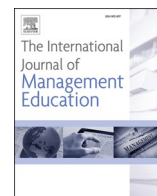


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Using Entrepreneurial Self-Efficacy as an Indirect Measure of Entrepreneurial Education

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ABSTRACT

Business schools are under increasing pressure to demonstrate their educational achievements. In particular, some have questioned the utility of entrepreneurship education. As a result, measuring the knowledge and skills obtained from entrepreneurship education is crucial for both entrepreneurship programs as well as for business schools. While other studies have tried to measure entrepreneurship intent, this study seeks to validate and use a tool developed by Gedeon and Valliere (2018) in order to compare students who have taken an entrepreneurship course with students who have yet to take the course. Unlike the entrepreneurial intent measure, entrepreneurial self-efficacy, as developed by Gedeon and Valliere (2018), is founded on an educational assessment perspective, thereby seeking to augment a university degree program's learning outcomes. The measure is validated and tested using a sample of 560 students from four private universities in Lebanon. The results obtained using confirmatory factor analysis both support the internal consistency of the measure as well as support its utility as a tool to measure differences between both groups of students. The results show that in the sample used, the entrepreneurship course has led to an increase in entrepreneurial self-efficacy.

1. Introduction

Many universities around the world continue to be subjected to more stringent financial controls (Alexander, 2000). As such, voices calling for accountability in higher education have been getting louder (Black & Duhon, 2003). Business schools, in particular, have been put under more pressure than other schools. In 2002, Jeffrey Pfeffer and Christina Fong published an article titled "The End of Business Schools? Less Success Than Meets the Eye." In the article, the authors argued that business schools have not been living up to their end of the bargain: possessing an MBA and better grades were not correlated with career success. Pfeffer and Fong (2002) note that to date little evidence exists supporting the actual connection between mastery of the MBA curriculum and subsequent on-the-job behavior, thus leading critics to conclude that the MBA is out-of-touch with the real world and the needs of practicing managers (Rubin & Dierdorff, 2009).

The problem is not only that of teaching relevant skills, but it is also related to the proper evaluation of whether the skills have been acquired or not. In order to address the issue of relevancy, not only must business programs teach relevant skills, but these skills need to be assessed using a sound training evaluation method that intends to evaluate the outcomes of the program.

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2. Literature review

In 2003, the standards of the Association to Advance Collegiate Schools of Business (AACSB) International were revised, with the most significant change being in the assurance of learning standard which requires a demonstration of direct educational achievement (Martell, 2007). This led to a shift from using only indirect measures such as surveys to using a combination of direct and indirect measures. Therefore, universities are now expected to gather data from direct measures. The data is then assessed, and the results are used to close the loop through a process of continuous improvement (Martell, 2007). Accreditation programs, however, do not specify the nature of the direct measures to be used. As such, each school must make its own decisions regarding the measures that are to be used. Examples of direct measures include standardized tests, case studies, and projects (Weldy & Turnipseed, 2010). A 2010 review found that the majority of schools have allocated a budget of more than \$10,000 annually to implement this new assurance of learning standards (Kelley, Tong, & Choi, 2010).

As mentioned previously, the use of direct measures has not eliminated the use of indirect measures. Both continue to be used in business schools (Weldy & Turnipseed, 2010). While direct measures are intended to demonstrate that knowledge has been acquired, indirect measures such as surveys and interviews are used to gauge student perceptions. Of particular importance is the teaching of entrepreneurship, in which interest has continued to expand (Katz, 2003). Despite this increase in interest, the field has only gained partial legitimacy (Katz, 2008), with some educators lamenting the current “state-of-the-art” (Gedeon, 2014) and others even asking whether entrepreneurship can be taught (Neck & Greene, 2011). This problem is accentuated by the fact few studies have evaluated entrepreneurship education in general (Warhuus & Basaiawmoit, 2014), and the few studies that have done so have produced different results (Karlsson & Moberg, 2013).

Gedeon and Valliere (2018) proposed the use of self-efficacy as an indirect measure to measure students’ self-perception after completing an entrepreneurship course. Self-efficacy as a concept is deeply rooted in social cognitive theory (SCT) (Bandura, 2001). SCT argues that individuals are neither completely autonomous nor controlled by their environment. This stance is made possible by distinguishing between two types of environments, the imposed environment, and the selected environment. SCT argues that the selected environment is chosen based on the individual’s perception of his or her own self-efficacy (Zimmerman, 1990). In SCT, what

Table 1
The eleven subdomains that measure entrepreneurial self-efficacy (Gedeon & Valliere, 2018).

