

# Personality composition and performance in entrepreneurial teams

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## Personality composition and performance in entrepreneurial teams: understanding the impact of stability and plasticity traits in a relative contribution model

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**Abstract:** Considering that personalities of entrepreneurs are diverse, we examine how the personality composition of entrepreneurial teams affects team performance. Given the specific challenges of the entrepreneurship setting, we suggest a new understanding of the team composition–team performance link by (1) taking a meta-perspective to personality that considers the stability vs. plasticity underlying the Big Five traits and by (2) applying a relative contribution (minimum/maximum) conceptualisation of team composition. We conduct a quantitative study with 104 entrepreneurial teams. Our findings indicate that high entrepreneurial team performance requires *all* team members to have minimum levels of stability-related traits (agreeableness, emotional stability, conscientiousness), but only *one* team member with high plasticity-related traits (openness, extraversion).

**Keywords:** entrepreneurial teams; team diversity; team composition; personality traits; team performance; big five; stability; plasticity.

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## 1 Introduction

Entrepreneurs are a diverse group of individuals. Just as all people that we meet, they can differ regarding more surface-level attributes (e.g., younger or older; male or female), but also regarding more deep-level attributes such as personality (Bell, 2007). The personality of entrepreneurs – mostly conceptualised as the Big Five personality traits (Costa and McCrae, 1992a; Goldberg, 1990)–has gained a lot of research interest within the entrepreneurship literature and scholars have linked personality to start-up decisions and venture success (e.g., Antoncic et al., 2015; Shane et al., 2010; Ciavarella et al., 2004). However, the dominant focus on the *individual* entrepreneur’s personality is surprising, given that entrepreneurial ventures are typically started by *teams* rather than by single founders (Lazar et al., 2019). In practice, thus, individuals bring together their *different* personalities when working collaboratively in entrepreneurial teams. For scholars and practitioners alike, this raises the question how the ideal “personality structure” of a successful entrepreneurial team should be composed (Chowdhury, 2005; Souitaris and Maestro, 2010; Ensley and Hmieleski, 2005).

This study examines how an entrepreneurial team’s personality composition affects team performance – i.e., the effectiveness and efficiency of team operations. To enhance a systematic, theory-driven understanding of the team personality – team performance link, we combine the *relative contribution model* of team composition with the *two-factor model* (stability-related vs. plasticity-related traits) of personality. We suggest that successful entrepreneurial teamwork requires a basement level of stability, but also certain amounts of plasticity. We thus expect that when it comes to personality traits reflecting tendencies towards *stability* (agreeableness, emotional stability, conscientiousness), the personality of the *lowest*-scoring team member determines team performance (minimum approach). When it comes to personality traits reflecting tendencies towards *plasticity* (openness, extraversion), we suggest that the personality of the *highest*-scoring member determines team performance (maximum approach). We combine two insights that are novel to entrepreneurship research. The first is the insight from personality theory that the widely used Big Five personality factors can be subsumed under two meta-factors labelled stability and plasticity (Digman, 1997; Feist, 2019). The second is the insight from team composition research (Mathieu et al., 2014; Kramer et al., 2014) that a single team member (i.e., the member scoring highest or lowest on a certain trait) can exert a powerful impact on the entire team, which calls for considering that person’s relative contribution (minimum/maximum scores) instead of using mean and heterogeneity team composition scores. We test our hypotheses in a sample of 104 dyadic entrepreneurial teams of technology and knowledge-based ventures, while controlling for various team-related factors such as demographic diversity, team tenure, and entrepreneurial experience.

Our contribution to the entrepreneurship literature is two-fold. Contributing to entrepreneurial team composition research, we add to the still limited research on deep-level team composition variables, especially personality variables (Chowdhury, 2005; Klotz and Neubaum, 2016; Kollmann et al., 2017). Scholars have concluded that findings on the impact of personality in entrepreneurship have often been small or mixed because hypotheses have not been sufficiently backed up with theory (Zhao et al., 2010; Rauch and Frese, 2007). We suggest that understanding the two meta-factors underlying the Big Five model of personality (i.e., considering the common and distinct features of

agreeableness, emotional stability, conscientiousness, openness, and extraversion) can provide new answers to the question how to compose entrepreneurial teams.

Second, we contribute an alternative methodological approach to entrepreneurial team composition research. Prior research has used two dominant methods of aggregating entrepreneurial team characteristics (Jin et al., 2017). First, *mean scores* follow the logic that “the higher the overall level of desirable attributes in a team, the better” (Stewart, 2006). Second, *heterogeneity scores* focus on the mix of member attributes in a team and follow the logic that “the more similar (or dissimilar) the team members, the better” (van Knippenberg and Schippers, 2007). Although these aggregation approaches have provided insights into the effects of team composition, findings are rather mixed (e.g., Horwitz and Horwitz, 2007), especially regarding the *personality* composition of team members (Bell, 2007). Specifically, prior research has shown that personality mean scores can predict team-related outcomes, but the traits identified as relevant were inconsistent across studies, such that some traits seem to matter more in some study contexts than in others (Stewart, 2006; Neuman et al., 1999; Peeters et al., 2006). Relating to heterogeneity scores, the empirical findings are also mixed, such that some studies observe positive and some observe negative effects of heterogeneity, making it a ‘double-edged sword’ (Horwitz and Horwitz, 2007; Kollmann et al., 2017). The reason may be that mean and heterogeneity scores neglect the powerful impact that single members of entrepreneurial teams (who score higher or lower than all the others) can exert on team outcomes. In other words, conventional aggregation scores disregard the possibility that the personality of single individual group members may ‘pop out’ from the team and thus may predominate the team’s work and associated outcomes (Stewart, 2006).

Taken together, this study follows the call by Klotz and Neubaum (2016) who claimed that alternative approaches to investigating entrepreneurial team personality would provide “insights that traditional approaches – assuming that all members contribute equally to affect team outcomes – cannot” (p.6). We do so by applying an alternative theoretical approach (based on the two-factor model of personality), together with applying an alternative methodological approach (based on the relative contribution model of team composition).

