

Entrepreneurship as a twenty-first century skill: entrepreneurial alertness and intention in the transition to adulthood

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Abstract Given the importance of entrepreneurial thinking and acting as a meta-skill in the future world of work, we focus on the emerging entrepreneurial mind-set in the transition to adulthood. We study the role of personality characteristics and age-appropriate entrepreneurial competencies (leadership, self-esteem, creativity, and proactivity motivation) in the prediction of entrepreneurial alertness and career intention. Using two-wave longitudinal data from high schools in Helsinki, Finland ($N = 523$), we tested a mediation model with competencies as mediators between personality and entrepreneurial alertness and intention. The findings suggest that entrepreneurial alertness and career intention (a) are rather independent career development constructs of the emerging entrepreneurial mind-set, (b) are both an expression of an entrepreneurial

personality structure, and (c) are predicted by different underlying competencies: leadership and self-esteem mediated the personality—entrepreneurial intention link, and leadership, creativity, and proactivity motivation the personality—entrepreneurial alertness link. Consistent with the balanced skill approach to entrepreneurship, the intraindividual variety of these competencies was also a valid mediator; it did not show incremental predictive power though. Implications for research and practice are discussed.

Keywords Entrepreneurial alertness · Intention · Personality · Competencies · Adolescence · Balanced skills

JEL Classifications A2 · A21 · J24 · L26

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1 Introduction

Many scholars and policy makers agree that entrepreneurship is highly relevant for the success of today's societies owing to its effects on economic and technological development and the creation of new jobs (Baumol et al. 2007). For example, economic analyses show that most new jobs are not created by large, established companies but by entrepreneurial startup companies (Birch 1987; Kane 2010). Hisrich et al. (2007) stress that “entrepreneurship is [...] a mechanism by which many people enter the economic

and social mainstream of society, facilitating culture formation, population integration, and social mobility” (p. 575). Thus today, entrepreneurial thinking and acting is seen as a twenty-first century skill, one of the basic meta-capabilities that the young generation will need to develop to be successful in life (Obschonka 2013; World Economic Forum 2009). This applies not only to one’s own business creation activities (e.g., youth entrepreneurship; see Damon et al. 2015), but also to intrapreneurship in an established organization (Hisrich et al. 2007), or to the utilization and managing of the various work-related opportunities and uncertainties brought in the wake of current social and economic change (Obschonka et al. 2012; Savickas and Porfeli 2012; Uy et al. 2015). Finally, an increasingly important field in the scholarly and public debate is social entrepreneurship—tackling social, cultural, or environmental problems via entrepreneurial means (e.g., social startups) in an enduring way (Corner and Ho 2010; OECD 1999). It is argued that entrepreneurial thinking and acting has the potential to foster positive social change. An often-cited example of this is the Nobel Prize-winning project *Grameen Bank*.

Given this multilayered relevance of entrepreneurship for the future career, scholars and policy makers have developed a strong interest in the emerging entrepreneurial mind-set in young generations (Lerner and Damon 2012). Developmentalists explicitly stress that “the transition to adulthood is an important period for understanding successful entrepreneurship” (Geldhof et al. 2014a; p. 410). This also concerns the major societal goal of “educating the next wave of entrepreneurs” to unlock “entrepreneurial capabilities to meet the global challenges of the twenty-first century” (World Economic Forum 2009). Indeed, recent empirical research on adolescent pathways to entrepreneurship has generated new insights into the developmental mechanisms characterizing the emergence of the young entrepreneurial mind-set (for a recent overview see Obschonka 2016). However, this existing developmental research, with its main focus on developing entrepreneurial competencies and the interplay between biologically based factors and developmental context, is rather silent with regard to *cognitive* entrepreneurial factors, for example, entrepreneurial alertness (Baron 2006).

Hence, this study examines entrepreneurial alertness as part of the emerging entrepreneurial mind-set. We focus on the emerging entrepreneurial mind-set in

the transition to adulthood as (a) an important phase of a person’s vocational development in general (Savickas 2002; Super 1980), (b) a period of developmental precursors of the adult entrepreneurial mind-set in particular (Schmitt-Rodermund 2004, 2007; Obschonka et al. 2013a; Obschonka et al. 2010, 2011a; Obschonka et al. 2015a; Schoon and Duckworth 2012), and (c) a mind-set directly underlying youth entrepreneurship activities (e.g., Damon et al. 2015). Focusing on such a developmental stage prior to adulthood might also be helpful in informing education programs and interventions aiming at promoting entrepreneurship (Geldhof et al. 2014a, b). For example, research suggests that entrepreneurship education programs targeting adult populations (e.g., students in universities; Oosterbeek et al. 2010) are often surprisingly ineffective, given the enormous amounts of money and other resources currently being invested in them by many societies. These puzzling findings might indirectly hint at the relevance of the early formative years in the development and promotion of entrepreneurial mind-sets (Lerner and Damon 2012), which would make it an emerging hot topic of Applied Developmental Science (Obschonka 2016; Obschonka and Silbereisen 2012). Taken together, it seems safe to conclude that achieving a better understanding of the emerging entrepreneurial mind-set is a salient task of contemporary research on vocational development.