Subdomain	Description	Sample Items
Opportunity Identification and Creativity	Opportunity identification is central to entrepreneurship. This includes opportunities that are discovered and those that are created (Alvarez & Barney, 2007).	I have the ability to Identify opportunities for new ways to conduct activities Come up with new and different solutions
Information Alertness	Information alertness reflects the fact that entrepreneurs need to be alert to new possibilities and therefore, should engage in proactive information searching (DeTienne & Chandler, 2004).	I have the ability to Be alert to proactively discovering new information of value Identify, select, and process information from a variety of sources
Planning under Uncertainty	Planning under uncertainty accounts for the fact that entrepreneurial decisions are made in the face of uncertainty (Engel, Dimitrova, Khapova, & Elfring, 2014).	I have the ability to Determine a competitive price for a new product or service Design an effective marketing/advertising campaign for a new product or service
Resource Marshalling	Resource marshalling is central to entrepreneurship, given that entrepreneurs are alert to underutilized resources (Valliere, 2013), and need to acquire resources (Zott & Huy, 2007).	I have the ability to Get others to identify with and believe in my vision and plans for a new venture Establish new contacts
Adaptability	Adaptability is crucial in entrepreneurship, given the dynamic context in which most entrepreneurs operate (Haynie, Shepherd, & Patzelt, 2012).	I have the ability to Deal with sudden changes and surprises Work under stress and pressure
Financial Management	Financial management is a necessary skill given that money is one of the, if not the, most important resources that entrepreneurs need to acquire and control (Gedeon & Valliere, 2018).	I have the ability to Manage the financial assets of my venture Estimate a budget for a new project
Teamwork	Recent studies have argued that entrepreneurship is better viewed as a team effort given that opportunity recognition and decision-making are most likely derived from social processes (Foss, Klein, Kor, & Mahoney, 2008).	I have the ability to Supervise employees and/or team members Recruit and hire employees and/or team members
Critical Thinking	Entrepreneurs are believed to have a distinct way of thinking (Kirzner, 1979) that is learnable (Mitchell et al., 2002).	I have the ability to Make correct inferences from data Deduce conclusions from information or data provided
Communication	Communication is recognized as a key skill for all managers, but especially so for entrepreneurs, given that these skills influence investor decision making (Clark, 2008).	I have the ability to Apply active listening skills to communicate with others Communicate with others
Persuading and Entrepreneurial Selling	While communication is necessary for persuading, it remains a holistic measure. Persuading and entrepreneurial selling is a more task-specific measure of an entrepreneur’s ability to sell in innovative ways and to generate several alternatives for a customer to choose from (Wang & Netemeyer, 2004).	I have the ability to Generate and evaluate multiple alternatives for novel customer problems Have fresh perspectives on old problems
Self-Management	Self-regulation is the primary skill by which an individual improves his or her self-efficacy (Bandura, 1991).	I keep focused on tasks I need to do even if I do not like them I make sure to track my progress regularly when I am working on a goal

really matters is self-efficacy and not actual efficacy since individuals select their environments based on their beliefs, not based on reality. As such, self-efficacy becomes the foundation of human agency (Bandura, 2001).

A central tenet of perceived self-efficacy is that it is domain-specific (Pajares, 1996), thus leading Bandura (1986) to caution against using general measures of the construct. Self-efficacy is an especially useful construct in education because it develops using information from four sources: actual performance, emotional arousal, vicarious learning, and social persuasion. Therefore, self-efficacy can be strengthened using educational processes (Wood & Bandura, 1989). Self-efficacy has been found to be a better predictor than both past performance (Bandura, 1982) and outcome expectations (Lent, Brown, & Larkin, 1987), and this has been especially true in the academic field. For examples, differences in self-efficacy between males and females have been found to explain why female students steer away from engineering and math (Ceci, Ginther, Kahn, & Williams, 2014) despite the fact that there were no gender differences in mathematics performance (Devine, Fawcett, Szűcs, & Dowker, 2012; Goetz, Bieg, Lüdtke, Pekrun, & Hall, 2013). Studies have also found the self-efficacy accounts for differences in college outcomes to a greater extent than standardized tests and aptitude measures (Brown, Lent, & Larkin, 1989), with the relationship between self-efficacy and academic performance being three times the magnitude of the relationship between previous and current academic performance (Gore, 2006).

Given that self-efficacy is domain-specific and given that it has been found to be better than other constructs at predicting the future, researchers in entrepreneurship have tried to develop an entrepreneurial self-efficacy construct in order to predict entrepreneurial intentions. Although the construct accounts for both cognitive elements as well as personality traits, these studies were primarily concerned with predicting start-up intent (Barbosa, Gerhardt, & Kickul, 2007; McGee, Peterson, Mueller, & Sequeira, 2009). Therefore, as noted by Schlaegel and Koenig (2014), entrepreneurial self-efficacy is deeply grounded in intention models such as the theory of planned behavior (Ajzen, 1991) and the entrepreneurial event model (Shapero & Sokol, 1982).

Previous entrepreneurial self-efficacy measures were aimed at predicting start-up intent. Entrepreneurship intent after all is defined as the intention of an individual to start a new business venture (Krueger, 2009). Despite the importance of measuring intent in the entrepreneurial setting, universities are more interested in measuring learning and performance, given that they are expected to measure program learning outcomes. Starting from this educational perspective, Gedeon and Valliere (2018) developed a 44-item survey that aimed at measuring eleven subdomains. The eleven subdomains are summarized in Table 1. Unlike entrepreneurial intent, the purpose of the proposed scale is to “help augment a university degree program’s learning outcome (Gedeon & Valliere, 2018, p. 278).”

Different entrepreneurship programs in different universities might have different learning outcomes. The measure used in this study is based on an analysis performed by Gedeon (2017) in which the author identified a representative list of entrepreneurship program learning outcomes. As such, these eleven subdomains aim at being representative of entrepreneurial programs while also acknowledging that no such list could exactly represent different programs.

3. Purpose of the study

As of this instance, no study has been conducted to validate the entrepreneurial self-efficacy scale developed by Gedeon and Valliere (2018). Given the aforementioned lack of consensus that surrounds entrepreneurial education in general, and the need to demonstrate educational achievement, this study aims at testing the validity of the proposed scale. An additional contribution of this study is that the generality of the measure will be tested in a different cultural context than the cultural context in which the survey instrument has been developed. Once the validity of the scale is established, the study will then attempt to compare students that have taken the entrepreneurship course with students that have not taken the course. Therefore, the study will attempt to use the survey instrument in order to measure the educational achievement of entrepreneurship education, at least in the sample that is used.

4. Methodology

4.1. Data collection

The data used in this study comes from four private universities in Lebanon. Despite having a small population of around 6 million, there is a total of 41 private universities and one public university operating in the country. The total number of students attending these universities is 200,807 (The statistical bulletin for the academic year 2016-2017, 2018). Business education is especially important in the country, given that most undergraduate students (around 33%) are enrolled in degrees that are categorized as the Ministry of Education as “Commerce, Business, and Law.”

The total number of students in the data set is 560, with all of them being undergraduate business students. Despite the fact that the education of entrepreneurship is not limited to business students (Kuratko, 2005), we limited our sample to students in business schools in order to have a more homogeneous sample thereby controlling for differences that may result from taking radically different

Table 2
Distribution of students by level.

