

## FACTORIAL STRUCTURE VALIDATION OF THE ENTREPRENEURSHIP QUALITIES QUESTIONNAIRE 2.0

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### Abstract

Entrepreneurs are more than ever very important economic actors in all societies. In many countries such as Canada, governments are mobilizing school curricula to include activities aimed to develop entrepreneurship competencies in high school students. However, there is no clear data on the actual level of these competencies among high school students and adults as well (Yergeau & Gingras, 2023). Accordingly, there is also few instruments intended to evaluate dimensions of entrepreneurship. This study examines the factorial solution of a modified version of an open online instrument aiming at measuring entrepreneurship qualities. The original Entrepreneurship Qualities Questionnaire (EQQ, L'Heureux et al., 2000) contains 59 items grouped in 6 continuous scales (Commitment, Motivation, Result-oriented, Creativity, Self-competition, Leadership) and a Total score. The EQQ 2.0 is an updated version based on previous work showing some items factor loadings were problematic in the original factorial solution (Yergeau, Busque-Carrier, Gingras & Lépine, 2023). A sample of 5527 high school students and n=5309 adults from the province of Québec have answered the EQQ between 2013 and 2023. An exploratory structural equation modeling within confirmatory factor analysis (EwC) was used to assess the second-order factor structure used by the EQQ 2.0. EwC mostly replicated the novel four first-order and one second-order factor structure. Results were validated with a subsample. Overall, these findings support the utility of the EQQ 2.0 to assess entrepreneurship qualities.

**Keywords:** *Entrepreneurship, factorial structure, construct validity, quantitative measure.*

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### 1. Introduction

Entrepreneurship competencies refer to the skills, knowledge, and abilities that individuals need to successfully start, manage, and grow a business venture. These competencies have been widely studied in the academic literature, and several frameworks have been proposed to categorize them. One commonly referenced framework, proposed by Audretsch and Lehmann (2005), identifies eight core entrepreneurship competencies: opportunity identification, innovation, proactiveness, autonomy, risk-taking, self-efficacy, networking, and learning. Another framework, proposed by Stevenson (1985), identifies four key competencies for entrepreneurs: conceptual, human, network, and financial. Additionally, a more recent study by Edelman, Watson, and others (2015) defines the following 8 entrepreneurship competencies: 1) Opportunity recognition, 2) business acumen, 3) creativity and innovation, 4) interpersonal and communication skills, 5) strategic thinking and planning, 6) resilience and persistence, 7) networking and relationship-building and 8) financial management. All these frameworks, however, have in common the emphasis that it is a combination of various abilities and traits that make an entrepreneur successful. These models have inspired some high schools to offer some basic training in entrepreneurship to students. However, questions remain regarding the objective measure of entrepreneurship competencies. This study aims to examine and validate the factorial structure of the revised version of the Entrepreneurship Qualities Questionnaire (EQQ 2.0), an open online instrument aiming at measuring entrepreneurship qualities.

### 2. Methodology

The participants have answered voluntarily and anonymously to the online version of the EQQ between 2016 and 2023. The EQQ is available free online to the general population and is often suggested by teachers and guidance counselors. All scores are computed electronically. There has been no

subject solicitation, so this is a convenience sample of 9182 persons who answered the online questionnaire on entrepreneurship. 4945 were youth, 1921 are young adults (18-30 y/o) and 2316 persons are over 30 years old. There are 5384 women and 3798 men. For validation purposes, two random subsamples of equal size were created.

The original Entrepreneurship Qualities Questionnaire (EQQ; L’Heureux et al., 2016) is a self-reported instrument including 59 items assessing a range of perceived behaviors and attitudes related to entrepreneurship. Respondents must determine the level of self-correspondence for each item on a 4-point scale from “not at all” to “totally” corresponding. The EQQ results in a total score and 6 specific scales: 1) Energy/commitment, 2) Motivation, 3) Results orientation, 4) Initiative/creativity, 5) Self-competition and 6) Leadership. The higher the score on a scale, the more competency on that dimension is being perceived by the subject. The EQQ total score has a very good homogeneity ( $\alpha=.95$ ) as the 6 dimensions scores with Cronbach’s alpha between .75 and .86.