## **2 Entrepreneurial team personality and the two-factor model of personality**

The most commonly used taxonomy for describing personality is the Big Five model (also called five-factor model of personality; Goldberg, 1990). The model characterises individuals along the five core traits of agreeableness, emotional stability, conscientiousness, openness, and extraversion (Costa and McCrae, 1992a). While the Big Five model is widely established also in entrepreneurship research (e.g., Zhao and Seibert, 2006), it is less well known that personality researchers have identified two meta-factors underlying the Big Five (Digman, 1997; Feist, 2019). Specifically, given that the Big Five personality traits are not completely independent of each other (e.g., Costa and McCrae, 1992a), these scholars have examined the patterns of correlations among the Big Five in systematic factor analyses (DeYoung et al., 2002). As a result, two higher-order factors emerged that have been labelled *stability* and *plasticity* (Digman, 1997; Feist, 2019).

The first meta-factor, which includes agreeableness, emotional stability, and conscientiousness, reflects individuals' tendencies to strive towards *stability* (Digman, 1997). The associated personality facets describe people's dispositions to be social and friendly in relationships with others, to follow social norms, and to control their impulses (Feist, 2019). The second meta-factor, which includes openness and extraversion, reflects individuals' tendencies towards *plasticity*, that is, towards exploration and flexibility (Blackburn et al., 2004). The associated personality facts describe people's propensity to strive for personal growth and self-actualisation, to explore and change the environment around them (Alessandri and Vecchione, 2012; Blackburn et al., 2004). We suggest that the higher abstraction level inherent in these two meta-factors of personality (Blackburn et al., 2004) will help to derive hypotheses about the kinds of entrepreneurial team compositions that are best suited to enable high team performance.

### 3 Entrepreneurial team composition: mean, heterogeneity, and relative contribution

The question *how* scholars conceptualise team composition variables largely determines the strength and direction of associations found between personality and team outcomes (Bell, 2007; Arthur et al., 2007; Mohammed et al., 2002). Entrepreneurial team research has, to date, been dominated by two major approaches of conceptualising team composition, that is, mean and heterogeneity scores (see Jin et al., 2017 for an integration of the literature). These approaches have different underlying logics. According to the mean approach, team performance depends on the average level of personality traits among team members, e.g., the higher the team's overall conscientiousness, the higher the team performance (Barrick et al., 1998). The underlying logic is that desirable personality traits can be an important resource for the team and thus, more of that resource is better for team performance (Stewart, 2006). The heterogeneity approach looks at the differences between team members and thus focuses on the mix of desirable personality traits (Jin et al., 2017). Calculated as the variance or standard deviation of team members' traits, the approach follows the logic that differences or similarities between members affect team performance, e.g., the greater the heterogeneity in team members' extraversion, the higher the team performance (Neuman et al., 1999).

What can be problematic about these two most conventional approaches is that both the mean and the heterogeneity approach assume that each team member *equally* shapes the team's overall performance (Mathieu et al., 2014). The logic that everyone's personality equally contributes to team performance, however, disregards the possibility that one single member may affect the group more strongly than other members (Barrick et al., 1998). However, it has been shown that "particular individuals can carry or undermine the entire team effort" (Mathieu et al., 2014, p.141). The *relative contribution model* of team composition (Kozlowski and Klein, 2000; Mathieu et al., 2014) addresses this issue and assumes that minimum or maximum levels of team member traits decisively affect team outcomes. The minimum approach implies that the one member with the lowest level of a trait most strongly affects team outcomes, regardless of the traits that the other members possess (Barrick et al., 1998). That is, like in a mountain climbing team, team performance depends upon the group's weakest link (Kozlowski and Klein, 2000). The maximum approach implies that the one member with the highest level of a trait most strongly affects team performance (Kozlowski and Klein, 2000). That is,

the highest-scoring member is 'strong enough' to pull the performance of the entire team (Bell, 2007).

#### **4 Combining the two-factor model and the relative contribution model to explain entrepreneurial team performance**

We suggest that the two-factor model of stability and plasticity is particularly suited to explain the performance effects of team composition within teams in the entrepreneurship domain. This is because, in a way, entrepreneurial teams also strive for both stability and plasticity, since they must manage their existing resources, while simultaneously exploring new resources (cf., Jansen et al., 2016; Gilbert, 2006). In order to be successful, teams must make sure to establish effective working relationships and team operations (thereby maintaining stability), while, at the same time, making sure that the team is outgoing and flexible (thereby exerting plasticity). Combining the relative contribution model with the two-factor model of personality, we suggest that minimum levels of stability-related traits and maximum levels of plasticity-related traits in terms of member personality can help to enhance team performance.

##### *4.1 Stability-related traits*

We expect that minimum levels of agreeableness, emotional stability, and conscientiousness as stability-related traits are required to enable effective team performance. Stability-related traits are especially important for entrepreneurial team functioning, because they may help to ensure an overall inbound stability of the team. This is essential because entrepreneurial team members are strongly interdependent on one another (Harper, 2008). They work together very closely over a long time and often invest huge amounts of money, time, and effort into the venture (Baron and Shane, 2012; Bygrave and Zacharakis, 2011). Moreover, the small size of entrepreneurial teams (mostly two or three team members; Ucbasaran et al., 2003) further reinforces such interdependence. Thus, mutual trust, strong team cohesion, and effective cooperation are important building blocks of an entrepreneurial team's stability (Khan et al., 2014; Mullen and Copper, 1994). If only one member of the entrepreneurial team scores very low on one of these traits, we expect that this person's 'unstable personality' can threaten the stability of team functioning as a whole, leading to destructive team dynamics such as team conflict or low team cohesion. Following the minimum approach according to which the weakest team member can undermine team performance (Mathieu et al., 2014), we thus suggest that the entrepreneurial team performance will depend on the least agreeable, least emotionally stable, and least conscientious entrepreneurial team member.

