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## The Effect of Primary School Entrepreneurship Education Programs on the Evolution of Pupils' Human Capital Assets

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## ORIGINAL ARTICLE

# The Effect of Primary School Entrepreneurship Education Programs on the Evolution of Pupils' Human Capital Assets

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## Abstract

The formation of entrepreneurship-related human capital in primary-school entrepreneurship education programs (EEPs) is of great interest to European policymakers. European education systems have widely implemented EEPs since the Oslo Agenda for entrepreneurship education in Europe was passed in 2006. However, primary-school EEPs remain an underresearched domain of entrepreneurship education. The present article investigates the development of entrepreneurship-related human capital in EEPs for 9–14-year-olds in 22 primary schools. It uses a quasi-experimental design with repeated measures. Based on data obtained from a sample of 180 participants, the analysis finds that the whole group partly improved only one of the components of human capital. However, the given EEPs positively impact the development of certain components of entrepreneurship-related human capital when investigated through the lens of entrepreneurial family background or gender. When subset by gender, results show that girls improved some components, while boys upgraded others. Also, pupils from entrepreneurial families improved more of the measured constructs than pupils from non-entrepreneurial families. The study provides valuable insights into the evolution of human capital among early adolescents in primary-school EEPs and uses human capital theory to explain this development. It also supplies evidence of the positive effect of EEPs on individuals of specific social groupings. Theoretical and practical implications are discussed and guidelines for further research are provided.

**Keywords:** Human capital theory, Entrepreneurship education program, Primary school, Early adolescents, Human capital assets

**JEL classification:** A22, L26

## Introduction

Due to the fast-paced process of globalization and technological advancements, society faces several challenges. These include financial, societal, and environmental ones, with all their ensuing unpredictability and consequences (Organisation for Economic Co-operation and Development, 2018). If society is to transform these challenges into opportunities, it has to invest in developing entrepreneurship-related human capital at all levels (Dams et al., 2021;

Martin et al., 2013). Cunha and Heckman (2007) have shown that interventions for developing human capital at an early age positively impact the economic welfare of individuals. In recent decades, entrepreneurship education programs (EEPs) have been introduced from primary to tertiary education levels (Fellnhofer, 2019; Kuratko, 2005). Research has shown that EEPs positively impact the evolution of several components of human capital, such as entrepreneurial intentions (EI), entrepreneurship competences (EC), a positive attitude towards

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entrepreneurship (EA), and entrepreneurial self-efficacy (ESE) (Martin et al., 2013; Martínez-Gregorio et al., 2021). The impact of EEPs on human capital assets (HCAs) is a thoroughly researched subject, but primarily at the secondary and tertiary levels of education. Individuals aged 16–25 are already choosing their future career paths as entrepreneurs or employees, so studying the development of HCAs among them is the logical step.

However, according to Lazarides et al. (2020), it is in early adolescence that individuals begin to develop career aspirations in different fields of interest. Primary-school pupils are thus already contemplating their future careers. For this reason, many authors have pointed out that early EEPs are necessary to develop entrepreneurship-related human capital. What is more, early adolescents seem to benefit more from EEPs than secondary school or university students (Kourilsky & Carlson, 1996; Rosário et al., 2014). In fact, early adolescents (pupils 9 to 14 years of age) are in a developmental stage where they enter puberty and desire more autonomy from their parents. Simultaneously, they look up to non-parent adults as mentors and role models (Bandura, 2006). Despite these reasons and even though EEPs are run in primary schools, research into their effects on entrepreneurship-related human capital in primary-school pupils is still scant (Liguori et al., 2019). Worse, a simple search on the Web of Science with the keywords “entrepreneurship” or “enterprise education” and “primary school” or “education” returns about 20 articles combined. The development of learning outcomes of primary-school EEPs is thus one of the most underresearched topics in entrepreneurship-related research. On top of that, the existing research into the learning outcomes of primary-school EEPs is still inconclusive. Although most research indicates a positive impact of EEPs on human capital (Moberg, 2014; Palmér & Johansson, 2018), some studies suggest mixed or even negative results (Huber et al., 2014; Pepin & St-Jean, 2019).

Consequently, there is a great need to investigate the evolution of entrepreneurship-related human capital in primary-school EEPs. The environment where early adolescents acquire their knowledge, skills, and attitudes for future life and work is also where human capital as the developmental outcome of EEPs forms (Martin et al., 2013). Moreover, it is necessary to conceptualize entrepreneurship-related human capital specifically for primary-school pupils. Entrepreneurship outcomes such as self-employment and achieving higher productivity might still be far in the future. However, evidence shows that entrepreneurship-related HCAs often lead to relatively successful entrepreneurship outcomes (Elert

et al., 2015; Unger et al., 2011). This study uses human capital theory to examine the evolution of entrepreneurship-related HCAs as a result of human capital investment. Specifically, it inspects the relationship between entrepreneurship-related human capital investments in the form of EEPs and entrepreneurship-related HCAs, the components of which are the learning outcomes of EEPs (Martin et al., 2013).

The purpose of this paper is to examine the impact of EEPs on the development of pupils' entrepreneurship-related HCAs during eight-month EEPs in 22 primary schools. It also investigates whether there is a difference in the development of entrepreneurship-related HCAs between girls and boys and between pupils with an entrepreneurial family background and those without one. Thus, it contributes to a better understanding of how the human capital theory can be applied to individuals in their early adolescence participating in EEPs and what role gender and entrepreneurial family background play. Furthermore, the study conceptualizes entrepreneurship-related human capital for primary schools (Martin et al., 2013). Therefore, this study opens up new avenues of research on the impact of EEPs on primary-school pupils.

The article begins with an overview of the literature that investigates the impact of EEPs on the development of the studied components of entrepreneurship-related HCAs and continues with the development of research hypotheses. The second part describes the methods and results. A discussion of results, theoretical and practical contributions, guidelines for future research, and conclusions follow.

## 1 Theoretical background and hypotheses development

Educational programs for developing entrepreneurship-related HCAs in primary schools are gaining momentum. At the same time, there have also been many calls for further research into their outcomes (Lazarides et al., 2020; Liguori et al., 2019). For instance, early development of HCAs in the form of non-cognitive skills in children has been shown to foster their cognitive skills. Consequently, the probability of an individual's economic success later in life increases (Hassi, 2016; Moberg, 2014). Similarly, Cunha and Heckman (2007) and Heckman et al. (2006) demonstrated that individuals attain non-cognitive skills best through early education interventions and continuous competence growth programs during their early adolescent years.

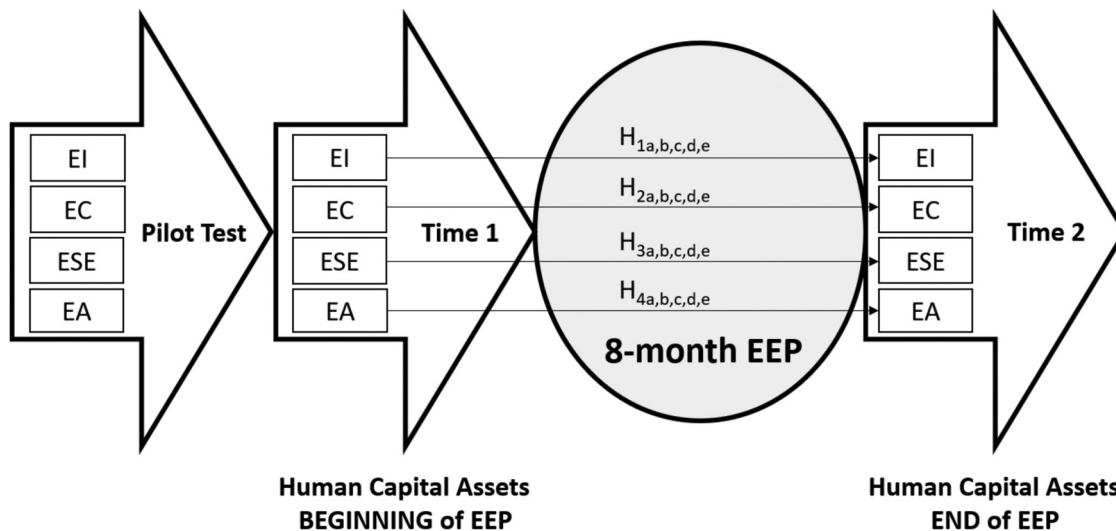


Fig. 1. Research framework.

According to human capital theory, individuals that have developed HCAs are more likely to achieve better performance outcomes and success either as employees or self-employed individuals (Becker, 1964; Mincer, 1958). Likewise, entrepreneurs are poised to achieve better productivity and, consequently, higher success with developed HCA. In entrepreneurship, HCAs are defined as (1) entrepreneurial intentions, (2) entrepreneurship competences, (3) an attitude towards entrepreneurship, and (4) entrepreneurial self-efficacy (Dams et al., 2021; Martin et al., 2013). Taking the domain-specific view of human capital theory, the relationship between EEPs as human capital investments and HCAs as their learning outcomes represents only the first part of the human capital theory model. In fact, Becker (1964) and Mincer (1958) contend that education is a human capital investment that should positively affect the evolution of HCAs. Thus, EEPs are a rather efficient way of improving entrepreneurship-related HCAs (Martin et al., 2013), especially if the EEPs in question use experiential pedagogical methods (Huber et al., 2014; Unger et al., 2011), where the pupils develop HCAs by experiencing a simulation of entrepreneurship (Gibb, 2002). Moreover, Elert et al. (2015) and Unger et al. (2011) have shown that HCAs developed early may lead to successful entrepreneurship outcomes, which are the second part of the human capital theory model (Martin et al., 2013).

