“I am apt to show off”: exploring the relationship between entrepreneurs’ narcissism and start-up innovation

Simona Leonelli - Federica Ceci - Francesca Masciarelli

Abstract

**Purpose of the paper:** In start-ups, innovation strategies are influenced by the entrepreneur’s personality. We aim to investigate such influence by exploring how entrepreneurs’ narcissism affects start-ups’ innovation.

**Methodology:** We integrated survey data on a cross-industry sample of 115 Italian entrepreneurs with secondary data consisting of patents, economic and financial information from a public database. The survey uses the NPI-16 scale to measure entrepreneurs’ narcissism.

**Results:** Results showed a non-linear relationship between entrepreneurs’ narcissism and start-ups’ innovation: high and low levels of narcissism are detrimental to innovation. Moreover, we found a substitution effect between market dynamism and start-ups’ innovation; the higher the level of market dynamism, the more negative the effect of entrepreneurs’ narcissism on innovation.

**Research limitations:** Being based on an Italian sample, the study does not address the impact of narcissism in other cultures.

**Practical implications:** Our study identifies the mechanisms through which entrepreneurs’ narcissism affects start-ups’ innovation and explores how the market scenario affects the relationship between entrepreneurs’ narcissism and innovation.

**Originality of the paper:** We show that narcissism might be positive for firms and identify how entrepreneurs’ narcissism affects start-ups’ innovation. We demonstrate that market scenario affects the relationship between entrepreneurs’ narcissism and innovation, while also showing that contextual factors can reveal important contingencies. From a methodological viewpoint, we applied the Narcissistic Personality Inventory (NPI) scale to a sample of entrepreneurs. Previous work mainly used secondary data consisting of business reports and interviews, or employed the NPI in samples of MBA students.

Key words: narcissism; innovation; market scenarios; start-ups; entrepreneurship

1. Introduction

Innovation is crucial for enabling firms’ growth and survival because it enhances their ability to face competition, reduces production costs and creates dynamic capabilities (Dahlqvist and Wiklund, 2012; Eisenhardt and Martin, 2000). Start-ups are firms in the early stages of their life cycles, and their small size means that the entrepreneur is often both the founder and Chief Executive Officer (CEO) (DeTienne, 2010; Gatewood
et al., 1995), resulting in the so-called “founder-CEO duality” (He, 2008; Wasserman, 2003). Serving also as CEOs, these founders have formal and informal powers that allow them to devote the necessary resources to explore and implement promising ideas (Abebe and Alvarado, 2013). Previous literature suggests that a firm’s innovative performance is strongly influenced by the entrepreneur’s personality traits, i.e. extraversion, strategic orientation, and openness to experience (Baron and Markman, 2003; Kickul and Gundry, 2002; Marcati et al., 2008). Scholars have examined the relationship between psychological disorders and entrepreneurship (Wiklund et al., 2018), showing positive associations between entrepreneurship and dyslexia (Logan, 2009), bipolar traits (Johnson et al., 2018), ADHD (Wiklund et al., 2017), and mood disorders (Bogan et al., 2014). However, so far there is no empirical evidence on the relationship between narcissism and the firm’s innovative performance.

Drawing on the Upper Echelons Theory (UET), which underlines the importance of the top management team’s traits for firm performance (Hambrick and Mason, 1984), this paper explores how entrepreneurs’ narcissism affects start-ups’ innovation. We consider start-ups to be an ideal empirical context for our study because the entrepreneurs’ personality traits will have a direct impact on the start-ups’ structure and performance, since the entrepreneur is often the founder and the CEO of the firms in start-ups. Start-ups’ routines are less rigid, allowing the firms to adapt more quickly to changes in their operating environment (Bruderl and Schussler, 1990).

The most common definition of a narcissist is an individual who is arrogant, haughty and grandiose, considers him or herself superior and deserving of special treatment, requires admiration, lacks empathy, is authoritarian, takes advantage of others, and overestimates his or her abilities (Campbell et al., 2004; Chatterjee and Hambrick, 2007; Rosenthal and Pittinsky, 2006; Wales et al., 2013). Narcissism encompasses a broad range of entirely negative characteristics and every sort of self-absorbed and self-centered behavior. If the lack of self-knowledge and restraint prevail in the narcissistic leader, there is a danger of unrealistic goals which will be detrimental to the firm’s long-run performance (de Vries, 1994; Maccoby, 2003). However, Maccoby (2003) suggests that narcissism can be productive if it involves a desire to change the world, risk taking, independent action and the passionate and persistent independent pursuit of a strategy and a vision.

We focus on entrepreneurs’ narcissism for three main reasons. Firstly, narcissism (compared to the other personality traits referred to above) tends to prevail among top management, especially since the mid-1990s (Campbell and Campbell, 2009; Engelen et al., 2016; Grijalva and Harms, 2014). Secondly, it has been shown that the strategic choices of narcissistic CEOs differ systematically from those of non-narcissistic CEOs. This is because the former tend to engage in types of strategic actions that destroy the status quo ante rather than in incremental elaboration (Chatterjee and Hambrick, 2007). Thirdly, narcissistic individuals emerge as leaders within groups and are quickly perceived by others to be effective and influential (Engelen et al., 2016; Judge et al., 2006).
Klotz and Neubaum (2016, p. 11) “encourage entrepreneurship researchers to think deeply about what aspects of the entrepreneurial context (i.e., extreme resource constraints or high market uncertainty) will activate certain dispositional tendencies in entrepreneurs”. In line with this, we analyze how some market scenarios can moderate the relationship between entrepreneurs’ narcissism and innovative performance.

