



Personality aspects of entrepreneurship: A look at five meta-analyses

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ABSTRACT

Research on personality aspects of entrepreneurship, recently summarized in five meta-analyses, has intensified during the past two decades. Internationally, entrepreneurship has been recognized as highly important for socio-economic prosperity. After discussing a few basic concepts relating task and context of entrepreneurship to personality characteristics the main results of the meta-analyses are reported. In the system of the Big Five, personality traits make a difference when entrepreneurs are compared with managers (C+, O+, E+, N–, A–). They are also relevant in predicting entrepreneurial intention (C+, O+, N–, E+) and entrepreneurs' performance (C+, O+, E+, N–). For other more specific scales that have frequently enough been used and could therefore be included in meta-analyses (e.g., readiness for innovation, proactive personality, generalized self-efficacy, stress tolerance, need for autonomy, locus of control) have also been reported significant correlations with business creation and business success. Risk propensity supports business foundation, but not necessarily business success. Achievement motivation is favourable both for business foundation and business success. The effect sizes are mostly small, some moderate. Complementing the results of the meta-analyses, some recent single studies on mediator or moderator effects are briefly reviewed.

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1. Introduction

During the past two decades entrepreneurship has become a very active field of research in various social science disciplines and a prominent concern of economic policy. Adaptation of economic systems to changing conditions, innovation of products and services, creation of jobs, and economic growth is assumed to be very much dependent on the readiness and willingness of people to start an independent privately owned business and on the founders' skills and efforts to run it successfully (cf. Böheim, Stiglbauer, & Winter-Ebmer, 2009; Erken, Donselaar, & Thurik, 2008; Van Praag & Versloot, 2007). This is particularly true in the field of new technology where entrepreneurial activities demand a high level of knowledge in applying research and development (R & D) and high creativity in taking advantage of market niches.

Decades after Schumpeter (1912/1988) convincingly pointed to the importance of the entrepreneur for economic development, looking for personality traits uniquely characteristic of entrepreneurs was occasionally the topic of research, albeit one with rather modest success. Consequently, in the 1970s and 1980s the personality approach to studying entrepreneurial behaviour was discredited (e.g., Gartner, 1989). However, it gained new momentum in the 1990s, which according to Zhao and Seibert (2006) probably reflected the increasing acceptance of the unifying five-factor model

(FFM) of personality and meta-analysis as technique for aggregating and generalizing the results of many single studies. Concurrently, the interest in, and appreciation of, the psychological sub-discipline of personality research has very much changed for the better.

Most of the studies published during the past two decades have already been reviewed in previous meta-analyses (Rauch & Frese, 2007; Stewart & Roth, 2001; Zhao & Seibert, 2006; Zhao, Seibert, & Lumpkin, 2010, on personality including risk propensity; Collins, Hanges, & Locke, 2004; Stewart & Roth, 2007, on achievement motivation). Thus, the present paper focuses on these meta-analyses in a form of intuitive meta-synthesis (Sipe & Curlette, 1997) as an attempt to integrate their results in the light of the FFM as reference system for personality traits. Single studies will be reviewed only when their design or their results are of special interest – this will be because they reveal mediator and/or moderator effects in the influence of personality traits on entrepreneurial behaviour that are not frequently enough encountered and are, therefore, not reported as average effects in meta-analyses.

Meta-analyses are commonly designed not to test hypotheses but to explore a field of research for congruence or heterogeneity of the results of many single studies reported in the literature. Therefore, it seems neither necessary nor reasonable to explicate in advance theoretical expectations about the effects of personality traits on entrepreneurial behaviour. Theoretical implications and interpretations of the results of the meta-analyses will be discussed later.

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That personality has some influence at all should be evident from basic characteristics of the entrepreneurial role: initiating a life of self-determination and independence (Emotional Stability), finding new opportunities and ways of structuring and developing the enterprise (Openness to experience), hard working and persistent in goal striving (achievement motivation component of Conscientiousness), establishing a social network (Extraversion), and taking the risk of failure (risk propensity, possibly a combination of Emotional Stability, Openness, and Extraversion).

After clarifying definitions of entrepreneurship and personality traits each of five meta-analyses are reported with their main results, summarized, integrated, and complemented by exemplary studies of mediating and moderating effects. This should contribute to a base of knowledge from which future research can start thinking about unresolved problems, necessary changes in research strategies, and promising theoretical and methodological approaches.

2. Some preliminary reflections

2.1. Definitions

2.1.1. The concept of entrepreneurship

Eckhardt and Shane (2003, p. 336) define entrepreneurship “... as the discovery, evaluation, and exploitation of future goods and services ... [by] ... creation or identification of new ends and means previously undetected or unutilized by market participants”. In this perspective, entrepreneurship could be an attribute of managers as well as of business founders, and founding a small private enterprise may not be an entrepreneurial activity *per se*, but only if it is clearly characterized by novelty and creativity. Because such a definition of entrepreneurship, though particularly relevant in the field of new technologies, would exclude quite a number of studies reviewed by extant meta-analyses, and because it would blur the distinction between managers and entrepreneurs, it is not adopted for the present review. The meta-analyses reported here deal with personality aspects of (a) founding a small privately owned business and/or (b) running it successfully as owner in the early stages of the enterprise.