Research shows that pupils can learn EC (Oosterbeek et al., 2010; Sánchez, 2013) and mold EA, ESE, and EI (Burnette et al., 2020; Fayolle & Gailly, 2015) through appropriate EEPs. Recent studies show that entrepreneurship-related HCAs can be

successfully taught to early adolescents and even to children in early stages of development (Barba-Sánchez & Atienza-Sahuquillo, 2016; Huber et al., 2014), as the research framework of the present study proposes (Fig. 1).

## 1.1 Hypothesis development

### 1.1.1 Entrepreneurial intentions

Intentions are an expressed belief of a person about a specific future behavior they intend to undertake. EI are either the intent to start a new venture or create new value in existing businesses (Bird, 1988). Boyd and Vozikis (1994), complementing Bird's description of EI formation, suggested that the shaping of intentions depends on how a specific person perceives the world around them and on the results they believe their future actions will bring. EI, therefore, will under certain conditions lead to entrepreneurial acts, such as new venture creation (Boyd & Vozikis, 1994). Krueger et al. (2000) defined EI as an individual's self-perceived likelihood of becoming or their desire to become an entrepreneur. Liñán and Chen (2009) see EI as the first step in starting a business, but whether or not this results in an actual new startup depends on several factors. They also acknowledge the importance of EEP in forming EI (Liñán & Chen, 2009).

Many authors espouse the importance of developing EI during early adolescence or even earlier (Barba-Sánchez & Atienza-Sahuquillo, 2016; Huber et al., 2014). Early adolescence is seemingly the best time to boost non-cognitive skills (Cunha & Heckman, 2007), which could positively impact EI development (Huber et al., 2014). Therefore, EI in pupils can indicate

their early intention of starting a business (Moberg, 2014). While some studies with children aged 11–12 have not demonstrated higher EI at the end of the EEP (Hassi, 2016; Huber et al., 2014), others have had more positive results. For instance, in a study that included 9th and 10th-graders from Danish lower secondary schools (aged 14–15 and 15–16, respectively), Moberg (2014) demonstrated that EI can be improved even at such a young age. Also, a Spanish primary-school EEP resulted in 8–12-year-old pupils increasing their EI (Barba-Sánchez & Atienza-Sahuquillo, 2016).

Research shows that in EEPs, boys usually increase their EI more than girls. While some studies have found no difference in EI development between boys and girls (Hassi, 2016; Huber et al., 2014), others find that boys develop higher EI than girls (Brüne & Lutz, 2020). For instance, a study by Athayde (2009) demonstrated that male participants developed their EI more than female participants.

Pupils from an entrepreneurial family background, meaning one or more members of their immediate family are entrepreneurs, are poised to improve their EI more than the pupils without such a background. Lindquist et al. (2012) demonstrated that nurture is more important than nature. That is, children adopted into an entrepreneurial family are more likely to become entrepreneurs themselves than the biological children of entrepreneurs adopted by non-entrepreneur parents. Also, Athayde (2009) and Johansen (2016) demonstrated that students taking part in the Junior Achievement mini-company program whose parents were entrepreneurs developed their EI more than students whose parents were not.

The following hypotheses can thus be postulated:

**H1a.** *EI in primary-school pupils will improve during an eight-month-long EEP.*

**H1b.** *At the end of an eight-month-long EEP, boys will display higher EI than girls.*

**H1c.** *During an eight-month-long EEP, boys will improve their EI more than girls.*

**H1d.** *At the end of an eight-month-long EEP, primary-school pupils with an entrepreneurial family background will display higher EI than those without an entrepreneurial family background.*

**H1e.** *During an eight-month-long EEP, primary-school pupils with an entrepreneurial family background will improve their EI more than those without an entrepreneurial family background.*

### 1.1.2 Entrepreneurship competences

Another entrepreneurship-related HCA that EEPs affect positively is EC. The concept of competence, which an individual needs to be able to complete a task, is seen as a combination of appropriate knowledge, skills, and attitudes (Baartman & de Bruijn, 2011). In Europe, EC are one of the eight key competences for lifelong learning (European Commission, 2019). According to Bacigalupo et al. (2016), more Europeans can face challenges in the present and future successfully if they develop their EC. To help educators teach EC, the European Commission developed the EntreComp entrepreneurship competence model as a combination of context-appropriate knowledge, skills, and attitudes. Three competence clusters (Into Action, Resources, Ideas and Opportunities) were formed with five entrepreneurship competences in each, enabling the would-be entrepreneur to create value for others. EntreComp defined EC on eight mastery levels (Bacigalupo et al., 2016).

Most research into primary-school EEPs shows that pupils can learn EC. For instance, Palmér and Johansson (2018), who taught EC together with mathematical competences in a primary school in Sweden, demonstrated that both types of competences had improved during the course of such a program. Also, a qualitative study in a Slovenian primary-school EEP evidenced that the participants had improved specific dimensions of EC, such as *learning from mistakes* and *coping with failure* (Zupan et al., 2018). Huber et al. (2014) discovered that a five-day BizWorld program positively impacted the development of EC. Moreover, Cárcamo-Solís et al. (2017) performed an entrepreneurship experiment where mini companies were created and run by primary-school pupils over several months and observed an improvement in EC. Floris and Pillitu (2019), who studied the learning outcomes of an EEP in a Sardinian rural primary school, also found that such programs can improve certain dimensions of EC, such as creativity, ethical thinking, perseverance, value creation, and teamwork.

There has been some research into whether gender plays a crucial part in the evolution of EC in EEPs. On the one hand, some researchers have found that EEPs impact EC development in females differently than males. For instance, Czyżewska and Mroczek (2020) have demonstrated that females perceived lower development of EC in finance and economics than their male counterparts. However, in *finding opportunities*, *resource management*, *team management*, and *risk management*, women fared better than males. In the same vein, Armuña et al. (2020) discovered that female students in STEM programs at the university fared better than their male schoolmates at developing the EC dimensions that were not related to finance and



economics, such as *motivation and perseverance*. The set of specific EC that both studies found better developed in females than males are also the ones usually taught in primary school as early adolescents do not yet need a detailed knowledge of finance and economics.

Another factor that has been shown to play a crucial role in EC development is entrepreneurial family background. Lindquist et al. (2012), for instance, have demonstrated that entrepreneurial parents most probably pass on a particular set of EC that are specific for developing and running a business to their children. Moreover, it does not matter whether these children are biological children or adopted, which might mean that role modeling is more important than genetics. Also, Wang et al. (2018) determined that children pick up the needed EC by getting involved in the family business. Consequently, according to human capital theory, children that have an entrepreneurial family background are much more likely to learn the EC needed to make headway in starting up and running a business (Botha & Taljaard, 2021).

The following hypotheses can be set:

**H2a.** *EC in primary-school pupils will improve during an eight-month-long EEP.*

**H2b.** *At the end of an eight-month-long EEP, girls will display higher EC than boys.*

**H2c.** *During an eight-month-long EEP, girls will improve their EC more than boys.*

**H2d.** *At the end of an eight-month-long EEP, primary-school pupils with an entrepreneurial family background will display higher EC than those without an entrepreneurial family background.*

**H2e.** *During an eight-month-long EEP, primary-school pupils with an entrepreneurial family background will improve their EC more than those without an entrepreneurial family background.*

### 1.1.3 Attitude towards entrepreneurship

Liñán (2004) characterizes EA as the extent to which a person feels positively or negatively about a particular activity. Likewise, Goel et al. (2007) describe EA as a combination of attitudes towards entrepreneurial activities and entrepreneurs. The present study represents EA as an amalgam of individual attitudes towards entrepreneurial behavior and towards entrepreneurs.

EEPs can positively impact EA at all levels of education. Pepin and St-Jean (2019) found that an EEP

in Quebec did not significantly impact the participants' EA. Athayde (2009), conversely, demonstrated that long-term programs such as the Young Enterprise Entrepreneurship Masterclass program can boost participants' EA. In some primary education settings, EEPs have also positively impacted EA development in pupils. For instance, in a Sardinian rural school, Floris and Pillitu (2019) demonstrated that the pupils' EA improved after participating in an EEP. Similarly, Barba-Sánchez and Atienza-Sahuquillo (2016) and Tsakiridou and Stergiou (2014) found that in a Greek and Spanish primary-school setting, respectively, EEPs had also had a positive impact on the pupils' EA.

The development of EA during an EEP depends on several factors, and gender is among the most important ones. Several researchers have found that EEPs will develop more positive EA in male students than in their female counterparts. For instance, Athayde (2009) discovered that male students improved their EA more than female students in her study on the development of students' EA in a Junior Achievement mini-company EEP. Similarly, Johansen (2016), studying the outcomes of the Junior Achievement mini-company EEP, also concluded that male students develop more positive EA in EEP than female students. Moreover, Adamus et al. (2021) revealed that women in Slovakia held less positive EA than men.