We chose to analyze markets with different levels of concentration and dynamism, which affects entrepreneurs’ managerial discretion and the effects of their personality traits on firm-level outcomes (Engelen et al., 2014; Hambrick and Finkelstein, 1987). Market concentration refers to the degree of competition in one market (Jansen et al., 2006; Miller, 1987). Dynamic markets are linked to unpredictability and rapid change in a start-up’s environment (Dess and Beard, 1984; Duncan, 1972). In stable markets, there are fewer price wars and less competition, and firms have greater market power. Stable environments are characterized by minimal changes to customer preferences, technologies and competitive dynamics, while highly dynamic industries are characterized by a high rate of change, instability and decision uncertainty (Jansen et al., 2006; Sørensen and Stuart, 2000; Wallace and Baumeister, 2002).

We based our analyses on a cross-industry sample of 115 Italian entrepreneurs. Our results suggest that there is an inverted U-shaped relationship between entrepreneur narcissism and start-ups’ innovation. We considered the moderating effect of market conditions and showed that market concentration has no significant effect on the relationship between entrepreneurs’ narcissism and start-ups’ innovation. However, we found a substitution effect between market dynamism and start-ups’ innovation in relation to entrepreneurs’ narcissism.

Our study makes important contributions to research on innovation and narcissism. We investigate into the relationship between entrepreneurs’ narcissism and start-ups’ innovation. Previous work has only explored the relationship between narcissism and firm innovation in established firms (Wales et al., 2013).

Our contribution to the narcissism literature is twofold. Firstly, we show that narcissism might be positive for firms and identify the mechanisms through which entrepreneurs’ narcissism affects start-ups’ innovation. Secondly, we demonstrate that the market scenario affects the relationship between entrepreneurs’ narcissism and innovation and show that contextual factors can reveal important contingencies. From a methodological viewpoint, we differ from previous studies by measuring narcissism through the application of the Narcissistic Personality Inventory (NPI) scale to a sample of entrepreneurs. Previous work mainly used secondary data consisting in business reports and interviews (Chatterjee and Hambrick, 2007) or employed the NPI in samples of MBA students (Campbell et al., 2004).
2. Theoretical background and hypotheses

2.1 The Upper Echelons Theory

The Upper Echelons Theory (UET) claims that firm performance, organizational change, strategy, and structure are influenced by manager’s and entrepreneur’s experience and personal traits (Hambrick and Mason, 1984). The proposition underlying UET is that human has bounded rationality, that is the difficulty to access, process, and use information (Hambrick, 2007). Hambrick and Mason (1984) assert that, due to these difficulties, the CEOs’ cognitive bases and personality traits impact their abilities to discern (i.e., observe and distinguish the differences), percept (i.e., know reality through the elaboration of external stimuli) and interpret (i.e., give meaning through knowledge). As a result, the CEOs’ experience and personality traits impacted on the analysis of the situations they face and consequently on the strategic choices they make (Hambrick, 2007). Those strategic choices refer to the expensive investments that tend to alter the firm’s scope because they involve significant risks and are often used to make changes or adjustments to the firm strategy (Wang et al., 2016).

The first studies on UET mainly focused on the composition, characteristics, and behavior of top management teams; however, in recent years, greater attention has been paid to shedding light on how the traits of CEOs and the way they behave impact on strategic and organizational performance (Abatecola et al., 2013). The strategic and organizational outcomes that are most often investigated are diversification, innovation, international alliances and risk propensity or aversion (Abatecola et al., 2013; Carpenter et al., 2004; Finkelstein and Hambrick, 1996; Hambrick, 2007).