2.1.2. The concept of personality traits

The concepts of personality and personality traits both in psychological research and in common sense understanding are rather fuzzy. In a broad sense, personality traits include abilities (e.g., general intelligence as well as numerical, verbal, spatial, or emotional intelligence), motives (e.g., need for achievement, power, or affiliation), attitudes (including values), and characteristics of temperament as overarching style of a person's experiences and actions (Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, called the Big Five with the acronym OCEAN).

Personality traits may be conceived of as descriptions of a person's mean level of her/his states (of Agreeableness, Openness, etc.) varying across circumstances and events, partly haphazardly encountered, partly deliberately chosen or provoked by the person (Fleeson, 2001). Correlating personality measures with entrepreneurial behaviour (foundation decision) and behaviour results (success of the enterprise) should be straightforward. The rather simple question would be whether people who describe themselves, for instance, as open to new experience will more often establish a private business than people low on Openness. Or we might expect that people high on Conscientiousness will be more successful with their recently founded small business than people low on Conscientiousness. Nothing is said about the mental and behavioural processes by which these traits influence start-up

decisions and entrepreneurial success. Obviously, a purely descriptive notion of traits would be of limited usefulness in personality research.

Going beyond description, one may conceptualize personality traits as complex, genetically co-determined psycho-physiological structures (for genetic influences on entrepreneurial activity, see Nicolaou & Shane, 2009) which originate and regulate the individual ways of experience and action. In this sense, adopted by the author of the present paper, traits are viewed as *causes* of mental and behavioural processes (John, Naumann, & Soto, 2008). Experimental research on individual differences and field studies, including measures of experiential (cognitive and affective) or psycho-physiological process measures, would have to rely on this theoretically richer notion of personality traits. Of course, the measures of the traits are usually based on descriptions of how people think, feel, and act in a variety of situations, but these reports are conceived of as indicators of real internal causes (interacting with the external causes) of a person's experiences and actions. Thus, the intention of establishing a private business is not part of the definition of the trait Openness, but an effect of this trait.

2.2. Five-factor model of personality traits

Since the 1980s, the FFM is the predominant reference system of personality traits (Costa & McCrae, 1992; Digman, 1990; Goldberg, 1990; John et al., 2008). Increasingly, research on personality of entrepreneurs, too, is based on FFM. Nevertheless, not all personality aspects can be located in the Big Five system, as shown by, for instance, Paunonen and Jackson (2000) and Ashton et al. (2004).

2.2.1. FFM and other personality traits

Some of the rather global personality constructs outside of FFM are rooted in specific theories (e.g., locus of control, self-efficacy, state vs. action orientation, regulatory focus) and have been applied now and then in entrepreneurial research where also specific purpose scales like entrepreneurial orientation (Rauch, Wiklund, Lumpkin, & Frese, 2009), proactive personality (Crant, 1996; Fuller & Marler, 2009), or entrepreneurial self-efficacy (Cassar & Friedman, 2009; Townsend, Busenitz, & Arthurs, 2010) are found. More often measures of need for achievement, internal locus of control, risk-taking propensity, and personal initiative (see for example Korunka, Frank, Lueger, & Mugler, 2003) have been used. Some of these personality constructs proved to be weighted composites of the Big Five (cf. Brandstätter, 2009; Crant, 1996; Zibarras, Port, & Woods, 2008).

2.2.2. FFM and motivational constructs

Although ‘dynamic traits’ (Cattell, 1965) are different from personality traits in the narrow sense, there are relationships between the two kinds of traits worthy of consideration. Bipp, Steinmayr, and Spinath (2008) show, for instance, that various aspects of achievement motivation as revealed in the prevalence of learning goals, performance approach goals, performance avoidance goals, and work avoidance goals correlate with the facets and global scales of the Big Five just as one would expect. Particularly high are the correlations between Openness and learning goals ($r = .40$), Neuroticism and performance avoidance goals ($r = .45$), and Conscientiousness and work avoidance goals ($r = -.30$). Another example of the relationship between Big Five and measures of achievement motivation is given by Heggstad and Kanfer (2000). Thus, it seems justified to deal with the Big Five and motives in the same vein, although they are kept apart in most empirical studies and in meta-analyses.

3. Meta-analysis results of entrepreneurship research on personality (1990–2010)

3.1. Risk propensity of entrepreneurs and managers (Stewart & Roth, 2001)

The first in the series of meta-analyses on entrepreneurs' personality traits performed during the last 10 years is that of Stewart and Roth (2001), which included 12 studies (six using the risk scale of the Jackson Personality Inventory, four the Choice Dilemmas Questionnaire, two some other scales). They compared risk propensity between entrepreneurs and managers. Contrasting entrepreneurs with managers makes sense if other conditions such as gender, education level, professional experience, type of industry, and number of employees reporting to the entrepreneur or manager, respectively, are at least roughly kept equal. It is assumed (a) that jobs characterized by specific demands and opportunities attract people characterized by specific talents, motives, and personality traits; (b) that starting a professional career is co-determined by others' (employers' or venture capitalists') judgements about the aptitudes and motives (goals) of an applicant or aspiring entrepreneur; (c) that those stay in the occupational group whose performance positively impresses their employers or – in the case of entrepreneurs – the business partners, and those who find their professional situation more rewarding than alternative positions (cf. the attraction – selection – attrition model of Schneider, 1987).

