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Nascent entrepreneurship and the developing individual: Early entrepreneurial competence in adolescence and venture creation success during the career

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Abstract

What predicts a person's venture creation success over the course of their career, such as making progress in the venture creation process and multiple successful venture creations? Applying a life span approach of human development, this study examined the effect of early entrepreneurial competence in adolescence, which was gathered retrospectively by means of the Life History Calendar method. Human capital and social capital during the founding process were investigated as mediators between adolescent competence and performance. Findings were derived from regression analyses on the basis of prospective and retrospective data from two independent samples ($N = 88$ nascent founders; $N = 148$ founders). We found that early entrepreneurial competence in adolescence had a positive effect on making progress in the venture creation process. Nascent founders' current human and social capital also had a direct effect, but it did not mediate the effect of early competences. Finally, the data revealed that early entrepreneurial competence in adolescence positively predicted habitual entrepreneurship (multiple successful venture creations) exhibited over a longer period of the individual career (specifically, 18 years). In line with results from prospective longitudinal studies on early precursors of entrepreneurship, our findings underscore the long neglected importance of adolescent development in the explanation of entrepreneurial performance during the subsequent working life.

Keywords: Nascent entrepreneurship, Entrepreneurial success, Adolescent competence, Venture creation, Human and social capital, Habitual entrepreneurship

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The growing importance of entrepreneurship for today's occupational careers is generally acknowledged [1]. Engaging in entrepreneurship is seen as an adaptive vocational behavior in view of the diverse challenges, occupational risks, but also opportunities that come along with the massive economic, technological, and social change that societies across the globe are facing today [2,3]. Furthermore, entrepreneurship, and the creation of innovative new ventures in particular, is regarded as a crucial contributor to economic development (e.g., through the exploitation of innovations) as well as to societal wealth (e.g., through job creation). However, there is still an ongoing debate on what actually is "the essence of being 'entrepreneurial'" [4] (p. 123) and on *what makes a successful entrepreneur* [5,6,7,8]. Knowing more about the antecedents of a person's entrepreneurial performance is not only essential for progress in theory development on the enterprising individual, but also for policy makers and educators who are interested in the promotion of entrepreneurial success [2,9].

Entrepreneurship researchers traditionally refer to entrepreneur's current human capital [10] and social capital [11] when studying the antecedents of a person's entrepreneurial performance. The focus here is on the possession of, and access to, relevant means that the enterprising individual may need in order to succeed. With regard to human capital, one focuses for example on entrepreneurial skills comprising opportunity recognition (e.g., being good at perceiving unmet consumer needs [12]) and resource management (e.g., being good at finding funds and people to start a new organization [13]). In the study of social capital, in turn, one examines network ties and the resources stemming from them (e.g., help and assistance from friends [11]). Whereas many studies found support for the relevance of such human and social capital [13,14,15,16,17,18], achieving successful entrepreneurship is far from being fully understood. This is particularly the case when it comes to the

psychological characteristics of the enterprising actor. Accordingly, Hisrich, Langan-Fox, and Grant [1] recently published “a call to action for psychology” in order to stimulate theory development and empirical research on the psychology of entrepreneurship.

A new promising psychological approach in the empirical literature [19,20,21,22] studies (potential) entrepreneurs from a *life span perspective of human development* [23]. Although the life span perspective has already led to path-breaking contributions in a variety of research fields on human nature, e.g., psychopathology [24], resilience [25], delinquency [26,27], human development in times of social change [28,29], skill formation [30], and vocational behavior and development [31,32], such a perspective has largely been neglected in past entrepreneurship research. Grounded in theoretical reflections by McClelland [33], the life span approach of entrepreneurship understands the enterprising actor as a developing person and highlights the importance of the *early formative years* (i.e., childhood and adolescence) in individuals’ development towards entrepreneurial activity and success over the course of the career [20,21]. Studying a person’s formative years to predict his or her later work outcomes in the context of entrepreneurship is an understudied field of research, despite the fact that it may provide policy makers and educators with results relevant for the planning and implementation of entrepreneurship education programs [34]. In view of these research gaps, the purpose of this study was to understand why entrepreneurs differ in their performance and what role the formative years, namely age-appropriate early entrepreneurial competence in adolescence (reported in retrospect), play here.

But how would one assess a person’s entrepreneurial performance? Gartner [7] argued that entrepreneurship, in its narrowest sense, is about new venture creation. Contrary to popular opinion, however, starting a new venture is by no means an easy undertaking. The process of venture creation, also termed *nascent entrepreneurship* [35], is in fact a complex and demanding endeavor. It requires successful undertaking of a broad range of *gestation activities* (e.g., the development of a marketable product or service, financing, finding rooms

for the new business, acquisition of materials and inventories, marketing, and the generation of the first sales [18]). Accordingly, emerging ventures differ in the pace with which they were founded. It is also not unusual that a nascent project never reaches the point of actual business start. Studying a representative sample of business founders and their emerging new ventures in the US, Reynolds [17] found that only 34% of the nascent projects operated as a going business within the first 10 years after the start of the venture creation process. In view of this demanding nature of starting a new business, it is a well-established approach to understand *progress in the venture creation process* and *getting emerging businesses started* as central indicators of a person's entrepreneurial success [16,35,36].

We follow such an understanding of entrepreneurial success and focus on a person's nascent entrepreneurship in this paper. We present results from two studies. In Study 1, our main study, *making progress within the venture creation process* was investigated prospectively via the cumulation of gestation activities undertaken over the course of the founding process [16]. Study 1 is complemented by Study 2, which targeted the *cumulation of successful venture creation activity over time* [37] by studying habitual entrepreneurship (multiple successful venture creations) across a period of about the past 18 years in the careers of founders. In Study 1 we examined whether and why early entrepreneurial competence in adolescence is relevant for a person's performance *within* a single venture creation process. In Study 2 we extend this approach by asking whether such an adolescent competence also matters *across* all founding projects pursued by the person. It is not uncommon that individuals who started one new venture also engage in the founding of other ventures during their subsequent occupational career [17]. Thus, entrepreneurship experts have called for more research on aggregated performance measures across all founding projects pursued by the individual [1,38,39]. The two datasets analyzed in this paper stemmed from the *Thuringian Founder Study* (a German research project on determinants of successful entrepreneurship from the perspectives of economics and psychology). The project solely

focuses on *innovative entrepreneurship* (technology-oriented or knowledge-based startups).