Moreover, following the suggestion of Hambrick and Mason (1984), previous studies examine observable characteristics of entrepreneurs as an indicator of their way of behaving (Abatecola and Cristofaro, 2019). Thus, demographic characteristics, such as age, culture, formal education and gender, are used for this purpose (Finkelstein and Hambrick, 1990; Miller and Shamsie, 2001; Westphal and Zajac, 1995). Other demographic characteristics are investigated to display the impact of CEO values (Berson et al., 2008), motivations (e.g., Wallace et al., 2010), cognitive styles (e.g., Miller et al., 1998), and risk propensity (e.g., Kraiczy et al., 2015) on firms performance. Despite the numerous studies that show the importance of CEO demographic characteristics, only recent studies have examined how the impact of non-visible characteristics, such as CEO personality, are related to firm performance (Wallace et al., 2010). The main personality traits that are commonly investigated are the Big Five (Sosik et al., 2012), core self-evaluation (Resick et al., 2009; Simsek et al., 2010), and hubris (Hiller and Hambrick, 2005; Li and Tang, 2010). However, only a few studies have considered the impact of narcissism (Chatterjee and Hambrick, 2007; Chatterjee and Hambrick, 2011; Nevicka et al., 2011; Zhu and Chen, 2015).
Start-ups need entrepreneurs with high levels of innovativeness, proactiveness and willingness to take risks to grow and survive (Piispanen et al., 2017; Wales et al., 2011). Narcissism is one such personal trait. Freud (1914) was the first to discuss narcissism yet he considered it a psychological disorder or pathology. Waelder (1925) suggested that narcissism is a personality trait and defined narcissistic individuals as condescending, absorbed by self-admiration, and prone to experience feelings of superiority and lack of empathy. In the present study, we consider narcissism as a personality dimension that can range between low and high levels, and we do not consider its extreme manifestations due to personality disorder (Emmons, 1987). In fact, we focus on the productive dimension of narcissism and, in line with Maccoby (2003), we define a narcissist a person with a precise vision of how to change the world; a person who acts independently and is competitive and a risk-taker; a person who pursues a vision with passion and perseverance and who has strategic intelligence. Previous papers mostly analyze the impact of entrepreneurs’ narcissism on the economic and financial performance of established firms, showing that narcissistic CEOs generally exhibit very positive or very negative performance (Chatterjee and Hambrick, 2007; Ham et al., 2018; Judge et al., 2006; Wales et al., 2013). A few recent papers have begun to tackle the relationship between narcissism and firm innovation. Gerstner et al. (2013) illustrate the role of CEOs’ narcissism in the context of radical organizational change by considering the adoption of technological discontinuities. They also consider the moderation effect of audience engagement on executive behavior, thus showing that when audience engagement is high, narcissistic CEOs will anticipate widespread admiration for their bold actions and will therefore invest in discontinuous technology. Finally, they consider the effect of executive personality on managerial attention, demonstrating that CEOs’ narcissism will influence top managers’ attention to discontinuous technology and this is reflected in the firm’s investments in the new technological domain. Zhang et al. (2017) focus on the relationship between the paradoxical traits of humility and narcissism and firm innovation in China. They show that humility and narcissism interact to enhance CEOs’ effectiveness in promoting firm innovation. Kashmiri et al. (2017) examine the relationship between CEOs’ narcissism and the firm’s innovation outcome. In particular, they show that firms that are led by narcissistic CEOs are likely to exhibit a higher rate of new product introduction and a greater proportion of radical innovation in their new product portfolios. However, all these studies focus on established firms, which are different from start-ups, firstly, because in established firms, which are generally very large, the figure of the founder and CEO are not the same person. Secondly, even if they do correspond, the distance between the personality of the decision-making figure and the action that should be undertaken is very high. In fact, the former relationship is mediated by the ideas and personality of the other members of the top management team and can also be influenced by the hierarchical levels that are present in the firm. Moreover, decision-making figures are
more likely to delegate decision authority (Graham et al., 2015). In contrast, in start-ups, which are very small and agile, the entrepreneur is often both the founder and the CEO, and his/her personality has a direct impact on the choices and strategic actions that he/she undertakes (DeTienne, 2010). This because there are very few members in the top management team, or there may not be a top management team, or there may not be any high hierarchical levels that mediate the above relationship. Finally, Smith and Webster (2018) suggest that grandiose narcissism indirectly influences innovation through adaptability (i.e. the emotional control of people in changing environments or in case of crises or ambiguous situations). However, they tested their hypothesis on undergraduate students and working adults, not on entrepreneurs. We therefore claim that there is no empirical evidence of the relationship between narcissism and start-ups’ innovative performance.

To explore the role of narcissism in enabling innovation, we identified three mechanisms through which narcissism works: (i) the charisma effect; (ii) the visionary effect; and (iii) the autocratic effect. The charisma effect helps the narcissist to raise capital easily and to obtain reassurance and support from followers. For example, when a narcissist pitches an idea to an investor or to his or her peers, this is invariably rewarded with agreement and support even if it is not particularly outstanding (Goncalo et al., 2010). The audience (e.g., investors) is convinced and reassured by the narcissistic entrepreneur’s personal capability (Elsbach and Kramer, 2003; Grijalva and Harms, 2014). This support and the extra financial input in particular, is fundamental in enhancing innovation. Moreover, the charisma effect inspires team members; entrepreneurs intrinsically motivate peers or employees to search for new approaches, solutions and creative ideas (Jung et al., 2003; Keller, 2006; Obschonka and Fisch, 2018; Sosik et al., 1998). However, the charisma effect reaches a turning point when its positive effect turns negative. In particular, risk tolerance and persuasiveness can turn into manipulative behavior, which is detrimental to innovation because being pushed towards a new idea might be negatively perceived by peers and employees, and therefore discourage their innovative activity (Mura et al., 2013). Further, enthusiastic and entertaining behavior can become attention-seeking behavior that distracts both the entrepreneur and the organization from their mission. There is evidence suggesting that narcissists capable of charming their followers become addicted to their devotion and their desire for approval fosters a distortion of reality in order to prolong their “high” (Chamorro-Premuzic, 2012). Finally, extreme creativity, which is revealed when the charismatic effect is exhausted, can allow narcissistic entrepreneurs to think and act in an eccentric manner that can threaten their effective pursuit of business goals (Vergauwe et al., 2018).

The visionary effect refers to how narcissistic entrepreneurs see the future and perceive opportunities. Generally, narcissistic people, since they are creative, are effective at devising novel solutions to complex problems and do not envisage any difficulties (Goncalo et al., 2010). Narcissistic entrepreneurs have a clear vision, which they pursue at any cost; according to Sosik et al. (1998), a clear and challenging vision enhances the creative
and innovative output of peers and employees. However, the visionary effect can become negative because high levels of narcissism do not allow for any cessation of entrepreneurs’ idea generation. This is detrimental, especially for start-ups, because they need to focus on a single innovative project and too many ideas result in blocked and delayed decisions (Hyytinen et al., 2015; Talaulicar et al., 2005). Moreover, if the ideas of a highly narcissistic entrepreneur are at odds with the start-up’s vision, these efforts will focus on different objectives and not on the well-being of the new firm (Maccoby, 2003).