Another factor in the development of EA during EEP is the entrepreneurial family background. For example, Carr and Sequeira (2007) found that individuals from an entrepreneurial family background held more positive EA than individuals who did not have such a family. Likewise, Fayolle and Gailly (2015) noted that individuals whose parents were involved with startups had a more positive EA than individuals without such parents.

Therefore, the following hypotheses may be posited:

**H3a.** *EA in primary-school pupils will improve during an eight-month-long EEP.*

**H3b.** *At the end of an eight-month-long EEP, boys will display higher EA than girls.*

**H3c.** *During an eight-month-long EEP, boys will improve their EA more than girls.*

**H3d.** *At the end of an eight-month-long EEP, primary-school pupils with an entrepreneurial family background will display higher EA than those without an entrepreneurial family background.*

**H3e.** *During an eight-month-long EEP, primary-school pupils with an entrepreneurial family background will improve their EA more than those without an entrepreneurial family background.*

#### 1.1.4 Entrepreneurial self-efficacy

Self-efficacy signifies a person's perceived ability to cope with any situation they might have to face (Bandura, 1977, 1982). Moreover, self-efficacy influences a person's behavior, the way they think, and the emotional states they experience in a situation of uncertainty. Thus, self-efficacy determines the activities a person chooses to perform or avoid and the environmental settings they may select to carry out the given activities (Bandura, 1982). In entrepreneurship, Boyd and Vozikis (1994) define entrepreneurial self-efficacy as how a person assesses internal and external hindrances to getting an entrepreneurial act done successfully.

EEPs seem to be an appropriate way of developing ESE at all educational levels (Burnette et al., 2020). Individuals can improve their ESE in an EEP, which may positively affect their career development (Burnette et al., 2020). ESE represents the confidence to participate in entrepreneurship activities successfully (Burnette et al., 2020; Karlsson & Moberg, 2013). Studies have shown that EEPs positively impact ESE development in different geographical locations and diverse educational settings – from Mexico (Cárcamo-Solís et al., 2017) to the Netherlands (Huber et al., 2014) and more.

Gender also plays a crucial role in the development of ESE. Research has demonstrated that male participants benefit more from EEPs in terms of developed ESE than female participants. Specifically, Brüne and Lutz (2020) found that boys advance their ESE more than girls. Similarly, Huber et al. (2014) showed that when done with early adolescents, the effect of EEPs on the evolution of ESE is smaller in girls than in boys.

Also, if the parents of the pupils taking part in the EEP are active in entrepreneurship, then the EEP will impact the development of ESE more than if the parents are not. Lindquist et al. (2012) demonstrated that parental role modeling increases the probability of children becoming entrepreneurs. Such children are thus more likely to believe in their abilities to perform the entrepreneurial act successfully. What is more, Schoon and Duckworth (2012) also showed that the evolution of ESE corresponded with parents' activities.

For this, the following hypotheses can be drawn:

**H4a.** *ESE in primary-school pupils will improve during an eight-month-long EEP.*

**H4b.** *At the end of an eight-month-long EEP, boys will display higher ESE than girls.*

**H4c.** *During an eight-month-long EEP, boys will improve their ESE more than girls.*

**H4d.** *At the end of an eight-month-long EEP, primary-school pupils with an entrepreneurial family background will display higher ESE than those without an entrepreneurial family background.*

**H4e.** *During an eight-month-long EEP, primary-school pupils with an entrepreneurial family background will improve their ESE more than those without an entrepreneurial family background.*

## 2 Methods

In the quasi-experimental design with no control group, changes in the constructs that represented the HCA elements, EI, EC, EA, and ESE, were measured at the beginning and the end of an eight-month-long EEP in primary schools.

### 2.1 Research setting: Entrepreneurship education programs in primary school

The research is based on a longitudinal study of primary-school entrepreneurship clubs that were held in 22 primary schools in Slovenia as part of the *Creativity, entrepreneurship, innovation* project. The goals of the project were to boost creativity and innovative spirit in pupils and to develop their EC and ESE. Also, the pupils made contact with the business world, which allowed them to understand the role entrepreneurship has in society and thus develop a positive attitude towards the phenomenon. Finally, the project aimed to encourage entrepreneurship among pupils by presenting it as a viable career option. Each entrepreneurship club consisted of at least 10 pupils and met for a minimum of 35 lessons, with each lesson lasting 45 minutes (SPIRIT Slovenija, 2017a).

The pupils in the entrepreneurship clubs worked in teams. They were guided to identify authentic problems that people around them had and recognize them as opportunities for developing solutions for prospective customers. The pupils talked to the people they were developing the solutions for and understood their needs. The solution would then be prototyped and tested with the customers again. If the prototype tests indicated that iterations were needed, the pupils would change the prototype and test it again. The pupils calculated the expenses they would incur if they wanted to develop their idea into a

marketable product and assessed the risks involved. Moreover, they were encouraged to prepare some marketing material to promote their solutions. On top of that, the pupils were also encouraged to contact prospective suppliers to manufacture their solution if that was what their business model required (Cankar et al., 2014). The pupils thus used the *learning through entrepreneurship* approach as described in Gibb (2002).

The teachers leading the EEP underwent entrepreneurship training organized by the SPIRIT Slovenia public agency. By and large, there were two types of training available – *With creativity and innovation to entrepreneurship* and *Startup Weekend for teachers*. The former was a 16-hour training program aimed at developing problem-solving skills in the participating teachers through their interaction with people they were solving the problem for (SPIRIT Slovenija, 2017b). The latter was a three-day startup weekend where the teachers worked to turn their business ideas into reality by understanding the problem they were solving, building a prototype and testing it, and developing a basic business model for it. Teachers worked in teams and pitched their ideas to a panel of entrepreneurs at the end of the startup weekend (SPIRIT Slovenija, 2016). Attending at least one of the training programs was mandatory for the teachers if they were to teach in the EEP.

## 2.2 Sample and data collection

The sample consisted of pupils that voluntarily participated in the entrepreneurship clubs. In all, 362 pupils underwent the EEP. The participating pupils were asked to fill in a questionnaire in paper form about the self-perceived level of their EI, EC, EA, and ESE at the beginning of the EEP (i.e., PRE questionnaires) and the very end of the EEP eight months later (i.e., POST questionnaires). Both the PRE and POST questionnaires were answered by 180 pupils, yielding an approximately 50% response rate.

The age of the participants ranged from 9 to 14 years. Most came from two-child families, themselves included. Their average grades were 3.28 out of 5.00, meaning most participants scored school grades of either 3 or 4, which is very similar to C and B grades, respectively. The genders were approximately equally distributed with, 42% boys and 58% girls. Of the entire sample, 47% of the pupils had an entrepreneurial family background.

## 2.3 Measures

All four constructs representing the distinct components of entrepreneurship-related HCAs (Dams et al., 2021; Martin et al., 2013) were measured with previ-

ously developed measurement scales. All items are presented in Table 1. Where applicable, measures' reliabilities were calculated using Cronbach's Alphas. For some constructs used, Cronbach's Alphas were slightly below .7, but in a research setting such as ours, where pupils from primary school were the target population and scarce research on such populations exists to date, a lower threshold of .6 was accepted. This is still permitted in exploratory research (Hair et al., 2010).

### 2.3.1 Entrepreneurial intentions

EI were measured with pupils' opinion of the likelihood of becoming entrepreneurs (Vincett & Farlow, 2008) at the beginning and the end of the entrepreneurship education activity. Repeated measures are a common way to investigate how EEPs impact the development of constructs like EI or ESE (DeGeorge & Fayolle, 2008; Moberg, 2014).

### 2.3.2 Entrepreneurship competences

EC were measured through a set of 18 items that mirrored the 1st-level descriptors of the EntreComp Framework (Bacigalupo et al., 2016). The items had been translated into Slovenian using the translation-back-translation method (Brislin, 1970). The students answered the items on a five-point Likert scale, which ranged from 1 = totally disagree to 5 = totally agree. The EC construct was measured with the same items in both the PRE and POST questionnaires.

The present study measures EC as an HCA construct with four dimensions – *Spotting opportunities*, *Mobilizing others*, *Motivation and perseverance*, and *Coping with uncertainty, ambiguity, and risk* (Bacigalupo et al., 2016; Morris et al., 2013). The *Spotting opportunities* competence is described as the ability to detect possibilities for value creation that have been overlooked (Bacigalupo et al., 2016; Morris et al., 2013). *Mobilizing others* is also an important competence for nascent entrepreneurs that enables them to enthruse and marshal the cooperation of other individuals in the pursuit of creating value (Karlsson & Moberg, 2013). Young future entrepreneurs also have to develop the competence of *Motivation and perseverance*, which allows them to keep up with their activities in the face of possible adversity and setbacks (Huber et al., 2014; Morris et al., 2013). Finally, the competence of *Coping with uncertainty, ambiguity, and risk* is one of the most recognizable competences of entrepreneurs as it enables them to mitigate eventualities that might hinder the activity of value-creation (Bacigalupo et al., 2016; Morris et al., 2013).