##### *4.1.1 Agreeableness*

Following the two-factor model, agreeableness reflects individuals' tendency to seek stability in social domains (DeYoung et al., 2002). Individuals high on agreeableness strive for harmonious and cooperative social relationships (Digman, 1990). They are empathic and supportive toward others and have good teamwork skills (Lim and Ployhart, 2004). Individuals low on agreeableness tend to mistrust others (Martin et al., 2000), engage in competitiveness rather than cooperation (Graziano et al., 1997), care

little for others' well-being, and exploit social relationships for their own purposes (Buss, 1992).

We posit that all entrepreneurial team members should have a minimum level of agreeableness to ensure good team performance. In other words, having just one highly *disagreeable* team member should threaten the stability of the overall team and drag down performance. This is because individuals with low agreeableness provoke relationship conflicts (Jensen-Campbell and Graziano, 2001), contribute to poor team cohesion and inequitable divisions of labour, which in turn leads to poor teamwork outcomes (van Vianen and De Dreu, 2001). Entrepreneurial teamwork, however, largely depends on trust, cooperation, and mutual support among team members (Khan et al., 2014; Mullen and Copper, 1994). Supporting this reasoning, Barrick et al. (1998) found that teams performed better when there was no disagreeable person in the team. Moreover, in her meta-analysis on teams in established organisations, Bell (2007) showed that a minimum conceptualisation of agreeableness had a strong association with team performance. Consequently, we hypothesise that team performance depends on the score of the least agreeable team member, regardless of the level of agreeableness of the other team members:

*Hypothesis 1. The higher the level of agreeableness score of the least agreeable team member, the higher the performance of the entrepreneurial team.*

#### 4.1.2 Emotional stability

Following the two-factor model, emotional stability reflects individuals' tendency to strive for stability in emotional domains (DeYoung et al., 2002). Individuals *high* on emotional stability tend to be calm, experience positive emotions, adapt to cope with stress, and do not suffer from mood swings (Judge and Bono, 2001). Individuals *low* on emotional stability (also called neuroticism) tend to be anxious, nervous, and easily annoyed (Costa and McCrae, 1992b). They have difficulties adapting to stressful situations, as they interpret environmental stimuli as threatening (Bolger and Schilling, 1991).

We again hypothesise that teams require a minimum level of emotional stability among all team members in order to ensure the overall stability of team functioning. Having only one emotionally unstable member within the team will have serious negative consequences, since these individuals have tendencies for antisocial behaviour, provoking conflict, and absenteeism, any of which can result in poor team performance (Barsade and Gibson, 2007). Due to their negativity and low-quality interactions with team members, emotionally unstable individuals hinder cooperation in their team (LePine and Van Dyne, 2001). This is particularly critical in the entrepreneurial context, which is characterised by high risk and uncertainty. Usually, working together in a team can reduce the stress experienced during the entrepreneurial venture (Lechler, 2001). However, having a highly emotionally unstable member in the team is rather likely to increase stress within the team, leading to lower performance. We thus hypothesise that:

*Hypothesis 2. The higher the emotional stability score of the least emotionally stable team member, the higher the performance of the entrepreneurial team.*

### 4.1.3 Conscientiousness

Following the two-factor model, conscientiousness reflects individuals' tendency to seek stability in motivational domains (DeYoung et al., 2002). Individuals *high* on conscientiousness show strong commitment to their job and perform in a very self-disciplined and organised manner (MacCann et al., 2009). Individuals *low* on conscientiousness tend to be low on self-discipline, be disorganised, and lack the perseverance to complete tasks and projects (Costa and McCrae, 1992b).

We again suggest that having only one team member with low conscientiousness may severely impede the overall team's performance. The particularly uncertain and demanding environment in which entrepreneurship takes place requires teams to engage in a cooperative effort, set goals, and work toward these goals in a structured and coordinated way (Lechler, 2001; Van Gelderen et al., 2015). In order to survive, entrepreneurs must also work in a very persistent manner and overcome obstacles on the way (Cardon and Kirk, 2015). Due to the strong interdependence among entrepreneurial team members (Harper, 2008), just one less conscientious member may hinder teams to meet deadlines or adhere to quality standards. This is especially critical in entrepreneurial environments, where time and capital resources are limited and where the survival of businesses depends on the favour of shareholders or stakeholders who expect deadlines and quality principles to be met in accordance with contracts. We argue that especially in typically small entrepreneurial teams (Franke et al., 2008), low conscientiousness on the part of one single individual team member cannot be compensated for. We hypothesise that team performance depends on the conscientiousness of the team's weakest link:

*Hypothesis 3. The higher the level of conscientiousness in the least conscientious team member, the higher the performance of the entrepreneurial team.*

## 4.2 Plasticity-related traits

We further suggest that maximum levels of openness and extraversion as plasticity-related traits are helpful for effective team functioning. Plasticity-related traits are especially important in entrepreneurial teams, because entrepreneurial success heavily depends upon the team's outbound activities. In other words, exploration is an integral part of entrepreneurship that determines the success of new ventures (Dai et al., 2017). Having an entrepreneurial team member who is open and extraverted and thus strives towards exploration can thus be an important asset for team performance. We thus argue that teams benefit from having *one* member with high plasticity-related traits. However, in contrast to the stability-related traits, we assume that *not all* members need to have certain level of plasticity. In other words, team performance is unlikely to be threatened by having another member low in plasticity. By contrast, while one member high in plasticity can engage in outbound activities, another member low in plasticity can engage in inbound activities, both of which need to be in balance for a team to be successful (Su et al., 2017). Among others, teams with an overly strong focus on exploration might lose their sense of direction (Fiol and Lyles, 1985) and their ability to see the 'big picture' (Akgün et al., 2007). Consequently, existing operations within the team can suffer (Gupta et al., 2006) and team members might feel stressed and overloaded (Golden and Powell, 2000), thus reducing team performance. Following the maximum approach, we thus suggest that having one individual scoring high on plasticity-related traits is enough to

ensure good team performance. Thus, entrepreneurial team performance will depend on the most open and most extraverted entrepreneurial team member.