Based on 14 independent samples of 12 studies with about 3000 participants, the effect size of risk propensity (corrected for reliability) amounts to $d' = .36$ (entrepreneurs' minus managers' mean risk propensity scores divided by pooled standard deviations). The authors looked at possible differences in effect sizes (a) between types of measurement (Kogan–Wallach Choice Dilemma Questionnaire and the Risk-Taking Scale of the Jackson Personality Inventory [JPI]; see Mandrik, 2005, for problems with risk measures) and (b) between 'growth-oriented entrepreneurs' and 'income-oriented entrepreneurs'. The effect sizes were higher for JPI-risk-taking scale and for growth oriented entrepreneurs.

By including 13 additional studies in a complementary meta-analysis on differences in risk propensity between entrepreneurs and managers, Miner and Raju (2004) arrived at lower effect sizes. However, responding to this critique, Stewart and Roth (2004) convincingly pointed to problematic criteria by which Miner and Raju categorized participants as entrepreneurs or managers, respectively. Moreover, according to Stewart and Roth (2004) the Miner Sentence Completion Scale-Form T (risk avoidance subscale), used in all studies included in the meta-analysis of Miner and Raju (2004), seems to measure risk perception rather than risk propensity and that there are indications of a substantial negative correlation between these two constructs: people underestimating the riskiness of decisions tend to risky actions. Stewart and Roth (2004), supplementing their original meta-analysis (Stewart & Roth, 2001) with five studies of Miner and Raju (2004) – these authors criticized Stewart and Roth (2001) for overestimating the effects of risk propensity – that met their original selection criteria, provided evidence for differences in effect sizes between 'objective' measures of risk propensity (mean $d = .31$) and 'projective' measures of risk perception (mean $d = -.35$).

3.2. Entrepreneurs' vs. managers' Big Five (Zhao & Seibert, 2006)

These authors use the Big Five as reference system for their meta-analysis. They subsume a personality scale under one of the Big Five according to empirical evidence found in the literature. A study was selected for the meta-analysis under the condition

that the trait correlated primarily and substantially with only one of the Big Five. Contrasting entrepreneurs with managers should most clearly make visible those characteristics of entrepreneurs that promote independent strategic decision making under risk and strong competition. They are assumed to be crucial for the survival and growth of the private enterprise as well as for the family income. About the definition of entrepreneurs and managers Zhao and Seibert (2006, pp. 262/263) say:

“We ... defined an entrepreneur as someone who is the founder, owner, and manager of a small business and whose principal purpose is growth ... We take a relatively broad definitional approach and include managers of all ranks and functions”.

For cross-cultural comparisons, the countries were classified as low or high in uncertainty avoidance and low or high in performance orientation according to the data provided by the project GLOBE (House, Hanges, Javidan, Dorfman, & Gupta, 2004). After thorough and careful screening of the English language literature 23 independent studies (out of a preliminary number of 47 studies from a variety of countries) met the selection criteria for meta-analysis.

Based on an intuitive understanding of the Big Five personality traits and of the personality implications of entrepreneurial tasks, complemented by some references to empirical studies, Zhao and Seibert (2006) assumed that entrepreneurs would have higher scores on Conscientiousness, Openness to Experience, and Extraversion, but lower scores on Agreeableness and Neuroticism.

The averages of effect sizes (entrepreneurs minus managers) d' , corrected for reliabilities of the measures, are $-.37$ (Neuroticism), $.22$ (Extraversion; not significant), $.36$ (Openness), $-.16$ (Agreeableness), and $.45$ (Conscientiousness), just as expected. The effect sizes for two components of Conscientiousness, identified by expert judgements, are $.59$ (achievement motivation) and $.01$ (dependability).

As moderators of the effects of Neuroticism and achievement motivation in distinguishing entrepreneurs from managers, the two culture dimensions, that is, uncertainty avoidance (“the extent to which a society relies on norms, rules, and procedures to alleviate the stress associated with unpredictability in future events”) and performance orientation (“the degree to which a society encourages and rewards performance improvement and high standards of excellence”) were taken into account (p. 262).

It was expected that national cultures characterized by high uncertainty avoidance would show larger differences in Neuroticism between entrepreneurs and managers (the latter with higher scores). An argument is that people would manifest more easily behaviour that is congruent with culture. However, this would imply that we find more often neurotic behaviour in societies characterized by uncertainty avoidance. How that should lead to a larger difference in Neuroticism between entrepreneurs and managers in societies of high uncertainty avoidance is not quite clear.

A plausible assumption could be that the percentage of people courageous enough to start their own business venture would be lower in societies characterized by high uncertainty avoidance (than in low uncertainty avoidance countries), but there are no data for testing this hypothesis. The OECD report on entrepreneurship (OECD, 2009) could provide the necessary information. However, even if there were such culture dependent differences, they would not imply larger effect sizes of Neuroticism in comparing entrepreneurs with managers.

In favour of the moderator hypothesis, however, one could argue (not argued by the authors in this way) that in a climate of high uncertainty avoidance only persons with particularly high Emotional Stability (Neuroticism reversed) would become entrepreneurs whereas for managers a higher level of Neuroticism would

be a minor hindrance in performing their roles. From this perspective the moderator hypothesis may look plausible.

In respect of performance orientation as cultural dimension one could say (not said by Zhao and Seibert (2006)) that entrepreneurs are more susceptible to the cultural influence of high performance orientation than managers. This could enlarge the positive difference in achievement motivation between entrepreneurs and managers (particularly high achievement motivation of entrepreneurs in societies characterized by high performance orientation). Actually, the authors report effect size differences in the predicted direction, more so for uncertainty avoidance than for performance orientation, but the confidence intervals overlap which means that the differences are not significant ($p > .05$).