The entire EC measurement instrument (i.e., 55 items measuring 15 competences within three areas) was pilot tested on a sample of 21 pupils. The test



Table 1. Scales' items.

**SCALES FOR MEASURING HCA CONSTRUCTS****ENTREPRENEURIAL INTENTIONS AT THE BEGINNING OF THE ACTIVITY**

What is the likelihood that you will become an entrepreneur?

**ENTREPRENEURIAL INTENTIONS AT THE END OF THE ACTIVITY**

What is the likelihood that you will become an entrepreneur now that you have completed this entrepreneurship activity (i.e., startup weekend, workshop, after-school club...)?

**ENTREPRENEURSHIP COMPETENCES****Spotting opportunities**

I can find opportunities to help others.

I can find different examples of challenges that need solutions.

I can find examples of groups who have benefited from a solution to a given problem.

**Motivation and perseverance**

I am driven by the possibility to do or contribute to something that is good for me or for others.

I see tasks as challenges to do my best.

I can recognize different ways of motivating myself and others to create value. (Level 2)

I show passion and willingness to achieve my goals.

I do not give up and I can keep going even when facing difficulties.

**Mobilizing others**

I show enthusiasm for challenges.

I can persuade others by providing a number of arguments. (Level 2)

I can communicate my ideas clearly to others.

**Coping with uncertainty, ambiguity, and risk**

I am not afraid of making mistakes while trying new things.

I can identify examples of risks in my surroundings.

I can critically evaluate the risks associated with an idea that creates value, taking into account a variety of factors. (Level 3)

**ATTITUDES TOWARDS ENTREPRENEURSHIP**

My parents have a positive attitude towards entrepreneurs.

I have a positive attitude towards entrepreneurs.

In my opinion, society respects successful entrepreneurs.

People who have started their own business and have failed should be given a second chance.

**ENTREPRENEURIAL SELF-EFFICACY**

I can identify my needs, wants, interests and goals.

I can identify things I am good at and things I am not good at.

I believe in my ability to do what I am asked successfully.

showed the instrument was too long, so a preliminary statistical evaluation of the items was done, and feedback on the items was gathered from pupils. Based on their feedback, as well as on low loadings, cross-loadings, and low reliabilities, seven competences were excluded. Cronbach's Alphas were the following: *Spotting opportunities*<sub>beginning of EEP</sub> = .690, *Spotting opportunities*<sub>end of EEP</sub> = .794; *Motivation and Perseverance*<sub>beginning of EEP</sub> = .719, *Motivation and Perseverance*<sub>end of EEP</sub> = .778; *Mobilizing others*<sub>beginning of EEP</sub> = .707, *Mobilizing others*<sub>end of EEP</sub> = .593, *Coping with uncertainty, ambiguity, and risk*<sub>beginning of EEP</sub> = .682, and *Coping with uncertainty, ambiguity, and risk*<sub>end of EEP</sub> = .640.

**2.3.3 Attitude towards entrepreneurship**

Attitude towards entrepreneurship was measured with a four-item measurement scale capturing pupils' attitudes towards entrepreneurship. Items developed by Liñán and Chen (2009), modified to suit the context of primary school, were applied. Respondents were asked to rate their degree of agreement on a five-point Likert scale (1 = totally disagree, 5 = totally agree).

Cronbach's Alpha for EA at the beginning of the EEP was .719; at the end of the EEP, it was .778.

**2.3.4 Entrepreneurial self-efficacy**

ESE was measured as an independent construct as it is an independent component of entrepreneurship-related HCAs (Dams et al., 2021; Martin et al., 2013). Thus, it was measured as such using items based on EntreComp's descriptors for "self-awareness and self-efficacy". Respondents were asked to rate to what extent they agreed or disagreed on a five-point Likert scale (1 = totally disagree, 5 = totally agree). Cronbach's Alpha for ESE at the beginning of the EEP was .661; at the end of the EEP, it was .690.

**2.3.5 Gender and entrepreneurial family background**

The participating pupils also reported their gender, which was subsequently used in our analysis of gender differences in the four HCAs (0 = girls, 1 = boys). In addition, we measured pupils' entrepreneurial family backgrounds in terms of entrepreneurial experiences. We asked pupils to rate whether any of their relatives (i.e., parents, older siblings, uncles,

Table 2. Mean differences in entrepreneurial intentions, entrepreneurship competences, attitude towards entrepreneurship, and entrepreneurial self-efficacy at the beginning and at the end of entrepreneurship education programs for the entire sample and repeated measures ANOVA statistics.

Construct of HCA	Beginning of the activity		End of the activity		Mean difference		Repeated measures ANOVA		
	Mean	SD	Mean	SD	Mean	Std. Error	F(1, 179)	Sig.	Partial Eta squared
Entrepreneurial intentions	3.006	1.275	3.070	1.249	-0.064	0.098	0.384	.536	.002
Entrepreneurial competences:									
Spotting opportunities	3.815	0.697	3.946	0.733	-0.131	0.031	<b>4.716</b>	<b>.031</b>	.026
Motivation and perseverance	4.080	0.637	4.149	0.618	-0.069	0.051	1.859	.174	.010
Mobilizing others	3.671	0.815	3.767	0.729	-0.096	0.065	2.183	.141	.012
Coping with uncertainty	3.825	0.706	3.846	0.687	-0.022	0.066	0.109	.742	.001
Attitude towards entrepreneurship	3.847	0.702	3.881	0.707	-0.034	0.060	0.311	.578	.002
Entrepreneurial self-efficacy	4.228	0.658	4.250	0.660	-0.022	0.050	0.194	.660	.001

Note:  $N = 180$ ; all variables measured on a 5-point Likert scale;  $SD$  = standard deviation;  $df_1$  = hypothesis degrees of freedom,  $df_2$  = error degrees of freedom.

aunts, cousins, or grandparents) had entrepreneurial experiences. We coded their answers as a binary variable (0 = no entrepreneurial family, 1 = with an entrepreneurial family).

#### 2.4 Statistical procedures of data analysis

We ran a confirmatory factor analysis on the HCA constructs of EC, EA, and ESE in IBM AMOS version 28. Then, we performed a descriptive statistical analysis of the studied constructs and variables. Table 2 reports mean values and standard deviations as well as mean differences and standard errors for EI, EC, EA, and ESE for the whole sample. Table 3 reports mean values and standard deviations in the HCA constructs at the beginning and the end of the EEP separately for boys and girls and separately for pupils with and without an entrepreneurial family background. In Table 3, we also report the ANOVA results ( $F$ -values and  $p$ -values) of the differences in HCA constructs among the groups. Then, we subjected our data to a repeated measures analysis of variance (rANOVA) to determine whether there were significant differences in mean values of EI, EC, EA, and ESE at the beginning and the end of the EEP (Table 2, section “Repeated measures ANOVA”) and whether potential differences in mean values were contingent on gender (Table 4) or entrepreneurial families (Table 5). We performed these tests in IBM SPSS version 28.

### 3 Results

Hypothesis H1a predicted that EI would increase for the pupils during the EEP. However, the results reported in Table 2 show no significant increase in EI at the end of the EEP; rANOVA:  $F(1, 179) = 0.384$ ,  $p = .536$ ,  $\eta^2 = .002$ . Next, we were interested in whether boys would display higher EI at the end of

the EEP (H1b) and whether boys would increase their EI more than girls during the EEP (H1c). The results in Table 4 show a significant difference in EI when gender is considered; rANOVA:  $F(1, 178) = 6.449$ ,  $p = .012$ ,  $\eta^2 = .035$ . Specifically, at the beginning of the EEP, boys reported higher EI compared to girls, although the difference was not statistically significant (Table 3:  $F = 3.027$ ,  $p = .084$ ), while at the end of the EEP, boys reported significantly higher EI compared to girls (Table 3:  $F = 6.667$ ,  $p = .011$ ). However, across the 8-month EEP, there was no significant increase in EI either for girls or for boys; Table 4: simple main effect for girls: rANOVA:  $F(1, 178) = 0.000$ ,  $p = 1.000$ ,  $\eta^2 = 0.000$ ; simple main effect for boys: rANOVA:  $F(1, 178) = 0.919$ ,  $p = .339$ ,  $\eta^2 = .005$ .