#### 4.2.1 Openness

Individuals *high* on openness are broad-minded, driven by curiosity and imagination, and feel attracted to novel ideas and stimulating environments (Costa and McCrae, 1992b). Individuals scoring *low* on this dimension prefer to follow familiar routines to new experiences and tend to have a narrow range of interests (Zhao and Seibert, 2006).

Since entrepreneurship takes place in a dynamic environment that offers multiple demands and challenges (Harms et al., 2006), entrepreneurial teams should benefit from having a member high in openness. High openness equips individuals with the ability to engage into exploration activities, i.e., discovering new opportunities and innovating (Brandstätter, 2011). Supporting that view, Nicolaou et al. (2009) argued that a certain level of openness was useful to help spot business opportunities and create business ideas in entrepreneurial settings. Empirical findings on openness also indicate its positive association with creativity (Feist, 1998) and entrepreneurial performance (Zhao et al., 2010). However, it is not imperative for all team members to be very open, nor should it be damaging to team performance to have a second team member low in openness. Instead, having more than one highly open members might even bear the risk of these members pursuing too many different directions and losing focus on existing team operations (cf., Su et al., 2017). Thus, having just one highly open team member should be enough to drive the explorative activities and make other (less open) team members and stakeholders believe in and act upon his or her ideas. Entrepreneurial ventures should thus benefit from having one highly open member who drives innovative idea creation:

*Hypothesis 4. The higher the level of openness of the most open team member, the higher the performance of the entrepreneurial team.*

#### 4.2.2 Extraversion

Individuals *high* on extraversion are outgoing, active, and talkative (Costa and McCrae, 1992b). Extraverts seek excitement, enjoy being with others, and get rather bored when alone (Carver et al., 2000). Individuals low on extraversion (i.e., introverts) are rather reserved, avoid social situations, and live quietly and independently (Zhao and Seibert, 2006).

For new ventures, it is essential to engage in exploratory activities of establishing and expanding social networks (Florin et al., 2003; Mainela and Puhakka, 2011). Such networking activities with parties outside of the venture equip entrepreneurial teams with access to much-needed resources (Florin et al., 2003; Greve and Salaff, 2003). The outgoing and enthusiastic nature of an extravert in the team can help to tie these important contacts with important stakeholders, shareholders, customers, or collaborators (Van Hove et al., 2009; Brandstätter, 2011). Again, however, having one highly extraverted team member who engages intensively in networking and ‘sells’ the business ideas to outside parties should be enough to ensure high team performance, while having another introvert in the team should not harm team performance. Having more than one extravert in a team who engage in outbound exploratory activities might however harm team performance. This is because having more than one team member focusing on such outbound activities may make teams lose track of their inbound activities important for

team functioning (cf., Watson, 2007; Chrisman et al., 2005). Thus, entrepreneurial teams should benefit from having one highly extraverted member who drives networking activities:

*Hypothesis 5. The higher the level of extraversion of the most extraverted team member, the higher the performance of the entrepreneurial team.*

## 5 Method

### 5.1 Data collection and sample<sup>1</sup>

To test our hypotheses, we investigated technology and knowledge-based firms in the early and expansion stages of their development (maximum age of 12 years). In line with prior research (e.g., Arthur et al., 2007; Coad and Timmermans, 2014), we examined dyadic entrepreneurial teams. A team size of two entrepreneurs characterises a typical entrepreneurial team (Steffens et al., 2012). Furthermore, dyads represent the most fundamental team setting (Bernerth et al., 2008) and thus provide a particularly suitable context in which to study team composition effects (Vanderheyden and De Baets, 2015). To collect our data, we contacted all 56 existing technology and start-up centres in the German state of greatest economic importance, North Rhine-Westphalia. To encourage a high rate of participation, we first established contact via telephone and then visited all 56 centres to ask the teams to complete the questionnaire. Out of the total  $n = 374$  dyadic teams within these centres, we received 104 applicable complete team responses (response rate = 27.8%) which formed the basis for the subsequent analysis. The sample of individuals ( $n = 208$ ) includes people aged between 22 and 66 years old ( $M = 40.13$ ,  $SD = 9.99$ ). Team tenure ranged from nine to 144 months ( $M = 42.88$ ,  $SD = 33.33$ ). The average firm age was 5.06 years ( $SD = 3.59$ ).

### 5.2 Measures

In order to reduce common method bias, the independent variables and the dependent variable were assessed differently. Items concerning personality traits (independent variables) were assessed by asking each individual member for his or her individual traits. In contrast, items concerning entrepreneurial team performance (dependent variable) asked for the team member's assessment of the level of performance displayed by the team as a whole, not his or her individual performance. Information concerning the final aggregation of measures is provided in the respective subsections.

*Personality traits.* We applied the 44-item Big Five inventory (BFI) (John et al., 1991) to measure agreeableness, emotional stability, conscientiousness, openness, and extraversion. Example items are, "I see myself as someone who ... is considerate and kind to almost everyone" (agreeableness), "... remains calm in tense situations" (emotional stability), "... does a thorough job" (conscientiousness), "... has an active imagination" (openness), and "... is talkative" (extraversion). Items were measured on 7-point Likert scales (anchored with *completely disagree* and *completely agree*). The five dimensions showed satisfactory reliabilities (Cronbach's alpha averaging 0.75).

An exploratory factor analysis showed that the items loaded correctly on the respective personality factors. Following the relative contribution model, we determined team-level minimum or maximum scores for each of the personality facets. In line with our hypotheses, we determined the score of the lowest-scoring team member on each stability-related trait (agreeableness, emotional stability, conscientiousness) and the score of the highest-scoring member on each plasticity-related trait (openness, extraversion) to represent the entire team. We additionally calculated the mean and heterogeneity scores for each team and each personality facet to enable comparisons between the relative contribution model and the two conventional composition approaches. For the mean scores, we calculated the average of all team members' personality traits. For the heterogeneity score, we calculated the standard deviation scores based on the individual average score on each factor.