Finally, the autocratic effect refers to the tendency of narcissistic entrepreneurs to act independently and impose their views; a limited form of authority is good for collaborators and employees because it promotes safety and protection. There is evidence that shows that to improve innovation, autonomy should be under managerial control, meaning that managing the interactive relation between autonomy and control is fundamental in improving innovation and also important for controlling employees’ motivation and self-esteem (Feldman, 1989; Volmer et al., 2012). However, in this case as well, there is a turning point, in that the higher the level of narcissism, the greater the authority that is exercised, and there is evidence suggesting that high levels of authority, that is, centralization of decisional power, are detrimental to innovation (Damanpour, 1991). The entrepreneur’s role is certainly fundamental for start-up growth, but collaboration, knowledge sharing and trust facilitate decision-making and eventual innovation (Talaulicar et al., 2005).

Based on the above, we propose a non-linear (inverted-U shaped) relationship between narcissism and innovation. In particular, at low levels of narcissism we expect this relationship to be negative; at medium levels we expect it to be positive; and at high levels we expect it to become negative again. For these reasons, we hypothesize that:

Hypothesis 1 ($H_1$): Entrepreneurial narcissism is curvilinearly (inverted U-shape) related to start-up innovation.

2.3 The moderating role of market concentration and market dynamism

The industry is the setting where firms compete and make strategic choices (Yamak et al., 2014). According to the UET, there are some forces inside the industry that may impact on the relationship between CEOs’ traits and firm performance. According to Wangrow et al. (2015), the environment alters managerial discretion and this is why managers have substantially differing roles in affecting organizational performance across industries. Managerial discretion is the latitude of managerial action that is available to a decision-maker in a given situation (Hambrick and Finkelstein, 1987). Therefore, higher managerial discretion gives CEOs a wider range of options (Campbell et al., 2012) and, at the same time, a greater latitude of action (Hambrick and Abrahamson, 1995). Because CEOs’ goals are to sustain and improve firm performance and effectiveness (Barker et al., 2001), it is interesting to investigate the dimensions that could constrain or favor CEOs’ influence on organizational outcomes.
Finkelstein (2009) identifies three industry dimensions that impact on the above relationship: complexity, instability (dynamism), and munificence. In this paper, we focus on the impact of the first two dimensions.

In this work, we investigate the first element, industry complexity, by analyzing the market concentration. Market concentration refers to the degree of competition in a single market (Jansen et al., 2006; Miller, 1987). Concentrated markets can affect new entrants’ chances of survival due to the associated significant competition (Burke et al., 2007). Firms in concentrated markets have higher margins and are protected by higher barriers to market entry (Hambrick and Finkelstein, 1987; Jansen et al., 2006; Matusik and Hill, 1998). Entrepreneurs with new ventures need to be capable of organizing new, flexible combinations of complementary competencies and exploiting opportunities to cooperate with other (both new and mature) firms in the market (Vickery and Wurzburg, 1996). According to Wangrow et al. (2015), highly concentrated and highly regulated markets, as well as powerful external forces such as competitors, suppliers, and buyers, may limit managerial discretion. However, narcissists are more sensitive to context, particularly in interactive settings where they have the opportunity to demonstrate their superior performance to others and be acclaimed by their audience (Nevicka et al., 2011). A highly concentrated market allows the entrepreneur to demonstrate his or her abilities to competitors (Engelen et al., 2016). In addition, motivating and partnering facilitate innovation in concentrated markets by promoting the forging of strategic alliances and persuading competitors to collaborate in the pursuit of a common goal (Dess and Lumpkin, 2005; Wallace and Baumeister, 2002). We can hypothesize a complementarity effect between market concentration and entrepreneurs’ narcissism to explain start-ups’ innovation according to which, in the presence of a given level of entrepreneur narcissism, higher market concentration will lead to more innovation. We hypothesize that:

Hypothesis 2 (H2): The inverted-U-shaped relationship between entrepreneur narcissism and start-up innovation is stronger in more concentrated markets compared to less concentrated markets.

Dynamic markets are linked to unpredictability and rapid change in the start-up’s environment (Dess and Beard, 1984; Duncan, 1972). Stable environments are characterized by minimal changes to customer preferences, technologies and competitive dynamics, while highly dynamic industries are characterized by high rates of change, instability and decision uncertainty (Jansen et al., 2006; Sørensen and Stuart, 2000; Wallace and Baumeister, 2002). Previous studies on UET have emphasized the role of environmental dynamism and its impact on performance (Henderson et al., 2006; Wallace et al., 2010). According to Ensley et al. (2006), start-ups in dynamic environments can achieve high levels of innovation if their entrepreneurs do not want to stand out from the crowd and are able to motivate the firm’s employees to work together towards a common goal. Dynamic environments that require extraordinary commitment, focus and effort are well-suited to entrepreneurs who are able to recognize the possible gains of sharing responsibility and rewards with peers.
In a context characterized by high market dynamism, we expect the relationship between entrepreneurs’ narcissism and innovation to be less productive than in a context of low market dynamism. An entrepreneur with an high level of narcissism motivates and reassures peers and employees while facing high levels of uncertainty in the environment; however, too much security and calmness are not conducive to rapid reactions to market changes and market evolution and can therefore penalize innovation (Baron and Tang, 2011; Judge and Piccolo, 2004). Moreover, independent and systems thinking grants the entrepreneur a high level of discretion in a context of unpredictable outcomes, limited availability of information and uncertainty (Baron and Tang, 2011; Gupta et al., 2004; Judge and Piccolo, 2004); in this case, increased innovation will require team work and the sharing of credit and rewards.