When taking into consideration the entrepreneurial family background (higher EI at the end of the EEP [H1d] and higher improvement in EI during the EEP [H1e] for pupils with an entrepreneurial family background), the results reported in Table 5 show a significant difference in EI among the two groups; rANOVA:  $F(1, 178) = 9.987$ ,  $p = .002$ ,  $\eta^2 = .053$ . Specifically, at the beginning and the end of the EEP, pupils with an entrepreneurial family background reported statistically significant higher values of EI (Table 3: at the beginning of the EEP:  $F = 10.262$ ,  $p = .002$ , at the end of the EEP:  $F = 4.593$ ,  $p = .033$ ). However, neither of the groups of participants increased their EI significantly; Table 5: simple main effect for pupils without an entrepreneurial family background:  $F(1, 178) = 1.287$ ,  $p = .258$ ,  $\eta^2 = .007$ ; simple main effect for pupils with entrepreneurial family background:  $F(1, 178) = 0.115$ ,  $p = .735$ ,  $\eta^2 = .001$ ). Still, entrepreneurial family background was statistically significant—Table 5: rANOVA:  $F(1, 178) = 9.987$ ,  $p = .002$ ,  $\eta^2 = .007$ —, which evidences that pupils with an entrepreneurial family background displayed higher levels of EI. This leads us to accept H1c and H1d, while there are no substantial grounds for accepting H1a, H1b, and H1e. Refer also to Figs. 2

Table 3. Mean differences in entrepreneurial intentions, entrepreneurship competences, attitude towards entrepreneurship, and entrepreneurial self-efficacy at the beginning and at the end of entrepreneurship education programs based on gender and entrepreneurial family.

Construct of HCA	Mean values (SD) Beginning of the EEP		Mean values (SD) End of the EEP		Mean difference for gender (std. error), F-value, sig.		Mean values (SD) Beginning of the EEP		Mean values (SD) End of the EEP		Mean difference for entrepreneurial background (std. error), F-value, sig.	
	Girls	Boys	Girls	Boys	Beginning of the EEP	End of the EEP	No entrepreneurial family	With entrepreneurial family	No entrepreneurial family	With entrepreneurial family	Beginning of the EEP	End of the EEP
Entrepreneurial intentions	2.867 (1.256)	3.200 (1.284)	2.867 (1.287)	3.347 (1.145)	-0.334 (0.192), F = 3.027, p = .084	-0.480 (0.186), F = 6.667, p = .011	2.740 (1.160)	3.338 (1.340)	2.890 (1.230)	3.290 (1.245)	-0.597 (0.186), F = 10.262, p = .002	-0.398 (0.185), F = 4.593, p = .033
Entrepreneurial competences:												
Spotting opportunities	3.859 (0.684)	3.753 (0.714)	4.057 (0.703)	3.791 (0.751)	0.107 (0.105), F = 1.025, p = .313	0.266 (0.109), F = 5.916, p = .016	3.811 (0.673)	3.820 (0.730)	3.927 (0.748)	3.971 (0.718)	-0.009 (0.105), F = 0.008, p = .930	-0.044 (0.110), F = 0.160, p = .689
Motivation and perseverance	4.138 (0.598)	3.998 (0.683)	4.238 (0.599)	4.024 (0.626)	0.140 (0.096), F = 2.131, p = .146	0.214 (0.092), F = 5.375, p = .022	4.036 (0.635)	4.134 (0.638)	4.164 (0.656)	4.130 (0.571)	-0.098 (0.095), F = 1.054, p = .306	0.034 (0.093), F = 0.134, p = .715
Mobilizing others	3.746 (0.732)	3.565 (0.914)	3.819 (0.713)	3.693 (0.749)	0.182 (0.123), F = 2.188, p = .141	0.126 (0.110), F = 1.304, p = .255	3.557 (0.848)	3.813 (0.753)	3.743 (0.744)	3.796 (0.713)	-0.256 (0.121), F = 4.465, p = .036	-0.053 (0.110), F = 0.230, p = .632
Coping with uncertainty	3.831 (0.643)	3.815 (0.790)	3.863 (0.677)	3.822 (0.705)	0.016 (0.107), F = 0.022, p = .881	0.041 (0.104), F = 0.157, p = .692	3.801 (0.744)	3.854 (0.659)	3.800 (0.703)	3.904 (0.667)	-0.053 (0.106), F = 0.245, p = .621	-0.104 (0.103), F = 1.021, p = .314
Attitude towards entrepreneurship	3.851 (0.661)	3.842 (0.760)	3.886 (0.681)	3.873 (0.746)	0.009 (0.106), F = 0.008, p = .930	0.012 (0.107), F = 0.013, p = .908	3.738 (0.711)	3.983 (0.669)	3.778 (0.741)	4.009 (0.643)	-0.245 (0.104), F = 5.574, p = .019	-0.232 (0.105), F = 4.887, p = .028
Entrepreneurial self-efficacy	4.248 (0.685)	4.200 (0.622)	4.343 (0.636)	4.120 (0.675)	0.048 (0.100), F = 0.229, p = .633	0.223 (0.099), F = 5.103, p = .025	4.201 (0.667)	4.261 (0.648)	4.233 (0.691)	4.271 (0.623)	-0.060 (0.099), F = 0.369, p = .545	-0.037 (0.099), F = 0.143, p = .706

Note: N = 180, of which 105 respondents are girls and 75 respondents are boys; 100 respondents have one or more entrepreneurial family members, and 80 respondents do not have any entrepreneurial family members. Codes: girls = 0, boys = 1; no entrepreneurial family member(s) = 0, entrepreneurial family member(s) = 1. Degrees of freedom = 178. SD = standard deviation. All variables measured on a 5-point Likert scale.

Table 4. Repeated measures ANOVA for entrepreneurial intentions, entrepreneurship competences, attitude towards entrepreneurship, and entrepreneurial self-efficacy at the beginning and at the end of entrepreneurship education programs based on gender.

Human capital assets	F(1, 178)	Sig.	Partial Eta squared	Human capital assets	F(1, 178)	Sig.	Partial Eta squared
<b>Entrepreneurial intentions</b>							
<i>rANOVA</i>							
Gender	<b>6.449</b>	<b>.012</b>	.035		/		
Time	0.536	.465	.003		/		
Gender*Time	0.537	.465	.003		/		
<i>Simple Main Effects</i>							
Time–Girls	0.000	1.000	.000		/		
Time–Boys	0.919	.339	.005		/		
<b>Entrepreneurial competences</b>							
<b>Spotting opportunities</b>				<b>Motivation and perseverance</b>			
<i>rANOVA</i>				<i>rANOVA</i>			
Gender	<b>4.467</b>	<b>.036</b>	.024	Gender	<b>5.060</b>	<b>.026</b>	.028
Time	3.720	.055	.020	Time	1.496	.223	.008
Gender*Time	1.690	.195	.009	Gender*Time	0.514	.474	.003
<i>Simple Main Effects</i>				<i>Simple Main Effects</i>			
Time–Girls	<b>6.255</b>	<b>.013</b>	.034	Time–Girls	2.258	.135	.013
Time–Boys	0.169	.681	.001	Time–Boys	0.110	.741	.001
<b>Mobilizing others</b>				<b>Coping with uncertainty</b>			
<i>rANOVA</i>				<i>rANOVA</i>			
Gender	2.559	.111	.014	Gender	0.123	.726	.001
Time	2.322	.129	.013	Time	0.086	.770	.000
Gender*Time	0.179	.673	.001	Gender*Time	0.035	.851	.000
<i>Simple Main Effects</i>				<i>Simple Main Effects</i>			
Time–Girls	0.727	.395	.004	Time–Girls	0.139	.710	.001
Time–Boys	1.624	.204	.009	Time–Boys	0.005	.945	.000
<b>Entrepreneurial self-efficacy</b>				<b>Attitude towards entrepreneurship</b>			
<i>rANOVA</i>				<i>rANOVA</i>			
Gender	2.505	.115	.014	Gender	0.015	.901	.000
Time	0.021	.884	.000	Time	0.296	.587	.002
Gender*Time	3.036	.083	.017	Gender*Time	0.001	.981	.000
<i>Simple Main Effects</i>				<i>Simple Main Effects</i>			
Time–Girls	2.139	.145	.012	Time–Girls	0.194	.660	.001
Time–Boys	1.092	.297	.006	Time–Boys	0.116	.734	.001

and 3 for a graphical representation of the significant results regarding EI analyses.

In the second set of hypotheses testing, we investigated changes in EC from the beginning to the end of

the EEP for the whole sample (H2a) and subsets of the sample broken down by gender (H2b and H2c) and entrepreneurial family background (H2d and H2e). We ran the analysis on each of the four dimensions

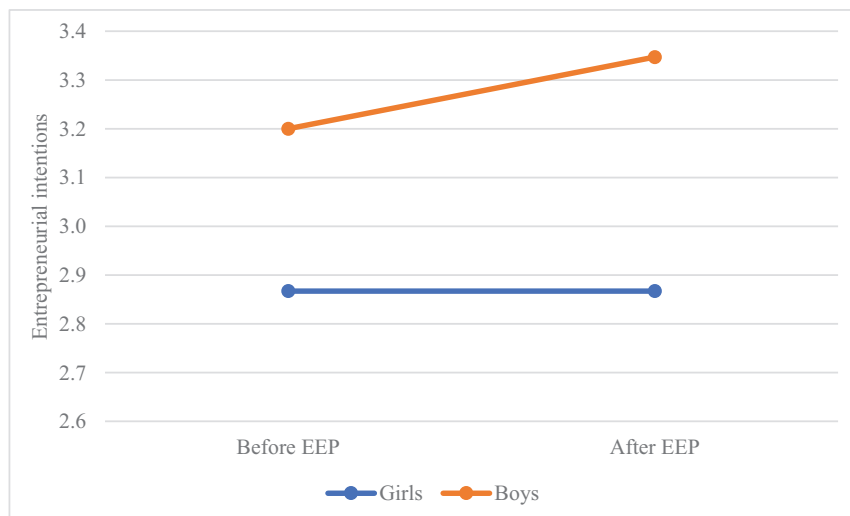


Fig. 2. Graphic representation of the evolution of EI during the duration of the EEP relative to gender.