*Entrepreneurial team performance:* We applied the well-established 7-item measure of Henderson and Lee (1992) to measure team performance as the effectiveness and efficiency of team operations. We thereby follow prior recommendations to reflect the multifaceted nature of team performance (Horwitz, 2005) and to capture team performance in terms of team-related outcomes (Horwitz and Horwitz, 2007; Chowdhury, 2005). The subjects were asked to rate critical aspects of the entrepreneurial project team's performance (example item, "The amount of work the team produces"). Items were measured on 7-point Likert scales (anchored with *completely disagree* and *completely agree*). Cronbach's alpha of the aggregated measure was very satisfactory (0.87). The factor analysis revealed the expected one factor. However, before being able to compute a performance mean score for each team, we had to check whether there was enough consensus between the individual members to justify such an aggregation (e.g., Harrison et al., 2002). To examine interrater agreement (i.e., the extent to which the team performance ratings of the team members were concordant), we computed the within-group agreement index for multi-item indices ( $r_{wg(j)}$ ), which compares the observed team variance to an expected random variance (Cohen et al., 2001). The mean  $r_{wg(j)}$  for all teams was 0.94, indicating high agreement among team members and exceeding the recommended value of 0.70 (Fleishman and Mumford, 1991). Additionally, we calculated two versions of the intraclass correlation coefficient (*ICC*), both of which indicate the relative consistency of ratings among team members (Bliese, 2000). Both *ICC* values (*ICC*(1) and *ICC*(2)) are calculated from a one-way ANOVA in which team performance serves as the dependent variable and team membership serves as the independent variable (cf., Bliese, 2000). The *ICC*(1) indicates the proportion of total variance explained by group membership (Bliese, 2000). In our sample, the *ICC*(1) value was 0.34 ( $p < 0.001$ ), which indicates a large effect (LeBreton and Senter, 2008), and thus justifies the aggregation of the single responses. The *ICC*(2) additionally indicates to which extent the mean rating assigned by different team members is reliable (LeBreton and Senter, 2008). We observed an *ICC*(2) value of 0.88, which indicates excellent interrater reliability (above the cut-off point of 0.75; LeBreton and Senter, 2008). Altogether, thus, the results justify our approach to aggregate the team performance ratings of the individual respondents to the team level.

*Control variables.* Following the findings of prior research that team performance is affected by team member age and diversity, gender diversity and education diversity, and

team tenure (Harrison et al., 2002; Somech, 2006; Carpenter, 2002; Amason et al., 2006; Shrader and Siegel, 2007), we control for these variables. Since experience can play an important role for team performance (Zhou and Rosini, 2015), we account for whether team members have gained experience within the current venture (i.e., number of team members who have been part of the original founding team) or experience within other entrepreneurial ventures (i.e., number of team members with additional prior entrepreneurial experience). Finally, since team functioning might also link with the venture's growth orientation and actual growth (cf., Dwyer et al., 2003; Bunderson and Sutcliffe, 2003), we controlled for the importance that team members attach to the venture's growth in market share and for their satisfaction with the venture's current growth in market share.

## 6 Results

### 6.1 Descriptive statistics

Table 1 summarises means, standard deviations, and intercorrelations of the study variables.

### 6.2 Hypotheses testing

To meaningfully test our hypotheses, we needed to apply a method that is not prone to biases, such as suppression effects, that might potentially inflate relationships and their significance even when there was no (or virtually no) relationship between them (MacKinnon et al., 2000). This is especially important when analysing the Big Five personality traits as they show systematic intercorrelations (Van der Linden et al., 2010). Therefore, we tested the effect of each personality facet on team performance separately. Table 2 shows these five models of hierarchical regressions in which we incorporated the control variables in the first step and the conceptualisation of each personality facet (minimum/maximum) in the second step.

First, we hypothesised positive links between the minimum conceptualisations of stability-related personality traits, i.e., agreeableness (Hypothesis 1), emotional stability (Hypothesis 2), and conscientiousness (Hypothesis 3). As shown in Table 1 (Models 1–3), the effect was marginally significant for agreeableness ( $\beta = 0.16$ ,  $p < 0.10$ ) and significant for emotional stability ( $\beta = 0.18$ ,  $p < 0.05$ ) and conscientiousness ( $\beta = 0.25$ ,  $p < 0.01$ ). Thus, Hypotheses 1, 2, and 3 received support, indicating that the higher the scores of the least agreeable, the least emotionally stable, and the least conscientious team member, the higher the team performance.

Second, we suggested positive links between the maximum conceptualisations of plasticity-related personality traits, i.e., openness (Hypothesis 4) and extraversion (Hypothesis 5). As shown in Table 1 (Models 4–5), the effect was positive for openness ( $\beta = 0.19$ ,  $p < 0.05$ ) as well as for extraversion ( $\beta = 0.20$ ,  $p < 0.05$ ). These findings were in line with Hypotheses 4 and 5, showing that the scores of the most open and the most extraverted team member lead to higher team performance.<sup>2</sup>

**Table 1** Means; standard deviations and correlations (aggregated scores)

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>Control variables</i>																					
1. Mean age (years)	40.13	9.03																			
2. Age diversity (SD)	4.29	4.32	0.32																		
3. Gender diversity (SD)	0.17	0.30	0.06	0.12																	
4. Education diversity (SD)	0.39	0.55	0.24	-0.03	0.03																
5. Team tenure (months)	42.88	33.41	0.34	0.12	-0.19	-0.01															
6. Founder team members	0.86	0.27	-0.15	-0.38	0.25	0.00	0.08														
7. Entrepreneurial experience	0.29	0.35	-0.14	0.00	0.08	-0.13	-0.01	0.07													
8. Market share growth importance	4.45	1.68	-0.16	-0.05	-0.15	0.00	-0.13	-0.05	0.00												
9. Market share growth satisfaction	4.17	1.34	0.21	0.06	0.00	0.00	0.02	-0.39	-0.11	0.05											
<i>Agreeableness</i>																					
10. Mean	4.60	0.75	0.26	-0.02	0.14	0.05	0.23	0.03	-0.11	-0.18	0.20										
11. Minimum	4.08	0.85	0.24	-0.08	0.09	0.07	0.14	0.10	-0.05	-0.18	0.19	0.90									
<i>Emotional Stability</i>																					
12. Mean	4.68	0.85	0.08	-0.14	0.23	0.07	-0.17	0.02	0.06	-0.05	0.14	0.23	0.29								
13. Minimum	4.10	0.99	0.05	-0.07	0.23	0.12	-0.19	0.02	0.08	-0.01	0.09	0.19	0.26	0.90							
<i>Conscientiousness</i>																					
14. Mean	5.36	0.56	0.00	-0.02	0.14	0.05	-0.10	-0.04	-0.09	0.23	0.16	0.26	0.23	0.25	0.21						
15. Minimum	4.91	0.65	0.00	-0.01	0.08	0.06	-0.13	-0.04	-0.11	0.15	0.08	0.26	0.29	0.26	0.21	0.87					