These arguments suggest a substitution effect between market dynamism and the relationship between entrepreneurs’ narcissism and innovation, according to which, in the presence of a given level of entrepreneur narcissism, higher market dynamism will lead to lower levels of innovation. Thus, we hypothesize that:

**Hypothesis 3 (H₃):** The inverted-U-shaped relationship between entrepreneur narcissism and start-up innovation is stronger in less dynamic markets compared to more dynamic markets.

The research model depicted in Figure 1 illustrates the core components of the study and how they are related.

![Fig. 1: Research model](image)

Source: Our elaboration

### 3. Methodology

#### 3.1 Sample and data collection

The data for the analysis consists of survey data and secondary data from a public database, which increases external validity. Our sample is composed of Italian start-ups. The survey data were collected via a questionnaire. The first section in the survey includes the 16 items of the...
NPI-16 scale to measure entrepreneurs’ narcissism (Ames et al., 2006). The original NPI-16 is in English and we employed a rigorous back-translation technique (Brislin, 1980) to ensure its accurate translation into Italian. The second section asks respondents for personal details such as the entrepreneur’s name, age, sex and number of owned firms. We selected start-ups that were listed in the business register of Italian Chambers of Commerce and founded between 2012 and 2015, thus leading to an initial sample of 495 firms.

We contacted the start-up entrepreneurs through two channels. For those registered on LinkedIn, we used our own personal LinkedIn profiles to introduce ourselves and the study: 391 entrepreneurs (79%) responded to our invitation. We sent these 391 entrepreneurs a link to the electronic survey on levels of narcissism. In the case of those with no LinkedIn profile, we contacted them via Facebook or their personal e-mail address. We received 120 responses, 2 incomplete questionnaires, 3 which were anonymous, which meant that we could not link their responses to start-up innovation. We thus obtained 115 usable questionnaires, with a response rate of 23.23%. The survey was administered between January and November 2016; afterwards, we sent three follow-up reminder emails.

Economic and financial information were collected from the Aida database, which is a Bureau Van Dijk database that contains comprehensive information on firms in Italy. Aida data allow the research, consultation, analysis and processing of the financial information, accounts and business of all joint stock companies operating in Italy. We defined each industry using the two-digit ATECO code.

3.2 Measures

Our dependent variable, i.e. innovation, was derived from a different database in order to avoid common method bias. We used secondary data from the Italian register of patents. According to Shan et al. (1994), patents are an excellent measure of innovation. We decided to use a dummy variable because start-ups generally have small numbers of patents. Thus, if the value is 1 the start-up has one or more patents and zero otherwise.

We constructed the three independent variables, i.e. narcissism, market concentration and market dynamism, as follows. We measured narcissism using the 16-item NPI-16 scale that was developed by Ames et al. (2006) in the five-point Likert scale version (see Gentile, 2013). We conducted a Confirmatory Factor Analysis on the NPI-16 to create a measure for narcissism. To provide an indication of the reliability of our measure of entrepreneur narcissism, we computed Cronbach’s Alpha to check the correlation between observed and true values. Cronbach’s Alpha is equal to 0.86, above the widely accepted threshold of 0.70 (Nunnally and Bernstein, 1994).

We measured market concentration using the Herfindahl index. The formula is $H = \sum_{i=1}^{n} S_i^2$, where $S$ represents the revenue market share and $i$ is the index for the individual firm. Data were gathered from Aida and the Herfindahl index was calculated for each industry in the final sample ($\mu=1.073$, $\sigma=3.181$).
Market dynamism was calculated considering the standard deviation of the annual industry (2-digit ATECO code) sales growth rate (Barelds and Dijkstra, 2010). Data for the previous four years were gathered from Aida (μ=0.063, σ=0.096).

We adopted a multilevel control as control variables. At the firm level, we used the start-up's initial capital, age, number of founders and total number of employees. At the individual level we checked the entrepreneur's age, education and previous experience of entrepreneurship. See Appendix A for more information on the control variables.

4. Results

Table 1 presents the means, standard deviations, and Spearman's correlations for the continuous and categorical variables. We checked for multicollinearity by using two important measures: tolerance and the Variance Inflation Factor (VIF). If the variables had all been completely uncorrelated to one another, tolerance and VIF would have both been 1. In our case however, they were close to 1.