Level	Percent
Sophomore	12.24%
Junior	33.04%
Senior	54.72%

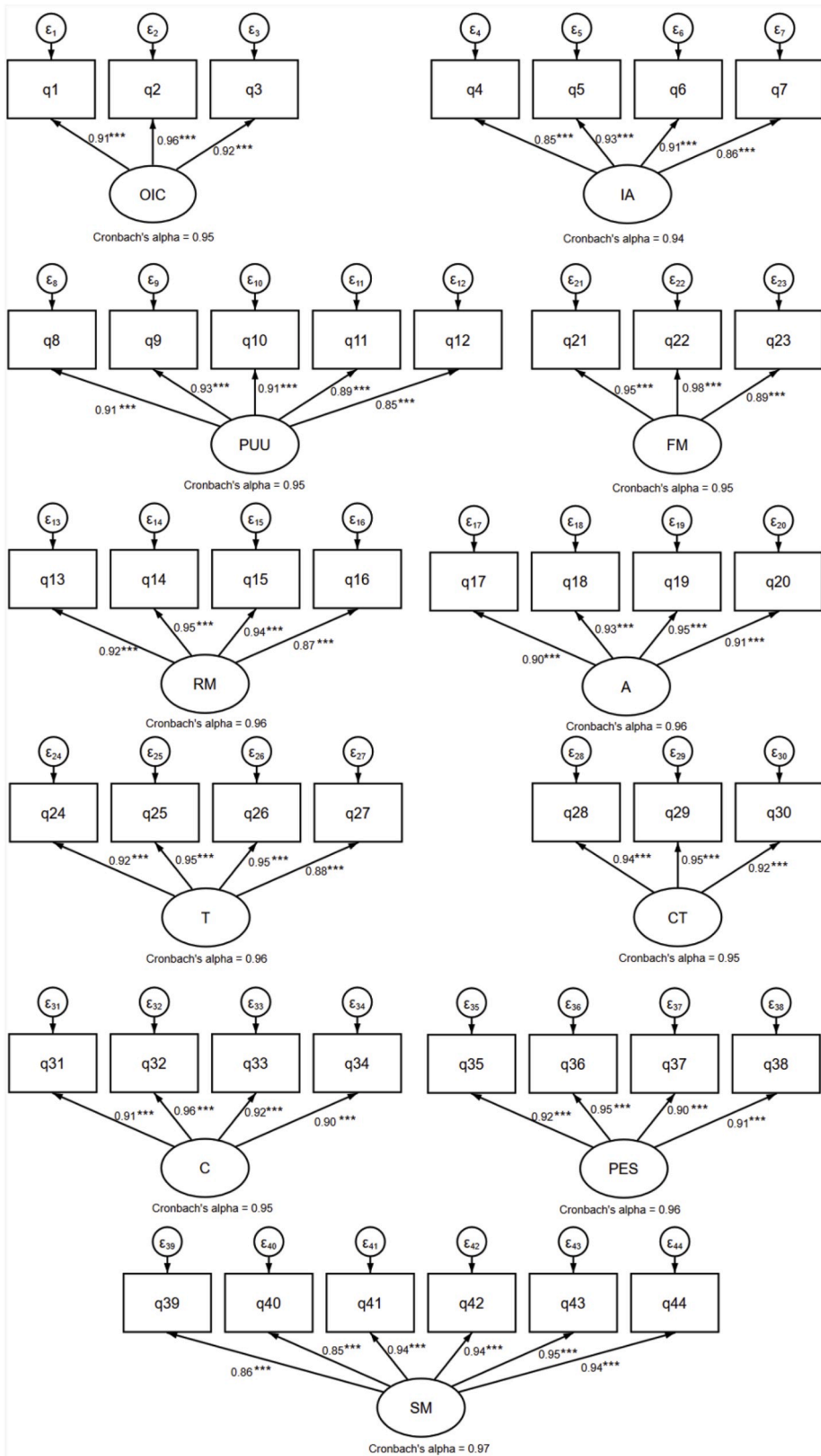


Fig. 1. Confirmatory factor analysis results for all dimensions (***) $p < 0.001$.

courses in different colleges. Of the 560 students, 56.52% were female and 43.46% were male. These statistics are in line with national statistics that show that around 56.91% of students enrolled in universities are female. Table 2 shows the distribution of the students by level. In all four universities from which the sample was selected, the entrepreneurship course is considered an upper-level undergraduate course that is usually taken either when the student is a junior or a senior. This is due to the fact that the entrepreneurship course has prerequisites that must be taken before the student is able to enroll in it. In our sample, only 4.29% of sophomore students said that they had taken the course, while 59.68% of junior students and 83.82% of senior students said that they had taken the course. It is important to note that the surveys were distributed at the beginning of the fall semester and that they were all collected within a two-week window. Students that had registered in the course in that specific semester were told to state that they have not yet taken the course. Since the surveys were filled out within the same period, this means that for those students that had already taken the entrepreneurship course, some might have just taken it the previous semester while others might have taken the course even before that. Therefore, the time between having completed the course and filling out the survey is not the same for all students who had taken the course. This also means that this study does not compare pre and post effects of the course since the same students were not asked to fill out the survey twice, once before taking the course and once after having taken it.

4.2. Data analysis

In order to test the validity of the construct, confirmatory factor analysis (CFA) was used. CFA separates the shared variance from the unique variances, thereby allowing each item to have its own variance, thus allowing for better estimates of constructs (Acock, 2013). The goodness-of-fit of the models is measured using an array of statistics: the comparative fit index (CFI), and the standardized root mean square residual (SRMR). A reasonably well-fit model should have a CFI that is greater than 0.90, and an SRMR that is less than 0.08 (Hu & Bentler, 1999).

