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Entrepreneurial Motivation in University Business Students: A Latent Profile Analysis based on Self-determination Theory

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Abstract: The development of entrepreneurship education (EE) has become a top priority for many universities around the world. Accordingly, the objectives of this paper are to identify motivation profiles of university business students, to determine how profile membership predicts students' entrepreneurial intention and interest to study entrepreneurship, and to identify predictors of membership in these motivation profiles. To achieve these objectives, our method entails the application of self-determination theory (SDT) in a person-centered analysis. Our study is, in fact, the first application of the full range of motivations from SDT to define students' entrepreneurial motivations; furthermore, we use latent profile analysis to identify groups of students that can be distinguished according to these motivations. We discover four groups of students: 1) uniformly lowly motivated, 2) indifferent, 3) conflicted, and 4) uniformly highly and intrinsically motivated. We find that students in these groups differ with regard to their interest to study entrepreneurship and their intention to be entrepreneurs. We also identify psychological traits and background factors that could explain the group membership. We discuss the implications of these findings on the promotion and delivery of EE, and on how students may be motivated to become entrepreneurs.

Keywords: entrepreneurship education, entrepreneurial motivation, entrepreneurial intention, self-determination theory, latent profile analysis, person-centered analysis

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1 Introduction

Entrepreneurship is widely acknowledged as an engine for economic growth and social development. Particularly, youth entrepreneurship is recognized as key to a country's future success (Volkmann et al. 2009). The development of entrepreneurship education (EE) in universities has become a priority for many countries around the world, with the goal of cultivating students to become the next generation of entrepreneurs (Dou et al. 2019; Lyons and Zhang 2018). Some scholars (e.g., Esfandiar et al. 2019) point out that to ensure a sufficient supply of youth entrepreneurs, academics need to understand the antecedents of students' entrepreneurial intention (i.e., intention to become entrepreneurs), an important precursor in the entrepreneurial process (Gieure, Benavides-Espinosa, and Roig-Dobón 2020; Shirokova et al. 2020).

Motivation has long been recognized as a crucial concept in understanding entrepreneurial behaviour (Carsrud and Brannback 2011; Carsrud et al. 2017). Researchers have also argued that the advancement of entrepreneurship theory should take motivation into account (Shane, Locke, and Collins 2003). Yet, research on the role of entrepreneurial motivation (i.e., the drive to become entrepreneurs) is still relatively scarce. A goal of this study is to examine the role of student profiles, in terms of entrepreneurial motivation, as a predictor of their entrepreneurial intention.

Recently, Douglas (2020) argues that the advancement of entrepreneurship theory is hindered by scholars' heavy reliance on the traditional *variable-centered* methods, such as regression or structural equation modeling. He believes that the era of entrepreneurship intention research based on variable-centered approach has come to an end, one major issue of this approach being that it fails to account for the heterogeneity of entrepreneurial phenomena (i.e., differences between people). He argues that, in trying to find independent variables that are associated *on average* with the dependent variables across respondents, the variable-centered approach overlooks an individual's entrepreneurial decision made for his/her own particular reasons. Douglas urges scholars to shift the focus to a *within-person* analysis of entrepreneurial behaviour (p. 185).

The method of our study addresses the call to examine motivations and the critique of variable-centered analysis. That is, we apply *self-determination theory* (SDT; e.g., Ryan and Deci 2017) to describe students' entrepreneurial motivations. Specifically, we explore the heterogeneity among students by using a *person-centered* analysis (e.g., Morin, Bujacz, and Gagné 2018) to identify groups of students that may differ with respect to their entrepreneurial motivations; we use *latent profile analysis* to help us discover such groups. We accordingly offer a

comprehensive account of different student profiles in terms of their entrepreneurial motivations. We argue that understanding students' entrepreneurial motivations is necessary for effective EE.

The objectives of this paper are: (a) to identify motivation profiles of university business students, (b) to determine how profile membership predicts students' entrepreneurial intention, and interest to study entrepreneurship, and (c) to identify psychological traits and background factors that could explain the motivation profile membership. Our findings are of interest to the educator who wants to help students realize their entrepreneurial aspirations. Our study also provides a detailed understanding of how students may be motivated to become entrepreneurs.

The remainder of this paper is organized as follows. We first discuss two main theoretical and methodological shortcomings of the research on entrepreneurial motivation. We then discuss SDT and formulate research questions. We describe our methodology, and we then present the results. In the final section, we discuss the implications of our findings, along with recommendations for future research and some limitations of our study.

2 Theoretical Underpinnings

2.1 Shortcomings in Past Entrepreneurial Motivation Research

2.1.1 Dichotomous versus Multiple Conceptualization of Entrepreneurial Motivation

Past research used a dichotomous conceptualization of entrepreneurial motivation. This dichotomy is primarily derived from drive versus incentive theories of motivation (Carsrud et al. 2017). Based on drive theory, the *push* motive is a person's drive to reduce the tension due to a gap between actual and desired states. Based on incentive theory, the *pull* motive is an incentive which draws the person forward. Push motives include threat of unemployment, job frustration (Yitshaki and Kropp 2016), or household burdens (Patrick, Stephens, and Weinstein 2016). Pull motives are incentives for pursuing new ventures, such as autonomy, independence, income and wealth (Hessels, Van Gelderen, and Thurik 2008). Other studies similarly used a dichotomy of extrinsic versus intrinsic motivation (e.g., Antonioli et al. 2016; Hamdi-Kidar and Vellera 2018; Hytti et al. 2010).

A dichotomous view of motivation, we believe, can be improved upon by recognizing additional types of motivation. Indeed, self-determination theory (SDT) conceptualizes motivations along a *control-autonomy continuum* (Ryan and Deci 2000, 2017). Different motivations are associated with a different degree of

behavioural regulation, ranging from controlled to autonomous. SDT acknowledges that many types of motivation (i.e., more than two) could be jointly experienced by a person. SDT also recognizes *amotivation*, the motivation to *not* do something. SDT has been widely used in educational psychology, sports psychology, and work psychology (Howard, Gagné, and Bureau 2017), but it has received relatively little attention in entrepreneurship research. As we will illustrate, SDT offers a more detailed understanding of entrepreneurial motivations, which in turn could improve EE.

2.1.2 Variable-centered versus Person-centered Approach

Past research on entrepreneurial motivation has primarily been *variable*-centered; that is, to study the relationship between variables (e.g., Carter et al. 2003; Shane, Kolvereid, and Westhead 1991). Similarly, recent studies explored the impact of entrepreneurial motivation on intention, behaviour, or venture performance via regression or structural equation modeling (e.g., Al-Jubari, Hassan, and Liñán 2019; Dou et al. 2019). Such variable-centered studies assume that all participants of a sample come from a single population for which a set of ‘averaged’ parameter estimates can be derived (Douglas 2020; Morin, Bujacz, and Gagné 2018), they do not consider that the relationships among parameters may differ in subgroups of the sample (Douglas 2020; Morin et al. 2011, p. 59).

A *person*-centered approach assumes that the sample might be drawn from multiple subpopulations specified by different sets of parameters (Morin, Bujacz, and Gagné 2018). The objective is to find groups within a population. In entrepreneurial motivation research, we found a few instances of the person-centered approach. For example, Jayawarna, Rouse, and Kitching (2013) identified groups of entrepreneurs based on their reasons for start-ups, and related the groups to life course contexts; whereas Roman and Maxim (2017) classified students based on personality traits and examined how the classification related to entrepreneurial intent. Such studies used traditional hierarchical (e.g., Ward’s algorithm) and/or non-hierarchical (e.g., K-means algorithms) clustering methods. Our study takes a person-centered approach to examine entrepreneurial motivations. Furthermore, we use *latent profile analysis*, which as we subsequently explain, has advantages over traditional clustering methods.

2.2 Self-determination Theory (SDT) and Motivation Profiles

SDT (Ryan and Deci 2000, 2017) conceptualizes motivations along a control-autonomy continuum. At the autonomous end of the continuum, motivation is

Intrinsic: one engages in a behavior because it offers spontaneous rewards (e.g., I exercise because it feels great to do so).