Given the retrospective nature of some of the variables collected within the *Thuringian Founder Study* (e.g., data on adolescence or past career data), an important methodological feature of this research project was the use of the *Life History Calendar (LHC)*. Broadly speaking, the LHC is a tool for guided recall using cognitive and visual memory anchors and retrieval cues (see Caspi et al. [40] for a detailed description of the LHC method). Retrospective LHC data were shown to be more reliable and valid than retrospective data collected with the traditional questionnaire method [41]. Moreover, support for the validity of the LHC method comes from prospective longitudinal studies (e.g., the famous Dunedin longitudinal birth cohort study conducted in New Zealand). Here, Caspi et al. [40] could show the accurateness of the LHC method by comparing current data collected from adolescents (e.g., educational status for each month) with the respective information the same persons gave retrospectively and by means of the LHC in adulthood.

Study 1

In Study 1 we investigated predictors of *making progress in the venture creation process* over a given period of time (12 months). Following previous nascent entrepreneurship research [16,18], we assessed making progress by reference to the cumulation of gestation activities (e.g., the development of a marketable product or service, financing, or marketing) shown over the course of the venture creation process. The greater the number of gestation activities that were undertaken, the more the emerging venture takes shape or becomes manifest [42]. This, in turn, enables the project to act as a complete venture, to organize production, to create sustainably economic value, and to generate earnings for its founder. For example, studies showed the number of activities undertaken to be a strong predictor for project continuation [43,44] and achieving initial sales [45].

Hypotheses

A central notion of developmental life span theory [23] is that psychosocial development is

driven by a life-long exchange between changing people and their changing environment. Moreover, research showed that adaptive development in one developmental epoch is the basis for adaptive development in the next [24]. In adolescence, for example, one central salient developmental task that has to be resolved to make future life success in adulthood more likely is the preparation for the subsequent working life through the growth of work-related skills [46]. In the context of a person's vocational development towards successful entrepreneurship, age-appropriate early entrepreneurial competence growth may thus lead to entrepreneurial achievements in adulthood. Indeed, consistent with general theories of vocational development such as Super's [31] and Vondracek, Lerner, and Schulenberg's [32] life span approaches, previous studies showed that both an entrepreneurial career choice and business success of existing firms (e.g., survival, profitability, or employment growth) are associated with adolescent entrepreneurial competence [20,21,47,48]. According to these studies, early competence is indicated by age-appropriate behaviors such as leadership, inventive behaviors, and commercial activities. Although our study did not examine business success but performance within the founding process, we nevertheless expected that adolescent competence should also be of importance here. Early entrepreneurial competence should prepare adolescents for a successful entrepreneurial career. Such a career, in turn, may not only be characterized by successfully running existing businesses but also by successfully founding new businesses. We thus assumed that nascent founders' early entrepreneurial competence in adolescence predicts their progress in the venture creation process, i.e. in the gestation activities (*Hypothesis, 1*).

With regard to the paths through which adolescent competence could affect such venture creation success, we decided to focus on nascent founders' current human and social capital. First, following the *human capital approach* [9,49], which concentrates on knowledge, skills, and abilities, we expected making progress in the venture creation process to be predicted by work experience in small and medium-sized enterprises (*Hypothesis 2*),

prior startup experience (*Hypothesis 3*), PhD status (*Hypothesis 4*), new resource skills (*Hypothesis 5*), and entrepreneurial competence (*Hypothesis 6*). We thereby targeted the common human capital indicators that are often used in entrepreneurship research (for a recent meta-analysis see Unger et al. [10]). Second, drawing from findings revealing the relevance of *social capital* for nascent entrepreneurship [16,18], we also expected social capital to have an effect on making progress (*Hypothesis 7*). Finally, we predicted this human and social capital to *mediate* the link between early entrepreneurial competence in adolescence and making progress in the founding process (*Hypothesis 8*). This hypothesis draws from previous research on indirect effects of adolescent competence on adult startup intentions and entrepreneurial behavior and success via adults' entrepreneurial resources [47,48,50]. Age-appropriate entrepreneurial competence in early developmental stages may stimulate subsequent growth of personal entrepreneurial resources well into adulthood due to certain channeling processes such as cumulative continuity. According to Caspi, Elder, and Bem [51], cumulative continuity describes a process where early personal characteristics are sustained and deepened over time through their own consequences. For example, research showed that individuals tend to place themselves in work experience categories (e.g., degree of work autonomy) according to their personal characteristics, e.g., specific personality traits such as agentic positive emotionality. These experiences, in turn, elaborate and deepen the same personal features that led to these experiences in the first place [52].

Method

One part of the Thuringian Founder Study is the examination of emerging innovative ventures via a longitudinal survey. Across two measurement occasions (over a period of 12 months), *nascent founders* who were in the process of founding a technology-oriented or knowledge-based new venture were followed along the founding process.

Sample and procedure

Using Reynold's [17] definition of an emerging venture, participants were recruited from two

sources. The first source was suppliers of advisory services, business incubators, the chamber of commerce, business angels, and elevator pitches (events where entrepreneurs pitch their business ideas to venture capitalists or angel investors). The second source was a web-based survey of scientists that is also part of the Thuringian Founder Study [47]. Employed scientists from Thuringian research institutions were asked whether they were in the process of founding a new business. Individuals with current startup activities (which mainly aimed at the commercialization of new research knowledge) were selected into the sample.