In addition to its utility in testing construct validity, CFA allows for group comparison using a structured means approach that is more accurate than more traditional tests such as multivariate analysis of variance (Thompson & Green, 2006). In order to investigate whether group differences existed, a series of models were fitted with increasing levels of restriction:

- The first model made no assumptions at all about group differences.
- The second model imposes the equivalence of form on all relationships but does not assume equality in any of the model parameters between the groups.
- The third model is more restrictive than the second model in that it assumes that item loadings for both groups are equal.
- The fourth model adds the assumption that the covariances of the measurement models for both groups (students who did not take the entrepreneurship course, and students who took the course) are equal.
- The fifth model adds the constraint that the covariances of the exogenous variables are the same across both groups.

Once the best-fit model is found, it is used in order to compare the means of the latent variables of both groups. This is done by fixing the mean of the groups at zero, thereby using this group as a reference, while allowing the mean of the other group to vary. In addition to comparing the two means, this method allows for testing the significance of the difference.

5. Results

5.1. Measurement model validation

5.1.1. Confirmatory factor analysis

The first step in the analysis was to verify the measurement model developed by Gedeon and Valliere (2018). All eleven models are shown in Fig. 1. The figure shows the item loadings, significant levels, and Cronbach's alpha. All item loadings are between 0.85 and 0.98. In addition, all the loadings are statistically significant at the $p < 0.001$ level. The reliability of the items used to measure each of the learning outcomes was measured using Cronbach's alpha and in all cases was found to be greater than 0.90. The goodness of fit

Table 3
Goodness of fit statistics of the best fit models for each dimension.

Model	Best fit model	Chi-squared (df)	CFI	SRMR
Opportunity identification and creativity	loadings	4.56 (2), $p > 0.05$	0.999	0.037
Information alertness	loadings	135.7 (7), $p < 0.001$	0.935	0.039
Planning under uncertainty	loadings	337.75 (14), $p < 0.001$	0.893	0.047
Resource marshalling	loadings	93.48 (7), $p < 0.001$	0.964	0.064
Adaptability	loadings	64.66 (7), $p < 0.001$	0.977	0.025
Financial management	loadings	3.19 (2), $p > 0.05$	0.999	0.025
Teamwork	loadings	44.97 (7), $p < 0.001$	0.985	0.036
Critical thinking	loadings	5.69 (2), $p > 0.05$	0.998	0.036
Communication	Same form model	8.68 (4), $p > 0.05$	0.998	0.005
Persuading and entrepreneurial selling	Same form model	155.16 (4), $p < 0.001$	0.939	0.030
Self-management	loadings	548.11 (23), $p < 0.001$	0.889	0.055

statistics such as the CFI and SRMR are not reported in the figure for the sake of simplicity and because they are shown in Table 3, which will be discussed in the next section.

5.1.2. Modeling group differences

The CFA used in the previous section assumed no group differences. As previously discussed, one of the purposes of this study is to investigate whether there are differences between students who took an entrepreneurship course and those who have not taken the course. As discussed in the methodology section, this is accomplished by comparing the model that assumes no group differences with a series of models where each model imposes different group-related constraints. This was done for all eleven models. The best-fit models are reported in Table 3 along with the goodness of fit statistics. As can be seen from the table, in all cases except for communication, and for persuading and entrepreneurial selling, the best fit model is the one that imposes the equivalence form on all relationships while assuming that the loadings are equal across both groups. The equality assumption is not imposed on other model parameters. Looking at the goodness of fit statistics, it can be seen that the CFI is larger than 0.90 for all models except for two models, which have a borderline value of 0.889, while the SRMR is less than 0.08 for all models.

The results reported in Table 3 indicate that the measurement tool used is valid for both groups of students with respect to the model form and the model loadings. This is an important result because it indicates that the same form and loadings can be used to measure the entrepreneurial self-efficacy of students who had taken the course and those who have not yet taken the course. This allows for the use of the same measurement tool to compare both groups.

5.2. Measuring entrepreneurial self-efficacy

Now that the use of the instrument for both groups of students has been established, we can compare the means of both groups for each of the constructs. The above models had assumed that the means of both groups are equal. We next relax this assumption by fixing the mean of one of the groups to zero and allowing the mean of the other group to vary. Table 4 reports the results obtained from this exercise for all eleven latent variables. In the table, we see that the group made from students who have not taken the course is the reference group. We see that in all cases, the mean of the latent variables for the group made up of students who had taken the course is both positive and significant at the $p < 0.001$ level. In order to better understand the magnitude of the difference between both groups, the effect size is calculated by dividing the mean by the pooled estimate of the standard deviation (Acock, 2013). The values are displayed in the last column of Table 4.

It can be seen that ten of the effect sizes are greater than 0.8, indicating a large effect, while the eleventh effect size was found to be 0.678, indicating a medium effect. The goodness of fit statistics indicate that all models are well fit since the CFI is larger than 0.90 in nine of the eleven cases. The two exceptions had values of 0.890 and 0.881. The SRMS was found to be less than 0.08 in all cases.

Fig. 2 displays the average factor score for all constructs in each group of students. The figure clearly shows that students who have taken the course report higher levels of self-efficacy than those who have not taken the course. This is true for all constructs. The figure, however, does not take into account an important piece of information, and it is that the entrepreneurship course is usually, but not always, taken during later years. This means that the increase in the reported self-efficacy might be due to the fact that students had already taken a larger number of courses that would have resulted in the observed increase.

In order to compare students with their counterparts who are at the same level, Fig. 3 is produced. This figure shows the averages of all constructs while dividing the students into their respective years. The figure clearly shows that in each group, students who have taken the entrepreneurship course report a higher level of self-efficacy than those who have not. Therefore, the increase in the self-efficacy that is observed in Fig. 2 is partly due to the course, and not just to the fact that the course is usually taken by more advanced students.

In order to visualize the increase in self-efficacy that is due to the entrepreneurship course, the model needs to control for the effect of the students' levels. This is done by introducing a structural component by incorporating the exogenous variable *level* (1 = sophomore, 2 = junior, and 3 = senior) and creating a path from it to each of the constructs, as shown in Fig. 4. This will allow for the treatment of the variable *level* as though it was an independent variable in a regression model, thus controlling for its effect on the

Table 4

Results of model fitting when finding the difference in the means between respondents who took the course and respondents who did not take the course.