In addition to the two culture dimensions, the authors looked at the type of personality measures (questionnaire vs. projective techniques) of achievement motivation and dependability (the two facets of Conscientiousness) as possible moderator of the personality effects. For achievement motivation both types of measures resulted in moderate effect sizes ($d' = .54$ for projective and $d' = .61$ for questionnaire measures). A moderator effect was found for dependability: the projective measure gives a significant effect of $d' = .22$ whereas the questionnaire measure came up with an insignificant negative effect. The two confidence intervals do not overlap suggesting that the moderator effect is significant ($p < .05$). As one can see again, specific personality constructs may have some merits beyond those of the global personality constructs.

3.3. Specific personality traits predict business creation and success (Rauch & Frese, 2007)

The meta-analysis of Rauch and Frese (2007) comprises 116 independent samples from 104 articles. It differs from Zhao and Seibert (2006) by (a) using not only entrepreneurial status (entrepreneurs vs. managers), but also business success as criteria in estimating the validity of selected personality scales; (b) using Pearson correlation coefficients r as effect sizes; and (c) accepting the 51 different labels of the personality constructs used by the authors of the single studies without an attempt to locate them in the Big Five system. Thus, scales based on FFM are mixed with scales rooted in specific theories (like self-efficacy, delay of gratification, goal orientation, proactive personality) or scales characterizing experience and behaviour in specific classes of situations (like stress tolerance, innovativeness, passion for work).

Assuming that traits judged as particularly relevant for entrepreneurs would come up with larger effects, 10 experts rated the importance of the traits for entrepreneurs on a five-point scale (very unimportant to very important). Such a scale, however, seems to be problematic with traits that have negative connotations like rigidity, dogmatism, or shyness and traits that are perceived as dysfunctional for entrepreneurs like conservatism or norm orientation. The rating category 'very unimportant', applied to negative traits, would imply rather high negative correlations with business creation and business success, but these traits were categorized as non-matching (Table 2 of Rauch & Frese, 2007).

Business creation was coded as dummy variable (1 = entrepreneur, 0 = managers or some other comparison groups). Business success was measured partly by key informant ratings of success and satisfaction, partly by financial outcomes and firm growth. The effect sizes were commonly higher with ratings, possibly as a result of common method.

As average of N -weighted r coefficients across all personality scales and studies, corrected for reliability of predictors and success criteria, is reported: $r = .19$ for business creation and $r = .20$ for business success. It was expected and found that traits judged as important or very important correlated on average significantly

higher ($p < .01$) with business creation and business success ($r = .25$ and $r = .25$) than traits rated as unimportant ($r = .13$ and $r = .03$). The difference between important and unimportant traits could be, at least in part, a consequence of the above mentioned scaling problem.

In subsets of studies the effect sizes (for business creation and business success) of those eight traits were analyzed that both were judged as important and were frequently enough studied that it was justified to compute average effect sizes. These are: need for achievement (.22, .30), innovativeness (.24, .27), proactive personality (.27, available for success only), generalized self-efficacy (.38, .25), stress tolerance (.10, .20), need for autonomy (.31, .16), locus of control (.19, .13), and risk-taking (.10, .10).

Most (i.e., 16 out of 19) of the studies analyzed by Zhao and Seibert (2006) were also part of the studies analyzed by Rauch and Frese (2007). Zhao and Seibert (2006) had applied a stricter selection criterion for contrasting entrepreneurs with managers than Rauch and Frese (2007). Because the studies of Zhao and Seibert (2006) overlap with those of Rauch and Frese (2007) it is not surprising that these meta-analyses arrive at similar conclusions. Together the two meta-analyses suggest that founding a business and running it successfully is supported by the same personality traits.

3.4. Entrepreneurial intention and performance – Big Five (Zhao et al., 2010)

The most recent meta-analysis complements that of Zhao and Seibert (2006) by focussing (a) on the intention to found a business, and (b) on entrepreneurial firm performance, again with FFM as reference system, supplemented by risk propensity as personality trait that cannot be equated with only one of the Big Five. There is no overlap of studies between Zhao and Seibert (2006) and Zhao et al. (2010), whereas many of the studies in Rauch and Frese (2007) are not only found in Zhao and Seibert (2006) but also in Zhao et al. (2010). A study focussing on a specific personality scale was selected by Zhao et al. (2010) for their meta-analysis only if there were empirically established links between this scale and predominantly one of the Big Five.

Entrepreneur is again defined as the founder, who also owns and manages his small business. The authors distinguish profitability/operational effectiveness and firm growth as the two global categories of performance measures with two subcategories of the first one: (1) profitability (financial indicators such as sales revenue, profit, liquidity, return on investment, and return on assets) and (2) operational effectiveness (firm size [number of employees], productivity [output per man hour], firm survival, and subjective ratings of overall performance). Obviously, these two types of success criteria are quite heterogeneous. They were subsumed under the global category profitability/operational effectiveness for the meta-analysis in order to arrive at a sufficient number of studies for testing moderator effects. The second global category is firm growth (i.e., relative change in profitability and operational effectiveness over time). Profitability/operational effectiveness combined with relative change form the overarching category 'performance'.