The present study contributes to this field by analyzing ongoing longitudinal data from the Mind-the-Gap project (University of Helsinki, Finland; Hietajärvi et al. 2015; Mind the Gap 2014). The novel contribution of this study is fourfold: it (a) examines entrepreneurial alertness (Tang et al. 2012) as a central ability feature of the emerging entrepreneurial mind-set, (b) connects entrepreneurial alertness to the established literature on entrepreneurial intention as another early career development construct (Schmitt-Rodermund and Vondracek 2002; Schoon and Duckworth 2012), (c) quantifies the role of basic personality characteristics as a potential driver of entrepreneurial alertness (and intention) in the transition to adulthood, and (d) examines age-appropriate early entrepreneurial competencies (in our case leadership, self-esteem, creativity, and proactivity motivation) as mediators between personality differences and entrepreneurial alertness and intention, thereby shedding light on potential mechanisms.

2 Entrepreneurial alertness and entrepreneurial intention as career development constructs in the transition to adulthood

In recent years, the concept of entrepreneurial alertness has become a key construct in entrepreneurship research (Baron 2006; Gaglio and Katz 2001; Tang et al. 2012). It was originally defined as an individual's ability to perceive new opportunities that are overlooked by others (Kirzner 1979). Recently, it was theoretically and empirically elaborated into a three-component construct consisting of a) "scanning and searching for information," b) "connecting previously disparate information," and c) "making evaluations on the existence of profitable business opportunities." Well-validated scales measuring these three sub-constructs are now available (Tang et al. 2012, p. 77).

Experts have stressed that entrepreneurial alertness is crucial not only for successful entrepreneurial behavior (e.g., in the process of pattern recognition and opportunity recognition, Baron 2006), but also for innovation behavior and, as a meta-skill, for adaptive career development in general. First, with respect to its relevance for entrepreneurship, many scholars agree that opportunity—and the perception and exploitation of opportunities—stands at the heart of entrepreneurship (Shane 2012; Shane and Venkataraman 2000). Therefore, entrepreneurial alertness is widely seen as a key ability for successful entrepreneurial thinking and acting, an assumption supported by a growing body of research, not only in the context of classic entrepreneurship (e.g., developing, evaluation, and exploiting new business opportunities, Shane 2012), but also in adjacent fields such as intrapreneurship and innovation behavior in established firms (Ma and Huang 2016; Tang et al. 2012).

Second, given its growing importance for career development and guidance, entrepreneurial alertness can generally be seen as a highly relevant career construct in the general population, as today "alertness to opportunities is an important component of career development" (Uy et al. 2015, p. 121). In the face of globalized social and economic change, one of the most crucial challenges facing young persons in their vocational development is preparing for a boundaryless, self-directed/constructed career, in which career adaptability and a boundaryless mind-set are key requisites (Savickas and Porfeli 2012). Interestingly, a

recent study examining university students in Singapore showed that entrepreneurial alertness is a strong and robust predictor of just such a boundaryless mind-set and career adaptabilities (Uy et al. 2015). This underscores the assumption that entrepreneurial alertness is highly relevant not only for entrepreneurship and innovation, but also for general career development and adaptive vocational behavior in today's world of work. It also underscores the need for more research explaining the observed interindividual differences in entrepreneurial alertness (Ma and Huang 2016; Uy et al. 2015). How does entrepreneurial alertness develop? How could one promote entrepreneurial alertness?

Besides entrepreneurial alertness, entrepreneurial intention has become another new research focus in contemporary research on vocational development (Hirschi and Fischer 2013; Obschonka et al. 2010; Schoon and Duckworth 2012). Such intentions are seen as constituting a more or less concrete plan to prepare for, and then ultimately start, an entrepreneurial career of one's own in the future. While such intentions have been widely studied as entrepreneurial intentions in adult samples (e.g., founding one's own business or engaging in entrepreneurial behavior in an established firm; Fini et al. 2012; Krueger et al. 2000), making intentions, besides entrepreneurial alertness, another hot topic in contemporary entrepreneurship research (Fayolle and Liñán 2014), less attention has been paid to early entrepreneurial intentions in adolescence and the transition to adulthood. Consistent with the career development theories (Porfeli et al. 2013; Super 1980) according to which adolescence and the transition to adulthood play a unique role in the development of vocational identity, preferences, interests, and career prospects, a growing amount of research hints at the relevance and usefulness of studying entrepreneurial intentions in young people as a key feature of the emerging entrepreneurial mind-set (Geldhof et al. 2014a, b; Schmitt-Rodermund 2004; Schmitt-Rodermund and Vondracek 2002). Longitudinal studies have further shown that such early entrepreneurial intentions do, in fact, predict later entrepreneurial activity in adulthood (e.g., Schoon and Duckworth 2012), underscoring the idea that such early intentions are a relevant career development construct of the emerging entrepreneurial mind-set in the transition to adulthood. In the present study, we aim at predicting both entrepreneurial alertness and

intention in the transition to adulthood as two important career development constructs.

3 Personality as a basic tendency

When seeking to explain entrepreneurial outcomes, such as entrepreneurial intentions and activity, scholars often turn to interindividual personality differences, as in the personality approach to entrepreneurship (Brandstätter 2011), and therefore to a biological approach (Nicolaou et al. 2008), since personality has a strong genetic basis. As discussed in detail elsewhere (Obschonka et al. 2013b), a focus on personality is the classic approach to explaining entrepreneurial competence and motivation, one that reaches back to Schumpeter (1934) and other seminal theorizing on the entrepreneurial mind-set. The basic message of this research is that to develop a coherent and complete model of entrepreneurship, personality differences need to be seriously taken into account (Hisrich et al. 2007).