As we move towards the controlled end of the continuum, motivations are regarded as *Extrinsic*: the desired reward or outcome is not directly tied to the behavior itself. Extrinsic motivations, however, can still vary in terms of autonomy. If the Extrinsic motivation is *Identified*, one is motivated by the value of the behavior, and one has accepted this value (e.g., I exercise because I believe it is important, even though I find it unpleasant); such motivation is still relatively autonomous.

If the Extrinsic motivation is *Introjected*, one has not accepted the value of the behavior, so the motivation is closer to the controlled end of the continuum (e.g., something is compelling me to exercise, not because I necessarily want to or enjoy it). Nevertheless, Introjected motivation still entails a reward or outcome that is internally experienced (e.g., I exercise because I feel guilty for wasting my gym membership; note the value is not directly attributed to exercise itself). Thus, Introjected motivation occurs when one feels one ‘ought to’ do something, whereas Identified motivation occurs if one ‘wants’ to do something (Moran et al. 2012).

If the Extrinsic motivation is *External*, this is the least autonomous (most controlled) form. The reward is external. As per Gagné et al. (2015) and Howard et al. (2016), we distinguish two types of External motivation: *External-material* entails material rewards (e.g., I exercise to keep my job as a firefighter), whereas *External-social* entails social rewards (e.g., I exercise to gain the approval of my friends). Thus, External motivation involves an outside source that compels one to act, whereas Introjected motivation does not. If the source of the External motivation is removed, so too is the motivation.

It is also helpful to point out that, according to SDT, more than one type of motivation may be present to compel one’s actions. For example, I exercise because I enjoy it *and* because I don’t want to waste my gym membership.

SDT also conceptualizes several forms of amotivation. The motivation to not exercise, for example, may be associated with *Non-value* (e.g., I believe exercise has no benefits), *Perceived incompetence* (e.g., I do not know how to exercise effectively), or *Perceived lack-of-control* over the outcome (e.g., I can’t lose weight even if I exercise).

In entrepreneurship research, some studies have explored extrinsic versus intrinsic motivation (e.g., Antonioli et al. 2016; Hamdi-Kidar and Vellera 2018; Hytti et al. 2010). However, there has been no attempt to account for all the types of motivation and amotivation from SDT to describe entrepreneurial motivation.

2.2.1 Discovering Motivation Profiles by Latent Profile Analysis

Given our previous definitions, a *profile* is a configuration of eight values, comprised of the five motivations and three amotivations of SDT. Our person-

centered approach considers the existence of *different* profiles among the population of students (i.e., the existence of subpopulations distinguished by motivation profiles). By identifying such groups of students, we could implement more effective EE. For example, we could address different learning goals within a course, improve a school curriculum by offering different types of entrepreneurship courses, or appeal to different career aspirations in course advertisement.

Furthermore, we improve upon earlier person-centered studies by applying latent profile analysis (LPA). Compared to traditional clustering methods, LPA has many advantages (Morin, Bujacz, and Gagné 2018). Most notably, LPA facilitates comparisons of different models fitted to a sample of data. In other words, LPA classifies participants (e.g., students) into groups; but many classifications are possible for a given sample. Because LPA is a probabilistic approach, we can determine the uncertainty of each classification, thereby helping us select the optimal description of our data.

Specifically, LPA entails finding *latent* profiles, which can be regarded as prototypical profiles that account for variations in the data. LPA assigns each participant to one of these latent profiles, thereby splitting the sample into groups. If, for example, a three-profile model is estimated, then three groups of participants have been identified, each group associated with a different latent profile. If a participant is assigned to one of these latent profiles, it means his/her profile is closest to that latent profile. Subsequently, unless we state otherwise, we refer to the latent profiles (i.e., those extracted by LPA); for simplicity, we omit 'latent'.

A person-centered analysis is typically exploratory (Meyer and Morin 2016), so the number of profiles is not hypothesized a priori. Thus, our first research question is: *how many distinct profiles of entrepreneurial motivation are discernible among university business students?*

2.2.2 Motivation Profile Membership as a Predictor of Outcome Variables

Outside of entrepreneurship research, other studies have used SDT to derive motivation profiles. These studies then determined dependent variables (outcomes) that are predicted by profile membership. The analysis is analogous to an ANOVA, where profile membership is the categorical predictor. These studies have, for example, found that motivation profiles with high autonomous motivation (i.e., groups of participants with such profiles) tend to have higher job satisfaction and engagement (Howard et al. 2016).

Our study focuses on two outcomes, students' interest *to be entrepreneurs* and *to study entrepreneurship*, which we refer to as *Intention* and *Study Interest*, respectively. In the past decade, Intention has become one of the most researched topics in the entrepreneurship literature (Liñán and Fayolle 2015). Relatively fewer

studies have explored Study Interest; this outcome, however, should be of interest to educators. Our second research question is: *do groups of students, corresponding to different entrepreneurial motivation profiles, differ with regards to their (a) Study Interest and (b) Intention?*

2.2.3 Psychological Traits and Background Factors as Predictors of Motivation Profile Membership

We aim to identify predictors of membership in the profiles. To the best of our knowledge, there has been no empirical study that examined predictors of entrepreneurial motivation. Because the response variable is discrete (i.e., membership in a particular profile), this search for predictors entails fitting *logistic* regression. This type of regression examines how changes in a predictor are related to the chance of being one profile versus another profile. A strong predictor is one that is associated with a strong chance of being in a particular profile over another.

If our LPA discovers more than two profiles, we must apply *multinomial* logistic regression. Then, for example, given four profiles, six pairwise comparisons are analyzed; and an important predictor is one that could help distinguish membership between any *pair* of profiles. Accordingly, multinomial logistic regression, in conjunction with LPA, is invaluable to our person-centered analysis. That is, after finding student profiles (groups), we could better understand the nature of these profiles by identifying variables that could potentially explain why students belong to a particular profile. Indeed, identifying such predictors could help us speculate as to how young people may transition from one profile to another, and thereby suggest teaching practices to better assist different kinds of students.

Past research has found inconsistent relationships between psychological traits and the intention to become entrepreneurs (e.g., Ahmed, Klobas, and Ramayah 2019; Athayde 2009; Gird and Bagraim 2008; Krueger, Reilly, and Carsrud, 2000; Yukongdi and Lopa 2017; Zgheib and Kowatly 2011; Zhang, Wang, and Owen 2015). For our study, we consider six psychological traits that have been examined in past research: Need for autonomy, Need for achievement, Leadership propensity, Importance of creativity (i.e., how participants regard creativity), Proactivity, and Risk-taking propensity. We also consider predictors that entail the background of our participants: Gender, Full-time work experience, and Entrepreneurship exposure. Past studies have observed relationships between such background factors and entrepreneurial intention (Carr and Sequeira 2007; Gird and Bagraim 2008; Strobl, Kronenberg, and Peters 2012). Thus, our third research question is: *do (a) the six psychological traits and (b) three background factors*

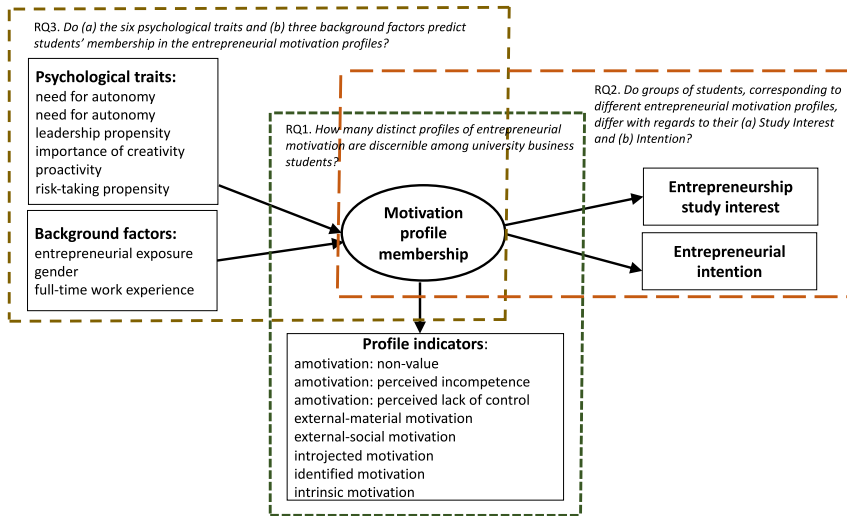


Figure 1: Theoretical Framework.

predict students' membership in the entrepreneurial motivation profiles? The theoretical framework is displayed in Figure 1.

