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Narcissism and Individual-level Workplace Outcomes

THESIS ABSTRACT

Marching over the world, the narcissism epidemic has spread in the workplace as well. Indeed, narcissism is now more present in the workplace than ever before due to the generational increase in narcissism and narcissists' prevalence in managerial positions. One implication of this trend is that being omnipresent and having power, narcissists are more likely to affect the lives of everybody of us. The research on narcissists in the workplace has generated a plethora of insights as well. However, while the research in management has mostly been focused on the dark side of a narcissistic personality (Back et al., 2013; Küfner et al., 2013; Rogoza et al., 2016; Rogoza et al., 2018), we expect that considering narcissism in the domain on training may contribute to the literature on positive implications of narcissism.

In order to address the following gap, in these three chapters, we are pursuing the following goals. First, we will construct and validate an Instagram-based unobtrusive measure of narcissism that can provide researchers with access to a broad audience and can help them to reach such groups as young adults or celebrities (Ch. 1). Second, we will empirically test the effect of trainers' and trainees' narcissism on training performance and training results and outline the mechanisms behind these relationships (Ch. 2). Finally, we will theorize how a narcissistic leader will affect the individual performance of his/her followers and why narcissism can have positive implications for an organization (Ch. 3).

We suggest that these three chapters may have the following contribution to the research.

Ch. 1, "Photos tell your story: Constructing and validating Instagram-based unobtrusive indicators of narcissism." First, we constructed and validated the two Instagram-based unobtrusive indicators of narcissism that can be used in future research. Second, we ran numerous studies in order to establish the validity and reliability of our unobtrusive measures; these measures should also have relatively high generalizability as can be applied towards each individual having an Instagram account but at the same time, may push forward the research on the narcissism of bloggers, celebrities, and other individual

prominent on Instagram. Finally, these measures can allow researchers to have relatively big samples as only 100 random photos are required.

Ch. 2, "Too good to train". Narcissism and Performance on the Training: Empirical Evidence from "The Biggest Loser" International." First, we found empirical support for the positive effect of the trainer's level of narcissism on training performance and results, thus contributing to the literature on the positive implications of narcissism. Second, we found empirical support for the negative relationship between a trainee's level of narcissism and training results. Finally, we outlined the mechanisms that underlie the relationship between trainers' and trainee's narcissism and training outcomes.

Ch. 3, "Narcissistic Leaders and Individual Performance of Their Followers: The Conceptual Model". First, we argued that a leader's narcissism positively affects the individual performance of followers in the short term, and negatively affects the individual performance of followers in the long term. We constructed a simple conceptual model that can be further empirically tested in future research. Moreover, we suggest that the proposed positive effect can extend the few literature on the positive implications of narcissism. Second, we outlined the possible mechanism for the proposed relationship and considered the narcissistic leader-follower relationship into role models' theoretical framework.

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Chapter 1

Photos tell your story: Constructing and validating an Instagram-based unobtrusive indicators of narcissism

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ABSTRACT

We argue that the use of unobtrusive measures would help to detect narcissists when traditional measures cannot be used and, in general, facilitate studying narcissism in young adults and celebrities. We introduce two Instagram-based unobtrusive indicators of narcissism, a three-dimensional indicator INUI (α=.6920) and a single-item indicator Face. We have found that both INUI (r=.3051, p=.0127) and Face (r=.3228, p=.0082) have acceptable convergent validity with NPI-40, acceptable test-retest reliability ($r \geq .7723$, $p < .0001$), and high inter-rater reliability ($\kappa \geq .9139$, $p < .0001$); we have found that Face has acceptable discriminant validity. Finally, we have confirmed that 100 random photos from an Instagram profile are enough to capture one's level of narcissism.

Key words: narcissism, unobtrusive indicator, self-report measure, structural equation modelling, Instagram.

Photos tell your story: Constructing and validating Instagram-based unobtrusive indicators of narcissism

INTRODUCTION

In the past two decades, the interest of researchers towards the construct of narcissism dramatically increased as increased the societal impart of narcissism in these years. In particular, several types of activities that had become popular across the population in recent years as excessive use of social media (McKinney et al., 2012; Panek et al., 2013; Davenport et al., 2014), blogging (Boklage, 2014), selfie-posting (Sorokowski et al., 2015; Weiser, 2015) were found to have a narcissistic nature. New generations of young adults were found to be more narcissistic than previous ones (Twenge & Foster, 2008). Several studies found that some of today's most popular celebrities (Young & Pinsky, 2006; Grijalva et al., 2019) and leaders (e.g., Watts et al., 2013) are narcissists.