Whereas earlier research connected entrepreneurial alertness to specific personality traits, such as a proactivity (Uy et al. 2015), we apply the Big Five trait approach, which is the dominant approach to personality in both contemporary personality psychology and applied psychology (Barrick and Mount 1991). Specifically, we draw on recent findings on an intraindividual entrepreneurial Big Five profile (high levels of extraversion, conscientiousness, and openness; low levels of agreeableness and neuroticism) that has been shown to be a particularly robust and consistent predictor of entrepreneurial outcomes, competencies, motivation, self-identity, and passion in a variety of studies and samples (see Obschonka et al. 2013a; Obschonka et al. 2015b). The entrepreneurial personality profile also matters in adolescence, as it has been shown to be predictive of age-appropriate early entrepreneurial competencies in adolescence (Schmitt-Rodermund 2004) and an entrepreneurial career during subsequent working life (Schmitt-Rodermund 2007), thus also making it a relevant construct in research on the emerging entrepreneurial mind-set in the transition to adulthood.

Extending this research, we studied the link between such an entrepreneurial personality structure at the Big Five level and entrepreneurial alertness and intention in adolescence. We expected to find a

positive effect of this personality structure on the two outcomes, thereby demonstrating that both constructs are, at least in part, an expression of a person's personality structure (cf. Holland 1997). Such basic personality differences are relatively (but not perfectly) stable inner basic tendencies in the personality system that may guide an individual's vocational development across the different stages of the lifespan.

Hypothesis 1 An entrepreneurial personality positively predicts both entrepreneurial alertness and intention in adolescence.

4 Age-appropriate entrepreneurial competencies as mediators

To take a closer look at the link between basic personality characteristics on the one hand and concrete entrepreneurial ability (alertness) and career intentions on the other, we study the role of age-appropriate early entrepreneurial competencies. Prior research suggests that early competencies such as creativity, leadership, self-esteem, and proactivity motivation reflect the kinds of early entrepreneurial competencies that are developmental precursors of entrepreneurial activity in adulthood (Obschonka et al. 2010; Obschonka et al. 2011b; Schmitt-Rodermund 2004, 2007) and build the basis for more concrete entrepreneurial skills during the occupational career (e.g., business founding skills) (Obschonka et al. 2011a). Moreover, research indicates that basic personality differences, like those constituting the entrepreneurial Big Five profile, are particularly predictive of such early competencies (Schmitt-Rodermund 2004, 2007; Obschonka et al. 2010, 2011a).

Following this earlier research, we expected such competencies (creativity, leadership, self-esteem, and proactivity motivation) to be predicted by an entrepreneurial personality structure.

Hypothesis 2a An entrepreneurial personality positively predicts age-appropriate early entrepreneurial competencies in adolescence.

We further expected such early competencies to mediate the effect of personality traits on entrepreneurial alertness and intention. The literature on both entrepreneurial alertness and intentions highlights the role of the underlying entrepreneurial competencies that enable a person to scan and search for new

information, connect previously disparate information, and evaluate opportunities (Tang et al. 2012), and also to develop a strong motivation (e.g., via self-efficacy beliefs and relevant mastery experiences) to engage in entrepreneurial behavior on one’s own account (Krueger et al. 2000; Obschonka et al. 2010). It seems plausible, therefore, to assume that age-appropriate early entrepreneurial competencies predict entrepreneurial alertness and intention in adolescence, and thus, operate as mediators that help explain the link between personality structure and entrepreneurial career constructs (Fig. 1 summarizes the hypothesized model).

Hypothesis 2b Age-appropriate early entrepreneurial competencies positively predict entrepreneurial alertness and intention.

Hypothesis 2c Age-appropriate early entrepreneurial competencies mediate the relationship between entrepreneurial personality on the one hand and entrepreneurial alertness and intention on the other.

Finally, in light of a recent discussion on entrepreneurial human capital (see, for example, Bublitz and Noseleit 2014), we investigated the single early competencies separately, and also as a variety index. This follows the balanced skill approach to entrepreneurship (Lazear 2005), according to which entrepreneurship is essentially a jack-of-all-trades phenomenon (the entrepreneurial individual needs to be skilled in a great variety of very different things). What is of particular importance for the entrepreneurial mind-set is not any single competence, but the variety and breadth of the competencies possessed by the individual. Research has shown initial support for this approach, demonstrating the importance of a varied skill set for engaging in entrepreneurship (Wagner 2006), getting a business up and running

(Stuetzer et al. 2013), self-employment longevity (Oberschachtsiek 2012), and business success (Hartog et al. 2010). Studies also indicate that a varied skill set is more important for entrepreneurship than single competencies (e.g., Stuetzer et al. 2013). We thus tested single competencies both separately and as a variety index, reflecting the balance of skills within the individual (Lazear 2005). We wanted to explore which of the two conceptualizations of early competencies would deliver the strongest, more robust effects and thus, fit the expected mediation model best.

5 Methods

5.1 Sample and procedure

This study is part of the ongoing project “Mind the Gap between Digital Natives and Educational Practices,” funded by the Academy of Finland (Mind the Gap 2014; Project Number: Academy of Finland 298323 and 273872). The project integrates educational, developmental, socio-emotional, and neuroscience approaches to examine the development of the so-called digital natives, a generation that is growing up in a digital world and that has to develop new skills to deal with the various demands imposed on young people by today’s economic environment (e.g., entrepreneurial skills). Mind the Gap gathers data from all the public schools in the City of Helsinki, Finland.