At the first measurement occasion (T1; assessment between July 2008 and May 2009), the research team conducted 100 extensive face-to-face interviews with the solo entrepreneur or leading entrepreneur of the project in gestation. We then had to exclude two cases where the start-up project was not genuinely new, leaving us with a sample of $n = 98$ valid cases. To collect psychological data, characteristics of the emerging venture, and information on public financing and business assistance, a self-developed structured questionnaire in addition to the Life History Calendar was employed in the interviews, which on average took one and a half hours. The LHC and the interviewing strategy were planned according to Belli, Lee, Stafford, and Chou's [41] recommendations for conducting retrospective interviews. At the beginning of the T1 interview, respondents were asked to enter the dates of major life events, transitions, and sequences in the LHC (e.g., schooling, place of residence during adolescence, secular 'Jugendweihe' or Christian confirmation (ceremonies in which 14-year-olds receive an adult-like social status in Germany), higher education, working sequences, family life, entrepreneurial activities, etc.). These biographical key data then served as memory anchors during the subsequent interview (the completed LHC remained visible to the participants during the entire interview). Before each set of the retrospective survey items was stated, participants were asked to look at the respective point in time in the completed LHC to contextualize and to better remember that time.

Twelve months after the T1 interview the research team conducted a follow-up survey by phone. Of the 98 founders at T1, 88 could be re-interviewed in T2. This follow-up interview mainly collected information on the progress made in the venture creation progress since T1. Some of the projects had been abandoned between T1 and T2 ($n = 13$; 14.8%), whereas others had already resulted in an ongoing business ($n = 14$; 15.9%). The majority, however, were still in the process of venture creation ($n = 61$; 69.3%).

On average, the 88 participants (from which we could gather data on both measurement occasions, and which serve as the final sample in our analyses) were 37.0 years old ($SD = 10.09$, $min = 24$, $max = 62$) and male (88.6%). Around two-thirds of the sample (68.2%) grew up in East Germany, 28.4% in West Germany, and 3.4% in another country (e.g., in Mozambique). One-fourth (25.0%) had a PhD. Some 39.8% had work experience in small and medium-sized enterprises, and 20.5% reported prior start-up experience. Concerning the current founding project, 65.9% founded the venture in a team. One-third of the ventures targeted the service sector (30.7%). Regarding the technology sector, 28.4% of the new ventures operated in information and communication technology, software, and picture processing (“branch 1”); 10.2% in (opto-)electronic, hardware, and measurement instrumentation (“branch 2”); 20.5% in quality management, consulting, professional training, and marketing services (“branch 3”); 11.4% in biotechnology, pharmaceuticals, and chemistry (“branch 4”); 10.2% in environmental technology, energy management, and solar technology (“branch 5”); and 19.3% in miscellaneous technology sectors (“branch misc.”).

Measures

Early entrepreneurial competence in adolescence (T1). Following previous research [20,47], we used three variables, assessed retrospectively at T1, to capture different aspects of early entrepreneurial competence in adolescence (early leadership, inventive activities, and commercial activities). The target age to remember was 14 to 15 years and the Life History Calendar was used to facilitate the recall process. The full item list for the measurement of

early entrepreneurial competence in adolescence is presented in Table 1. *Early inventive activities* targeted respondents' inventive behaviors during leisure time (e.g., composing, painting, or building) (14 items; 1 = never, 5 = very often; $M = 2.42$, $SD = 0.52$, $\alpha = .66$). *Early leadership* was assessed via a six-item checklist that asked for six types of leadership roles (e.g., class spokesman or captain in a sports team) (five items; 0 = no, 1 = yes). The sum score served as the variable ($M = 1.65$, $SD = 1.45$). *Early commercial activities (T1)* covered age-related selling activities (e.g., "How often did you sell things e.g., to friends?"; three items; 1 = never, 5 = very often; $M = 2.32$, $SD = 0.89$, $\alpha = .60$). We z-standardized and averaged the three variables, resulting in the final variable early entrepreneurial competence in adolescence ($M = 0.01$, $SD = 0.68$). Such averaging of indicator variables to come up with an index on adolescent competence has been employed in earlier life span research [53].

Human capital during venture creation (T1). Following previous research [10,16,18], we considered different indicators of human capital at T1. Participants' level of education was assessed via the respondent's *PhD status* (0 = no, 1 = yes). Prior work experience was measured with *work experience in small and medium-sized enterprises* (0 = no, 1 = yes) and *startup experience* (0 = no, 1 = yes). Entrepreneurial skills during venture creation were assessed via *new resource skills* ([13]; six items; 1 = never, 5 = very often; $M = 3.80$, $SD = 0.70$, $\alpha = .77$; e.g., "I am good at finding money and people to start a new organization or new program.") and *entrepreneurial competence* ([12]; six items; 1 = never, 5 = very often; $M = 3.81$, $SD = 0.62$, $\alpha = .66$; e.g., "I accurately perceive unmet consumer needs.").

Social capital during venture creation (T1). Following Samuelsson and Davidsson [18], we measured instrumental social capital through the summation of personal network resources. We focused on weak network ties (i.e., friends or acquaintances [54]) as these types of ties, in contrast to strong ties such as family members, were shown to be particularly relevant for progress in the founding process [16]. At T1, respondents were asked whether they had received advice, support, or help from friends or acquaintances in nine different

areas (e.g., writing a business plan, coming into contact with potential customers, developing the product or service, or acquiring financial capital). The total number of areas where the respondents received help served as the final variable ($M = 2.89$, $SD = 2.47$).

Number of gestation activities undertaken between T1 and T2. Using a list of 32 gestation activities (which was developed according to Samuelsson & Davidsson [18]), at T2 respondents were asked which of these gestation activities they had undertaken between T1 and T2. The counting variable had a mean of 14.24 ($SD = 6.26$; min = 0, max = 25). Because we were interested in examining progress in the venture creation process [35], we had to take into account in our analyses the achievements prior to T1. At T1, participants were thus asked how many gestation activities they had initiated or completed so far ($M = 14.88$, $SD = 5.62$; min = 3, max = 28). As the time period covered here varied across participants, we conducted a regression analysis with *number of activities undertaken until T1* as the dependent variable and *duration (in months) of the venture creation process until T1* ($M = 37.64$, $SD = 28.80$; min = 6, max = 137) as the independent variable. It explained 10% of the variance and had a positive effect of $\beta = .33$ ($p < .01$). The standardized residuals of this regression analysis represented the time-adjusted achievements prior to T1 (prior progress in the venture creation process). In our main regression analysis in this study (hypotheses testing), we use the number of gestation activities between T1 and T2 as the dependent variable, and this prior progress variable (the standardized residuals) is included as an independent variable. This has the effect that the number of gestation activities between T1 and T2, adjusted for prior progress, then represents the *progress between T1 and T2* (our outcome variable of interest).