Why should we care about narcissism becoming widespread? First of all, because narcissists impose a long-term cost for society and commons (Campbell et al., 2005). Indeed, we can already observe some of the negative consequences of the recent trends, as, for example, body image disturbance caused by narcissistic photos on social media (Meier & Gray, 2013) or risky strategies of corporations chosen by narcissistic CEOs (Chatterjee & Hambrick, 2007). However, this is still too early to recognize all the negative long-term consequences. One of the steps forward for having more evidence is to improve measurement strategy to better recognize narcissists and study them in detail.

Measuring narcissism has always been considered an important issue in the research on narcissism. Two main approaches emerged in the literature over time: measuring narcissism with self-report measures (Raskin & Hall, 1979; Emmons, 1987; Raskin & Terry, 1988; Ames et al., 2006; Gentile et al., 2013) and measuring narcissism with unobtrusive indicators (Chatterjee & Hambrick, 2011; Scrand & Zechman, 2012; Olsen et al., 2014; Zhu & Chen, 2015; Aktas et al., 2016; Rovenpor et al., 2016; Aabo & Ericksen, 2018; Ham et al., 2018; Grijalva et al., 2019). Whereas self-report measure of narcissism, NPI-40 (Raskin & Terry, 1988), appeared to be the most widespread measure of non-pathological narcissism (Ackerman et al., 2011), increased use of social media gave a fresh impetus to unobtrusive measures. Indeed, the most recent unobtrusive measures capture the level of the narcissism of

individuals via their LinkedIn (Aabo & Ericksen, 2018) or Twitter accounts (Grijalva et al., 2019).

In this research, we construct and validate new unobtrusive measures of narcissism that capture individuals' level of narcissism from their Instagram photos. We argue that introducing this measure may fill in the gap in extant research for the following reasons. First, Instagram is now considered as one of the most popular social networks (Khoros, 2018) that can provide access to a broader audience and can help to reach such groups as young adults or celebrities. Second, as Instagram being a picture-first platform, it provides more opportunities to capture individuals' levels of narcissism from their photos. The importance of using personal photos to measure narcissism was acknowledged and approved in previous studies (Chatterjee & Hambrick, 2007; Chatterjee & Hambrick, 2011; Scrand & Zechman, 2012; Olsen et al., 2014; Zhu & Chen, 2015; Aabo & Ericksen, 2018; Grijalva et al., 2019). Finally, Instagram can allow measuring narcissism not only at the individual but at different levels, as many organizations and groups (e.g., musical groups, brands) have their Instagram pages.

In this research, we used the sample of students (n_{max}=139) in order to construct and validate two Instagram-based unobtrusive indicators of narcissism – multidimensional INUI (Instagram-based narcissism's unobtrusive indicator) and unidimensional face. In order to establish INUI's face validity, we used three codification criteria – the presence of a face, exhibitionism, and interaction (which is equal to one if an individual interacts with others on the photo). We found INUI and face to have very high inter-rater reliability ($\kappa \geq .9139$, $p < .0001$), acceptable convergent validity ($r \geq .3$) with NPI-40, acceptable test-retest reliability ($r \geq .7723$, $p < .0001$), INUI to have acceptable internal consistency ($\alpha = .6920$, n=68), and face to have acceptable discriminant validity with Just World Scale ($r < .2$). We also confirmed that only 100 random photos from an Instagram profile are enough to capture the level of narcissism.

This paper is structured as follows. In the theoretical part, we considered existing approaches to measure narcissism. In the methodological part, we ran a number of studies to construct and validate our future unobtrusive indicators of narcissism. In Study 1, we checked whether our sample is homogeneous. In Study 2, we tested the inter-rater reliability of our codification rules, constructed a multidimensional Instagram-based indicator of narcissism

(INUI), introduced a unidimensional Instagram-based indicator of narcissism (face), and checked for correlation differences (between unobtrusive and self-report measures) in our sample. In Study 3, we confirmed that only 100 random photos from an Instagram profile are enough to capture someone's level of narcissism with INUI and face. Moreover, we tested the test-retest reliability of INUI and face. In Study 4, we tested convergent and discriminant validity of INUI and face.