By relating intuitively the content of personality constructs to the entrepreneurial tasks, and taking into account what other authors thought about the roles of entrepreneurs and the relevance of personality traits, it was predicted that the meta-analysis would come up with positive effects of Conscientiousness, Openness to Experience, Emotional Stability (Neuroticism reversed), and Extraversion on both intention and performance, whereas Agreeableness was expected to have negative effects on intention and performance. Risk propensity should have positive effects on intention and negative effects on performance. The meta-analysis confirmed all hypotheses that actually cannot be understood in

the strict sense of *a priori* theoretical reflections, because they seem to be based, at least in part, on knowledge of previous research much of which was the object of the meta-analysis.

Risk propensity is the only personality trait where the correlations with intentions and performance were significantly different. It is a good predictor of intentions, but irrelevant for performance.

3.5. Achievement motivation of entrepreneurs (Stewart & Roth, 2007)

There are two meta-analyses on achievement motivation (Collins et al., 2004; Stewart & Roth, 2007). Because the second meta-analysis defines ‘entrepreneur’ and ‘manager’ in a psychologically more meaningful and precise way and shares a larger part of studies with the first (10 out of 18), the second is used as main source here. Based on the data of 18 studies (about 3000 participants), Stewart and Roth (2007) compared achievement motivation of entrepreneurs (i.e., someone who independently owns and actively manages a small business) with that of managers. Achievement motivation was measured partly by questionnaires, partly by projective techniques. The *N*-weighted average effect size is $d = .35$ in favour of the entrepreneurs. The effect size of the seven US studies is $d = .20$, that of all others ($n = 11$) is $d = .54^*$ (* means that the 90% confidence interval does not include zero). The authors assumed that outside the USA the entrepreneurial climate is less favourable. Thus, for becoming an entrepreneur one has to have more of the ‘entrepreneurial traits’. As to measurement type (questionnaires vs. projective tests) no consistent differences were found. Contrasting a subgroup of entrepreneurs (the founders) with the managers, the effect size rises to $d = .64^*$. Moreover, growth oriented owners differ from income oriented owners by $d = .67^*$. One can see that with rising demands on initiative and self-directed formation of the environment achievement motivation is becoming increasingly important.

4. Summarizing and integrating the results of the five meta-analyses

Most attention has been attracted by temperament traits (or personality traits in the narrow sense), as represented by the five-factor model, or by traits that can be located within the FFM-system as equivalent to one of the five factors (Zhao & Seibert, 2006; Zhao et al., 2010), or as equivalent to a weighted composite of several FFM-dimensions. Examples of the latter are proactive personality and innovativeness among the traits dealt with in the meta-analysis of Rauch and Frese (2007). Though motives (like need for achievement, affiliation, or power), values, and attitudes are not independent of temperament traits (Cattell, 1965; Olver & Mooradian, 2003; Roberts & Robins, 2000), they are theoretically and empirically distinct individual dispositions with different causes and effects that may be relevant in different situations and in different time perspectives.

4.1. Risk propensity

The meta-analysis of risk propensity (Stewart & Roth, 2001) and its extension by Stewart and Roth (2004), in response to the criticism of Miner and Raju (2004), provides clear empirical evidence that entrepreneurs are more risk prone than managers and that growth oriented entrepreneurs are more risk prone than income oriented entrepreneurs. More than managers, entrepreneurs have to cope with situations that are unstructured and uncertain about the outcome of decisions and, therefore, more problematic for risk averse than for risk prone people. However, according to Zhao et al. (2010) only entrepreneurial intention, not entrepreneurial performance, is (positively) related to risk propensity. Running a new

enterprise successfully demands careful and prudent decision making. It reminds one of McClelland’s (1965) idea that entrepreneurs, in particular successful entrepreneurs, have high scores on achievement motivation, characterized by hope for success rather than by fear of failure, with a preference for moderate risks as condition of entrepreneurial success.

Zhao et al. (2010), focussing on entrepreneurial intentions and performance, and Stewart and Roth (2001), comparing entrepreneurs with managers, refer to risk propensity in different studies and with different dependent variables. Nevertheless, both meta-analyses agree on the importance of risk propensity in the context of entrepreneurship.

There is still some debate about the best way to measure risk propensity (Miner & Raju, 2004; Stewart & Roth, 2004). Relating measures of risk propensity to the Big Five dimensions as reference system helps clarifying their construct validity. An example is given by Nicholson, Soane, Fenton-O’Creedy, and Willman (2005) who assessed risk propensity by asking people how often they have shown risky behaviour in six areas of life (recreation, health, career, finance, safety and social risk-taking), resulting in a risk measure that seems more similar to the Jackson Personality Inventory (JPI) risk scale than to Choice Dilemma Questionnaire or Miner’s risk avoidance scale. With positive beta-coefficients of Extraversion (.26) and Openness (.36), and negative beta-coefficients of Neuroticism (–.18), Agreeableness (–.31), and Conscientiousness (–.20) 41% of the variance of their risk propensity measure is explained. The negative coefficient of Conscientiousness is a hint of possible detrimental effects on business success when risk propensity is very high. Presumably, not only risk propensity, but also many of other specific (special purpose) personality scales can be reconstructed as weighted composites of the Big Five (cf. Brandstätter, 2009).