Table 5. Repeated measures ANOVA for entrepreneurial intentions, entrepreneurship competences, attitude towards entrepreneurship, and entrepreneurial self-efficacy at the beginning and at the end of entrepreneurship education programs based on entrepreneurial family.

Human capital assets	F(1, 178)	Sig.	Eta squared	Human capital assets	F(1, 178)	Sig.	Eta squared
<b>Entrepreneurial intentions</b>							
<i>rANOVA</i>							
Entrepreneurial family	<b>9.987</b>	<b>.002</b>	.053		/		
Time	0.254	.615	.001		/		
Entrepreneurial family*Time	1.018	.314	.006		/		
<i>Simple Main Effects</i>							
Time–No entrepreneurial family	1.287	.258	.007		/		
Time–With entrepreneurial family	0.115	.735	.001		/		
<b>Entrepreneurial competences</b>							
<b>Spotting opportunities</b>				<b>Motivation and perseverance</b>			
<i>rANOVA</i>				<i>rANOVA</i>			
Entrepreneurial family	0.091	.764	.001	Entrepreneurial family	0.163	.687	.001
Time	<b>4.772</b>	<b>.030</b>	.026	Time	1.474	.226	.008
Entrepreneurial family*Time	0.082	.775	.000	Entrepreneurial family*Time	1.669	.198	.009
<i>Simple Main Effects</i>				<i>Simple Main Effects</i>			
Time–No entrepreneurial family	2.026	.156	.011	Time–No entrepreneurial family	3.532	.062	.019
Time–With entrepreneurial family	2.748	.099	.015	Time–With entrepreneurial family	0.003	.958	.000
<b>Mobilizing others</b>				<b>Coping with uncertainty</b>			
<i>rANOVA</i>				<i>rANOVA</i>			
Entrepreneurial family	2.617	.107	.014	Entrepreneurial family	0.940	.334	.005
Time	1.692	.195	.009	Time	0.137	.711	.001
Entrepreneurial family*Time	2.432	.121	.013	Entrepreneurial family*Time	0.151	.698	.001
<i>Simple Main Effects</i>				<i>Simple Main Effects</i>			
Time–No entrepreneurial family	<b>4.602</b>	<b>.033</b>	.025	Time–No entrepreneurial family	0.000	.989	.000
Time–With entrepreneurial family	0.030	.862	.000	Time–With entrepreneurial family	0.259	.611	.001
<b>Entrepreneurial self-efficacy</b>				<b>Attitude towards entrepreneurship</b>			
<i>rANOVA</i>				<i>rANOVA</i>			
Entrepreneurial family	0.326	.568	.002	Entrepreneurial family	<b>7.885</b>	<b>.006</b>	.042
Time	0.169	.681	.001	Time	0.292	.590	.002
Entrepreneurial family*Time	0.050	.823	.000	Entrepreneurial family*Time	0.013	.911	.000
<i>Simple Main Effects</i>				<i>Simple Main Effects</i>			
Time–No entrepreneurial family	0.227	.634	.001	Time–No entrepreneurial family	0.239	.625	.001
Time–With entrepreneurial family	0.016	.900	.000	Time–With entrepreneurial family	0.083	.774	.000

of EC separately. When investigating the whole sample, only the EC dimension of *Spotting opportunities* yielded significant changes across time as seen from results reported in Table 2;  $rANOVA: F(1, 179) = 4.716$ ,

$p = .031, \eta p^2 = .026$ . When controlling the reported values of EC dimensions and their changes over time for gender, we uncovered that there were differences in two EC dimensions (see Tables 3 and 4). First, the

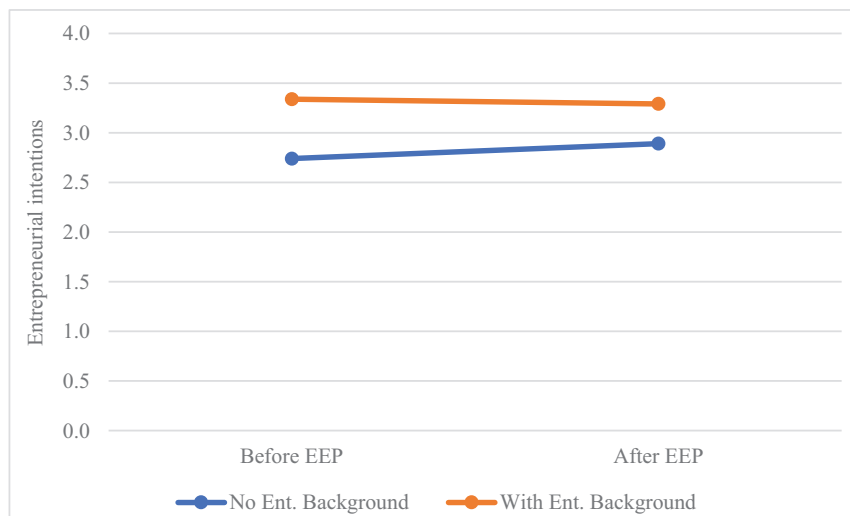


Fig. 3. Graphic representation of the evolution of EI during the duration of the EEP relative to entrepreneurial family background.

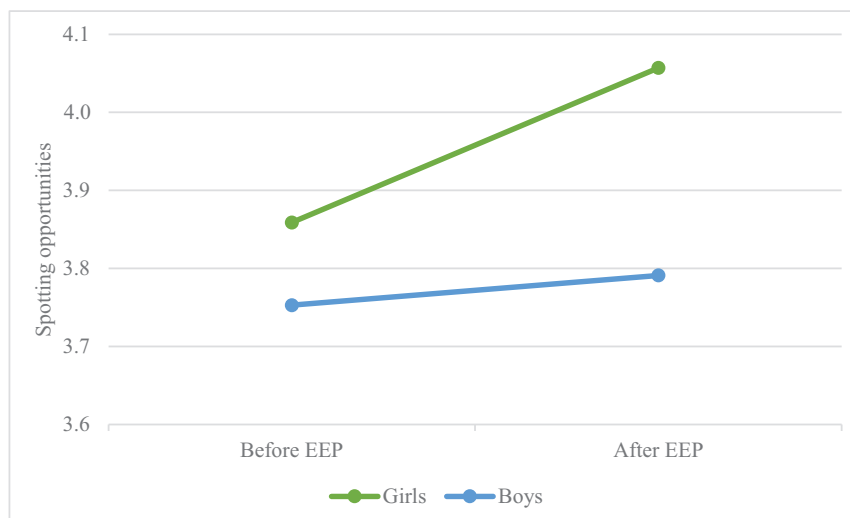


Fig. 4. Graphic representation of the evolution of EC—Spotting opportunities during the duration of the EEP relative to gender.

dimension of *Spotting opportunities* yielded a significant increase across time for girls but not for boys; Table 4: simple main effect for girls:  $F(1, 178) = 6.255$ ,  $p = .013$ ,  $\eta^2 = .034$ ; simple main effect for boys:  $F(1, 178) = 0.169$ ,  $p = .681$ ,  $\eta^2 = .001$ . Moreover, girls reported a higher value for the *Spotting opportunities* dimension compared to boys at the end of the EEP (Table 3:  $F = 5.916$ ,  $p = .016$ ), and they also improved the EC dimension more than boys through the course of the EEP; Table 4: rANOVA:  $F(1, 178) = 4.467$ ,  $p = .036$ ,  $\eta^2 = .024$ . The second EC dimension that demonstrated gender differences was *Motivation and perseverance*—rANOVA:  $F(1, 178) = 5.060$ ,  $p = .026$ ,  $\eta^2 = .028$ —, where girls displayed significantly higher values compared to boys (Table 3:  $F = 5.375$ ,  $p = .022$ ), although there were no statistically significant increases in *Motivation and perseverance* either for girls or for boys separately through the course of the EEP; simple main effect for girls:  $F(1, 178) = 2.258$ ,  $p = .135$ ,  $\eta^2 = .013$ ; simple main effect for boys:  $F(1, 178) = 0.110$ ,  $p = .741$ ,  $\eta^2 = .001$ .

There were also differences in changes across time in some EC dimensions when considering entrepreneurial family background. Yet, no statistically significant differences were detected in the value of the reported EC dimensions between the two groups at the end of the EEP (see Tables 3 and 5). The EC dimension of *Spotting opportunities* demonstrated an effect of time, meaning that the differences among the levels of *Spotting opportunities* between the two groups remained almost the same, yet for both groups, there was an increase in the level of *Spotting opportunities*;  $F(1, 178) = 4.772$ ,  $p = .030$ ,  $\eta^2 = .026$ . Based on these results, we can only partly accept H2a, H2b, H2c, and H2e. Namely, only some EC dimensions increased

from the beginning to the end of the EEP and only in some of the EC dimensions did girls report higher values compared to boys at the end of the EEP. We must reject H2d because none of the EC dimensions were significantly higher at the end of the EEP for pupils with an entrepreneurial family background. See Figs. 4 and 5 for a graphical representation of the EC analyses results.