**Table 1** Means; standard deviations and correlations (aggregated scores) (continued)

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>Openness</i>																					
16. Mean	5.40	0.64	-0.27	-0.04	0.21	-0.01	-0.13	0.12	0.22	0.06	-0.21	-0.15	-0.22	0.13	0.06	0.08	0.00				
17. Maximum	5.89	0.63	-0.17	-0.09	0.20	-0.07	-0.14	0.15	0.13	-0.01	-0.19	-0.16	-0.20	0.16	0.04	0.11	0.00	0.82			
<i>Extraversion</i>																					
18. Mean	5.39	0.78	-0.21	0.00	0.11	-0.25	-0.23	-0.01	0.25	0.22	0.18	0.04	0.03	0.12	0.09	0.35	0.26	0.24	0.19		
19. Maximum	5.94	0.77	-0.15	-0.11	0.13	-0.29	-0.09	0.05	0.23	0.21	0.18	0.06	0.02	0.16	0.14	0.41	0.34	0.25	0.22	0.85	
<i>Entrepreneurial team performance</i>																					
20. Mean	5.67	0.68	-0.11	-0.10	0.10	-0.09	-0.16	0.00	-0.03	0.19	0.34	0.12	0.17	0.23	0.22	0.32	0.31	0.12	0.16	0.35	0.31

Gender diversity (0 = gender-homogeneous team; 1 = gender-heterogeneous team).  
 Education (1 = no graduation; 2 = secondary school; 3 = intermediary secondary school; 4 = university entrance qualification; 5 = university graduation; 6 = doctoral degree).  
 Founder team members (0 = no; 1 = yes). Entrepreneurial experience (0 = no; 1 = yes).  
 Market share growth importance (1 = 'not at all important' to 7 = 'very important').  
 Market share growth satisfaction (1 = 'not at all satisfied' to 7 = 'very satisfied').  
 Correlations of |0.17| and above are significant on a level of 0.10% (two-tailed test).  
 Correlations of |0.20| and above are significant on a level of 0.05 (two-tailed test).  
 Correlations of |0.26| and above are significant on a level of 0.01 (two-tailed test).  
 Correlations of |0.32| and above are significant on a level of 0.001 (two-tailed test).

**Table 2** Hierarchical regression analyses predicting team performance

<i>Dependent variable:</i> <i>Team Performance</i>	<i>Model 1</i> <i>Agreeableness</i>	<i>Model 2</i> <i>Emotional stability</i>	<i>Model 3</i> <i>Conscientiousness</i>	<i>Model 4</i> <i>Openness</i>	<i>Model 5</i> <i>Extraversion</i>
Control variables					
Mean age	-0.12	-0.09	-0.09	-0.09	-0.09
Age diversity (SD)	-0.01	-0.03	-0.03	-0.03	-0.03
Gender diversity (SD)	0.09	0.09	0.09	.09	.09
Education diversity (SD)	-0.07	-0.07	-0.07	-0.07	-0.07
Team tenure	-0.12	-0.11	-0.11	-0.11	-0.11
Founding team members	0.10	0.13	0.13	0.13	0.13
Entrepreneurial experience	-0.04	-0.04	-0.04	-0.04	-0.04
Market share growth importance	0.18	0.16	0.16	0.16	0.16
Market share growth satisfaction	0.36**	0.40***	0.40***	0.40***	0.40***
Hypotheses testing					
Minimum agreeableness	0.16 <sup>†</sup>				
Minimum emotional stability		0.18*			
Minimum conscientiousness			0.25**		
Maximum openness				0.19*	
Maximum extraversion					0.20*
F-statistic	2.57	3.36	7.68	3.92	3.59
R square	23.4%	24.0%	27.3%	24.5%	24.2%
Change in R square	2.1% <sup>†</sup>	2.7%*	6.0%**	3.2%*	2.9%*

*N* = 104 teams. We performed one-tailed tests when our hypotheses contained directionality and two-tailed tests otherwise.

<sup>†</sup>*p* < 0.10; \**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001.

### 6.3 Comparative model testing

We performed two additional sets of analyses to compare the hypothesised minimum and maximum configurations of team personality against the two most established configurations used in the literature, i.e., the mean and heterogeneity scores. Notably, we did not have concrete hypotheses about superiority of one configuration against another. Nevertheless, a more detailed comparative analysis could reveal the meaningfulness of

the relative contribution approach in light of the more traditional approaches.