Control variables (T1). Respondents' *age*, *origin (East vs. West Germany)*, *gender*, and *portfolio entrepreneurship at T1* (0 = no, 1 = yes) were used as control variables. Portfolio entrepreneurship applied to those 13 respondents (14.8%) who were currently running at least one other business at T1 (besides the emerging venture investigated in this study). The responsibilities towards these other ventures could hamper progress in the

creation process of the venture under consideration. Finally, to take the type of the emerging venture into account [55], we also controlled for the *branch* (six dummy variables for the technology sectors), *team founding* (0 = no, 1 = yes), and *service sector* (0 = no, 1 = yes).

Results

In Table 2 we present zero-order correlations. We tested our hypotheses for the prediction of making progress in the venture creation process between T1 and T2 using hierarchical linear regression analysis. As noted earlier, the dependent variable was number of gestation activities undertaken between T1 and T2. We first entered the time-adjusted gestation activities until T1 (prior progress in venture creation process) and the control variables, and subsequently the central independent variables. The regression results are shown in Table 3.

In the first step of the regression analysis, we adjusted the dependent variable for prior progress in the venture creation process (which had an effect of $\beta = .62$ [$p < .001$]). We further entered the control variables into the regression equation. Males were more likely to achieve a higher level of progress between T1 and T2 ($\beta = .22$, $p < .05$). None of the other control variables reached the level of significance. In the second step of the regression analysis, early entrepreneurial competence in adolescence was entered into the equation. Supporting Hypothesis 1, such an early competence had a positive effect ($\beta = .25$, $p < .05$) on making progress between T1 and T2. In the final step of the regression analysis, we introduced the human and social capital variables. Only PhD status ($\beta = .26$, $p < .05$) and social capital ($\beta = .20$, $p < .05$) had an effect on progress between T1 and T2. Thus, Hypotheses 2, 3, 5, and 6 were not supported, whereas Hypotheses 4 and 7 received support. Again, early entrepreneurial competence had a positive effect ($\beta = .22$, $p < .05$) in this regression model (even after entering human and social capital into the regression equation).

Finally, we found no support for a mediation effect of human and social capital. In our case, a mediation effect would be possible if early competence predicts the mediators which in turn predict progress. As only PhD degree and social capital had an effect on progress, we

tested in separate regression analyses whether these two variables were predicted by early entrepreneurial competence (age and gender served as control variables). We found no significant effect of early competence. In addition, we also used Preacher & Hayes' [56] SPSS macro for assessing indirect effects in multiple mediator models (retrieved from http://www.comm.ohio-state.edu/ahayes/SPSS_programs/indirect.htm). This macro estimates bootstrap confidence intervals for the indirect effect of early competence on progress. In line with our regression results, the results obtained from this macro revealed no indication of mediation effects. Taken together, Hypothesis 8 was not supported as the direct effect of early entrepreneurial competence on progress was not mediated by human and social capital.

Discussion

As shown in Table 3, our full regression model explained 39% of variance in the dependent variable (adjusted R^2). This compares well with the explanatory power achieved in past nascent entrepreneurship studies on making progress in the venture creation process [16]. Consistent with McClelland's [33] theoretical reflections on the formative years of entrepreneurs, and with longitudinal research on the link between adolescent competence and work success in adulthood [53,57], we found early entrepreneurial competence in adolescence to predict the performance of nascent founders during the founding process.

Moreover, getting help from friends or acquaintances also appeared relevant for nascent entrepreneurship performance. This result contributes to a growing body of evidence on the fundamental role of social capital for nascent entrepreneurship, particularly with respect to social capital stemming from weak ties [11,16]. Consistent with the human capital approach, we also found that higher education (PhD degree) is important. As shown by Samuelsson and Davidsson [18], higher education is particularly important for making progress in an *innovative* founding project (compared to imitative founding projects). The authors argue that scientific knowledge is beneficial for developing and exploiting innovative

business ideas, and for marshaling the resources needed for founding an innovative startup. Note that in our study we solely examined innovative founding projects.

However, all other human capital variables examined in our study appeared as irrelevant predictors. This hints at the limited predictive power of the traditional human capital approach in the explanation of nascent entrepreneurship performance, as also discussed by Davidsson and Gordon [35]. Moreover, this would also help to explain results on the ineffectiveness of public business assistance programs aiming to promote successful nascent entrepreneurship [58]. Aiming to help nascent founders to get their ventures started and to promote subsequent business success, such programs often target the promotion of human capital like entrepreneurial knowledge and skills. As stated by Davidsson and Honig [16], these measures, however, seem to be “missing the mark” (p. 325), given the disappointing research findings on the relevance of human capital in the prediction of successful nascent entrepreneurship. From a process perspective of entrepreneurship [59], there seems to be a stage-specific effect of such human capital (specific to the developmental stage of the new venture). For example, past studies that demonstrated the relevance of the skills we had investigated, i.e., new resources skills and entrepreneurial competence, examined the performance of *existing* ventures (e.g., venture growth [12,13,48]). In contrast, in our study we focused on the founding process prior to business start, and thus on the early stage of the new venture. Setting up a new business probably requires skills other than leading and managing an existing one, for example due to differences in the task environment and the extent of uncertainty [35]. The set of skills we studied mainly refers to managerial strategies (capability to acquire and to manage resources in order to utilize a given market opportunity).

Finally, the data revealed no indication for a mediation effect of human and social capital. Adolescent competence had a direct effect on making progress, above and beyond the effect of human capital (PhD status) and social capital (help from friends or acquaintances).