The third set of hypotheses that we tested were about the improvement of EA in the course of an eight-month EEP for primary-school pupils in general (H3a). The hypotheses were separately tested for boys and girls (H3c) and for pupils with or without an entrepreneurial family background (H3e). In addition, we tested the differences in the displayed EA at the end of the EEP for the two pairs of groups of pupils under study (H3b and H3d). First, the results reported in Table 2 show no significant increase of EA for the whole sample of pupils taking part in the eight-month EEP; rANOVA:  $F(1, 179) = 0.311$ ,  $p = .578$ ,  $\eta^2 = .002$ . There was also no effect of gender on the level of EA; Table 4: rANOVA:  $F(1, 178) = 0.015$ ,  $p = .901$ . However, there were significant effects of the entrepreneurial family background—Table 5: rANOVA:  $F(1, 178) = 7.885$ ,  $p = .006$ ,  $\eta^2 = .042$ —, which evidenced that pupils with an entrepreneurial family background displayed higher EA at the beginning and at the end of the EEP (Table 3: at the end of the EEP:  $F = 4.887$ ,  $p = .028$ ). However, there was no significant increase of EA over time for either of the groups: pupils with no entrepreneurial family background—simple main effect:  $F(1, 178) = 0.239$ ,  $p = .625$ ,  $\eta^2 = .0001$ —and pupils with an entrepreneurial family background—simple main effect:  $F(1, 178) = 0.083$ ,  $p = .774$ ,  $\eta^2 = .000$ . This

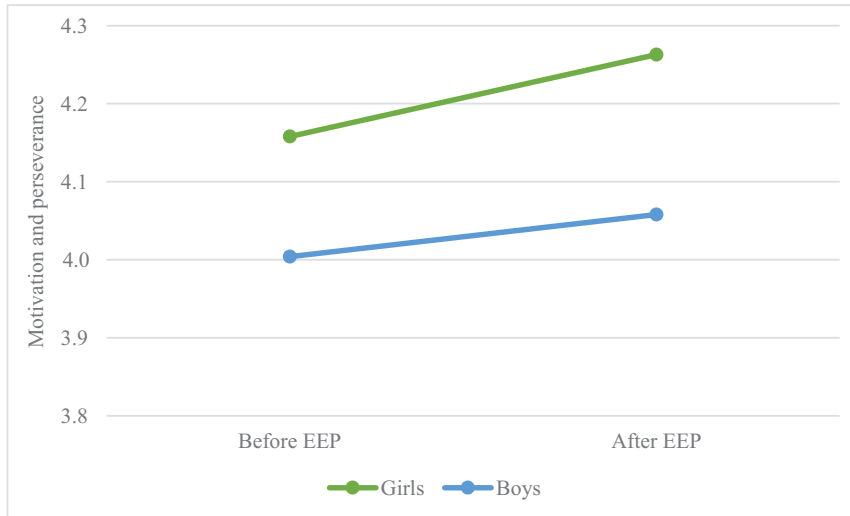


Fig. 5. Graphic representation of the evolution of EC—Motivation and perseverance during the duration of the EEP relative to gender.

leads us to accept H3d, while there is no ground for accepting H3a, H3b, H3c, and H3e. Refer to Fig. 6 for a graphical representation of the significant results regarding EA analyses.

The final set of hypotheses dealt with the possible improvement of ESE in the course of an eight-month EEP for primary-school pupils in general (H4a). Boys and girls (H4c) and pupils with and without an entrepreneurial family background (H4e) were also tested for differences. We also investigated the differences in reported ESE at the end of the EEP for the two pairs of groups (H4b and H4d). As seen in Table 2, there is no significant change in the level of ESE in the course of the EEP for the entire sample; rANOVA:  $F(1, 179) = 0.194, p = .660, \eta p^2 = .001$ . However, Table 3 shows a significant difference in the level of ESE among boys and girls at the end of the EEP ( $F = 5.103,$

$p = .025$ ), with girls reporting significantly higher ESE at the end of the EEP. However, during the EEP neither girls nor boys increased their ESE significantly. When investigating the groups of pupils with and without an entrepreneurial family background, we could not confirm any statistically significant changes throughout the EEP or in the value of ESE at the end of the EEP. These results lead us to the conclusion that there are no grounds for accepting H4a, H4b, H4c, H4d, or H4e. Refer to Fig. 7 for a graphical representation of the significant results regarding ESE analyses.

#### 4 Discussion

According to the European Commission (2016), every young European should benefit from at least one business experience before their mandatory

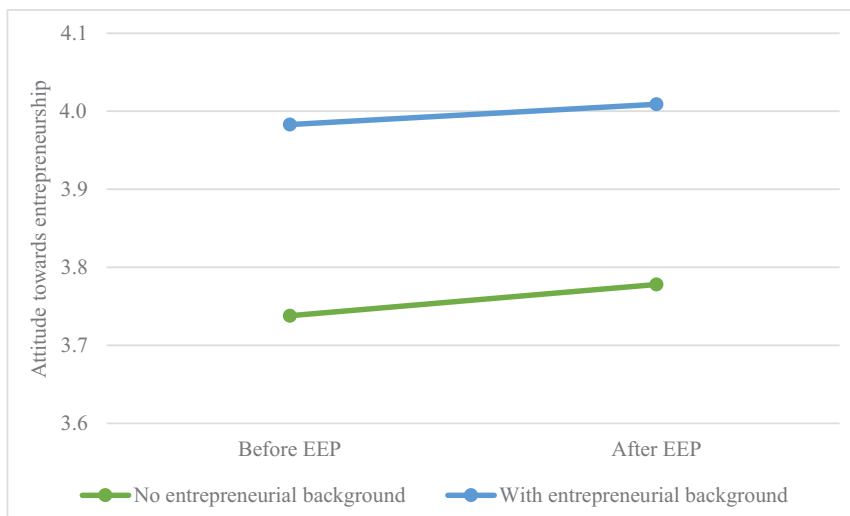


Fig. 6. Graphic representation of the evolution of EA during the duration of the EEP relative to entrepreneurial family background.

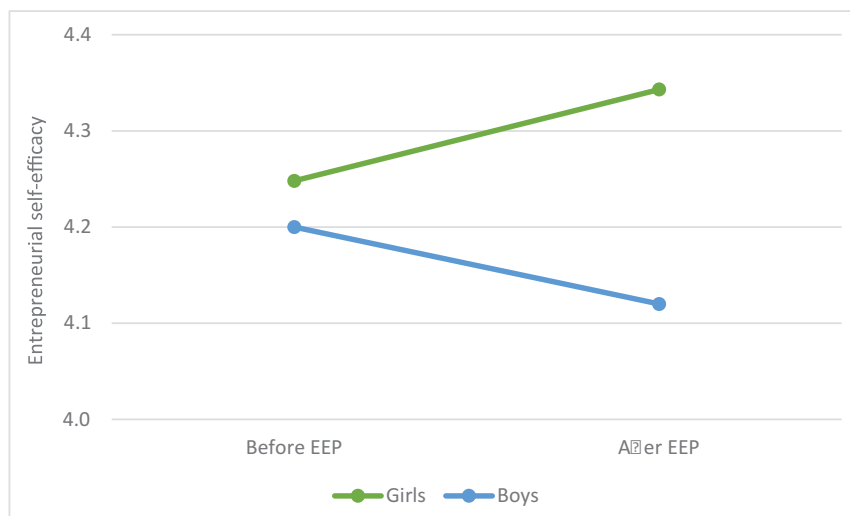


Fig. 7. Graphic representation of the evolution of ESE during the duration of the EEP relative to gender.

education ends. Considering that the number of EEPs in primary schools is growing (Kourilsky & Carlson, 1996; Rosário et al., 2014), the development of entrepreneurship-related HCAs remains surprisingly underresearched (Liguori et al., 2019). Conceptualizing entrepreneurship-related HCAs and assessing the effect EEPs have on their evolution in younger adolescents is thus an essential undertaking.

The goal of the present study was thus to conceptualize the components of entrepreneurship-related HCAs and investigate the role that EEPs play in their evolution (Dams et al., 2021; Martin et al., 2013). The data analysis has shown that girls benefitted most from the EEP in terms of developed EC and ESE compared to boys, while boys improved EI significantly more than girls. At the same time, pupils with an entrepreneurial family background developed EC more than pupils without such a background, and they also developed higher EA and EI. The present study brings theoretical and practical contributions, as discussed below.

#### 4.1 Theoretical contributions

The present study employs human capital theory to explain how the proposed components of entrepreneurship-related HCAs, namely EI, EC, EA, and ESE, develop in primary-school EEPs. Thus, we gain insight into the evolution of HCAs in early adolescents, which has largely been absent in existing research on primary-school EEPs. The concept of entrepreneurship-related HCAs contributes to understanding the development of task-specific human capital in primary-school pupils. This contribution

thus adds to the ongoing debate on how human capital is formed and maintained in early adolescents and beyond.