Model	Did not take course	Took the course	Chi-squared (df)	CFI	SRMR	Effect size
Opportunity identification and creativity	0 (constrained)	0.739***	5.51 (4), $p > 0.05$	0.999	0.038	0.962
Information alertness	0 (constrained)	0.660***	163.87 (10), $p < 0.001$	0.923	0.053	0.908
Planning under uncertainty	0 (constrained)	0.695***	349.45 (18), $p < 0.001$	0.890	0.052	0.905
Resource marshalling	0 (constrained)	0.741***	105.52 (10), $p < 0.001$	0.961	0.073	0.938
Adaptability	0 (constrained)	0.696***	73.81 (10), $p < 0.001$	0.975	0.031	0.940
Financial management	0 (constrained)	0.782***	8.73 (4), $p > 0.05$	0.997	0.027	0.984
Teamwork	0 (constrained)	0.771***	50.09 (10), $p < 0.001$	0.984	0.037	0.918
Critical thinking	0 (constrained)	0.699***	14.49 (4), $p < 0.01$	0.994	0.041	0.872
Communication	0 (constrained)	0.680***	34.36 (10), $p < 0.001$	0.991	0.077	0.888
Persuading and entrepreneurial selling	0 (constrained)	0.755***	178.32 (10), $p < 0.001$	0.932	0.060	0.961
Self-management	0 (constrained)	0.546***	590.14 (28), $p < 0.001$	0.881	0.068	0.678

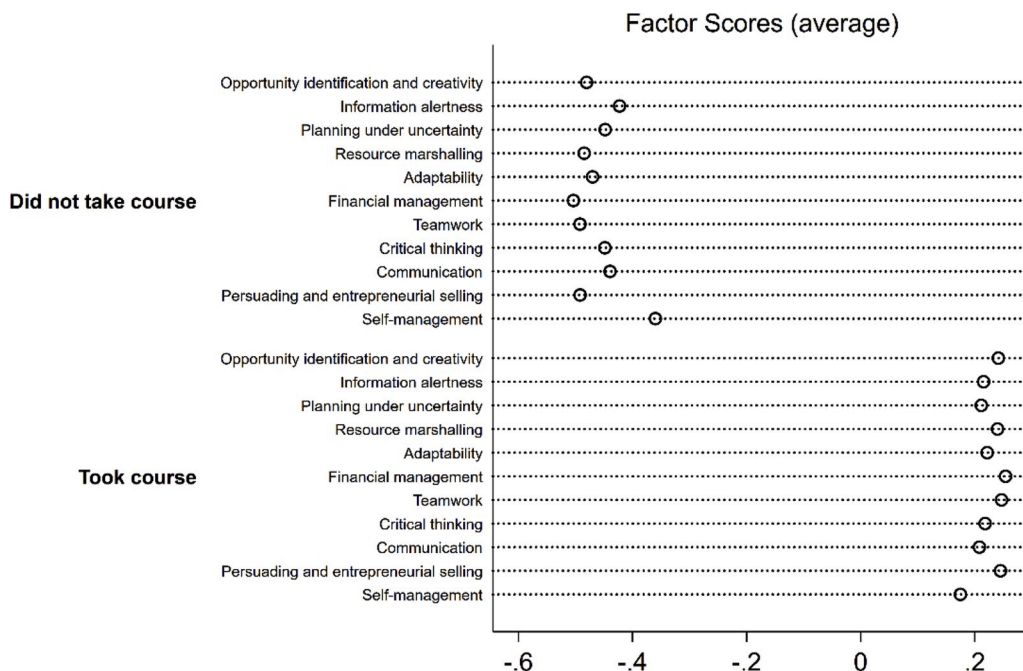


Fig. 2. Average factor scores for all eleven latent constructs per group.

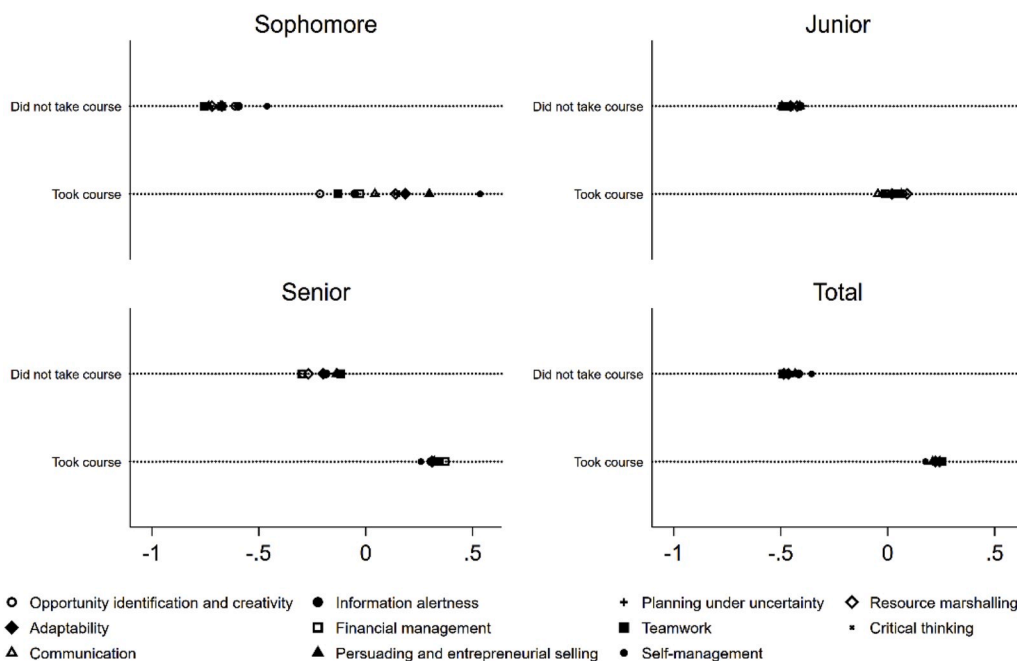


Fig. 3. Average factor scores for all eleven latent constructs per group for students in different academic standings.

latent variables (the eleven subdomains).