Hypotheses

If early entrepreneurial competence in adolescence is indeed as important for venture creation activity during the career as suggested by Study 1, then it should also be relevant in the explanation of *cumulated* measures of a person's nascent entrepreneurship performance across all founding projects and over a longer period of the career [38]. In Study 2 we aimed at testing this additional hypothesis using elaborate career data from a sample of founders.

Besides progress in the venture creation process, one can view multiple successful venture creations during the career (also termed habitual entrepreneurship) as another indicator of a person's entrepreneurial performance [37]. Fortunately, the Thuringian Founder Study allows the investigation of such an outcome. We expected early entrepreneurial competence to serve as a predictor of *habitual entrepreneurship* (starting more than one venture successfully). This assumption draws from both research on the relevance of early entrepreneurial competence in adolescence for the achievement of entrepreneurial success [20,48] and research pointing to the "motivational aspect" of such an early competence for the engagement in entrepreneurship in a more intensive way across the career [21,47].

Method

The Thuringian Founder Study also targeted the investigation of venture performance after business start (e.g., in the post-startup phase). To achieve that aim, the research team examined a sample of *business founders* who had already founded at least one innovative new business in the past 14 years in the Federal State of Thuringia, Germany. This business founders survey and the nascent founders survey analyzed in Study 1 represent independent surveys within the Thuringian Founder Study (no overlap in cases between the two surveys).

Sample and procedure

The database for this study drew from the public register for commercial and private companies and consisted of 2,971 technology-oriented or knowledge-based startups founded between 1994 and 2006 in the Federal State of Thuringia. From this list of startups, we

selected a random sample of 2,604 startups (and 3,671 corresponding founders). These founders were contacted by mail and telephone in order to recruit one founder per startup, resulting in a response rate of 24.5% (referring to numbers of startups). The main reasons for drop-out were 1) we could not make any contact with the founder, 2) founder was not interested in participation, and 3) the phone call revealed that the foundation was not genuinely new (e.g., subsidiaries of existing companies). Note that this recruitment procedure made it possible to also study respondents whose venture had already closed. This is an important advantage of this study, since it avoids a central shortcoming of many entrepreneurship studies, namely a certain sample bias towards the survived new ventures and thus more successful entrepreneurs. Finally, 639 founders were interviewed face-to-face in 2008. Members of the research project or trained student research assistants conducted these interviews, which took one and a half hours on average.

We then had to exclude 108 cases where the interview made it clear that the start-up was not genuinely new or where we had concerns over interview quality, resulting in a sample of $n = 531$ valid cases. Given the location of our study in the eastern part of Germany, very few respondents were born in the West; we therefore refer to those born in the East only. Among those 455 cases, we searched for founders who, based on their age, were unlikely to engage in any further venture creation, so that the number of businesses founded so far can be deemed a fair estimate of their overall venture creation activity across the life span. In line with the literature [16], we chose the age of 55 because nascent entrepreneurship studies consistently demonstrated that “business creation is clearly concentrated among young and mid-career adults, those under 55 years of age” [17] (p. 36). This fits with Super’s [31] life span theory on career development. Here, career development during and after late-middle adulthood is described as “maintenance” with subsequent “decline”, meaning that individuals older than 45 generally keep away from significant occupational transitions towards growth and the new (e.g., starting an entrepreneurial career or a new business) and instead

concentrate on holding their position and later disengage from the world of work. Of the 455 cases, 148 participants were chosen for the final sample by virtue of their age. The mean age of these 148 respondents was 60.8 years ($SD = 4.89$, $Min = 55$; $Max = 74$). Almost all of these participants were male (94.6%). Given the measurement occasion in 2008 and the fact that all respondents in this final sample came from East Germany, the time window in which these subjects could show entrepreneurship in a capitalist system was about 18 years (from German Reunification in 1990; after World War II, Germany was divided into a socialist state in the East and a capitalist state in the West).

We then conducted t-tests and χ^2 -tests to examine differences between the 148 older respondents (our final sample) and the remaining younger respondents from East Germany (younger than 55 years; $n = 307$). We found that the older group (a) more often had self-employed parents (self-employment was possible in socialistic East Germany, e.g., among craftspeople), (b) were somewhat more satisfied with respect to the business performance of the target startup in the first three business years, and (c) founded the target startup more often in the economic sector “chemical industry/ metalworking industry/ engineering” and less often in the sector “information and communication technologies/ research and development/ services”. This last distinction makes particular sense as Thuringia has a long tradition in the first sector, whereas the latter represents a more recent development. To adjust for a possible influence of these variables on the results, they were utilized in the analyses to find out whether they had an effect on the role of the predictor variables of habitual entrepreneurship.

Measures

The same kind of procedure as in Study 1 at the first measurement occasion was employed in this study. This means that the same comprehensive questionnaire and Life History Calendar was used to conduct the structured face-to-face interviews. In contrast to our analyses in Study 1, we did not include information on human and social capital in the analyses of Study 2. Founders’ human and social capital features were assessed here with reference to the time

when they had started the *target startup* that we had randomly selected from a complete list of innovative startups in Thuringia between 1994 and 2006, as explained earlier. For example, respondents were asked whether they received advice, support, or help from friends or acquaintances during the founding of the target startup, or whether they completed a doctoral degree prior to this founding project. While this procedure made it possible to examine the link between these capital features and the business success of the target startup after business start [48,60], it did not allow the study of the effect of these capital features on the aggregated performance measures across different founding projects pursued by each respondent (many of them had started other ventures prior to the target venture creation).

Early entrepreneurial competence. Exactly the same items as in Study 1 were employed to retrospectively assess *early inventive behavior* ($M = 2.61$, $SD = .53$, $\alpha = .66$), *early leadership* ($M = 1.64$; $SD = 1.31$), and *early commercial activities* ($M = 2.17$, $SD = 0.98$, $\alpha = .75$). Again, these variables were first z-standardized and then taken together into the final variable, early entrepreneurial competence in adolescence ($M = -0.00$; $SD = 0.61$).