3 Methodology

3.1 Participants and Data Collection

Our data was collected from undergraduate business students at a Canadian university via a self-administered survey in several classes. About 700 questionnaires were distributed and 430 of them were returned, this led to 409 usable questionnaires. Approximately two thirds of this sample are students from first year courses. We compared results based on the entire sample versus those based on students of first year courses only; since the results are very similar, we report results based on the entire sample. This sample is 51.3% male and 48.7 female, and the average age is 20.5 years.

3.2 Measures

A list of the items we used is in the Appendix. Since items that measure entrepreneurial motivations and amotivations of SDT do not exist, we developed our own items by adapting existing items in the literature that measure general attitude toward

entrepreneurship (e.g., Liñán and Chen 2009) or reasons for self-employment versus employment (e.g., Eurobarometer 2007). The items for the outcome variables were borrowed from past studies. Please see Table A1 in the Appendix for all the sources we used (the correlation matrix of the items is available upon request).

The reliability of each scale (i.e., set of items used to measure a variable) is generally adequate (ranging from alpha of 0.70–0.94). The two exceptions are Identified motivation (alpha = 0.59) and Risk-taking propensity (alpha = 0.49).

3.3 Common Method Bias

Common method bias (CMB) is a concern with survey-based research. To reduce the impact of CMB, we protected respondents' anonymity and confidentiality (Podsakoff et al. 2003). To assess the presence of CMB in the data, we performed two tests (see Podsakoff et al. 2003). First, we performed Harman's single-factor test by running exploratory factor analysis on all items. The results indicated that the first primary factor accounted for only about 23% of variance, which is far below the 50% threshold that would suggest a substantial impact of CMB. Second, we also performed confirmatory factor analysis on the single factor model. The results showed a poor model fit ($\chi^2/df = 5.2$ with $p\text{-value} < 0.0001$; root mean square error of approximation = 0.1; comparative fit index = 0.45; Tucker Lewis index = 0.43; standardized root mean square residual = 0.15). These tests suggest that CMB is not a serious issue that could undermine the other analyses in this study.

3.4 Analyses to Address Research Questions

Prior to the analyses to address our research questions, we examined the data and found no serious problems related to missing data, non-normality, and outliers. For each item, the number of missing values is less than 0.3% of the sample; we used the expectation-maximization in SPSS to impute the missing values.

If a variable is measured by two or more items, for example, we added the values of these items to form a composite score to represent this variable. We then converted this variable into a z score (i.e., mean 0 and standard deviation of 1). This z -score is used in all subsequent analyses.

3.4.1 Latent Profile Analysis

The goal of LPA is to identify prototypical profiles defined by, in our case, configurations of amotivation and motivation values. An important preliminary step

of LPA is to determine the optimal number of profiles in a given sample. This step is analogous to the onset of factor analysis, where the researcher must select the optimal number of factors to extract. That is, before interpreting the results, we should decide on which set of results should be interpreted. Accordingly, we compared a series of models that correspond to different number of profiles. The best model is the one with the optimal number of profiles.

We used robust maximum likelihood estimation in *Mplus* (version 7.1). The estimation of each model used 500 random sets of start values, 300 iterations for each random start, and the 200 best solutions retained for final stage optimization (Hipp and Bauer 2006). All models converged on replicated solutions.

Unlike cluster analysis, LPA is a model-based approach that provides fit indices to help select the best model. We used five popular fit indices (Nylund, Asparouhov, and Muthén 2007): Akaike's Information Criterion (AIC), Bayesian Information Criterion (BIC), the sample-size adjusted BIC (SSA-BIC), the Lo–Mendell–Rubin likelihood ratio test (LMRLRT) and the Bootstrapped Likelihood Ratio Test (BLRT). As the AIC, BIC, and SSA-BIC of a model decrease, stronger is the evidence of a well-fitting model. We examine elbow plots of the information criteria to help assess the improvement of model fit (Howard et al. 2016). The LMRLRT and BLRT evaluate the extent to which estimating an additional profile improves the fit of a model: a statistically significant LMRLRT or BLRT test implies an improvement in fit.

We also examined the entropy as a descriptive summary of classification accuracy of the retained solution. This index ranges from 0 to 1, where higher values indicate greater accuracy (Celeux and Soromenho 1996). We further consulted the average posterior classification probabilities. In a model with, for example, three profiles, participants are assigned to one of these profiles; we can obtain the posterior probability that a participant belongs to his/her assigned profile, as well as the posterior probability that he/she belongs to the other two (unassigned) profiles. The adequacy of a model can be gauged by comparing these two probabilities averaged across the sample; if the former is substantially higher than the latter, we have evidence of a good model. We also considered the recommendation that no profile should contain less than 5% of the sample (Stanley, Kellermanns, and Zellweger 2017). Finally, we examined the interpretability of the profiles.

3.4.2 Motivation Profile Membership as a Predictor of Outcome Variables

After we selected the best model by the criteria in the previous section, to answer the second research question, we used the three-step approach (Asparouhov and Muthén 2014) to determine the outcome variables that profile membership may explain. We used the BCH procedure (i.e., analogue of ANOVA; Bakker and Vermunt

2016) to determine if profile membership is associated with differences in Study Interest and Intention.

3.4.3 Psychological Traits and Background Factors as Predictors of Motivation Profile Membership

To answer the third research question, we used *Mplus*’s R3STEP procedure (Vermunt 2010) to conduct multinomial logistic regressions, where the six psychological traits and three background factors are predictors and motivation profile membership is the dependent variable.

4 Results

4.1 Motivation Profiles

4.1.1 Selection of the Best Model

Table 1 provides the fit statistics for the models with one to six profiles. The values of the AIC, BIC, and SSA-BIC decrease as the number of profiles increases; the BLRT tests are significant for all the models. These results suggest that each successive model has a better fit than the one before. The LMRLRT tests, however, favour the four-profile solution, since this test is no longer statistically significant in the five- or six-profile solution. Figure 2 shows the elbow plot of the three information criteria: the AIC, BIC, and SSA-BIC stabilize (flatten out) after the five-profile solution, which indicates negligible improvement in model fit by extracting additional profiles. This plot accordingly suggests the five-profile solution is optimal.

Table 1: Fit statistics and entropy for latent profile models.

No. of profiles	FP	LL	AIC	BIC	SSA-BIC	LMRLRT	BLRT	Entropy
1	16	−4639	9310	9374	9323	n.a.	n.a.	n.a.
2	25	−4345	8740	8840	8761	< 0.01	< 0.01	0.83
3	34	−4220	8507	8644	8536	<0.05	<0.01	0.82
4	43	−4149	8384	8556	8420	<0.01	<0.01	0.84
5	52	−4093	8290	8499	8334	0.16	<0.01	0.86
6	61	−4066	8253	8498	8305	0.70	<0.01	0.79

FP, number of free parameters; LL, log-likelihood; AIC, Akaike information criteria; BIC, Bayesian information criteria; SSA-BIC, sample-size adjusted BIC; LMRLRT, *p*-value associated with Lo, Mendell, and Rubin test; BLRT, *p*-value associated with the bootstrapped log-likelihood ratio test.