Tab. 1: Descriptive statistics and correlation (N=115)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrepreneurs' narcissism</td>
<td>-0.000</td>
<td>0.929</td>
<td>1</td>
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<td></td>
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<td></td>
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<tr>
<td>Market concentration</td>
<td>1.055</td>
<td>3.156</td>
<td>0.189**</td>
<td>1</td>
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<td></td>
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<tr>
<td>Market dynamism</td>
<td>0.062</td>
<td>0.096</td>
<td>-0.187**</td>
<td>-0.776***</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>Start-up initial capital</td>
<td>3.443</td>
<td>0.993</td>
<td>0.060</td>
<td>0.014</td>
<td>-0.046</td>
<td>1</td>
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<tr>
<td>Start-up age</td>
<td>3.817</td>
<td>0.601</td>
<td>0.053</td>
<td>0.243*</td>
<td>-0.284**</td>
<td>0.127</td>
<td>1</td>
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<tr>
<td>Start-up number of founders</td>
<td>2.383</td>
<td>1.405</td>
<td>-0.118</td>
<td>-0.011</td>
<td>0.051</td>
<td>0.200**</td>
<td>0.120</td>
<td>1</td>
<td></td>
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<tr>
<td>Start-up total number of employees</td>
<td>1.139</td>
<td>0.457</td>
<td>-0.111</td>
<td>-0.223**</td>
<td>0.236*</td>
<td>0.194*</td>
<td>-0.138</td>
<td>0.017</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>Entrepreneur age</td>
<td>3.704</td>
<td>0.936</td>
<td>-0.105</td>
<td>0.020</td>
<td>0.041</td>
<td>0.251**</td>
<td>-0.230</td>
<td>0.033</td>
<td>0.098</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Entrepreneur level of education</td>
<td>3.043</td>
<td>1.252</td>
<td>-0.008</td>
<td>0.149</td>
<td>-0.071</td>
<td>0.065</td>
<td>0.191**</td>
<td>0.281***</td>
<td>0.075</td>
<td>-0.063</td>
<td>1</td>
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* p<0.1, ** p<0.05, *** p<0.01

Source: Our elaboration

Since our dependent variable is a dummy variable, we employed logistic regression. Table 2 presents these findings. Model 1 includes the control variables and Model 2 adds the linear and quadratic terms of entrepreneur narcissism. Models 3a and 3b respectively add the effect of market concentration and of market dynamism to Model 2. Models 4a and 4b examine the moderating effects of market concentration and market dynamism on the relationship between entrepreneur narcissism and start-up innovation.
Table 2: Results of regression analyses (N=113)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3a</th>
<th>Model 3b</th>
<th>Model 4a</th>
<th>Model 4b</th>
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<tbody>
<tr>
<td><strong>Control Variables</strong></td>
<td></td>
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<tr>
<td>Start-up initial capital &amp; 0.481 &amp; 0.787** &amp; 0.732* &amp; 0.843** &amp; 0.827* &amp; 0.870*</td>
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<tr>
<td>Start-up age &amp; 0.848 &amp; 1.325 &amp; 1.157 &amp; 0.934 &amp; 1.045 &amp; 0.563</td>
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<tr>
<td>Start-up number of founders &amp; 0.108 &amp; 0.026 &amp; 0.046 &amp; 0.040 &amp; -0.003 &amp; 0.059</td>
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<tr>
<td>Start-up total number of employees &amp; 0.722 &amp; 0.300 &amp; 0.546 &amp; 0.379 &amp; 0.489 &amp; 0.718</td>
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<tr>
<td>Entrepreneur age &amp; 0.042 &amp; 0.112 &amp; -0.007 &amp; -0.003 &amp; -0.081 &amp; -0.132</td>
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<tr>
<td>Entrepreneur level of education &amp; 0.296 &amp; 0.152 &amp; 0.242 &amp; 0.105 &amp; 0.324 &amp; 0.357</td>
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<tr>
<td>Entrepreneur previous experience &amp; -0.287 &amp; -0.236 &amp; -0.057 &amp; -0.320 &amp; -0.040 &amp; 0.010</td>
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<tr>
<td><strong>Main effects</strong></td>
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<tr>
<td>Entrepreneur narcissism &amp; -0.897* &amp; -0.901* &amp; -1.018* &amp; -2.149** &amp; -14.110**</td>
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<tr>
<td>(Entrepreneur narcissism)² &amp; -1.668** &amp; -1.531** &amp; -1.480** &amp; -2.399** &amp; -7.028**</td>
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<tr>
<td>Market concentration &amp; 0.180** &amp; 0.187** &amp;</td>
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<tr>
<td>Market dynamism &amp; -1.040* &amp;          &amp;</td>
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<tr>
<td><strong>Two-way interactions</strong></td>
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<tr>
<td>Market concentration x Entrepreneurs’ narcissism &amp; 0.308**</td>
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<tr>
<td>Market concentration x (Entrepreneurs’ narcissism)² &amp;</td>
<td>0.114</td>
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</tr>
<tr>
<td>Market dynamism x Entrepreneurs’ narcissism &amp;</td>
<td></td>
<td>-23.270**</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Market dynamism x (Entrepreneurs’ narcissism)² &amp;</td>
<td></td>
<td></td>
<td>-8.560*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR Chi²</td>
<td>11.40* &amp; 20.26** &amp; 26.76*** &amp; 25.50*** &amp; 33.46*** &amp; 37.91***</td>
<td></td>
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<tr>
<td>Pseudo R²</td>
<td>0.105 &amp; 0.187 &amp; 0.247 &amp; 0.235 &amp; 0.308 &amp; 0.349</td>
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</tbody>
</table>

