. This is consistent with some of the major theoretical approaches to engagement (Fredrick et al. 2004).

This study may have also some practical implications. The USEI may be considered a valid tool that can predict relation with other academic variables related to the students'