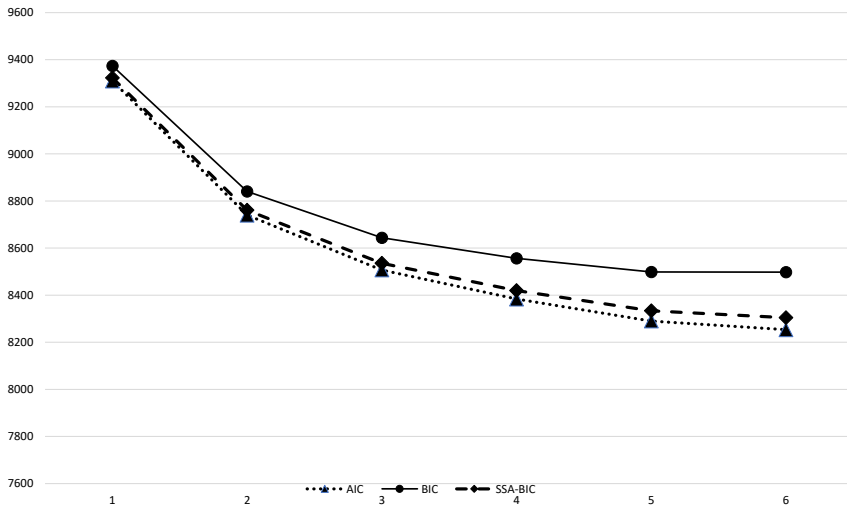


Figure 2: Elbow plot for fit information criteria.

We compare the four- and five-profile solutions. In terms of classification accuracy, the solutions are comparable and exhibit high accuracy. The entropies are 0.84 and 0.86, for the four- and five-profile solutions, respectively. The average posterior probabilities of profile membership in the assigned profile range from 0.89 to 0.93 in the four-profile solution, and from 0.91 to 0.97 in the five-profile solution; whereas the probabilities for the unassigned profiles range from 0.01 to 0.08 in both solutions. The five-profile solution, however, has one profile that contains only 3% of the sample. In the four-profile solution, every profile contains more than 10% of the sample. In terms of interpretability, the five-profile solution contains two profiles that are quite similar in meaning; this is not parsimonious. Thus, we selected the four-profile solution.

4.1.2 Description of the Profiles from the Best Model

The means of the amotivations and motivations appear in Table 2. Given four profiles, there are four sets of means. These means are further shown as a bar chart (Figure 3) and as a line plot (Figure 4). We produced four additional line plots (Figure 5), to summarize the information of Figures 2 and 3 in an alternative way. For each profile, Figure 5A compares the average amotivation to the average motivation; Figure 5B compares External motivation (average of External-material and External-social) to Internal motivation (average of

Table 2: Mean levels of profile indicators in the final model and 95% confidence intervals.

Profiles	1. Uniformly low motivations	2. Indifferent	3. Conflicted	4. Uniformly high motivations and particularly intrinsic
Indicators	Sample proportion	18%	54%	17%
Amotivation: non-value		0.58 [0.37, 0.8]	-0.07 [-0.21, 0.07]	-1.33 [-1.55, -1.11]
Amotivation: perceived incompetence		0.39 [0.16, 0.62]	-0.07 [-0.2, 0.06]	-1.3 [-1.54, -1.07]
Amotivation: perceived lack of control		0.14 [-0.07, 0.35]	-0.1 [-0.21, 0.01]	-0.78 [-1.18, -0.38]
External-material motivation		-0.99 [-1.3, -0.68]	-0.07 [-0.18, 0.04]	0.63 [0.28, 0.99]
External-social motivation		-1.01 [-1.2, -0.81]	-0.1 [-0.25, 0.06]	1.02 [0.77, 1.27]
Introjected motivation		-1.35 [-1.63, -1.07]	-0.07 [-0.19, 0.06]	1.04 [0.81, 1.27]
Identified motivation		-1.33 [-1.55, -1.11]	-0.12 [-0.25, 0.01]	1.15 [0.92, 1.38]
Intrinsic motivation		-1.35 [-1.64, -1.05]	0.07 [-0.06, 0.21]	1.08 [0.96, 1.21]

N = 409. Based on z-scores.

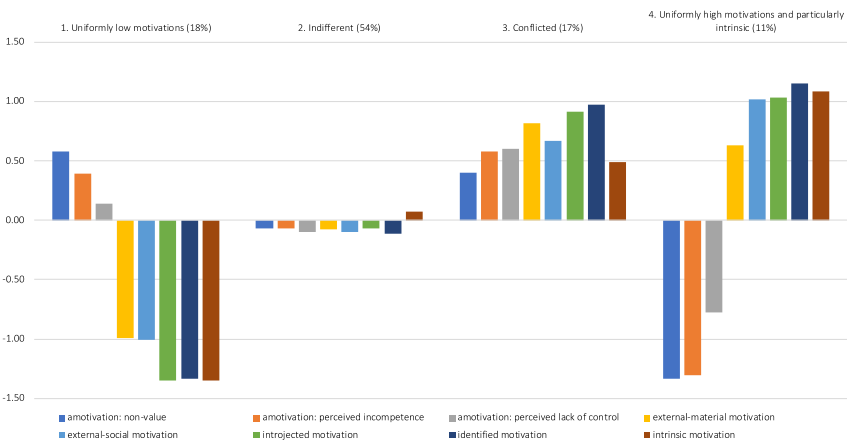


Figure 3: The final model of the motivational profiles (Bar chart). *Note.* Based on z-scores.

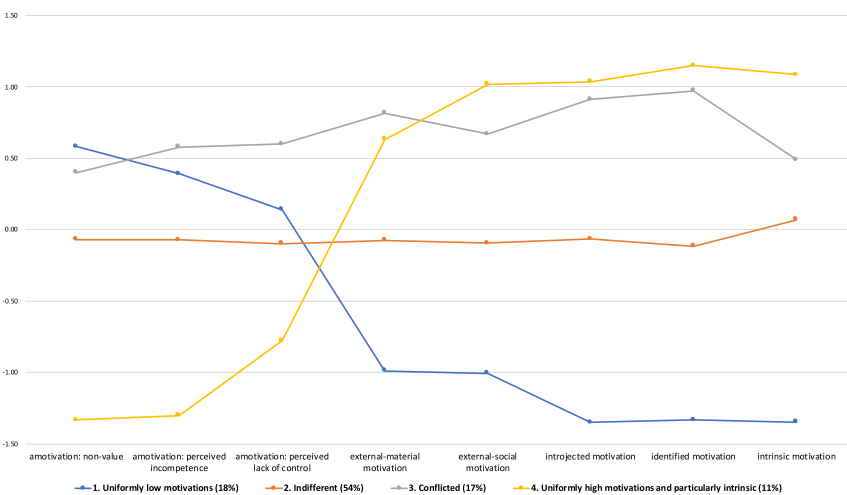


Figure 4: The final model of the motivational profiles (Line plot). *Note.* Based on z-scores.

Introjected, Identified, and Intrinsic); Figure 5C compares Extrinsic motivation (average of External-material, External-social, Introjected, and Identified) to Intrinsic motivation; Figure 5D compares Controlled motivation (average of External-material, External-social, and Introjected) to Autonomous motivation (average of Identified and Intrinsic). The descriptions of the profiles below are based on z-scores (see Section 3.4).

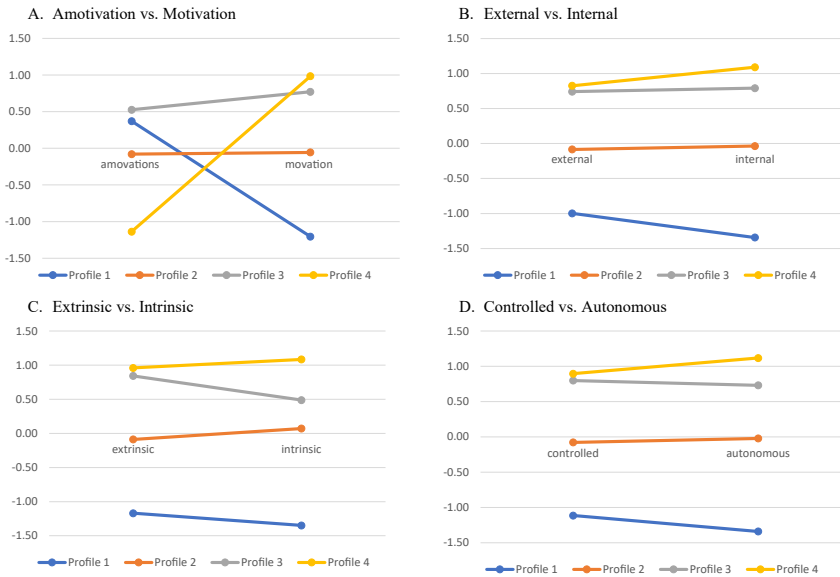


Figure 5: Profile comparisons based on various forms of motivations.