4.2. Achievement motivation

The studies selected by Zhao et al. (2010) – these authors look at achievement motivation as a component of Conscientiousness – and those selected by Stewart and Roth (2007) show no overlap. Only one article that explicitly deals with personality traits (in the narrow sense) and achievement motives of entrepreneurs is found in both meta-analyses. Obviously, these two areas of research are unduly separated.

Stewart and Roth (2007) clearly confirm achievement motivation as a prominent characteristic of entrepreneurs, in particular of entrepreneurs who are the founders of their business and who are oriented toward growth of their enterprise. Zhao and Seibert (2006), analyzing a different set of studies and differentiating achievement motivation and dependability as components of the global dimension Conscientiousness, report a large superiority of entrepreneurs (compared to managers) in achievement motivation. No difference was found in dependability.

As in any correlation or group comparison study, causal inferences are more or less problematic. People who have founded a business (for whatever reason) might *post hoc* conclude from this very fact that they must be particularly achievement motivated, otherwise they would not have acted in this way. Logically, such an interpretation cannot be excluded, although this causal path seems much less plausible than the other way around. Properly designed longitudinal studies could better clarify this issue (see Escher et al., 2002; McClelland, 1965; Rauch & Frese, 2000). Longitudinal studies focussing on the personality–entrepreneurship link are still rather rare.

4.3. More about entrepreneurs’ motives

Focussing primarily on achievement motivation as the driving force behind entrepreneurial activities goes back to McClelland

(1965). However, it would be a mistake to gauge the real importance of an explanatory variable simply according to a frequency count of articles focussing on that variable. Meta-analyses could even reinforce such a problematic conclusion because it tends to include only frequently performed research. Thus, the effects of subcategories of the achievement motive (e.g., hope for success vs. fear of failure or approach vs. avoidance goals), although theoretically and practically important, may be missed in meta-analyses. Other motivational constructs like need for autonomy (Ryan & Deci, 2000) may be important, too. Moreover, limiting the attention to traits that distinguish entrepreneurs from managers, and not taking into account what they may have in common (cf. Holland, 1997, for ‘enterprising occupations’), could forfeit a thorough understanding of the person by environment interaction in the field of entrepreneurship.

Starting with McClelland, Koestner, and Weinberger (1989), differences in antecedent conditions and consequences of implicit (sub-conscious) vs. explicit (reflected) motives (reflected as component of the self-concept) are discussed with steadily increasing intensity (Brunstein, 2008). One can expect that differences between implicit and explicit motives will be more important in future entrepreneurial research.

4.4. Big Five

Having summarized first the meta-analysis results of risk propensity and achievement motivation with some peripheral connections to the Big Five, now the focus is on the contribution of the Big Five (in the sequence of OCEAN) to a better understanding of the entrepreneurial behaviour. Each paragraph begins with a short definition of the trait construct quoted from John et al. (2008, p. 138).

4.4.1. Openness to experience

“... describes the breadth, depth, originality, and complexity of an individual’s *mental and experiential life*”. According to Zhao and Seibert (2006) entrepreneurs have substantially higher scores on Openness than managers. Zhao et al. (2010) report higher correlations of Openness with intention and performance than for the other Big Five dimensions. One can see some affinity to innovativeness for which Rauch and Frese (2007) report positive effects on business creation and business success. Correlations between Big Five scales and cognitive styles, reported by Zang and Huang (2001), are fully compatible with the link between innovativeness and Openness.

4.4.2. Conscientiousness

“... describes *socially prescribed impulse control* that facilitates task- and goal-directed behaviour, such as thinking before acting, delaying gratification, following norms and rules, and planning, organizing, and prioritizing tasks”. Conscientiousness is reported by Zhao and Seibert (2006) as one of the Big Five dimensions where entrepreneurs are superior to managers. Looking at two facets of Conscientiousness (i.e., achievement motivation and dependability), only achievement motivation differentiated entrepreneurs from managers. Obviously, it can make sense to look for lower level components (facets) of well established global dimensions. For Conscientiousness as global trait (without distinction of facets) Zhao et al. (2010) report a positive correlation both with intention to become an entrepreneur and with entrepreneurial performance.

4.4.3. Extraversion

“... implies an *energetic approach* toward the social and material world and includes traits such as sociability, activity, assertiveness, and positive emotionality”.

Entrepreneurs are somewhat more extraverted than managers (Zhao & Seibert, 2006) and Extraversion shows weak but signifi-

cant correlations with intentions (of setting up a business) and business performance (Zhao et al., 2010). One could think of a certain affinity between Extraversion and proactive personality (i.e., initiating actions on opportunities, shaping the environment according to one’s goals and being persistent in goal striving) for which Rauch and Frese (2007) report higher scores for entrepreneurs than for managers. There is indeed a substantial correlation between proactive personality and the assertiveness and activity facet of Extraversion (Major, Turner, & Fletcher, 2006), but also with facets of Openness (actions, ideas, values), Conscientiousness (achievement striving, but not dutifulness), and Neuroticism (vulnerability, negative correlation). Obviously, the proactive personality scale (Crant, 1996) is like innovativeness (Zibarras et al., 2008) a specific purpose scale encompassing various components that are not necessarily correlated.

4.4.4. Agreeableness

“... contrasts a *prosocial and communal orientation* toward others with antagonism and includes traits such as altruism, tender-mindedness, trust, and modesty”.