Habitual entrepreneurship during the career. Habitual entrepreneurship is a separate sub-branch in entrepreneurship research [37] and researchers are interested in learning more about the antecedents of this phenomenon. In this study, a *habitual entrepreneur* is defined as somebody who has started more than one venture (0= no; 1 = yes). Almost half of the sample had achieved this status at the time of the survey (43.9%).

Control variables. Again, *age* and *gender* were used as control variables. Drawing from respondents' career data collected with the LHC, we also controlled in our analysis for the *total duration of being self-employed during the career*. To do so, we summed up the duration in years of all sequences of self-employed work over a respondent's past working life ($M = 12.51$; $SD = 4.68$). Controlling for such a variable makes it possible to study a person's entrepreneurial achievements when the total duration of the entrepreneurial career so far is held constant. We thus studied time-adjusted achievement, as was done in Study 1.

Results

Table 4 presents the zero-order correlations. Providing preliminary support for our expectations, early entrepreneurial competence in adolescence positively correlated with the outcome variable habitual entrepreneurship. We then conducted a hierarchical logistic regression analysis for the prediction of the achievement of habitual entrepreneurship status. The results are illustrated in Table 5. In the first step of the regression analysis we included the control variables. In the second step we introduced early entrepreneurial competence as an additional independent variable. We found that, among the control variables, only a longer total duration of being self-employed during the career corresponded to a somewhat higher likelihood of habitual entrepreneurship status (OR = 1.131, $p < .01$). As expected, early entrepreneurial competence in adolescence was associated with a higher likelihood of habitual entrepreneurship, and this was a strong effect (OR = 2.043, $p < .05$).

We then tested the robustness of our regression results by re-conducting the analyses with those variables in which the study sample differed from the 307 respondents younger than 55 years of age included as additional control variables. After adding self-employed parents, subjective satisfaction with respect to the business performance of the target startup, and economic sector of the target startup (dummy-coded), we still found that early entrepreneurial competence in adolescence predicted habitual entrepreneurship almost to the same degree (OR = 1.942, $p < .05$). This indicates robustness of our results.

Discussion

Study 2 extends the result from Study 1 as it indicates that adolescent competence is not only important for making progress in the founding process but also for the cumulated entrepreneurial performance during the career. Those who reported a higher level of adolescent competence had successfully started not just one but more than one new venture, independent of the duration of their entrepreneurial career so far.

Compared to the explanatory power of the final regression model in Study 1, the 14% explained variance in Study 2 indicates a considerably smaller effect, but one should keep in mind the small number of explanatory variables used here. As explained earlier, we unfortunately could not analyze whether the variables PhD degree and social capital from weak ties would have played a role among this group as suggested by Study 1.

General Discussion

Taken together, in our studies we found support for a developmental approach of a person's entrepreneurship. On the basis of two datasets we investigated success in the field of venture creation over a given period of time (12 months in the working life of nascent entrepreneurs in Study 1 and, in Study 2, across around 18 years of the past career of business founders who were older than 54 years). The main result is that early entrepreneurial competence in adolescence (indicated by recalled leadership roles as well as inventive and commercial activities) predicted both making progress over the venture creation process and cumulated successful venture creation over a longer period in the working life.

This finding concurs with prospective longitudinal results on early developmental precursors of adults' entrepreneurship [19,22]. Even more importantly, it contributes to a growing body of prospective and retrospective results on the relevance of early entrepreneurial competence in adolescence in the explanation of entrepreneurial behavior and success during the working life [20,21,47,48]. Our retrospective results are in line with models of the life span as characterized by a sequence of culture-specific developmental tasks individuals need to resolve [46]. In other words, growth of early entrepreneurial competence in adolescence may indeed constitute subsequent adult work success in the field of nascent entrepreneurship. There is growing evidence now that, in a world of work that increasingly requires entrepreneurial thinking and acting [1,2,3], such adolescent competencies may be considered as a crucial feature in society's human capital stock [9].

Our measures of human and social capital did not help to explain the link between adolescent competence and making progress in the venture creation process. In order to shed light on the underlying process, future studies could consider other human and social capital indicators (e.g., balanced skills or industry-specific experience [10]). In addition, other psychological approaches to entrepreneurship such as Sarasvathy's [6] effectuation approach could be considered. It may also be fruitful to draw from more general career theories. For example, the social cognitive career theory [61] postulates that competencies and competence-related beliefs affect vocational behavior via interests. Schmitt-Rodermund [20,21] presented evidence that studying entrepreneurial interests may indeed help to better understand the link between competence growth and entrepreneurial activity.

What are the implications of our study? Today, policymakers call for expanded efforts in stimulating the development of entrepreneurial mindsets as early as in childhood and adolescence, for example by targeting the formation of basic business skills [34]. Related empirical findings, however, are still scarce. Although one has to keep in mind the partly retrospective nature of our findings, our study hints at the importance of fostering early entrepreneurial competence in adolescence. Nevertheless, the question arises whether and in which way such an early competence can be promoted. Experts from the more general field of ability and talent research consistently emphasize the role of early experiences and learning in skill development across the life span [62,63,64]. Studies have further demonstrated that childhood and adolescence represent an important time for stimulating skill formation [30,65]. Entrepreneurship studies indeed indicate that early contextual stimulation contributes to later successful entrepreneurship via the promotion of early competence growth [20,48]. In view of these considerations and findings, it seems feasible to assume that successful entrepreneurship can be promoted early in life. Educational measures may target age-appropriate entrepreneurial activities as a way to promote early mastery [30], deliberate practice [63,66], and learning [4] in the context of entrepreneurial competence growth.