4.1.2.1 Profile 1

This profile entails 18% of the sample, and we label it as *uniformly low motivations*. Other than amotivation (Figure 5A), profile 1 has the lowest score on every type of motivation (Figure 4B–D) by a difference of one standard deviation (SD) or more.

4.1.2.2 Profile 2

This profile entails 54% of the sample, and we label it as *indifferent*. This profile entails scores that are close to the mean with regards to every amotivation and motivation (Figures 2 and 3). In fact, this profile shows very little difference in terms of amotivation versus motivation (Figure 5A), External versus Internal motivations (Figure 5B), or Controlled versus Autonomous motivations (Figure 5D). The largest discrepancy is between Intrinsic versus Extrinsic motivations (Figure 5C), by a difference of 0.16 SDs.

4.1.2.3 Profile 3

This profile entails 17% of the sample, and we label it as *conflicted*. From Figure 5A, we see the unique nature of this profile. This profile has high motivation, but this profile also has amotivation that is even higher than that of profile 1. In fact, only profiles 1 and 3 had above average amotivation (Figure 5A). Non-value is the highest type of amotivation for profile 1, whereas Perceived incompetence and

Perceived lack-of-control are higher types of amotivation for profile 3 (Figure 3). In other words, when the amotivation is defined more by competency and external reasons, the respondents could still have high motivations.

4.1.2.4 Profile 4

This profile entails 11% of the sample, and we label it as *uniformly high motivations and particularly intrinsic*. Profile 4 stands out as the one that has the highest average motivation (Figure 5A), Internal motivation (Figure 5B), Intrinsic motivation (Figure 5C), and Autonomous motivation (Figure 5D). Profile 4 is, in fact, 0.59 SDs higher than the next profile with regards to Intrinsic motivation. In terms of Internal and Autonomous motivations, profile 4 is approximately 0.25 SDs higher than the next closest profile. Profile 4 also has the lowest amotivation (Figure 5A).

It is also of interest to compare profiles 1 and 4. When we consider all types of amotivation and motivation (Figure 4), profiles 1 and 4 are nearly mirror images of each other around the mean. That is, when one amotivation/motivation is above average for one profile, it is below average for the other profile. The opposite behaviours of these two profiles are also manifested in Figure 4A–D: the line associated with each profile is always of opposite orientation. For example, whereas the amotivation of profile 1 is higher than its motivation (Figure 5A), the opposite occurs in profile 4.

We also compare profiles 3 to 4 in more detail. Profile 3 is notably different than profile 4. Specifically, profile 3 had higher amotivation by more than 1.5 SDs (Figure 5A), lower Internal motivation by about 0.25 SDs (Figure 5B), lower Intrinsic motivation by about 0.5 SDs (Figure 5C), and lower Autonomous motivation by about 0.25 SDs (Figure 5D). The only caveat to these trends is that profile 3 actually has higher External-material motivation than profile 4 (Figure 3), by a difference of 0.19 SDs.

In response to research question 1, the results support the existence of distinct profiles of entrepreneurial motivation. In the subsequent discussion, when we speak of a *profile*, we are referring to the particular group of students that have been assigned to *that* profile. Further implications and interpretations are presented in the Discussion.

4.2 Motivation Profile Membership as a Predictor of Outcome Variables

Both outcomes, Study Interest and Intention, are standardized. In our sample, 49% of respondents has a positive z-score on Intention; we interpret this to mean that such students have a preference for self-employment.

The means of the outcomes for each profile are shown in Table 3 (e.g., -1.19 is the mean Study Interest, in z-scores, for participants in profile 1). These means are also depicted in Figure 6. The test of equal means across the four profiles is statistically significant for each outcome: $\chi^2(4) = 208, p < 0.001$ for Study Interest, and $\chi^2(4) = 463, p < 0.001$ for Intention. We also carried out pairwise comparisons for each outcome with Bonferroni adjustment. The only non-significant comparison is between profiles 3 and 4 in terms of Study Interest. These results are summarized in Table 3.

4.3 Psychological Traits and Background Factors as Predictors of Motivation Profile Membership

Results from the multinomial logistic regression are shown in Table 4. The regression was used to identify predictors of profile membership. Given four profiles, there are six unique pairwise comparisons. In each comparison, the regression estimates the tendency to be in a *target* profile over a *reference* profile. For example, in Table 4, the results under “Profile 4 vs. 1” refer to the comparison where profile 4 is the target and profile 1 is the reference.

To facilitate the interpretation of the regression results, we use a tableplot (Kwan, Lu, and Friendly 2009) to show the regression coefficients from Table 4. The tableplot appears as Figure 7. The symbols in a tableplot are scaled so that the largest symbol corresponds to the largest absolute cell value (2.69 in this case); circles represent positive values; diamonds represent negative values. The column and row averages, based on absolute value, are also included in the tableplot (yellow cells).

Among the profiles, it is not surprising that our predictors most strongly predict membership in profile 4 over 1 and in profile 3 over 1 (i.e., these are the columns in Figure 7 with the largest symbols). Recall that we interpreted profile 1 as participants that have *uniformly low motivations*, whereas both profiles 3 (*conflicted*) and 4 (*uniformly high motivations and particularly intrinsic*) entail highly motivated participants.

To answer the third research question, we note that from Figure 7, based on average coefficient size, the strongest predictors are Entrepreneurial exposure, Importance of creativity, Need for achievement, and Full-time work experience. The weakest predictors are Gender and Need for autonomy. The background factors, on average, are stronger predictors compared to the psychological traits.

Entrepreneurial exposure is by far the strongest predictor; it has, on average, the largest coefficient, it also has the largest coefficient in four of the possible six comparisons. Entrepreneurial exposure is strongly associated with the tendency to

Table 3: Means of outcome variables and their pairwise comparisons between profiles.

Outcome variables	1. Uniformly low motivations	2. Indifferent	3. Conflicted	4. Uniformly high motivations and particularly intrinsic	Overall Chi-square test	p-value	Summary of pairwise comparisons between profiles
Entp. study interest	-1.19	0.00	0.63	0.94	208	< 0.001	4 = 3 > 2 > 1
Entp. intention	-1.29	0.04	0.47	1.21	463	< 0.001	4 > 3 > 2 > 1

The significance level for the equality test of mean pairwise comparison was Bonferroni corrected within each outcome variable (0.05/6) and set to 0.008.

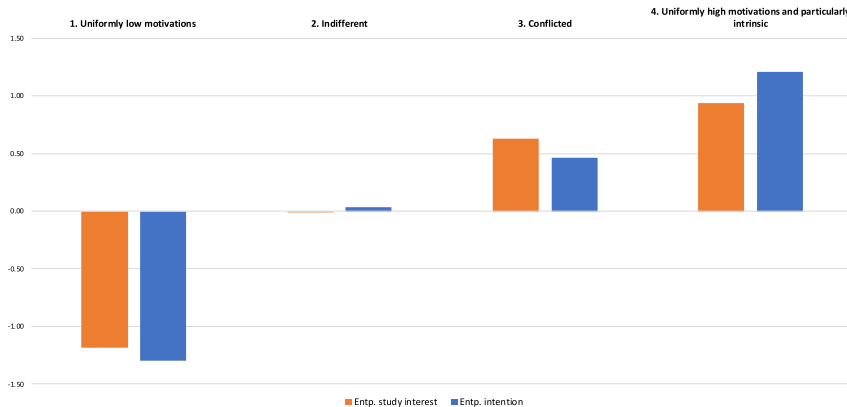


Figure 6: Means of outcome variables associated with profile membership.