Here, we analyze data collected at *T1* (October 2013–January 2014) and at *T2* (October 2014–January 2015) from the same 16 high schools. At *T1*, participants were 16–17 years old and in the first grade of high school, and at *T2* 17–18 years old and in the second grade. The questionnaires were administered during school hours and took about an hour to complete. Participation was voluntary, and informed consent forms were collected from both the students and their parents. The study protocol was approved by the University of Helsinki Ethical Review Board in the Humanities and Social and Behavioral Sciences.

The original *T1* sample of 1 615 high school students (67.3 % females, 32.7 % males) was drawn from 18 schools. The *T2* sample (with full information on the study variables examined in this analysis) contained 523 students. Attrition was analyzed by comparing the students who participated at *T2* with

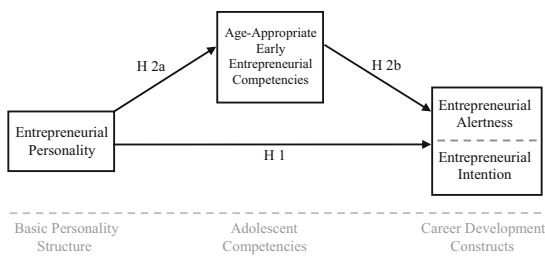


Fig. 1 Conceptual model

those who dropped out. The attrition analyses were carried out with the study variables examined in this analysis. The results showed that dropouts differed significantly from *T2* participants in their proactivity motivation. The *T2* participants showed higher proactivity motivation (school engagement *T1*: $M = 4.82$, $SD = 1.17$; intrinsic mastery *T1*: $M = 5.31$, $SD = 1.09$) than dropouts (school engagement *T1*: $M = 4.53$, $SD = 1.25$, $t(1338) = -4.36$, $p < .001$; intrinsic mastery *T1*: $M = 5.09$, $SD = 1.19$, $t(1282) = -3.46$, $p < .001$). No significant differences were observed in the other study variables between dropouts and the *T2* participants.

5.2 Measures

Table 1 provides an overview of the measurements, including means, standard deviations, and Cronbach's alphas. Additional information on the calculation of the entrepreneurial personality structure and the components of the entrepreneurial competencies index are provided in the following.

5.2.1 Entrepreneurial personality (*T1*)

Following earlier research on an entrepreneurial personality structure (Obschonka et al. 2010, Obschonka et al. 2013a, b; Stuetzer et al. 2013, 2015), the variable entrepreneurial personality is based on the D^2 approach to quantify the similarity between two profiles presented by Cronbach and Gleser (1953). The match is determined between a person's empirical Big Five profile and the fixed reference profile, with the extreme scores in each of the Big Five dimensions defining their outer limits in the entrepreneurial personality structure (i.e., highest possible values [4] in extraversion, conscientiousness, and openness; lowest possible values [0] in agreeableness and neuroticism). In the first step, for each person, the squared differences between the reference values and their personal scores on each of the five trait scales were computed. For instance, if a person scored 3 in neuroticism, the squared difference was 9 (as the reference value was 0). In the second step, the five squared differences were summed for each person. Third, the algebraic sign of this sum was reversed (e.g., a value of 20 became -20). The final variable had a mean of -22.65 ($SD = 6.18$).

5.2.2 Variety of entrepreneurial competencies (*T1*)

Following the balanced skill approach (Lazear 2005), we calculated an index reflecting the intraindividual variety in the single competencies (leadership, self-esteem, creativity, and proactivity motivation, measured as school engagement, intrinsic motivation). Specifically, median splits were conducted, resulting in dichotomized variables for each competence (below median = 0/above median = 1). These five dichotomized variables were then summed ($M = 2.51$, $SD = 1.25$). Similar approaches have been used in prior research on balanced skills (e.g., Stuetzer et al. 2013).

5.2.3 Control variables (*T1*)

We controlled our analyses for gender (Kelley et al. 2011; Wilson et al. 2007; 1 = female, 2 = male; $M = 1.28$, $SD = 0.45$) and self-employment among parents (Lindquist et al. 2015; Schoon and Duckworth 2012; Schmitt-Rodermund 2004; at least one parent is self-employed; 0 = no, 1 = yes; $M = 0.24$, $SD = 0.43$).

6 Results

6.1 Correlations

Table 2 presents the zero-order correlations. Of the control variables, gender showed positive correlations with both outcomes, i.e., entrepreneurial alertness and intention (males scored higher in these outcomes). These observed gender differences are consistent with the literature on the gender gap in entrepreneurship (Kelley et al. 2011) and indicate that such gender differences in entrepreneurial development exist not only in adulthood (e.g., with respect to entrepreneurial activity) but also in adolescence (Wilson et al. 2007). In contrast, having self-employed parents was associated with higher intention levels (which is again consistent with prior findings (Schmitt-Rodermund 2004; Schoon and Duckworth 2012)), but not with entrepreneurial alertness.