This study has important limitations. Due to time and money constraints, we had to draw from retrospective reports on adolescent competence. Such retrospective study designs are a common method in life span research [67] and have proven their usefulness in past entrepreneurship research on adolescent precursors [20,22]. Nevertheless, recalled information can be biased due to imprecise memory or interferences with the current mind state of the respondent. Note that there are several indications that speak for the validity of our results. First, we utilized effective mnemonic techniques (Life History Calendar method) to facilitate the recall process. Second, we deliberately did not target childhood data but referred to adolescence, as this developmental phase is in general well represented in the adult mind [68]. Third, we focused more on factual information (instead of requesting evaluations). Finally, our results are very similar to findings from a comparable prospective longitudinal study covering almost the complete lives of the ‘Terman boys’ [21]. As stressed by life span researchers, “the validity of retrospective reports is supported where they yield findings similar to those from prospective studies” [67] (p. 228). Another limitation however is the data source. All gathered information stemmed solely from respondents’ self-reports. Future research could additionally draw from other sources such as parental statements or observational methods when assessing adolescent competence. Finally, we acknowledge the limits resulting from studying entrepreneurs retrospectively after they have achieved the prime of their career (Study 2). However, the results turned out to be unaffected by the conditions that distinguish this group from entrepreneurs earlier in their career.

To conclude, this study contributes to the ongoing discourse on the development of a person’s successful entrepreneurship by pointing to the relevance of a framework of human development for this field of investigation. Our study raises important research questions and what is clearly needed now is more empirical research. We thus end this paper with a call to entrepreneurship research to open up to the life span perspective of human development.

Understanding a person's entrepreneurial behavior and success as a developmental outcome may be the first step in this direction.

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Table 1

Measurement of Early Entrepreneurial Competence in Adolescence (at Age 14 or 15 Years)

Variable	Item list
Early inventive activities (14 items)	<p>“In the following we are interested in creative behaviors during your leisure time activities when you were 14 or 15 years old. Please indicate how often you undertook creative activities in the following domains.”</p> <ol style="list-style-type: none"> 1. “Music (e.g., inventing songs, playing melodies composed by yourself using an instrument)” (1 = never, 5 = very often) 2. “Writing (e.g., writing stories/poems)” (1 = never, 5 = very often) 3. “Painting (e.g., painting pictures)” (1 = never, 5 = very often) 4. “Technical constructions (e.g., metal construction kit, soldering, wiring)” (1 = never, 5 = very often) 5. “Repair work (e.g., repairing a moped, technical apparatus)” (1 = never, 5 = very often) 6. “Woodwork (e.g., carving, sawing, filing)” (1 = never, 5 = very often) 7. “Cooking (e.g., inventing/trying out new recipes)” (1 = never, 5 = very often) 8. “Handicrafts (e.g., sewing, embroidering something new, making pottery)” (1 = never, 5 = very often) 9. “Gardening (e.g., laying out new patches, planting patches in a creative way)” (1 = never, 5 = very often) 10. “Magic (e.g., creating new magic tricks)” (1 = never, 5 = very often) 11. “Chemical experiments (e.g., with chemicals/ other materials)” (1 = never, 5 = very often) 12. “New games (e.g. devising new games)” (1 = never, 5 = very often) 13. “Decorative work (e.g., flower arrangements, table decoration)” (1 = never, 5 = very often) 14. “Building something (e.g., hut, tree house, making objects out of chestnuts or acorns)” (1 = never, 5 = very often)
Early leadership (6 items)	<p>“When you were 14 or 15 years old, what responsibilities did you have at school or in your leisure time?” “I had some important responsibilities . . .”</p> <ol style="list-style-type: none"> 1. “in my grade (e.g., class spokesperson)” (0 = no, 1 = yes) 2. “in school (e.g., school magazine, school radio)” (0 = no, 1 = yes) 3. “in a club (e.g., treasurer)” (0 = no, 1 = yes) 4. “in a youth organization (e.g., scouts)” (0 = no, 1 = yes) 5. “in a sports team (e.g., team captain)” (0 = no, 1 = yes) 6. “other important responsibilities in your leisure time (e.g., singer in a band)” (0 = no, 1 = yes)
Early commercialization behavior (3 items)	<p>“Please indicate whether, and how often (at age 14 or 15), you engaged in the following leisure activities.”</p> <ol style="list-style-type: none"> 1. “Selling things (e.g., selling things to friends, selling as a part time job)” (1 = never, 5 = very often) 2. “Thinking of things that would sell well” (1 = never, 5 = very often) 3. “Trading/exchanging things (e.g., swapping stickers with friends)” (1 = never, 5 = very often)

Note: This item-list was developed on the basis of the literature [20,21] and has already been successfully employed in past entrepreneurship research [47,48].

Table 2
Correlations between the Variables in Study 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Control variables:																					
1 Age (T1)	–																				
2 Origin (T1; 0=West Germany, 1=East Germany)	-.12	–																			
3 Gender (T1; 0=female, 1=male)	.14	-.08	–																		
4 Team founding (T1; 0=no, 1=yes)	-.08	-.18	.05	–																	
5 Service sector (T1; 0=no, 1=yes)	.10	-.15	.01	.17	–																
6 Branch 1 (T1; 0=no, 1=yes)	-.27**	-.04	.07	.29**	-.15	–															
7 Branch 2 (T1; 0=no, 1=yes)	.10	-.03	.12	.09	.35***	-.21*	–														
8 Branch 3 (T1; 0=no, 1=yes)	.01	-.05	.01	-.23*	-.34***	-.32**	-.17	–													
9 Branch 4 (T1; 0=no, 1=yes)	.09	.03	.02	.11	.23*	-.23*	-.12	-.18	–												
10 Branch 5 (T1; 0=no, 1=yes)	.23*	.12	.00	.01	-.14	-.21*	-.11	-.17	-.12	–											
11 Branch misc. (T1; 0=no, 1=yes)	-.02	.00	-.19	-.26*	.17	-.32**	-.17	-.25*	-.18	-.17	–										
12 Portfolio entrepreneurship at T1 (T1; 0=no, 1=yes)	.19	-.30**	.05	.16	.14	.09	.07	.03	-.15	-.04	-.04	–									
13 Duration of founding process until T1 (T1)	.36**	-.17	.16	.19	.09	-.06	.01	-.18	.07	.11	.10	.26*	–								
14 Number of gestation activities undertaken until T1 (T1)	.08	-.22*	.06	.24*	-.03	.22*	-.07	-.14	.01	-.11	.02	.29**	.33**	–							
Central variables:																					
15 Early entrepreneurial competence in adolescence (T1)	.24*	-.11	.06	.06	-.10	-.04	-.02	.01	.06	.22*	-.16	.28**	.18	.07	–						
16 Work experience in small or medium-sized enterprises (T1; 0=no, 1=yes)	-.06	-.11	.15	.10	-.09	.36**	-.04	-.07	-.07	-.12	-.16	.25*	.15	.13	.06	–					
17 Startup experience (T1; 0=no, 1=yes)	.30**	-.26*	.09	.19	.15	.12	.02	-.05	-.00	.02	-.11	.82***	.30**	.16	.24*	.34**	–				
18 PhD (T1; 0=no, 1=yes)	.25*	-.07	.12	.14	.30**	-.31**	.24*	-.10	.54***	-.02	-.15	-.02	.11	.05	.25*	-.26*	-.03	–			
19 Social capital during venture creation (T1)	.02	-.01	.00	.08	-.12	.02	-.05	.20	.11	-.17	-.15	.08	.10	.30**	.09	.04	.14	.04	–		
20 New resource skills during venture creation (T1)	.08	-.03	.13	.22*	.08	.14	-.05	-.05	.11	.09	-.22*	.27*	.10	.35***	.23*	.25*	.31**	.08	.20	–	
21 Entrepreneurial competence during venture creation (T1)	.12	-.04	-.02	.19	.00	.24*	-.05	-.29**	.10	.04	-.06	.15	.26*	.34**	.25*	.17	.22*	-.05	.24*	.34**	–
22 Number of gestation activities undertaken between T1 and T2	.01	-.05	.17	.04	-.04	.10	-.06	-.04	.00	-.04	.01	.02	.03	.57***	.16	-.04	-.09	.19	.30**	.17	.18