Note. Based on z-score.

be in profiles 4 over 1, 3 over 1, and 2 over 1; the corresponding regression coefficients are 2.69, 1.84, and 1.67. By exponentiating these coefficients, we obtain odds ratios of 15, 6, and 5 (rounded to the nearest whole number) respectively. This means that as Entrepreneurial exposure increases by one unit (i.e., one SD, as predictors are z scores), the estimated odds of being in profile 4 over 1 increase by a factor of 15, odds of being in profile 3 over 1 increase by a factor of 6, and odds of being in profile 2 over 1 increase by a factor of 5.

Importance of creativity and Need for achievement are also strong predictors of the tendency to be in profile 4 over 1, and to be in profile 3 over 1. The corresponding regression coefficients range from 1.36 to 1.7 (see Figure 7). Thus, as these predictors increase by one SD, the estimated odds to be in profile 4 over 1, or to be in profile 3 over 1, increase by a factor of 4–5.

Full-time work experience is another strong predictor. Its associations are, however, in the opposite direction (see Figure 7). This means if a participant has Full-time work experience, the estimated odds of being in a target profile often *decrease*. Since the target profile always entailed higher motivation than the reference profile, greater Full-time work experience is associated with less motivation. The only exception occurs in the comparison of profiles 4 and 3. Although not a strong predictor, Leadership propensity has the same pattern of association.

Another noteworthy finding is the strong predictors in the comparison of profiles 4 and 3 (i.e., predictors that could differentiate *uniformly motivated* from *conflicted* participants). From Figure 7, we see that two predictors stand out: Entrepreneurial exposure and Risk-taking propensity, with regression coefficients

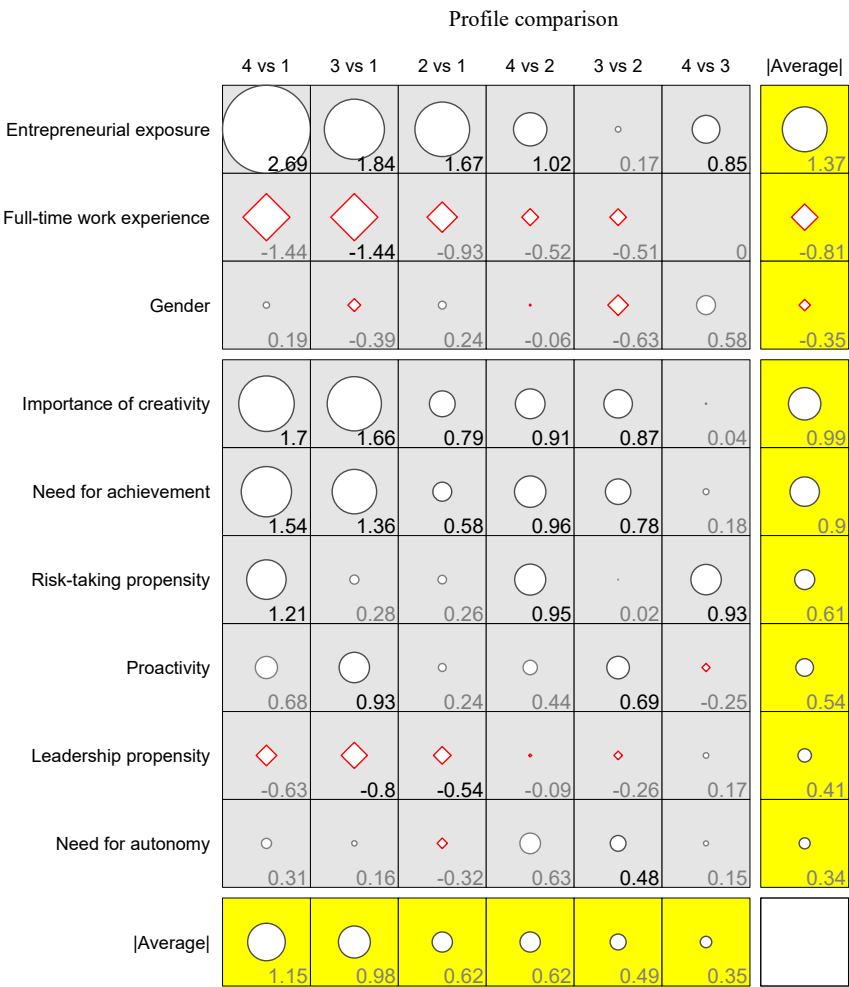


Figure 7: Regression coefficients of the multinomial logistic regressions. *Note.* The average of each column (in absolute value) appears in the bottom row; the columns are arranged by the value of these averages, in descending order. The average of each row (in absolute value) appears in the right most column. The first three rows pertain to background factors, the next six rows pertain to psychological traits; within each type of predictor, the rows are arranged by the value of the row averages, in descending order. Statistically significant regression coefficients appear in black.

of 0.85 and 0.93 respectively. Thus, the estimated odds being in profile 4 over 3 increase by a factor of 2–3, as these predictors increase by one SD.

5 Discussion

This paper takes a new approach to understand university students' entrepreneurial intention (i.e., intention to become entrepreneurs) by exploring their entrepreneurial motivation profiles. Our study is the first attempt to apply a full range of motivations from SDT to describe entrepreneurial motivations in university business students. By taking a person-centered approach, we identified four groups, distinguished by specific profiles. In this section, we discuss four sets of implications. The first three sets entail using our results to improve EE. The fourth set considers how the usage of SDT and LPA could also provide a better understanding of entrepreneurial intent, especially in relation to some phenomena of interest in EE research. We conclude by noting some limitations of our study and providing recommendations for future research.

5.1 Implications for Promoting the Study of Entrepreneurship

We consider how to promote the study of entrepreneurship to students characterized by the four profiles we discovered. Because our data were collected in predominantly first year business courses, we regard the four profiles as a portrait of students at the early stages of their business degree.

Profile 1 attributes the least value to entrepreneurship. Its Non-value amotivation is highest, and its motivations are the lowest (Introjected, Identified and Intrinsic motivations being especially low). We nevertheless believe that an entrepreneurship course could be valuable for students of profile 1, as part of a comprehensive business education. However, since such students may have no intention to be self-employed (Intention of profile 1 is the lowest), a reason that an entrepreneurship course may be appealing is if the student realizes that entrepreneurship training includes skills that are useful *outside* of entrepreneurship (e.g., intrapreneurial skills; Heinonen 2007). Program advisors or course descriptions should thus convey the skills that are taught in a entrepreneurship course and convey that the course is appropriate for students interested in entrepreneurship *or* corporate entrepreneurship.

Profile 2 may depict a typical student at the onset of undergraduate studies (i.e., no preference for any area of concentration). Compared to profiles 3 and 4, profile 2 has lower levels on all five motivations, and as such, it may be helpful for students of profile 2 to know more about entrepreneurship. Such information can be covered in a first-year introductory course to business, and it could be helpful in raising Introjected or Identified motivations, and accordingly pique students' Study Interest.

Profiles 3 and 4 entail above average Study Interest and Intention, but there are important caveats. As we noted, profile 3 in fact has the highest level of amotivation, which may be a barrier in students' pursuit of entrepreneurship. Students of profile 3, for example, may not believe in their ability to succeed as an entrepreneur. As such, an entrepreneurship course may be more appealing to these students if they are aware of successful ventures of former students who have taken the course. Such information may be communicated through school newsletters. Similarly, it may be beneficial to provide venues for first year students to meet alumni entrepreneurs.

Profile 4 has the lowest level of Perceived incompetence amotivation; this sense of self-efficacy, combined with high levels of Intrinsic and Autonomous motivations, along with very high Intention, may lead students of this profile to bypass formal EE. Even though such students may be a minority (11% of our sample belong to profile 4), it would be regrettable if they are not sufficiently trained, especially given their aspirations. Since these students regard themselves as competent, what may compel them to take an entrepreneurship course is if the course offered experiences outside the classroom (e.g., projects with actual entrepreneurs, access to incubators or accelerators). Thus, it is important to inform a prospective student of these opportunities if they are part of the curriculum.