Among the main study variables, the age-appropriate entrepreneurial competencies differed in their correlations with the outcomes. Leadership and self-esteem showed positive correlations with both outcomes. Creativity, in turn, only showed a positive correlation with intention and with one of the three

Table 1 Description of the measured variables

Variables/scale/source	Sample item	Mean (SD)	Cronbach's alpha
Entrepreneurial alertness <i>T2</i> (Scale: 1 to 5) (Tang et al. 2012)			
1. Scanning and search (3 items)	I am always actively looking for new information	3.48 (0.84)	.70
2. Association and connection (2 items)	I often see connections between previously unconnected domains of information	3.42 (0.86)	.83
3. Evaluation and judgment (4 items)	I can distinguish between profitable opportunities and not-so-profitable opportunities	3.42 (0.86)	.85
Entrepreneurial intention <i>T2</i> (Scale: 1–5; 1 item)	I would like to own my own business, when I am an adult	2.63 (1.05)	
Personality <i>T1</i> (Scale: 0–4) (Shortened, 20-item version of the Big Five Inventory (BFI; John et al. 1991)			
1. Extraversion (4 items)	I am outgoing, sociable	2.00 (0.66)	.70
2. Conscientiousness (4 items)	I am reliable	2.22 (0.63)	.60
3. Openness (4 items)	I am original, I come up with new ideas	2.63 (0.80)	.70
4. Agreeableness (4 items)	I am kind and considerate to almost everybody	2.74 (0.64)	.52
5. Neuroticism (4 items)	I get nervous easily	1.92 (0.76)	.62
Leadership <i>T1</i> (Scale: 1–5; 2 items)	When I am with my friends, I am usually the one who decides what we do	2.96 (0.80)	.56
Self-esteem <i>T1</i> (Scale: 1–7; 5 items) (Rosenberg 1965)	I take a positive attitude toward myself	4.68 (1.26)	.84
Creativity <i>T1</i> (Scale: 1–7; 7 items) (Internet Activities Inventory, IAI)	I share self-created knowledge about my hobbies or things I am interested in	1.46 (0.61)	.83
Proactivity motivation: school engagement <i>T1</i> (Scale: 1–7; 9 items) (Schoolwork engagement inventory, EDA; Salmela-Aro and Upadyaya 2012)	I feel happy when I am working intensively at school	4.86 (1.15)	.92
Proactivity motivation: intrinsic mastery <i>T1</i> (Scale: 1–7; 3 items) (Niemivirta 2002; Tuominen-Soini et al. 2012)	I study in order to learn new things	5.31 (1.11)	.86

alertness sub-factors (association and connection). The two proactivity motivation variables, in turn, showed positive correlations with entrepreneurial alertness but no relationship with intention. As with

leadership and self-esteem, the variety index, reflecting the variety of entrepreneurial competencies within the individual, also showed consistently positive correlations with all the outcome variables.

We then turned to the testing of our hypotheses, employing structural equation modeling (Kline 2010). Following Tang et al. (2012) and Uy et al. (2015), we modeled entrepreneurial alertness as a latent factor behind the three sub-scales: (1) scanning and search, (2) association and connection, and (3) evaluation and judgment. We tested mediation effects by estimating bootstrap confidence intervals for the indirect effects (2000 bootstrap resamples).

6.2 The direct effect of personality on entrepreneurial alertness and intention

Figure 2A describes the direct effect of entrepreneurial personality on entrepreneurial alertness and intention, controlled for gender and self-employed parents. The model fit was acceptable, with CFI = .973 and RMSEA = .056 (Hu and Bentler 1999). Personality differences predicted both outcomes, with a positive effect of $\beta = .18$ ($p < .001$) on alertness, and of $\beta = .16$ ($p < .001$) on intention. Hence, Hypothesis 1 received full support.

Interestingly, the correlation between entrepreneurial alertness and intention was nonsignificant in this model, owing to the third variable effect of the personality variable. In other words, this analysis suggests that while both outcomes showed a bivariate correlation (the latent alertness construct and the intention variable, and the potential effects of gender and parental self-employment were partialled out), this link could be spurious owing to an underlying effect of personality structure. This would also argue against a model in which entrepreneurial alertness is a mediator between personality and intention.

6.3 The mediation models using single competencies versus variety of competencies as mediators

Figure 2B shows the mediation model with the single competencies as multiple mediators. Again, the model fit was acceptable, with CFI = .974 and RMSEA = .054 (Hu and Bentler 1999). Note that only significant paths are depicted. Analysis of the model revealed no significant direct effect of entrepreneurial personality on entrepreneurial alertness ($\beta = .06$, ns) or intention ($\beta = .08$, ns). Entrepreneurial personality positively predicted leadership ($\beta = .25$, $p < .001$), creativity ($\beta = .36$, $p < .001$),

and proactivity motivation (school engagement: $\beta = .25$, $p < .001$; intrinsic mastery: $\beta = .18$, $p < .001$). No effect of personality differences on creativity was found. Hence, Hypothesis 2a received partial support in this model.