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3

Hierarchical Regression Analysis for the Prediction of Progress in the Venture Creation Process between T1 and T2

	Step 1			Step 2			Step 3		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Control variables:									
1 Prior progress in venture creation process (T1)	3.90	.64	.62 ***	3.92	.61	.63 ***	3.67	.66	.59 ***
2 Age (T1)	.01	.06	.01	-.01	.06	-.02	-.02	.07	-.04
3 Origin (T1; 0=West Germany, 1=East Germany)	.26	1.33	.02	.50	1.29	.04	.66	1.26	.05
4 Gender (T1; 0=female, 1=male)	4.12	1.81	.22 *	4.16	1.74	.22 *	4.13	1.73	.22 *
5 Team founding (T1; 0=no, 1=yes)	-1.18	1.40	-.09	-1.31	1.35	-.10	-1.72	1.35	-.13
6 Service sector (T1; 0=no, 1=yes)	.80	1.59	.06	1.47	1.56	.11	1.59	1.56	.12
7 Branch 1 (T1; 0=no, 1=yes)	-.44	1.86	-.03	-.47	1.79	-.04	-.08	1.82	-.01
8 Branch 2 (T1; 0=no, 1=yes)	-1.09	2.27	-.06	-1.52	2.19	-.08	-2.89	2.20	-.15
9 Branch 3 (T1; 0=no, 1=yes)	.83	1.94	.06	.63	1.87	.04	-.04	1.90	-.00
10 Branch 4 (T1; 0=no, 1=yes)	.19	2.42	.01	-.53	2.35	-.03	-2.74	2.65	-.13
11 Branch 5 (T1; 0=no, 1=yes)	.82	2.44	.04	-.03	2.37	-.00	.64	2.33	.03
12 Portfolio entrepreneurship at T1 (T1; 0=no, 1=yes)	-1.70	1.76	-.10	-3.02	1.78	-.18	-1.56	3.25	-.09
Adolescent competence:									
13 Early entrepreneurial competence in adolescence (T1)				2.28	.89	.25 *	1.94	.93	.22 *
Founders' human and social capital:									
14 Work experience in small and medium-sized enterprises (T1; 0=no, 1=yes)							.87	1.28	.07
15 Startup experience (T1; 0=no, 1=yes)							-1.24	3.13	-.08
16 PhD (T1; 0=no, 1=yes)							3.67	1.80	.26 *
17 New resource skills during venture creation (T1)							-1.33	.93	-.15
18 Entrepreneurial competence during venture creation (T1)							.03	1.07	.00
19 Social capital during venture creation (T1)							.51	.25	.20 *
R^2		.40			.45			.53	
ΔR^2						.05*		.08	
Adjusted R^2		.30			.35			.39	
<i>N</i>		85			85			85	

Note. The variable Prior progress in venture creation process (T1) stands for the standardized residuals of Number of gestation activities until T1 regressed on Duration of venture process until T1 (as explained under Method/Measures/Control Variables).

* $p < .05$. *** $p < .001$.

Table 4

Correlations between the Variables in Study 2

	1	2	3	4
Control variables:				
1 Age	–			
2 Gender (0=female, 1=male)	.10	–		
3 Total duration of being self-employed over the past career	-.12	-.08	–	
Central variables:				
4 Early entrepreneurial competence in adolescence	-.05	.06	.11	–
5 Habitual entrepreneurship over the past career (0=one venture founded, 1=more than one venture founded)	-.06	.03	.25**	.22**

** $p < .01$.

Table 5

Hierarchical Logistic Regression Analysis for the Prediction of Habitual Entrepreneurship over the Past Career of Founders (Age \geq 55 Years)

	Step 1			Step 2		
	<i>B</i>	<i>SE B</i>	OR	<i>B</i>	<i>SE B</i>	OR
Control variables						
1 Age	.04	.04	1.037	.04	.04	1.045
2 Gender (0=male, 1=female)	-.41	.77	.665	-.22	.77	.800
3 Total duration of being self-employed over the past career	.12	.04	1.131 **	.12	.04	1.124 **
Central variable:						
4 Early entrepreneurial competence in adolescence				.71	.30	2.043 *
<i>Nagelkerke R²</i>		.10			.14	
<i>N</i>		148			148	

Note. Dependent variables was coded as 0 = one venture successfully founded over the past career, 1 = more than one venture successfully founded over the past career. OR = Odds ratio.

* $p < .05$. ** $p < .01$.