Thus, we first complemented our multiple regression approach shown above with a stepwise regression approach in order to compare the different team personality configurations against each other. For each personality trait, we thus entered the minimum and maximum score, the mean score and heterogeneity (*SD*) score, alongside the control variables into a stepwise regression. Stepwise regression is a procedure that iteratively checks each variable for inclusion or exclusion on the grounds of its predictive power. As a result, the analysis reveals included variables (i.e., those that significantly predict the outcome variable) and excluded variables (i.e., those that do not add additional predictive power to the included ones). In the stepwise model for agreeableness, minimum agreeableness remained as the sole significant predictor ( $\beta = 0.18, p < 0.05$ ), while minimum, maximum, and *SD* agreeableness were excluded. For emotional stability, only minimum emotional stability significantly predicted team performance ( $\beta = 0.20, p < 0.05$ ), while the maximum, mean, and *SD* values were excluded. For conscientiousness, the minimum remained as a significant predictor ( $\beta = 0.28, p < 0.01$ ), while the other conscientiousness configurations were removed. For openness, the maximum configuration remained in the regression ( $\beta = 0.23, p < 0.01$ ), while minimum, mean, and *SD* were excluded. For extraversion, the analysis revealed that mean extraversion ( $\beta = 0.30, p < 0.01$ ) remained in the model, while maximum extraversion was excluded. Altogether, thus, the results of the stepwise regression analyses largely support the pattern observed before. The minimum or maximum configurations of personality highlighted in our hypotheses were superior in direct comparison with the mean and standard deviation. As an exception of this pattern, mean extraversion outperformed maximum extraversion in the stepwise approach. While this finding does not contradict our hypothesis (which states that maximum extraversion positively links to team performance), we acknowledge that the mean of extraversion outperforms the predictive power of maximum extraversion in a direct comparison.

**Table 3** Competing models overview

<i>Model</i>	<i>R square</i>	<i>Change in R square</i>
1. Hypothesised model (relative contribution model)	32.9%	11.6%**
2. Mean model	30.5%	9.2%*
3. Heterogeneity model	25.3%	4.0%

*N* = 104 teams. The change in *R square* refers to the inclusion of the Big Five conceptualisations in comparison to the variance explained by the control variables only.

<sup>+</sup>  $p < 0.10$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

As a second complementary analysis, we intended to compare the predictive power of the different Big Five team personality configurations as a whole. Thus, we compared the variance explained by the hypothesised model (consisting of minimum agreeableness, minimum emotional stability, minimum conscientiousness, maximum openness, maximum extraversion) to the variance explained by the two conventional and most established team composition methods, that is, the mean approach and the heterogeneity approach. The model incorporating the hypothesised minimum and maximum scores of the personality traits explained 32.9% of variance in team performance ( $\Delta R^2 = 11.6\%$  in addition to the control variables). The mean model incorporating the average scores of the personality traits explained 30.5% of variance ( $\Delta R^2 = 9.2\%$ ) and the heterogeneity

model incorporating the standard deviations scores of the personality traits explained 25.3% of variance ( $\Delta R^2=4.0\%$ ). Taken together, the hypothesised approach outperformed both the mean and the heterogeneity approach. Table 3 summarises our model comparisons.<sup>3</sup>

## 7 Discussion

The present study points out that personalities of entrepreneurs can be diverse and that such diversity needs to be considered when building entrepreneurial teams. We addressed the question how entrepreneurial teams should be composed – in terms of members' personality traits – in order to ensure high team performance. Combining the relative contribution model of team composition with the two-factor model of personality, our findings show that minimum scores of agreeableness, emotional stability, and conscientiousness (stability-related traits), and maximum scores of openness and extraversion (plasticity-related traits) relate positively to team performance. In other words, high entrepreneurial team performance requires all team members to have minimally acceptable levels of agreeableness, emotional stability, and conscientiousness, but only one team member with a decent level of openness and extraversion (cf., Barrick et al., 1998).

### 7.1 Theoretical implications

Our study offers theoretical implications to entrepreneurial team composition research by introducing and combining insights that have not yet been considered in the entrepreneurship literature. First, our findings suggest that the two-factor conceptualisation of personality consisting of stability vs. plasticity-related traits can enhance our understanding of the team personality – team performance link. We have argued that the two meta-factors match particularly well with the specific challenges that entrepreneurial teams are facing. That is, stability and plasticity personality traits echo entrepreneurial teams' needs to simultaneously engage in managing existing resources and exploring new resources (e.g., Fernhaber and Patel, 2012). Consequently, as a special requirement for *entrepreneurial* teams, their teamwork requires a baseline level of stability, but also certain amounts of plasticity. Stability-related traits (agreeableness, emotional stability, conscientiousness) are needed to maintain team stability by ensuring inbound team functioning. If one of the links is too weak, the team's stability will crash. Thus, minimum levels are required. Plasticity-related traits (openness, extraversion) are required to ensure the team's plasticity, that is, exploration and engagement in outbound activities such as networking. However, given that too much plasticity and exploratory activities can also hamper team performance (Su et al., 2017), our findings indicate that one single team member is enough to successfully engage in these kinds of behaviours. Taken together, understanding the stability – plasticity dimension underlying the Big Five and thus understanding the common and distinct features of agreeableness, emotional stability, conscientiousness, openness, and extraversion) can help to better answer the question how to compose entrepreneurial teams. Over and above, understanding the common ground behind the five facets of personality may allow for more well-grounded, systematic (and less arbitrary) theorising about the effects of entrepreneur's personality concerning a wide range of further entrepreneurship-related outcomes.

Second, our study suggests that shifting the focus from mean and heterogeneity scores as the team composition approaches most commonly used in entrepreneurship research (Jin et al., 2017) to a relative contribution model of team composition (i.e., minimum/maximum scores). In contrast to these conventional approaches that assume each team member to contribute equally to team performance, our results underscore the notion that *there is an I in team*. We find that our relative contribution approach outperforms both mean scores and heterogeneity approaches in predicting team performance in an entrepreneurship setting. This indicates that these conventional approaches might be incomplete and too simplifying, since they ignore the powerful impact that one single team member's personality can have on the functioning of the entire team (cf., Kollmann et al., 2018). Conventional team composition scores may thus mask important individual effects and thereby result in rather small effects, if any at all. Given the specifics of the entrepreneurial team context (e.g., high interdependence, small team size, joint risk), we thus suggest that the relative contribution model of team composition can reveal important team-related dynamics that might be overlooked by conventional approaches. At the same time, it is important to note that the holistic approaches of mean and heterogeneity should not be ignored, because they too can reveal meaningful team-related effects (as also indicated by the smaller, but significant effects of the mean model in this study). Scholars should thus bear in mind the different logics underlying mean, heterogeneity, and minimum/maximum approaches (Kozlowski and Klein, 2000), depending on the theoretical nature of the attribute of interest or the specifics of the environment considered. Altogether, we suggest that research should pay more attention to the *individuals* who constitute the team, and to evaluating the team against the background of the environment it operates in.