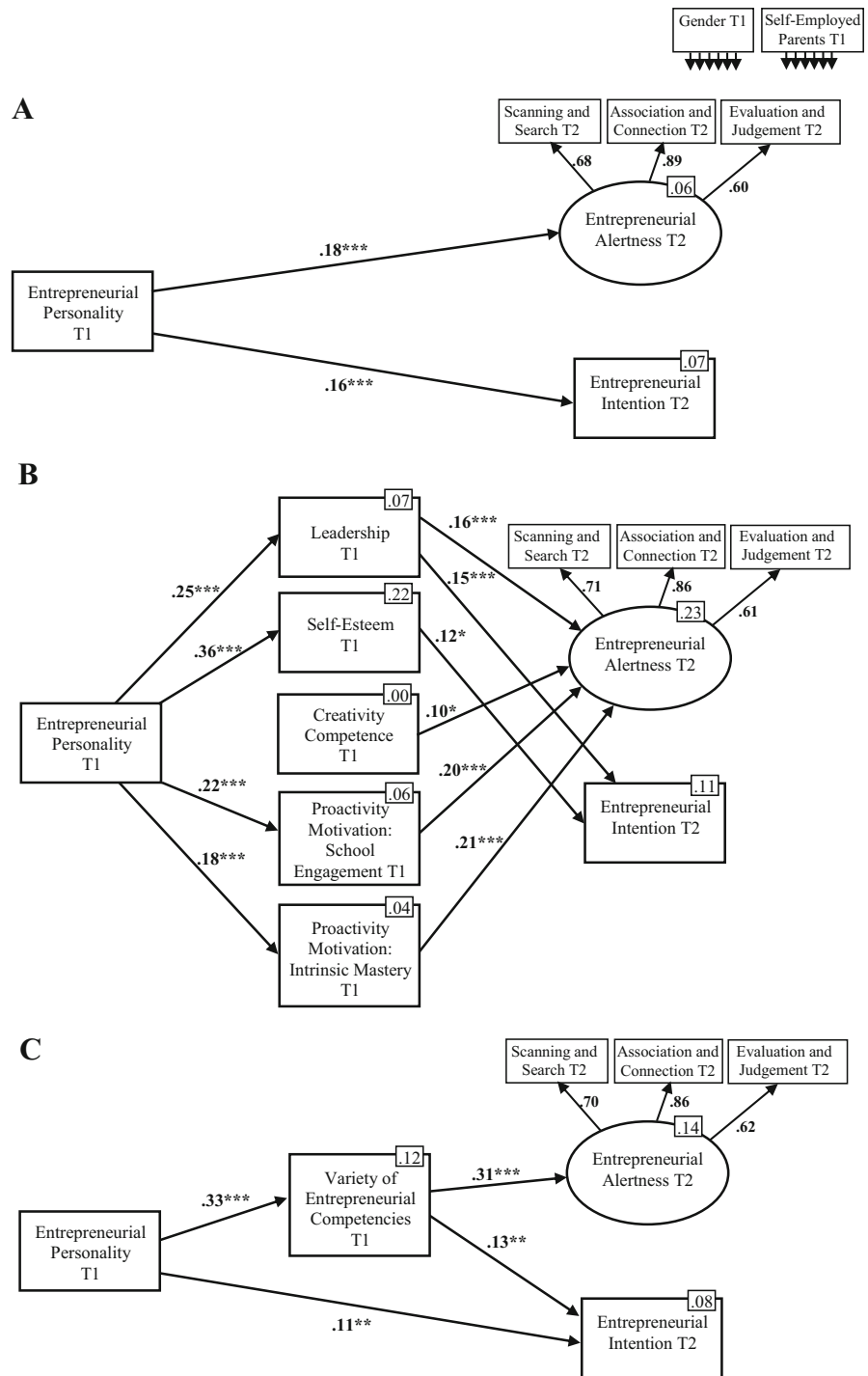
Entrepreneurial alertness was positively predicted by leadership ($\beta = .16$, $p < .001$), creativity ($\beta = .10$, $p < .05$), and proactivity motivation (school engagement: $\beta = .20$, $p < .001$; intrinsic motivation: $\beta = .21$, $p < .001$). Self-esteem showed no effect on entrepreneurial alertness. Entrepreneurial intention was predicted only by leadership ($\beta = .15$, $p < .001$) and self-esteem ($\beta = .12$, $p < .05$). Hypothesis 2b thus also received partial support. The two outcomes, alertness and intention, were again not correlated in this model.

Figure 2C shows the results when the variety of the entrepreneurial competencies index was added as a mediator, instead of the single competencies, as in Fig. 2B. The model fit was somewhat weaker than in the other models but nevertheless acceptable (CFI = .964 and RMSEA = .064; Hu and Bentler 1999). Personality positively predicted the variety index ($\beta = .33$, $p < .001$), which in turn positively predicted entrepreneurial alertness ($\beta = .31$, $p < .001$) and intention ($\beta = .13$, $p < .01$), thereby fully supporting Hypotheses 2a and 2b. In addition, a significant direct effect of personality on entrepreneurial intention remained ($\beta = .11$, $p < .05$). Personality had no effect ($\beta = .08$, ns) on alertness. Finally, the two outcomes again showed no correlation in this model.

The mediation testing is summarized in Table 3. The indirect effect of personality on entrepreneurial alertness in the single competencies model (Fig. 2B) was $\beta = .13$ ($p < .001$), with 95 % confidence intervals of .07–.19. The indirect effect of personality on intention in the single competencies model was $\beta = .07$ ($p < .001$), with 95 % confidence intervals of .03–.12. Hence, Hypothesis 2c, predicting a mediation effect of entrepreneurial competence, received full support.