Entrepreneurs have lower scores in this dimension than managers (Zhao & Seibert, 2006) while Zhao et al. (2010) found no significant correlation between Agreeableness and intentions (of setting up a business) or business performance. Only in the context of a special mode of multiple regression analysis (adapted for meta-analyses) low significant negative beta-coefficients were found for both dependent variables. Support of rather negative effects of Agreeableness can be seen in the positive effects of need for autonomy on business creation and (to a lesser degree) on business success reported by Rauch and Frese (2007), since Koestner and Lossier (1996) provided evidence for a strong negative correlation between need for autonomy (i.e., to act independently of others or of social values and expectations) and Agreeableness show.

4.4.5. Neuroticism

“... contrasts Emotional Stability and even-temperedness with *negative emotionality*, such as feeling anxious, nervous, sad, and tense”. Zhao and Seibert (2006) report for entrepreneurs lower scores on Neuroticism than for managers and Zhao et al. (2010) report negative effects of Neuroticism both on intention to establish a private business and on performance. This corresponds to the effects of those personality scales, reported by Rauch and Frese (2007), whose labels suggest a certain affinity to Emotional Stability (reverse of Neuroticism), i.e., generalized self-efficacy, stress tolerance, and locus of control (for empirical evidence of this affinity see Hartman & Betz, 2007; Judge, Erez, Bono, & Thoresen, 2002).

5. Beyond meta-analyses

5.1. Variables mediating the personality trait effects

Whereas the meta-analysis approach is quite efficient in detecting, summarizing, and reporting personality main effects, it is less apt in dealing with mediating and moderating effects, mainly because the number of studies reporting such effects is often not large enough to allow a reliable estimation of means and error variances of the effects across studies. It seems, therefore, advisable to pay special attention to some single studies that report theoretically interesting and practically relevant mediator and moderator effects.

An example of the role of mediator variables in a complex design is a study by Göbel and Frese (1999) who correlate self-reports on 29 specific personality traits, four human capital variables, and 13 entrepreneurial strategies (the latter as mediating variables) with self-reported success (composed of business size, growth,

entrepreneur's job satisfaction, and income) in a heterogeneous sample of German small business entrepreneurs.

Marcati, Guido, and Peluso (2008) show that the influence of general innovativeness (GI) on the intention to adopt innovations (as proxy for actual innovative behaviour in one's firm) is completely mediated by domain specific innovativeness (SI). In addition, they correlated GI and SI to measures of the Big Five ($n = 188$ entrepreneurs of small and medium sized firms of various industries) with the following results: $O (.41; .38)$, $C (-.51; -.21)$, $E (.24; .39)$, $A (-.38; -.34)$, and $N (.22; -.07)$. It would have been interesting to see how the Big Five influence (indirectly and directly) the intention to adopt innovations, but this information is not given by the authors.

How the effects of entrepreneurial orientation (with the components of innovativeness, risk-taking, proactiveness, competitive aggressiveness, and autonomy) on performance (efficiency, growth, and profit) of newly founded firms in Taiwan is mediated by knowledge creation processes (ways of sharing individual knowledge and optimizing its use in solving of organizational problems) is reported by Li, Huang, and Tsai (2009).

5.2. Variables moderating the personality trait effects

Intentions to found a private business can be conceived of as an additive effect of perceived desirability (attitude to ownership) and perceived feasibility (entrepreneurial self-efficacy). However, Fitzsimmons and Douglas (2010), controlling for some other variables possibly influencing entrepreneurial intentions, found in a sample of about 400 MBA students from a variety of countries (Australia, China, India or Thailand) a (multiplicative) interaction effect of desirability and feasibility: there were main effects of perceived desirability ($\beta = .36$) and perceived feasibility ($\beta = .30$) complemented by a negative interaction effect desirability \times feasibility ($\beta = -.16$), all coefficients being highly significant ($p < .001$). People high on desirability form intentions, even if the perceived feasibility is low, whereas people with low desirability tend to abstain from intentions only when feasibility is low, too. The authors classify entrepreneurs according to their pattern of perceived desirability and perceived feasibility.

Ensley, Pearce, and Hmieleski (2006) found that transformational leadership of entrepreneurs was particularly effective (in

terms of business success) with dynamic, fast changing environments, whereas transactional leadership turned out to be particularly unfavourable in such an environment.

Hmieleski and Baron (2008) present an example of three-way interaction of entrepreneurial self-efficacy \times dispositional optimism \times environmental dynamism on firm performance (revenue growth and employment growth): in dynamic environments entrepreneurial self-efficacy (self-ratings of skills in various entrepreneurial activities) has positive effects on performance when optimism is moderate, but negative when it is high. In stable environments self-efficacy had only a weak effect on performance and was not moderated by optimism. It seems that a very high level of dispositional optimism implies overconfidence that is particularly dangerous in dynamic environments where timely realistic judgements of opportunities and risks are first and foremost important.

5.3. A look at a complex model of entrepreneurship

Meta-analyses cannot adequately mirror the results of studies the design of which is highly complex (in terms of number of variables and connections between the variables). For the sake of brevity only one example is presented here that should give an impression of how such complex models could look like.

From the perspective of a theory of action (Frese & Zapf, 1994), Frese (2009) elaborated on the influence of the entrepreneur's personality characteristics as well as of human capital on entrepreneurial success which is assumed to be mediated by action styles like goal orientation and planning (Frese, Stewart, & Hannover, 1987). Several other individually characteristic ways of information processing and acting in the specific environment are taken into account (Fig. 1). The environment is characterized by the developmental stage of the firm (life cycle), the speed of change (dynamism), adverse economic conditions like high competition and lack of resources (hostility), and branch of business (industry). In combination with personal characteristics, the environment influences entrepreneurial activities which in turn change the environment. Personality and environment are seen also as moderators of the influence of ways of actions on business success. All these conditions and processes are embedded in the specific cultural context. For some of the theoretically postulated influences the authors refer to supporting empirical studies.