Fig. 5 shows the averages of all constructs after controlling for the student level. Comparing Figs. 5–2, it can be clearly seen that the gap between the scores of students who had not yet taken the course and those who have has narrowed. This is because part of the gap is explained by the level of the students. As students progress, they take more and more courses, thus gaining more skills. Yet even after controlling for this, it can still be seen that the self-efficacy of students who have taken the entrepreneurship course is higher than students who have yet to take the course. This result indicates that when comparing students who are in the same year, having taken the entrepreneurship course is correlated with higher self-efficacy scores.

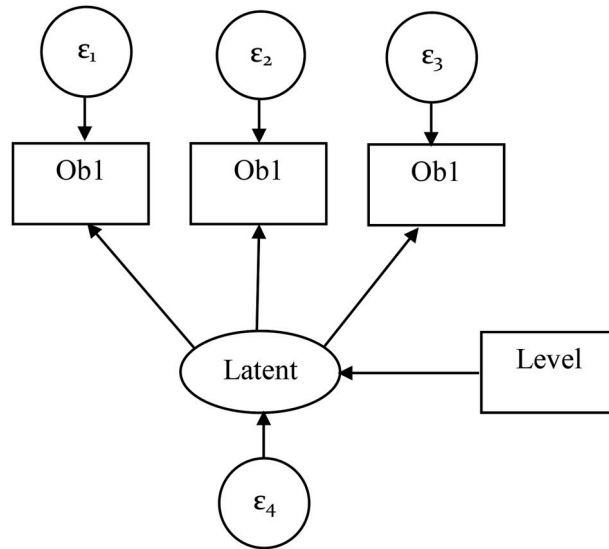


Fig. 4. Structural component that includes the exogenous variable level.

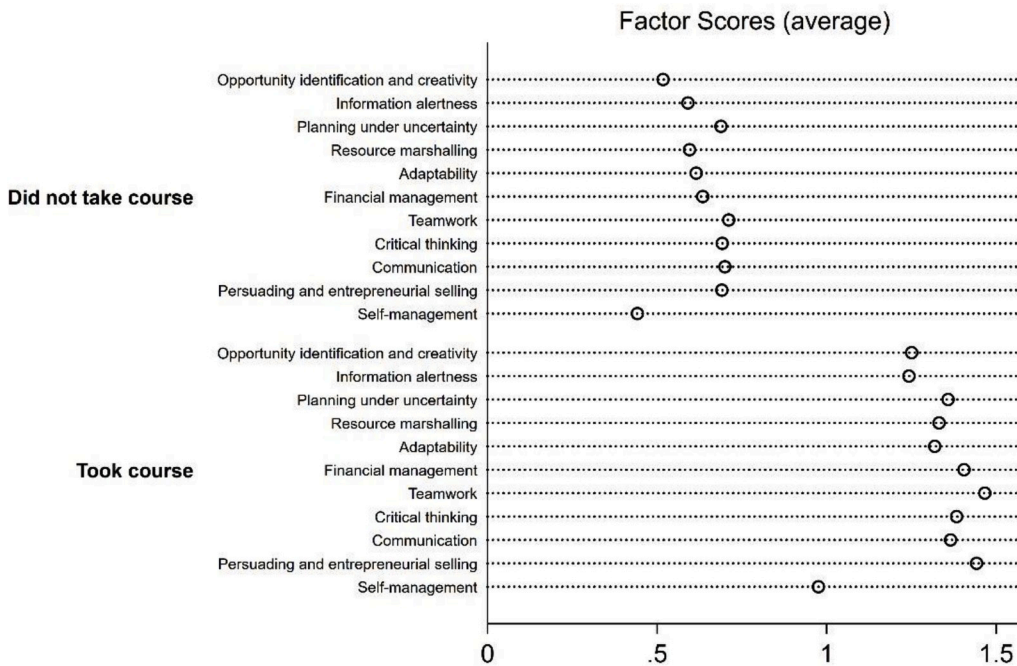


Fig. 5. Average factor scores for all eleven latent constructs per group after controlling for student levels.

6. Discussion and conclusion

Unlike previous entrepreneurial self-efficacy measures that were rooted in intentions models, the measure developed by Gedeon and Valliere (2018) is founded on an educational assessment perspective. The measure is not intended to act as the primary assessment of the program. As mentioned in the literature review, business programs are required to demonstrate knowledge acquisition using direct measures. However, using direct measures has its own problems given that AACSB does not specify what direct measures should be used, faculty members may be pressured to improve the scores obtained from direct measures (Shaftel & Shaftel, 2007), and the cost of using these measures is high in terms of time (Pringle & Michel, 2007) and money (Heriot, Franklin, & Austin, 2009). Therefore, business schools continue to use a combination of direct and indirect measures. As such, the entrepreneurial self-efficacy measure used in the present study can be used to augment the accreditation system. Since self-efficacy is a predictor of choice (Fouad & Santana,

2016) and performance (Honick & Broadbent, 2016), researchers and educators can better understand the link between assignments and pedagogy on one hand and student beliefs about themselves on the other hand.

This study has found that the measure developed by Gedeon and Valliere (2018) is valid and can be used in a different culture. The results obtained by the present study support the use of entrepreneurial self-efficacy to compare students that have not yet taken an entrepreneurship course and students that have taken the course. Out of the eleven subdomains, the same form model was found to be the best-fit model in nine of them. This is an important finding because it clearly supports the use of this measure whether students have taken the course or not. In both cases, the loadings of the items on the factors are the same. Since the measure has the same form for both groups of students, a direct comparison between the two groups is possible.