5.2 Implications for Delivering Entrepreneurship Courses

For this section, we suppose that the four profiles do describe students that would enrol in an entrepreneurship course (some schools do have a mandatory entrepreneurship course). We consider how to deliver a course that recognizes all four groups.

To maintain the interest of students from profiles 1 and 2, it may be necessary to consistently identify the value of various course content as a supplement to the teaching of the content. Because such students have low Intrinsic or Autonomous

motivations, they may find it difficult to appreciate theoretical concepts or abstract exercises. The instructor, accordingly, may find it helpful to explain how course content relates to practical problems or to applications beyond the classroom. On a related note, we believe it is important that the course conveys the benefits of entrepreneurship, preferably near the beginning of the term. Students of profiles 1 and 2 could prematurely abandon the course if there is little evidence at the onset to suggest that it is worth pursuing.

Students of profile 3 have the highest amotivations. On one hand, Perceived incompetence amotivation should be reduced by learning the skills of entrepreneurship, and Non-value amotivation should be reduced by the pedagogical efforts discussed above. On the other hand, it may also be useful if the course discusses resources that are available to entrepreneurs (e.g., start-up funds, mentoring programs, professional networks, or incubators). Learning how to access such resources should greatly reduce these students' Perceived lack-of-control amotivation (i.e., students would acquire a greater sense of control over the success of their entrepreneurial efforts).

Students of profile 4 are the most intrinsically motivated and their Intention is also the highest. Accordingly, these students may be interested in additional learning opportunities beyond assignments or tests. To cultivate this interest, we suggest a flexible grading scheme (e.g., option to replace tests with a project, based on a topic of students' choosing). As Hytti et al. (2010) point out, highly motivated students may begin the course with a business idea in mind; letting such students develop their idea through a project could be an effective learning experience. Students of profile 4 may also benefit from being introduced to university or professional networks related to entrepreneurship. Membership in such networks could continue to cultivate the drive in these students, beyond the completion of the course.

It is also of interest to recognize three types of entrepreneurship courses (e.g., Sirelkhatim and Gangi 2015). In a course *about* entrepreneurship, students learn *what* is entrepreneurship, wherein the primary mode of teaching is lecturing. A course *for* entrepreneurship, in contrast, is geared towards teaching the skills to become an entrepreneur; and a course *through* entrepreneurship has a similar goal. The second and third types of courses rely more on experiential learning (i.e., learn by doing); the key difference between the second and third types is that the latter provides students with the experience of actual entrepreneurship. Thus, the first type of course is theoretically oriented, whereas the second and third are practically oriented.

A curriculum with several entrepreneurship courses should be ideal for acknowledging four profiles of students. Based on our findings, we advocate a two-course sequence. The first course has a theoretical component for learning what is entrepreneurship. However, there is also a practical component that imparts the skills of entrepreneurship, especially through experiential learning. Thus, this first course is a hybrid of the *about* and *for* courses in order to maximize its appeal and impact. This course would be recommended to all business students; as such, our previous recommendations for teaching (or promoting to) each profile are applicable to this course. (We would limit the project or independent learning in this first course, given that a second course will be offered, as we discuss below.) Such a course would also be pivotal in generating student interest to pursue entrepreneurship.

The second course would be more practically oriented, with the first course as a prerequisite. The objectives of the second course are to give students the opportunity to apply what they have learned in the first course, and to acquire extensive practical skills. The primary mode of instruction would be experiential learning. As such, this course entails a large project that, for example, could revolve around student generated ideas, based on which students may work with incubators, apply for funding, or pitch to investors. This project could also be a collaboration with actual entrepreneurs (e.g., develop a product, conduct market research), which may take on the form of an internship. Accordingly, this second course is most similar to the third type in the trichotomy. Such a course would appeal to students of profiles 3 and 4, and there should be flexibility in letting students decide on the nature of the project.

5.3 Implications for Transitioning Students from One Profile to Another

We next examine the strong predictors of profile membership (see Results section) to consider further implications. These predictors may be indicative of the learning activities or environments that could *transition* students from one profile to another. Furthermore, because profile 4 is associated with the highest Intention, we would regard it a desirable outcome if an entrepreneurship education could shift some students into profile 4.

Entrepreneurial exposure and Risk-taking propensity are both important predictors of membership in profile 4 over the other profiles (i.e., 4 vs. 3, 4 vs. 2, and 4 vs. 1; see Figure 7). In other words, as entrepreneurial experience increases, or as propensity for risk increases, our analysis suggests that the chance of being in profile 4 (over profile 3, for example) also increases. The instructor accordingly should consider the use of role play, simulations, or experiential learning to give students a chance to experience some aspects of entrepreneurship. Similarly, by learning more about risk management, or market and opportunity assessment, students' propensity for taking risks may accordingly increase. Empirical evidence suggests that, in fact, the acquisition of any entrepreneurial skills should bolster students' confidence for taking risks (Bandera, Collins, and Passerini 2018).

Importance of creativity is another strong predictor with educational implications. Past research has observed a positive association between creativity and entrepreneurial intent (e.g., Hamdi-Kidar and Vellera 2018). Our results suggest that the more a student values creativity, higher is the chance that such a student is associated with profile 4, in particular, relative to profile 1, and relative to profile 2 (see Figure 7). One recommendation then is to implement assignments or exercises that require students to use their creativity, but most of all, the instructor should help students recognize the role such creativity plays in the entrepreneurial process.

5.4 Implications for Understanding Students' Entrepreneurial Intention

The participants of profile 4 reported the highest level of Intention, whereas those of profile 1 reported the lowest (see Figure 6). As we previously observed, these two profiles are almost mirror images of each other (see Figure 4). Thus, it seems that when motivations are more extensive than amotivations (as in profile 4), such participants expressed a very high Intention. Conversely, when amotivations are much higher than motivations (as in profile 1), the participants expressed a very low Intention.

The existence of profile 3, however, suggests that the impact of motivations and amotivations on Intention may be more complicated. Recall that we regard profile 3 as *conflicted* because it entails participants with high motivations *and* amotivations (see Figure 3). Interestingly, these participants also

expressed a moderate level of Intention (see Figure 6). One interpretation is to construe that participants of profile 3 originated as a subset of those from profile 4; that is, this subset emerged as a result of some stimuli (e.g., being informed that it is difficult to receive start-up funds) that altered its profile. The conjecture then is that this substantial increase to amotivations, along with a drop in Intrinsic motivation, are sufficient to counteract (overcome) the other four motivations, thereby resulting in a decrease to the participants' entrepreneurial intent (see Table 3).

A phenomenon similar to our interpretation has been proposed to explain why some students may actually experience a decrease in Intention *after* receiving entrepreneurship training: despite being initially motivated to become entrepreneurs, learning about the necessary process and challenges proved to be quite discouraging, and accordingly decreased students' intent (Bandera, Collins, and Passerini 2018). In other words, students experienced a reality check (i.e., they feel less competence or less control towards their entrepreneurial aspirations, and accordingly, there would be a rise in the corresponding amotivations).

Based on their review of entrepreneurship education research, Nabi et al. (2017) have in fact called for a closer examination of how students' entrepreneurial intention may be impacted by formal entrepreneurship training. The application of SDT and LPA to derive motivational profiles has the potential to offer a better understanding. A possible study is to compare student profiles *before* and *after* an entrepreneurship course. If students of profile 4 do become reclassified into a new profile that resembles profile 3 after the course, this would suggest discouragement. If a substantial proportion of students experiences such a shift, this could also suggest that the course has failed to some extent in helping students. Indeed, if the post-profiles entail very high Perceived incompetence or Perceived lack-of-control amotivations, this could signal that additional skills need to be included in the syllabus. Conversely, if a majority of students from profile 3 transitions into profile 4, this would support the usefulness of the course.