Likewise, the indirect effects of personality on entrepreneurial alertness and intention also became significant in the mediation model using the variety of competencies index (Fig. 2C) and thus also supported Hypothesis 2c. The indirect effect of personality on entrepreneurial alertness was $\beta = .10$ ($p < .001$), with 95 % confidence intervals of .07–.14. The indirect effect of

Fig. 2 Empirical models ($N = 523$). **a** Direct effects of entrepreneurial personality on entrepreneurial alertness and intention. **b** Mediation model with single competencies as mediators. **c** Mediation model with variety of competencies as mediator. *Note.* Standardized coefficients are given. R^2 is shown in the upper right corner of the dependent variables. All effects are controlled for gender (*f/m*) and self-employed parents (*no/yes*). Only significant effects (and the respective *arrows*) are shown. Correlations between the mediator variables as well as correlations between the two dependent variables were allowed. * $p < .05$; ** $p < .01$; *** $p < .001$



personality on entrepreneurial intention was $.04$ ($p < .01$), with 95 % confidence intervals of $.02-.07$.

Finally, we also tested a mediation model that simultaneously included both the single competencies

and the variety index. As a result, the variety index did not show incremental explanatory power in the prediction of entrepreneurial alertness and intention, above and beyond the effects of the single competencies.

Table 2 Correlations between the variables ($N = 523$)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Entrepreneurial alertness: scanning and search T2	–											
2. Entrepreneurial alertness: association and connection T2	.61***	–										
3. Entrepreneurial alertness: evaluation and judgment T2	.40***	.53***	–									
4. Entrepreneurial intention T2	.07	.11*	.16***	–								
5. Entrepreneurial personality T1	.07	.18***	.16***	.16***	–							
6. Leadership T1	.15***	.20***	.19***	.21***	.25***	–						
7. Self-esteem T1	.10*	.12**	.23***	.19***	.37***	.15***	–					
8. Creative competence T1	.07	.13**	.07	.11*	.01	.14***	–.04	–				
9. Proactivity motivation: school engagement T1	.30***	.28***	.23***	.05	.22***	.07	.25***	.00	–			
10. Proactivity motivation: intrinsic mastery T1	.30***	.30***	.19***	.05	.18***	.11**	.14***	–.00	.61***	–		
11. Variety of entrepreneurial competencies T1	.27***	.26***	.28***	.18***	.33***	.44***	.49***	.19***	.59***	.58***	–	
12. Gender (f/m) T1	.17***	.10*	.11*	.17***	.06	.07	.30***	.05	.06	–.01	.10*	–
13. Self-employed parents (no/yes) T1	.03	–.03	–.04	.13**	–.02	.05	–.02	–.00	.09*	.05	.05	–.03

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

7 Discussion

The changing landscape of work requires a new set of abilities and skills to fully utilize the opportunities and meet the challenges of future careers (Savickas and Porfeli 2012). One such twenty-first century skill is entrepreneurship, which renders the development of the entrepreneurial mind-set in the transition to adulthood an important field of research. The central goal of this longitudinal study was thus to examine entrepreneurial alertness, a key concept in contemporary entrepreneurship research, in the emerging entrepreneurial mind-set. We applied a person-oriented personality approach to entrepreneurship and quantified the effect of an entrepreneurial Big Five profile on entrepreneurial alertness. We further studied age-appropriate early entrepreneurial competencies as mediators between personality and alertness. Finally, we used this mediation model to predict entrepreneurial intention in the transition to adulthood, and to compare the effects on alertness with those on intention.

The first major finding underlines the important role of personality differences in early entrepreneurial development. The entrepreneurial personality profile predicted entrepreneurial alertness and intention, which is consistent with the personality approach to entrepreneurship (Brandstätter 2011), and thus also with a biological perspective (Nicolaou et al. 2008). The present result underscores the notion that basic personality differences are an important factor of the emerging entrepreneurial mind-set during the transition to adulthood. Specifically, entrepreneurial

alertness and intention can both be seen as expressions of the basic personality structure.

The second major finding pertains to the mechanisms behind this personality—entrepreneurial alertness/intention link. Inspired by a competence growth approach that stresses the successive development of work-related competencies with age-appropriate broad competencies as developmental precursors of later, more fine-grained work competencies (“competence begets competence”) (Masten et al. 2010), we focused on relatively broad competencies that are age-appropriate and, at the same time, show a conceptual link to entrepreneurship (Schmitt-Rodermund 2004, 2007).

The data revealed leadership and self-esteem to be mediators in the prediction of entrepreneurial intention, which is consistent with earlier findings (Obschonka et al. 2010; Schmitt-Rodermund 2004, 2007). Interestingly, school motivation and intrinsic mastery in the school context did not predict entrepreneurial intention. This might be explained by recent findings, suggesting that budding entrepreneurs show *mid-level* school motivation during their teenage years (Saw and Schneider 2012). In addition, the effect of personality on alertness was mediated by leadership and proactivity motivation. Creativity competence, measured via creative activities involving the use of new communication and Internet technologies, also predicted entrepreneurial alertness, but had no mediating effect. When comparing the mediation effects, early age-appropriate competencies were particularly powerful mediators in the prediction of alertness. The same picture emerged when using the competence

Table 3 Mediation effects

Relationship	Effect without mediators	Effect with mediators: single competencies	Indirect effect with mediators: single competencies (95 % CI)	Effect with mediator: variety of competencies	Indirect effect with mediator: variety of competencies (95 % CI)
Entrepreneurial personality → entrepreneurial alertness	.18***	.06	.13*** (.07–.19)	.08	.10*** (.07–.14)
Entrepreneurial personality → entrepreneurial intention	.16***	.08	.07*** (.03–.12)	.11**	.04** (.02–.07)

Standardized effects are given. All effects are controlled for gender and self-employed parents. Indirect effects and confidence intervals (95 % CI) were estimated with 2,000 bootstrap resamples

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

variety index as a mediator (the balanced skill approach, Lazear 2005), instead of single competencies. Hence, our study indicates that a focus on age-appropriate early competencies (studied either as single competencies or as a set of competencies) is particularly fruitful in the study of *entrepreneurial alertness* in the transition to adulthood.