This study also demonstrated that, at least in the four universities from which the sample was taken, students that have taken the course had a higher level of self-efficacy than students who have yet to take the course. One of the main advantages of using this measure is that, because it is divided into eleven subdomains, a comparison of the gains made in each subdomain is possible. For example, in this study, the largest gain was in financial management, while the smallest gain was in self-management. The results did not change when the level of the student was accounted for. In all levels, it was seen that students who had taken the entrepreneurship course scored higher than students who have not taken the course in all subdomains.

7. Direction for future research

Since the entrepreneurial self-efficacy measure used in this study is aimed at augmenting a university degree program's learning outcome, the next logical step is to investigate whether any relationship exists between this indirect measure and more direct measures such as project grades and standardized tests. This would allow instructors to take a closer look at the link between the teaching pedagogy adopted in class with students' beliefs about themselves.

This is not to say that the entrepreneurial self-efficacy measure used in this study is not without merit on its own. By administering the survey to students at the start of the semester, before any direct measure has been used, instructors can identify the specific subdomains in which students have the lowest self-efficacy. This would, therefore, allow instructors to concentrate on a specific set of learning outcomes, thus allowing instructors to tailor their instruction to each class differently, based on the results of the survey.

8. Limitations

This study is not without its limitations. First, the sample taken is a convenience sample and not a random sample. Therefore, the generalizability of the results needs to be verified through further studies. Second, CFA does not allow for the study of causality. Instead, the results are those of correlation. As such, we cannot conclude that the entrepreneurship course resulted in an increase in the self-efficacy measure. We can only conclude that, on average, students who took the course had a higher level of entrepreneurial self-efficacy than students who did not take the course. Third, while the results of this study provide support for the use of the entrepreneurial self-efficacy measure in different cultures, it should be noted that the cross-cultural validation presented here is narrow since the data comes from a single country. As noted by Gedeon and Valliere (2018), more replicative studies are needed to further demonstrate the cross-cultural validity of the measure.

CRedit authorship contribution statement

Najib A. Mozahem: Conceptualization, Formal analysis, Methodology, Writing - original draft. **Rasha O. Adlouni:** Methodology.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijme.2020.100385>.

References

- Acock, A. C. (2013). *Discovering structural equation modeling using Stata*. College Station, Texas: StataCorp LP.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Alexander, F. K. (2000). The changing face of accountability. *The Journal of Higher Education*, 71(4), 411–431. <https://doi.org/10.1080/00221546.2000.11778843>
- Alvarez, S. A., & Barney, J. B. (2007). Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepren. J*, 1(1-2), 11–26.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122–147.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. New Jersey: Prentice Hall.
- Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, 50(2), 248–287.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52(1), 1–26. <https://doi.org/10.1146/annurev.psych.52.1.1>
- Barbosa, S. D., Gerhardt, M. W., & Kickul, J. R. (2007). The role of cognitive style and risk preference on entrepreneurial self-efficacy and entrepreneurial intentions. *Journal of Leadership & Organizational Studies*, 13(4), 86–104.
- Black, H. T., & Duhon, D. L. (2003). Evaluating and improving student achievement in business programs: The effective use of standardized assessment tests. *The Journal of Education for Business*, 79(2), 90–98. <https://doi.org/10.1080/08832320309599095>
- Brown, S. D., Lent, R. W., & Larkin, K. C. (1989). *Self-efficacy as a moderator of scholastic aptitude-academic performance relationships* (Vol. 35, pp. 64–75), 1.
- Ceci, S. J., Ginther, D. K., Kahn, S., & Williams, W. M. (2014). Women in academic science: A changing landscape. *Psychological Science in the Public Interest*, 15(3), 75–141.