*p < 0.10, ** p < 0.05, *** p < 0.01

Source: Our elaboration

Model 2 shows that entrepreneur narcissism has both a significant negative linear effect (β=−0.897, p < 0.1) and a significant negative quadratic effect (β=−1.668, p < 0.05) on start-up innovation. This confirms Hypothesis 1, i.e. that entrepreneur narcissism is curvilinearly related to start-up innovation. To ensure an accurate interpretation of the results, the significance of the inverted U-shaped relationship was assessed by following the three-step procedure proposed in Lind and Mehlum (2010). First, we tested the joint significance of the direct and squared terms of narcissism using the Sasabuchi (1980) inverted U-shape test. Second, we checked whether the slope was sufficiently steep at both ends of the data range; we observed that (i) the effect of entrepreneur narcissism on start-up innovation does not increase at low values of entrepreneur narcissism, and (ii) the effect of entrepreneur narcissism on start-up innovation does not decrease at high values of entrepreneur narcissism. Third, we estimated the extreme point of the effect of entrepreneur narcissism and calculated confidence intervals based on Fieller’s standard error and the Delta method (Lind and Mehlum, 2010).
The confidence intervals for both Fieller’s standard error and the Delta method indicated that entrepreneurs’ narcissism values are within the limits of the data. Table 3 shows that the inverted U-shaped relationship is significant. As a final robustness check, Model 1 includes the cubic term of entrepreneur narcissism to ensure that the quadratic term is of the highest significant to determine the shape of the relationship between entrepreneur narcissism and start-up innovation (results not reported here). However, its inclusion produced no significant results.

Tab. 3: Test of an inverted U-shaped relationship between Entrepreneurs’ Narcissism and Start-ups’ innovation

<table>
<thead>
<tr>
<th>Source: Our elaboration</th>
</tr>
</thead>
</table>

| Sasabuchi test for inverse U shape | 1.69 |
| Slope at \( X_l \) | \( \hat{\beta} + 2\hat{\gamma}X_l = 7.658 \) (2.333) ** |
| Slope at \( X_h \) | \( \hat{\beta} + 2\hat{\gamma}X_h = -59.353 \) (1.694) ** |
| Extremum point | \( -\hat{\beta}/(2\hat{\gamma}) = -1.004 \) |
| 95% confidence interval, Fieller method | (-2.067; -0.675) |
| 95% confidence interval, Delta method | (-1.292; -0.717) |

Robust standard errors in parenthesis and p-values in square brackets.

Figure 2 plots the inverse U-shaped effect and shows that both very low and very high levels of narcissism are detrimental to start-ups’ innovation, while medium levels of narcissism enhance innovation.

Fig. 2: The nonlinear relationship between entrepreneurs’ narcissism and start-ups’ innovation

Source: Our elaboration
Model 3a shows a significant positive relationship between market concentration and start-up innovation ($\beta=0.180$, $p < 0.05$). This is in line with the frequent finding on the relationship between a more concentrated market and innovation. In particular, it helps small firms to innovate and increase their innovative output because this small size allows these start-ups to react quickly to market demand (Bhattacharya and Bloch, 2004; Van Dijk et al., 1997).

This is an opportunity for small firms to obtain a share of potential market power through innovation (Lind and Mehlum, 2010).

Model 3b shows a significant negative relationship between market dynamism and start-up innovation ($\beta=-1.040$, $p < 0.1$). In line with Ensley et al. (2006), start-ups achieve high levels of innovation in dynamic markets, depending on the entrepreneur’s traits. Entrepreneurs should be outward looking, dedicated and hardworking, characteristics that can transform dynamism from being a threat to being an opportunity for a start-up.

Model 4a shows that market concentration has a non-significant moderating effect on the relationship between the quadratic term of entrepreneur narcissism and start-up innovation. Thus, the complementarity effect between market concentration and the predicted relationship between entrepreneur narcissism and innovation is not confirmed by our data; Hypothesis 2 is therefore rejected.

Hypothesis 3 refers to the moderating role of market dynamism on the effects of entrepreneur narcissism.

Model 4b shows that the first-order interaction between market dynamism and entrepreneurs’ narcissism negatively ($\beta = -23.270$, $p < 0.05$) affects start-up innovation, and the second-order interaction is related negatively ($\beta = -8.560$, $p < 0.10$) to start-up innovation, which indicates that market dynamism weakens the effect of entrepreneur narcissism on start-up innovation (Aiken and West, 1991).

This confirms the presence of a substitution effect and the fact that market dynamism negatively moderates the relationship between entrepreneur narcissism and innovation.

To gain further insight into the interaction effects predicted in Hypothesis 3, we followed the procedure in Aiken and West (1991) to decompose the interactive terms and, following Dawson (2014), we plotted the interaction effect to facilitate interpretation (Figure 3). In the test, we split market dynamism into two groups, low ($10^{th}$ percentile) and high ($90^{th}$ percentile), and estimated the effect of entrepreneur narcissism on start-up innovation for both levels. Figure 3 shows a shift in the turning point of the U-shape toward the left-hand side (Haans et al., 2016); this means that in industries with low annual sales growth, high levels of entrepreneur narcissism are associated to a higher probability of patent ownership, compared to high-sales growth industries.
5. Discussion and conclusions

This study investigated the relationship between entrepreneurs’ narcissism and start-ups innovation and how this varies with the industry context (i.e., market concentration and dynamism). We found support for the hypothesis that the relationship between entrepreneur narcissism and innovation is curvilinear (inverted U-shaped); thus, both low and high levels of narcissism are detrimental to start-up innovation, while medium levels of narcissism can increase innovation in new ventures. In terms of the moderating effect of market conditions, we found that market concentration does not have a significant effect on the relationship between entrepreneur narcissism and start-up innovation, but that market dynamism has an important, significant and negative effect on this relationship. In fact, when market dynamism is high, the relationship between entrepreneur narcissism and innovation is weaker than in the case of low market dynamism.