## 7.2 Practical implications

The findings shown in this study also offer practical guidance for practitioners, including entrepreneurs and entrepreneurial teams, but also investors or entrepreneurship counsellors. In sum, our findings suggest that entrepreneurial team members should cover both stability-related and plasticity-related traits. However, successful teams require all members to have minimum levels of stability-related traits, but they only require one member who is high on plasticity-related traits. Our finding on the meaningfulness of a relative contribution model to team composition further suggests that team-based organisations or founders looking for team partners or investors should not simply target complementarity or similarity when assembling teams (e.g., Mohammed et al., 2002). Instead, organisations, cofounders, or investors should look at every potential team member individually, rather than regarding teams as a holistic entity.

Taken together, our study highlights the importance of personality as an important facet of entrepreneurial diversity. Understanding the impact of team composition on team performance may thus help entrepreneurs to build more effective and efficient teams, and to achieve greater success while reducing wasted personal resources. When composing a new entrepreneurial team, the great range of personality tests available may allow entrepreneurs to look beyond demographic characteristics such as age, gender, or areas of expertise to identify the most suitable team members. Moreover, venture capitalists consider composition of the founding team one of the most important criteria in the decision to offer capital (e.g., Dautzenberg and Reger, 2010), so selecting founding teams based on research evidence could enhance the attractiveness of an investment.

While personality testing is nowadays common practice within the talent management and assessment procedures of most large and established organisations (Kantrowitz et al., 2018), it is still largely underrepresented in the entrepreneurship context (Santos and Caetano, 2014). Given the findings of our study, together with prior research highlighting the important role of personality in entrepreneurship (e.g., Zhao and Seibert, 2006), we would clearly advise entrepreneurs making systematic personnel selection common practice in the future. We thereby follow Markman and Baron's (2003) call to develop techniques "for assessing the extent to which individuals are suited for entrepreneurial roles, just as standard techniques of personnel selection" (p. 296). Following our study's findings, such systematic personnel selection procedures would not only help to determine a person's fit to entrepreneurship as an occupation in general, but also to examine person – team fit, i.e., the important compatibility of members within a team (cf., DeRue and Morgeson, 2007).

However, our study's findings may also help in building successful entrepreneurial teams without engaging in systematic personality testing. Individuals can rate each other's personality in surprisingly accurate ways and thereby predict each other's behaviour (Connelly and Ones, 2010). Thus, to make use of this study's findings, practitioners should pay attention to the personality traits revealed by other individuals when forming an entrepreneurial team. However, an intensive phase of getting to know each other could be important before actually founding the venture, since close acquaintance is helpful for making reliable personality inferences, especially when it comes to traits that are low in immediate visibility such as emotional stability (Connelly and Ones, 2010).

Our finding on the meaningfulness of a relative contribution model to team composition against conventional approaches can also be of importance to practitioners. It supports suggestions that team-based organisations or founders looking for team partners or investors should not simply target complementarity or similarity when assembling teams (e.g., Mohammed et al., 2002). Instead, organisations, cofounders, or investors should look at every potential team member individually, rather than regarding teams as a holistic entity.

### 7.3 *Limitations and suggestions for future research*

Despite our contribution to the literature, we have to concede that there are limitations in our study that may be addressed in future research. First, our study has taken place in a specific context, that is, within technology and knowledge-based firms in the early and expansion stages, most of them operating in the ICT sector. While this focus enabled us to control for variations in industry, firm location, and age, our findings might not be generalisable to any other context. Future research should thus test whether these findings hold in different industries, countries, or stages of firm maturity. Future research may also take differences among start-up centres into account, for instance, the centres' embeddedness within local start-up ecosystems or clusters or the concrete support structures provided by them (cf., Spigel and Harrison, 2018; Busch and Barkema, 2020). While we would not expect such external factors to affect our study findings – which relate to team-*internal* functioning – these factors might affect further important outcomes such as firm growth or firm survival.

Second, while focusing on the comprehensive Big Five personality traits is undoubtedly useful as a starting point (Barrick et al., 1998), future research may aim to

identify the best fitting conceptualisations for other deep-level personality traits (e.g., orientation toward a team's functionality and the degree of shared mental models in a team; see Vanaelst et al., 2006) and other characteristics that members of the entrepreneurial team may contribute (e.g., functional expertise; see Ensley and Pearce, 2001).

Third, we also exclusively applied the performance of the entrepreneurial team as our dependent variable. Although this variable is considered very important and is well established in the relevant research literature (e.g., Bell, 2007), other measures of entrepreneurial outcomes (e.g., organisational performance) or processes (e.g., conflicts) used as a dependent variable might provide additional insights (Amason et al., 2006; Mohammed and Angell, 2004). To conclude, we are confident that our research has revealed promising opportunities for future comparative and complementary research on entrepreneurial team composition.

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**Notes**

<sup>1</sup>Data was collected as part of a larger research project that aims to better understand performance variations between young ventures and has also been used in Kollmann et al. (2017).

<sup>2</sup>In response to a comment from an anonymous reviewer, we additionally conducted White's test (White, 1980) to rule out that heteroscedasticity has been a threat in our regression analysis. The test was insignificant for all five models, indicating that heteroscedasticity has not been a major concern here. Nevertheless, we re-ran our regressions with robust standard errors (HC3 method; cf., Long and Ervin, 2000), which did not change the pattern or significance of the parameter estimates, thus indicating the robustness of our findings. Detailed analyses are available from the authors upon request.

<sup>3</sup>All Variance Inflation Factors were close to 1 and thus far below the threshold of 5 (Sheather, 2009), indicating that multicollinearity did not confound our comparative model testing.