- Clark, C. (2008). The impact of entrepreneurs' oral 'pitch' presentation skills on business angels' initial screening investment decisions. *Venture Capital*, 10(3), 257–279.
- DeTienne, D. R., & Chandler, G. N. (2004). Opportunity identification and its role in the entrepreneurial classroom: A pedagogical approach and empirical test. *The Academy of Management Learning and Education*, 3(3), 242–257. <https://doi.org/10.5465/amle.2004.14242103>
- Devine, A., Fawcett, K., Szűcs, D., & Dowker, A. (2012). *Gender differences in mathematics anxiety and the relation to mathematics performance while controlling for test anxiety* (Vol. 8, p. 33), 1.
- Engel, Y., Dimitrova, N. G., Khapova, S. N., & Elfring, T. (2014). *Uncertain but able: Entrepreneurial self-efficacy and novices' use of expert decision-logic under uncertainty* (Vols. 1–2) pp. 12–17.
- Foss, N. J., Klein, P. G., Kor, Y. Y., & Mahoney, J. T. (2008). Entrepreneurship, subjectivism, and the resource-based view: Toward a new synthesis. *Strategic Entrepren.* 2(1), 73–94.
- Fouad, N. A., & Santana, M. C. (2016). SCCT and underrepresented populations in STEM fields: Moving the needle. *Journal of Career Assessment*, 25(1), 24–39.
- Gedeon, S. A. (2014). Application of best practices in university entrepreneurship education: Designing a new MBA program. *European J. Training Dev.*, 38(3), 231–253.
- Gedeon, S. A. (2017). Measuring student transformation in entrepreneurship education programs. *Educational Research International*, 2017, 1–12.
- Gedeon, S. A., & Valliere, D. (2018). Closing the loop: Measuring entrepreneurial self-efficacy to assess student learning outcomes. *Entrepren. Edu. Pedagogy*, 1(4), 272–303. <https://doi.org/10.1177/2515127418795308>
- Goetz, T., Bieg, M., Lüdtke, O., Pekrun, R., & Hall, N. C. (2013). Do girls really experience more anxiety in mathematics? *Psychological Science*, 24(10), 2079–2087.
- Gore, P. A. (2006). Academic self-efficacy as a predictor of college outcomes: Two incremental validity studies. *Journal of Career Assessment*, 14(1), 92–115.
- Haynie, J. M., Shepherd, D. A., & Patzelt, H. (2012). Cognitive adaptability and an entrepreneurial task: The role of metacognitive ability and feedback. *Entrepreneurship: Theory and Practice*, 36(2), 237–265.
- Heriot, K. C., Franklin, G., & Austin, W. W. (2009). Applying for initial AACSB accreditation: An exploratory study to identify costs. *The Journal of Education for Business*, 84(5), 283–289.
- Honicke, T., & Broadbent, J. (2016). *The influence of academic self-efficacy on academic performance: A systematic review* (Vol. 17, pp. 63–84).
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary J.*, 6(1), 1–55.
- Karlssoon, T., & Moberg, K. (2013). *Improving perceived entrepreneurial abilities through education: Exploratory testing of an entrepreneurial self efficacy scale in a pre-post setting* (Vol. 11, pp. 1–11), 1.
- Katz, J. A. (2003). *The chronology and intellectual trajectory of American entrepreneurship education* (Vol. 18, pp. 283–300), 1876–1999, 2.
- Katz, J. A. (2008). Fully mature but not fully legitimate: A different perspective on the state of entrepreneurship education. *Journal of Small Business Management*, 46(4), 550–566.
- Kelley, C., Tong, P., & Choi, B.-J. (2010). A review of assessment of student learning programs at AACSB schools: A dean's perspective. *The Journal of Education for Business*, 85(5), 299–306. <https://doi.org/10.1080/08832320903449519>
- Kirzner, I. M. (1979). *Perception, opportunity, and profit*. Chicago, IL: University of Chicago Press.
- Krueger, N. F. (2009). Entrepreneurial intentions are dead: Long live entrepreneurial intentions. In A. L. Carsrud, & M. Brännback (Eds.), *Understanding the entrepreneurial mind, international studies in entrepreneurship* (pp. 51–72). New York: Springer.
- Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship: Theory and Practice*, 29(5), 577–597.
- Lent, R. W., Brown, S. D., & Larkin, K. C. (1987). Comparison of three theoretically derived variables in predicting career and academic behavior: Self-efficacy, interest congruence, and consequence thinking. *Journal of Counseling Psychology*, 34(3), 293–298. <https://doi.org/10.1037/0022-0167.34.3.293>
- Martell, K. (2007). Assessing student learning: Are business schools making the grade? *The Journal of Education for Business*, 82(4), 189–195. <https://doi.org/10.3200/JOEB.82.4.189-195>
- McGee, J. E., Peterson, M., Mueller, S. L., & Sequeira, J. M. (2009). Entrepreneurial self-efficacy: Refining the measure. *Entrepreneurship: Theory and Practice*, 33(4), 965–988.
- Mitchell, R. K., Busenitz, L., Lant, T., McDougall, P. P., Morse, E. A., & Smith, B. J. (2002). *Toward a theory of entrepreneurial cognition: Rethinking the people side of entrepreneurship research* (Vol. 27, p. 93), 2020/2/28/, 2.
- Neck, H. M., & Greene, P. G. (2011). Entrepreneurship education: Known worlds and new frontiers. *Journal of Small Business Management*, 49(1), 55–70.
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66(4), 543–578. <https://doi.org/10.3102/00346543066004543>
- Pfeffer, J., & Fong, C. (2002). The end of business schools? Less success than Meets the Eye. *The Academy of Management Learning and Education*, 1. <https://doi.org/10.5465/AMLE.2002.7373679>
- Pringle, C., & Michel, M. (2007). Assessment practices in AACSB-accredited business schools. *The Journal of Education for Business*, 82(4), 202–211.
- Rubin, R. S., & Dierdorff, E. C. (2009). How relevant is the MBA? Assessing the alignment of required curricula and required managerial competencies. *The Academy of Management Learning and Education*, 8(2), 208–224.
- Schlaegel, C., & Koenig, M. (2014). *Determinants of entrepreneurial intent: A meta-analytic test and integration of competing models* (Vol. 38, p. 291), 2020/2/20/, 2.
- Shaftel, J., & Shaftel, T. L. (2007). Educational assessment and the AACSB. *Issues in Accounting Education*, 22(2), 215–232. <https://doi.org/10.2308/iace.2007.22.2.215>
- Shapero, A., & Sokol, L. (1982). Social dimensions of entrepreneurship. In C. A. Kent, D. L. Sexton, & K. H. Vesper (Eds.), *The encyclopedia of entrepreneurship* (pp. 72–90). Englewood Cliffs, NJ: Prentice-Hall.
- The statistical bulletin for the academic year 2016-2017*. (2018) (Retrieved from Lebanon).
- Thompson, M. S., & Green, S. B. (2006). Evaluating between-group differences in latent variable means. In G. R. Hancock, & R. O. Mueller (Eds.), *A second course in structural equation modeling* (pp. 119–169). Greenwich, CT: Information Age.
- Valliere, D. (2013). *Towards a schematic theory of entrepreneurial alertness*, 28(3), 430–442.
- Wang, G., & Netemeyer, R. G. (2004). Salesperson creative performance: Conceptualization, measurement, and nomological validity. *The Influence of Culture on Services*, 57(8), 805–812.
- Warhuus, J. P., & Basaiawmoit, R. V. (2014). Entrepreneurship education at Nordic technical higher education institutions: Comparing and contrasting program designs and content. *International Journal of Management in Education*, 12(3), 317–332. <https://doi.org/10.1016/j.ijme.2014.07.004>
- Weldy, T. G., & Turnipseed, D. L. (2010). Assessing and improving learning in business schools: Direct and indirect measures of learning. *The Journal of Education for Business*, 85(5), 268–273. <https://doi.org/10.1080/08832320903449535>
- Wood, R., & Bandura, A. (1989). Social cognitive theory of organizational management. *Academy of Management*, 14(3), 361–384.
- Zimmerman, B. J. (1990). Self-regulating academic learning and achievement: The emergence of a social cognitive perspective. *Educational Psychology Review*, 2(2), 173–201. <https://doi.org/10.1007/BF01322178>
- Zott, C., & Huy, Q. N. (2007). How entrepreneurs use symbolic management to acquire resources. *Administrative Science Quarterly*, 52(1), 70–105.