A comparison of pre- and post-profiles could be used to better understand other outcomes of an entrepreneurship education. For example, Hsu et al. (2019) noted that some students may decide not to pursue entrepreneurship because after taking a course they realize that being an entrepreneur is not suitable to their personal needs. Such a phenomenon would be characterized by a drop in Identified and Introjected motivations, along with a drop in Perceived incompetence and Perceived lack-of-control amotivations. That is, although students feel they

have gained knowledge from the course, they nevertheless have come to regard entrepreneurship as less worthwhile.

5.5 Limitations and Future Research Directions

Our application of SDT to entrepreneurial motivations of students is the first study of its kind. As such, we note the importance of replicating the profiles we identified. Furthermore, the scales we used were adapted largely from studies to measure general attitude toward entrepreneurship or reasons for self-employment. The formal development of a scale of entrepreneurial motivations based on SDT could be very useful.

Outside of post-secondary institutes, there have been efforts by organizations to stimulate entrepreneurship among high school and primary school students (e.g., Uncharted Learning Organization, SHAD Canada, Junior Achievement, Acton Children's Business Fair). It would be of interest to examine how such programs impact participants' motivation to subsequently study entrepreneurship at university. A longitudinal panel could track the experience of participants, and latent transition analysis (e.g., Nylund, Asparouhov, and Muthén 2007) could determine how young people may transition between motivation profiles.

It is also of interest to note that EE may not necessarily increase students' intention to become entrepreneurs (e.g., Hsu et al. 2019; Nabi et al. 2018). A potentially important study is to compare student motivation profiles *before* and *after* an entrepreneurship course. Such a comparison could help educators understand any changes in students' intention, and accordingly facilitate efforts to improve the curriculum.

Lastly, we note that our study has focused on youths' motivation in starting a new *commercial* venture. As per Short, Moss, and Lumpkin (2009), it may be important to also examine youth motivations in starting a *social* venture. Clark, Newbert, and Quigley (2018) contend that the distinction between these two endeavors has not been well supported by research, and that there is insufficient research to distinguish the motivations between these two types of entrepreneurs. We believe that an investigation into the motivation profiles of these two groups would be a very useful first step.

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APPENDIX

Table A1: List of items.

Items	Alpha	Loadings	Sources
<i>Motivation profile indicators</i>			
amotivati on: non-value			
<i>Why would you prefer to be an employee rather than self-employed in your own business?</i>	n.a.		Eurobarometer (2007)
Being an employee is the most suitable option for my future profession			
Having colleagues/too lonely being self-employed			
amotivation: perceived incompetence			
<i>Why would you prefer to be an employee rather than self-employed in your own business?</i>	n.a.		Eurobarometer (2007)
Lack of an entrepreneurial idea			
Lack of knowledge/familiarity with regards to self-employment			
amotivation: perceived lack of control	0.77		Teixeira and Forte (2009)
<i>To what extent do you agree the following are current obstacles to starting a new business?</i>			
Business climate is not favourable		0.61	
Lack of financial support for new business creation		0.76	
Lack of institutional support for new business creation		0.78	
Complex administrative procedures for new business creation		0.73	
Scarcity of information for new business creation		0.74	
external-material motivation			
<i>Why would you prefer to be self-employed in your own business rather than an employee?</i>	0.70		Eurobarometer (2007)
Better income prospects		0.72	
Lack of attractive employment opportunities		0.84	
To avoid uncertainties related to employment (e.g., being unemployed)		0.81	
External-social motivation			
<i>Why would you prefer to be self-employed in your own business rather than an employee?</i>	0.76		Eurobarometer (2007)
Family/friends are self-employed		0.64	

Table A1: (continued)

Items	Alpha	Loadings	Sources
The friends who are important to me would approve of my starting a business of my own		0.91	
The family member who are important to me would approve of my starting a business of my own		0.93	
Introjected motivation	0.70		Eurobarometer (2007)
<i>Why would you prefer to be self-employed in your own business rather than an employee?</i>			
I have an idea that can be a business opportunity		0.78	
Being self-employed is a "normal thing to do"		0.67	
Possibilities for self-fulfillment		0.71	
Being self-employed is more prestigious than being an employee		0.75	
Identified motivation	0.59		Eurobarometer (2007); Liñán and Chen (2009)
<i>Why would you prefer to be self-employed in your own business rather than an employee?</i>			
Personal independence/Managing own time		0.70	
No need to adapt to a particular business environment		0.74	
Having my own business is the most suitable option for my future profession		0.79	
Intrinsic motivation	0.80		Eurobarometer (2007); Liñán and Chen (2009)
<i>Why would you prefer to be self-employed in your own business rather than an employee?</i>			
A career as a business entrepreneur is attractive to me		0.90	
Being a business entrepreneur would entail great satisfaction for me		0.92	
Being self-employed in your own business is more interesting work		0.70	
Outcome variables			
entp. study interest	0.87		Wilson and Sepulveda (2009)
<i>How interested are you, in taking courses about the following topics?</i>			
Starting a new business from an idea		0.81	
Entrepreneurs hip using research		0.79	
Entrepreneurs hip within an existing company		0.67	
I would take/have taken more entrepreneurs hip courses during my program if available		0.84	

Table A1: (continued)

Items	Alpha	Loadings	Sources
I would take/have taken a family business course during my program if available		0.63	
I would take/have taken entrepreneurship as a concentration during my program if available		0.75	
I would take/have taken entrepreneurship as a minor during my program if available		0.80	
entp. intention	0.94		Liñán and Chen (2009)
I will make every effort to start a business in the future		0.92	
I am determined to create a business in the future		0.93	
I have very seriously thought of starting a business		0.89	
I have the firm intention to start a business some day		0.94	
Predictors of motivation profik membership (Psychological traits and background factors)			
need for autonomy	n.a.		Boissin et al. (2009)
How important is it for you in your future professional life - to work autonomously			
need for achievement	0.75		Boissin et al. (2009)
How important is it for you in your future professional life - to have power		0.80	
How important is it for you in your future professional life - to be my own boss		0.72	
How important is it for you in your future professional life - to have a high income		0.73	
How important is it for you in your future professional life - to achieve high social status		0.79	
leadership propensity	0.88		Athayde (2009)
I usually take the initiative on any project I'm involved in		0.79	
I think I can easily carry my classmates with me when I have an idea		0.81	
I enjoy taking responsibility for things in the classroom		0.81	
I like taking the lead in projects at school		0.87	
When we do a school project I'm right there at the centre of things		0.85	
importance of creativity	0.77		Athayde (2009)
I believe that a good imagination helps you do well at school		0.79	
I enjoy lessons where the teacher tries out different ways of teaching		0.70	
Being creative is an advantage in lessons and project work		0.84	

Table A1: (continued)

Items	Alpha	Loadings	Sources
I like lessons that really stretch my imagination pro activity	0.77		Athayde (2009)
I like to get on with things in class rather than be taken through step-by-step by the teacher	0.80	0.80	
I usually get on with things in class rather than wait for everyone else		0.81	
I like lessons or assignment where we are left on our own to get on with our work		0.83	
I prefer to figure things out on my own rather than rely on a teacher to explain everything		0.74	
risk-taking propensity	0.49		Boissin et al. (2009)
How important is it for you in your future professional life - to take risks		0.81	Huuskonen (1993)
One should not start a business when there is a risk it might fail (reverse coding)		0.44	Venesaar, Kolbre, and Piliste (2006)
I like challenges that many think are risky		0.84	
entp. exposure	0.68		European Commission (2003),
I have previously worked for myself (e.g., delivering papers, babysitting, mowing lawns, etc.)		0.66	Huuskonen (1993); Krueger
I have been a freelancer or self employed		0.79	(1993)
I have closely followed or assisted family members who have started companies		0.69	
I have closely followed or assisted friends or acquaintances who have started companies		0.72	
gender male (51.3%); female (48.7%)			
full-time work experience (at least one year): yes (14.4%); no (85.6%)	n.a.		

Note. Five-point bi-polar scale (with 1. strongly disagree and 5. strongly agree) was used for all items, except gender and full-time work experience.

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