Our contribution to the literature is twofold. First, we examined unobservable entrepreneur traits. The previous studies investigating the link between CEOs’ traits and the firm’s innovation are focused on CEOs’ age, tenure, and functional background (Finkelstein and Hambrick, 1990; Miller and Shamsie, 2001; Westphal and Zajac, 1995). Only a few papers underline the importance of the personality traits of the CEOs and their impact on the firm’s innovation, but they rather generally consider established firms (Gerstner et al., 2013; Kashmiri et al., 2017; Zhang et al., 2017). We fill in these research gaps by investigating entrepreneurs’ personality traits, and focusing on the founder-CEOs’ duality, as well as their influence on the firm’s innovation - particularly in new and small ventures. This is because, in a start-up, the entrepreneur acts as founder-CEO and has a centralized decision-making process, which provides a high level of control over decisions that are made in the firm.
Second, we demonstrated that the importance of the environment in affecting the impact of entrepreneur personality traits on start-up innovation in an effort to enrich previous research. We used a famous paradox to explain our contribution: the “right” people regularly end up in the “wrong” places (Navis and Ozbek, 2016). Therefore, in order to benefit from narcissism, firms that are run by entrepreneurs with medium levels of narcissism should be located in less dynamic markets. Our results show that in the case of high levels of market dynamism, the relationship between entrepreneurs' narcissism and innovation is weaker than those in which the levels of market dynamism are low.

Our findings have some practical implications for the founders-CEOs entrepreneur of start-ups. They should understand how to develop the self-knowledge that is needed to be successful in business and they should realize the importance of forming teams composed of individuals with different and complementary personalities and strengths. Moreover, they should consider the main features of the market in which they operate because innovation can increase or decrease based on the moderating effect of these features on the entrepreneur's personality traits.

Entrepreneurs with high levels of narcissism should be aware that the environment will affect the outcomes of their start-ups: for instance, if the new venture is in a very dynamic market, narcissistic entrepreneurs should curb this personality trait or find a trusted colleague who will help to keep them rooted in reality (Maccoby, 2000). The second practical implication is for executive coaches, principally in helping them develop higher education and teaching methods. We hope that this study will help them to establish a developmental and situational view of narcissism. Although individual traits are relatively stable, life changes or role transitions can change self-views or behavioral tendencies (Caspi et al., 2005; Zhang et al., 2017).

According to Hoyle (2013), individuals can regulate their cognitions, motivations or behaviors when the situation requires it; therefore, coaches can consciously train entrepreneurs to adopt complementary cognitions, motivations and behaviors when necessary. Moreover, to foster innovative propensity, executive coaches should encourage individuals with a high creative inclination to apply and organize their ideas so as to apply them in the new business, while less creative individuals should be challenged to think outside of the box.

The present study has some limitations that suggest avenues for further research. Our results are based on an Italian sample, so the study does not address the impact of narcissism in other cultures. Second, the paper focused on innovation and ignored the relationship between entrepreneurs’ narcissism and other measures of performance. Future research could consider the relationship between narcissism and business internationalization or capital raising. Finally, it would be worth investigating how entrepreneurs’ narcissism influences or is influenced by other members of the work team.
References


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GENTILE B. (2013), *Investigating alternative response sets with the Narcissistic Personality Inventory: Validation of a new Likert version*, (Doctoral dissertation), University of Georgia.


### Appendix A: Control variables description

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Type</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start-up initial capital</td>
<td>Multinomial variable</td>
<td>1= from 1€ to 5,000€; 2= from 5,001€ to 10,000€; 3= from 10,001€ to 50,000€; 4= more than 50,001€</td>
<td>Aida and Italian register of innovative start-ups</td>
</tr>
<tr>
<td>Start-up age</td>
<td>Continuous variable</td>
<td>Reference year 2017</td>
<td>Aida</td>
</tr>
<tr>
<td>Start-up number of founders</td>
<td>Continuous variable</td>
<td>Number of founders</td>
<td>Aida</td>
</tr>
<tr>
<td>Start-up number of employees</td>
<td>Multinomial variable</td>
<td>1= from 0 to 4 employees; 2= from 5 to 9 employees; 3= from 10 to 14 employees</td>
<td>Aida and Italian register of innovative start-ups</td>
</tr>
<tr>
<td>Entrepreneur age</td>
<td>Multinomial variable</td>
<td>1= less than 20 years old; 2= between 20 and 29 years old; 3= between 30 and 39 years old; 4= between 40 and 49 years old; 5= between 50 to 59 years old; 6= more than 60 years old</td>
<td>Survey</td>
</tr>
<tr>
<td>Entrepreneur level of education</td>
<td>Multinomial variable</td>
<td>1= high school; 2= bachelor's degree; 3= master's degree; 4= MBA; 5= PhD</td>
<td>Survey</td>
</tr>
<tr>
<td>Entrepreneur previous experience</td>
<td>Dummy variable</td>
<td>Did you manage or found other firms? 0= No; 1= Yes</td>
<td>Survey</td>
</tr>
</tbody>
</table>

Source: Our elaboration

### Academic or professional position and contacts

**Simona Leonelli**  
Research Fellow of Management  
University of “Gabriele d’Annunzio” Chieti-Pescara - Italy  
e-mail: simona.leonelli@unich.it

**Federica Ceci**  
Associate Professor of Management  
University of “Gabriele d’Annunzio” Chieti-Pescara - Italy  
e-mail: f.ceci@unich.it

**Francesca Masciarelli**  
Associate Professor of Management  
University of “Gabriele d’Annunzio” Chieti-Pescara - Italy  
e-mail: f.masciarelli@unich.it