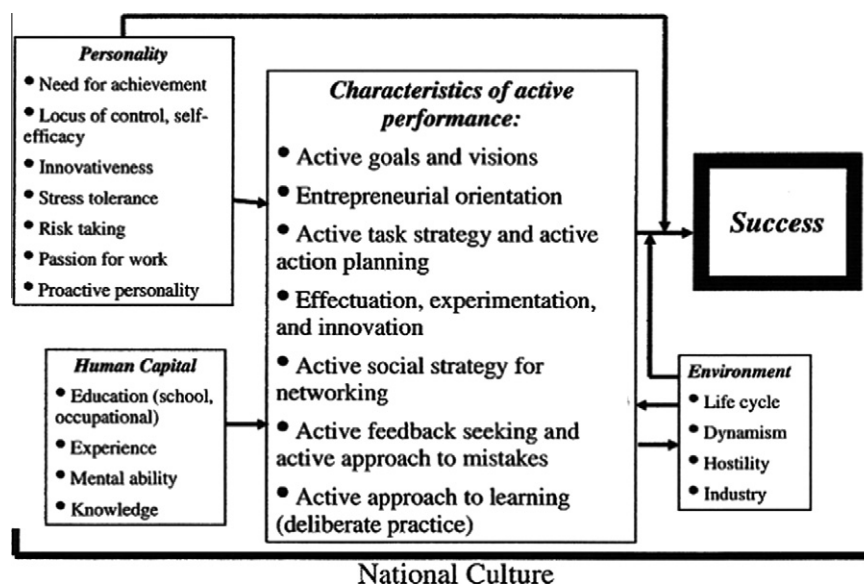


Fig. 1. Example of a complex process model of entrepreneurship (Frese, 2009, p. 459).

5.4. Missing laboratory experiments in entrepreneurship research

Psychological research on entrepreneurship is almost exclusively based on questionnaires, usually applied in field studies, whereas econometric research on antecedent conditions and economic consequences of entrepreneurship commonly draws on macro-economic indicators characterizing national or regional economies. The advantage of the experimental approach in testing causal influences is widely neglected in psychological entrepreneurship research. Experimental economics, too, has rarely focussed on entrepreneurial decision making. Examples of experiments that have some affinity to the tasks of entrepreneurs are Dittrich, Güth, and Maciejovski (2005) for investment decisions and Dimov (2007) for entrepreneurial opportunity perception and action.

5.5. Personality in counselling and training aspiring entrepreneurs

Research on how personality characteristics influence business set-up and success can improve counselling of aspiring entrepreneurs and the efficiency of business support. Since consulting aspiring entrepreneurs has become quite common, thinking about the opportunities and restraints given with one's personality structure will be a useful part of counselling and self-reflection. Some aspiring entrepreneurs will need encouragement, to others warnings of the dangers of overconfidence might be helpful.

6. Conclusions

Analyzing the tasks of entrepreneurs is an indispensable first step in entrepreneurial research. These tasks vary with circumstances such as the type of industry (providing service or material goods, based on new technology or conventional techniques), region, competitors, social networks, founding a business as a matter of necessity or opportunity, financial resources, developmental stage of the business. But techniques for systematic analyses of entrepreneurial tasks under various circumstances still wait for development. It should be an important project of future psychological entrepreneurship research. A systematic analysis of entrepreneurs' tasks and socio-economic circumstances will probably reveal that as yet neglected personality aspects like cognitive abilities or values are equally important as the Big Five personality dimensions or similar constructs.

The prominence of FFM should not hinder development and application of special purpose scales, but it should be standard, actually a matter of routine, to include in any entrepreneurship study on individual differences short, but sufficiently reliable and valid measures of the Big Five. This is the only way to secure comparability of the results across the variety of personality measures and studies, and to learn whether a specific (new) scale is redundant or has incremental validity beyond the Big Five.

In the future, longitudinal studies are very much needed in order to defend causal inferences from personality traits (in the broader sense) to entrepreneurial intentions, set-up decisions, and performance against common objections. Such studies could also collect data on mental and behavioural processes that might be conceived of as variables that mediate the influence of personality traits on the results of the entrepreneurs' endeavours. Mental processes are accessible mainly through self-reports when neurophysiological measurement techniques are not available or not applicable, whereas behavioural processes can and should be assessed both with self-reports and reports of observers in different roles.

There can be little doubt any more that personality traits contribute substantially to the way entrepreneurs think, what they

aim for, what they do, and what they actually achieve. The influence of personality traits may be stronger with entrepreneurs than with most other professions, because the entrepreneurial role provides more freedom in choosing and changing the environment as well as in acting according to personal preferences and goals. Helping aspiring entrepreneurs not only to learn about economic opportunities, legal regulations, and financial support of a start-up, but also about the chances, limits, and risks given with their personality structure (cognitive abilities, motives, values, and temperament) can now rely on the results of highly valuable psychological entrepreneurship research. This topic is a fine example of the value of integrating personality psychology and economic-related behaviour.

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