The present study shows that the four measured constructs comprising entrepreneurship-related HCAs evolved in such a way that only one of the HCA components increased significantly for the whole sample. However, different subsets developed HCAs differently. First, the EI component of HCAs increased for the boys while it remained the same for the girls. Other authors have also observed that males usually develop higher EI than women, regardless of geographical setting (Burnette et al., 2020). This phenomenon may be because early adolescent girls possess greater self-discipline than boys, which often leads to higher grades in school (Duckworth & Seligman, 2006). Girls usually have greater career aspirations and are more ambitious than boys as they aim for professional and managerial jobs (Ashby & Schoon, 2010; Francis, 2002). Girls are also usually more risk-averse than boys (Brüne & Lutz, 2020). Since better grades commonly lead to a better choice of secondary schools, girls tend to focus more on their academic performance and less on evolving their HCAs in extra-curricular activities. Such activities do not bring extra credits for entering secondary school. However, boys seem more attracted to careers that will put them up against challenges (Ashby & Schoon, 2010).

Pupils from entrepreneurial families demonstrated higher EI at the beginning and the end of the EEP than those without an entrepreneurial background. It is interesting, however, that their EI significantly decreased through the EEP. While the phenomenon of higher EI is in line with the study by



Lindquist et al. (2012), who noted that entrepreneurial parents have entrepreneurial children because of role modeling, not because of their genes, an actual decrease in EI comes somewhat as a surprise. However, it is in line with the results of a study by Fayolle and Gailly (2015), who discovered that EEP participants with previous exposure to entrepreneurship—which holds for pupils with an entrepreneurial family background—were more alert to the risks of entrepreneurship that appeared during the EEP and thus less inclined to follow the career path of self-employment.

EC is another measured entrepreneurship-related HCA component that only increased in one of the dimensions for the whole sample, *Spotting opportunities*. These findings regarding EC are inconsistent with Huber et al. (2014), who observed significant increases in most dimensions of EC among participants of EEPs. The results also do not correspond with Moberg (2014), who found that experiential EEPs foster improved EC. However, when the results were explored separately for boys and girls, some of the EC dimensions (*Spotting opportunities, Motivation and perseverance*) were shown to have improved significantly more for girls than for boys during the EEP. Several other researchers have observed that female students usually develop the particular dimensions of EC that are not connected to economy and finance more than male students (Armuña et al., 2020; Czyzewska & Mroczek, 2020).

The analysis of the third component of HCAs, namely EA, showed it had not increased significantly for the whole sample or any subset. The results differ from what Athayde (2009) and Johansen (2016) discovered. Both measured the impact of the Junior Achievement mini-company program on the development of EA. Their studies showed that the construct had improved significantly more in male than female students. However, the participants were late adolescents or young adults, which differs from the present study. When studied through the lens of entrepreneurial family background, the present research corresponds with Fayolle and Gailly (2015) and Carr and Sequeira (2007). They found that EA had improved more for pupils with an entrepreneurial family background than their counterparts with no such family background. This may be attributed to the impact of parent role modeling, which is all-important for the evolution of EA and EI (Lindquist et al., 2012).

When investigating the evolution of the fourth HCA component, ESE, the analysis showed no significant development for the whole group. However, this only tells part of the story. After controlling for gender, results showed that boys had decreased their

ESE significantly, not increased as had been hypothesized. Girls, on the other hand, had increased their ESE. Such findings differ from Brüne and Lutz (2020), who found that women had improved their ESE less during the studied EEP than their male counterparts.

The study thus contributes to the understanding and the broadening of the view on human capital theory and its implementation in primary-school entrepreneurship education programs. A particular contribution to understanding human capital theory is that the present study formulates entrepreneurship-related HCAs with four components. The fact that EC, one of the elements of entrepreneurship-related HCAs, is also one of the key competences for lifelong learning (European Commission, 2019), and taking into consideration the importance of developing human capital in an individual's early years (Cunha & Heckman, 2007), highlights the urgency of researching this aspect of the human capital theory. The study demonstrates that the evolution of the entrepreneurship-related HCA components of EI, EC, EA, and ESE goes hand in hand with EEPs.

#### 4.2 Practical implications

Additionally, the study also has implications for practitioners of entrepreneurship education in primary school, as well as researchers of entrepreneurship education. It empirically tests the possibility of developing entrepreneurship-related HCAs in early adolescents in the final years of primary school. It also investigates the impact of EEPs based on experiential pedagogical methods, which seemingly hold great promise for developing HCAs. The findings show that more effort should be made to develop entrepreneurship-related HCAs in primary school. The results demonstrate that HCAs can develop for certain groups, such as EI for boys and partly EC for girls and pupils with an entrepreneurial family background.

However, the study also highlights the need to make self-employment more attractive for girls. The results specifically demonstrate that boys have a higher propensity to develop their EI and that girls are on the losing end regarding this component of entrepreneurship-related HCAs. Conversely, boys are the ones that fall short when it comes to developing EA and ESE. Because men are more prone to start a business than women as it is (Burnette et al., 2020), practitioners should pay extra care to tailor the EEP methods in such a way that girls and boys would benefit more when it comes to developing particular components of HCAs.

The study also demonstrates differences between pupils with an entrepreneurial family background

and those without one. As expected, pupils with an entrepreneurial family background had higher EI, just as they had developed their EC better (Lindquist et al., 2012). Practitioners should pay special attention to how the HCAs of pupils with no entrepreneurial background evolve as it would not make much sense to get them involved in an EEP only to witness no positive development of HCAs.

#### 4.3 Limitations

Some limitations have been identified in the present study. Firstly, while the teachers in the EEP had undergone some entrepreneurship training, information on how much training specific teachers had received was unavailable. A difference in the level of competence individual teachers possessed might have affected the results in disparate EEPs. Secondly, many of the participants failed to fill in the POST questionnaire, leading to a 50% churn. This fact may have caused the loss of valuable information as the participating pupils might not reliably represent the characteristics of the entire population. Thirdly, the participants elected to join the EEP of their own volition, which might have slanted the results towards a more favorable position than a random sampling would have done. Fourthly, data on how the teachers carried out individual EEP lessons were unavailable. There may have been differences between schools in the length of individual sessions and the pedagogical methods used in the EEP, which could partly have affected the results. Additionally, we do not possess data on how the teachers were picked to mentor the EEP. Teachers mentoring EEPs not of their own will but by fiat could skew the results unfavorably. And finally, while the questionnaire for EC based on *EntreComp* was scientifically validated, it might still be too abstract for early adolescents. It is recommended that future researchers develop a questionnaire tailor-made for 9–14-year-olds, so they could answer it without any misunderstandings.

#### 4.4 Further research

There are several new avenues this study opens for future researchers. Firstly, the present study shows how the disparate components of entrepreneurship-related HCAs, namely EI, EC, EA, and ESE, develop in a quasi-experimental design with no control group and no randomization. Future researchers could randomly sample participants from an EEP and create a control group to mitigate the threat to internal validity. Also, researchers could collect data on how much training the teachers had, how they were picked to teach in an EEP, what pedagogical methods and class-

room setup they used in their EEP, and how long each EEP session was.

Secondly, researchers could investigate how individual HCA components form. For instance, theory postulates that ESE, one of the components of entrepreneurship-related HCAs, could be enhanced through mastery, vicarious experience, verbal persuasion, and emotional and physiological states (Bandura, 1982). For instance, having a young entrepreneur mentor that regularly shares experience and knowledge gained in their entrepreneurial endeavor could be a way to increase ESE through vicarious experience. Additional research could investigate how EEPs foster ESE through the four enhancement sources and further broaden the understanding of human capital theory in the context of early adolescents.

Finally, theory shows that learners enhance their overall belief in their abilities by following their role models (Fayolle & Gailly, 2015). For instance, living in an entrepreneurial family and having daily exposure to an entrepreneurial environment can be considered prior experience with entrepreneurship, which positively affects the development of the HCA component of EA. Future research could explore what shapes EA in early adolescents, which could be addressed in EEPs tailored for them. EEPs could be designed to promote the development of EA and other HCA components through the role modeling of teachers, entrepreneurs, and entrepreneurial family members associated with an EEP (Fayolle & Gailly, 2015). Future research could examine how role models influence the development of each HCA component.

## 5 Conclusion

The present study provides a better understanding of the application of human capital theory for pupils engaged in EEPs. Thus, we investigated the development of HCAs for primary school pupils in an eight-month EEP. PRE and POST evaluations measured the EEP outcomes to monitor HCA development.

The results showed that overall, participants had significantly increased some dimensions of EC; boys had increased EI, and girls had partly improved their EC and ESE. In addition, participants from entrepreneurial families demonstrated higher EI and EA and partly improved EC. These results are consistent with studies by other authors who have investigated these constructs (Athayde, 2009; Burnette et al., 2020; Johansen, 2016).

Broadly speaking, the findings of the present study provide several opportunities for future research to better understand what outcomes can be expected

from an EEP, depending on the setting of the EEP, its duration, and whether the majority of participants are from entrepreneurial families. Research on entrepreneurship education is crucial for informing practitioners and policymakers and providing new insights into primary school EEPs with early-adolescent participants.

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## Conflict of interest declaration statement

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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