An exploratory structural equation modeling within confirmatory factor analysis (EwC; Morin & Asparouhov, 2018) was used to replicate the second-order factor structure of the EQQ with problematic items previously identified ( $n=2$ ) removed from analysis (Yergeau et al., 2023). The MLR estimator was used. Model fit was assessed with the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). According to typical guidelines (e.g., Hair et al., 2010), CFI or TLI values equal or above .90 are considered acceptable while values equal or above .95 are considered excellent in model fit assessment. Regarding RMSEA, values lower than .08 can be qualified as acceptable, whereas a value lower than .06 can be qualified as excellent.

### 3. Results

Table 1. Summary of factorial structure validation analysis of EQQ 2.0.

Description	$\chi^2$ (df)	CFI	TLI	RMSEA	90% CI
<i>Sample 1</i>					
EFA 4-factor 59 items	19,224.207(1537)*	.884	.871	.050	[0.050;0.051]
ESEM 57 items	14,663.396 (1374)*	.911	.897	.046	[0.045;0.047]
EWC 57 items	14,627.807 (1376)*	.911	.897	.046	[0.045;0.047]
<i>Sample 2</i>					
ESEM 57 items	14,820.418 (1374)*	.913	.899	.046	[0.045;0.047]
EWC 57 items	14,633.992 (1376)*	.911	.897	.046	[0.045;0.047]

Note. \*  $p < .05$ ; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling

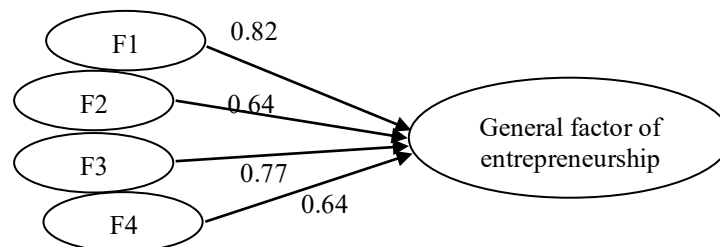
Table 1 shows factorial modeling analysis for both samples. The EwC model of perceived entrepreneurship related competencies revealed acceptable fit to the data in both samples. A four-competency model with a second-order general level of perceived entrepreneurship related competency was thus supported as the best performing solution. Information about factor loadings and cross-loadings of the first-order factors are reported in Table 2.

Table 2. Descriptives statistics of EQQ 2.0 first-order factor loadings (sample 2;  $n= 4620$ ).

Scales	Factor loadings			Cross loadings		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum
<b>F1. Dedication / success</b>	.60	.40	.85	.09	-.13	.32
<b>F2. Initiative</b>	.52	.32	.76	.06	-.26	.36
<b>F3. Responsibility</b>	.43	.29	.67	.06	-.30	.35
<b>F4. Leadership</b>	.46	.20	.72	.05	-.15	.30

Dedication/success (25 items), Initiative (10 items), Responsibility (13 items) and Leadership (9 items) items were all well related to their expected factors. This new factorial structure with 57 items shows all items are good indicators of their respective factor. Cross-loadings were generally low. For each first-order scale, there was no report of high level cross-loading with an unexpected factor. Moreover, the second-order factor loadings were all acceptable (see Figure 1 below).

Figure 1. Second-order factor loadings.



#### 4. Conclusion

This study tested the structural validity of the Entrepreneurship Qualities Questionnaire 2.0, a revised version of a questionnaire measuring perceived entrepreneurship related competencies. Factorial analysis showed that a four factors structure was the most performing solution and was validated in a satisfactory manner. Results tables indicate that very few items were still unrelated to their expected factor, a much smaller account than in the original version. Overall, second-order factor loadings were satisfactory, which supported the relevance of these competencies for assessing a general factor of perceived entrepreneurship related competencies. Future works should consider the results of this study to use the updated version of the EQQ 2.0 in relevant research ventures. For example, the validity of the updated version of the EQQ could then be further examined through divergent and convergent validity analysis.

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