While the balanced skill approach delivered significant mediation results, our study nevertheless found *no* indications that such a balanced skill approach is superior to the study of single competencies in our case. Hence, we leave it to future research to delve deeper into this topic and to explore the usefulness of the jack-of-all-trades approach (somebody who is skilled in a great variety of domains) to the study of the emerging entrepreneurial mind-set in the transition to adulthood. We feel, however, that such a balanced skill approach could potentially enrich our understanding of early developmental processes on the path toward an adult entrepreneurial mind-set (Stuetzer et al. 2013; Wagner 2006).

The third finding was that, after controlling for the effect of personality and/or competence factors, entrepreneurial alertness and intention turned out to be rather independent career development constructs. One could interpret this finding as a two-sides-of-the-same-coin phenomenon. Although both alertness and intention may represent manifestations of personality differences, mediated by competence growth processes, both seem to stand for different aspects of the emerging entrepreneurial mind-set. Whereas career intentions concern concrete career planning outside of the current school environment, in the specific case of starting one's own business in adulthood (Fayolle and Liñán 2014; Schoon and Duckworth 2012), entrepreneurial alertness is more a meta-ability relevant for the variety of entrepreneurial activity and innovation behavior, and in general, also for adaptive career development in today's boundaryless careers (Savickas 2002; Tang et al. 2012; Uy et al. 2015). Moreover, early entrepreneurial career intentions might *not* be crucially motivated by entrepreneurial alertness (which could be channeled into very different activities, besides business startup activities), but rather by age-appropriate early entrepreneurial competencies, which is in line with the intention and career choice theories highlighting self-efficacy and the competencies underlying this (Fishbein and Ajzen 2010; Lent et al. 1994).

7.1 Limitations

This study has several limitations. First, we had to base our analyses on the smaller *T2* sample, since there was considerable attrition between the *T1* and *T2* waves. Our analyses revealed (plausible) systematic attrition in that the more motivated students with a higher (intrinsic) motivation to learn were overrepresented in the *T2* sample. Our results on the indirect effects of proactivity motivation could thus be somewhat biased. They were, however, largely in line with those of prior research, as explained above.

The second limitation concerns potential reciprocal effects, which we were unable to investigate owing to our study design. For example, it could be that higher entrepreneurial alertness or intention motivates young people to deliberately develop the age-appropriate early competencies that facilitate the utilization of such alertness and intention. Nevertheless, there are strong theoretical and empirical grounds for favoring the direct effect of early competencies on alertness and intention, as explained earlier.

Finally, our study analyzed a sample of Finnish students. While the results are broadly in line with theories and findings from Western cultures (e.g., USA, Germany, UK), future research should examine potential cross-cultural differences in the early development of the entrepreneurial mind-set.

7.2 Implication for practice and conclusion

The findings have implication for early entrepreneurship education. The development of entrepreneurial skills is now part of the school curriculum in many countries. For example, it was recently introduced into the new national curriculum in Finland, where entrepreneurial skills are now defined as one of the seven core skills required for success in the twenty-first century economy (http://www.oph.fi/download/163777_perusopetuksen_opetussuunnitelman_perusteet_2014.pdf). The present findings provide further empirical evidence for the usefulness of targeting age-appropriate early entrepreneurial competencies in adolescence and the transition to adulthood (Masten et al. 2010). It might not be developmentally appropriate to teach young people (e.g., adolescents) in schools the specific entrepreneurial skills needed for successful business creation during the actual career (e.g., business plans, accounting, product development, etc.); instead, efforts could be

made to instill broad developmental precursors during this critical phase of competence growth. Such early precursors comprise, among others, leadership, self-esteem, proactivity, and creativity (Schmitt-Rodermund 2004, 2007; Obschonka et al. 2010, 2011a). However, future research is needed to clarify the role of school motivation in early entrepreneurial development. Our study, together with earlier findings (Saw and Schneider 2012; Obschonka et al. 2013a), indicates that highly motivated (and potentially conformist) students, who place a heavy emphasis on their academic achievement in school, might not develop a strong personal entrepreneurial motivation. Instead, research indicates that entrepreneurial types show a mid-level school motivation. However, our results also indicate that school motivation is beneficial for entrepreneurial alertness, that is, to openness to, connecting with, and critically evaluating a wide spectrum of new information.

Finally, such early education programs should take into account basic personality differences between students, such as in the entrepreneurial Big Five structure. Consistent with a biological perspective, students differ in their “innate talent” for entrepreneurial alertness and intention, and underlying competencies, and hence, education programs could target, in particular, those scoring lower in entrepreneurial personality (Schröder and Schmitt-Rodermund 2006).

To conclude, this study sheds further light on the development of entrepreneurship in young people, with direct implications for the world of practice. A possible next step in this line of research would be to study the long-term effects of early entrepreneurial alertness, for example, with respect not only to successful enterprising behavior in adulthood but also to innovation behavior and adaptive and successful career development in general (e.g., as indicated by extrinsic and intrinsic career success in adulthood). However, such future research endeavors should also consider the role and effect of the personality differences that are likely to channel the individual career not only in the transition to adulthood but also throughout working life.

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