THEORY: Approaches to measure narcissism

As in this study we will refer to the organizational literature, the measures of pathological narcissism – MMPI narcissism personality disorder scale (Morey et al., 1985), Hypersensitive Narcissism Scale (Hendin & Cheek, 1997), Narcissistic Grandiosity Scale (Rosenthal, Hooley, & Steshenko, 2007), Pathological Narcissism Inventory (Pincus et al., 2009), etc. – will not be considered in this research.

The two main approaches that have been commonly used in the literature to measure narcissism are (1) use of self-report measures and (2) use of unobtrusive indicators.

Insert Figure 1a about here

Self-report measures of narcissism. In short, all the measures of narcissism (**Figure 1a**) appear to be different versions of Narcissism Personality Inventory (NPI). In the course of time, NPI-measures followed the trend of becoming shorter, from the original version of 54 items to 37-40-items in 1987-1988, and to 13-16-items versions in 2006-2013.

NPI-52. All the NPI-measures derive from Narcissism Personality Inventory (Raskin & Hall, 1979). The original scale included 52 forced-choice items, that means a respondent should choose one out of two statements that describe him better. All the later versions of NPI are also n-item forced-choice questionnaires, for which the pairs of statements are taken from the original NPI-52 (NPI-37, NPI-40) or NPI-40 (NPI-16, NPI-13) questionnaires. NPI-52 was a unidimensional measure, so its items were not broken down into subscales. The alpha coefficients of NPI-52 ranged from .80 to .86 across several studies (Raskin & Terry, 1988).

NPI-37. The 37-item measure of narcissism (Emmons, 1987) was the first simplified version of the original NPI Inventory. Emmons found it to have satisfactory internal consistency, with Cronbach's alpha of .87. Another improvement of NPI-37 was that its items can be broken down into four subscales: Leadership/Authority, Superiority/Arrogance, Self-Absorption/Self-Admiration, and Exploitativeness/Entitlement.

NPI-40 (Raskin & Terry, 1988) is now considered as the most widespread measure of non-pathological narcissism (Ackerman et al., 2011; Ackerman et al., 2012). This measure includes 40 forced-choice pairs of statements (their sum represents overall level of

narcissism) that were originally broken down into seven dimensions: Authority (8 items), Self-Sufficiency (6), Superiority (5), Exhibitionism (7), Exploitativeness (5), Vanity (3), and Entitlement (6). However, this 7-dimensional structure is not the only possible, the issue of the factor structure of NPI-40 generated huge debate in the literature on narcissism. The latest version was offered by Ackerman et al. (2011) and included three dimensions: Leadership/Authority, Grandiose Exhibitionism, and Entitlement/Exploitativeness. According to Raskin & Terry (1988), the average NPI-40 score for the general population is equal to 15.55 (n=1018). According to Young & Pinsky (2006), the average score for celebrities is equal to 17.84 (n=186). The alpha coefficient for NPI-40 is equal to .83 (Raskin & Terry, 1988).

Although NPI-40 demonstrated high internal consistency and is recognized as "the most widespread measure used by non-clinical researchers" of narcissism (Ames et al., 2006, p. 440), several researchers noticed that it's lengthiness may limit its applicability. For example, Gentile et al. (2013) noticed that "with a length of 40 items this measure may not be ideal in settings in which time or participant attention may limit the types of measures that can be administered" (p. 1120). That's why the two shorter versions of NPI-40, NPI-16 (Ames et al., 2006) and NPI-13 (Gentile et al., 2013) were created in the following years.

NPI-16 (Ames et al., 2006) is a 16-item forced-choice measure of narcissism. Unlike NPI-40, NPI-16 is a unidimensional measure, so it cannot be broken down into subscales. Ames et al. (2006) considered NPI-16 as "tool that could expand scholarship on narcissism" (p.441) and hoped that it "will facilitate research where a longer measure would be impractical" (p. 441). NPI-16 is strongly correlated to NPI-40 ($r=.90$, $p<.01$, $n=776$) and it's alpha coefficient is equal to .72 (Ames et al., 2006).

NPI-13. Unlike NPI-16, NPI-13 (Gentile et al., 2013) is a multidimensional measure of narcissism, the three subscales – Leadership/Authority, Grandiose Exhibitionism, Entitlement/Exploitativeness – can be extracted from it. NPI-13 includes 13 pairs of forced-choice items. Gentile et al., (2013) considered NPI-13 as good in terms of its fit (alpha=.82 in Study 2, CFI=.931, SRMSR=.056, RMSEA=.059, $chi^2(62)=333.41$). NPI-13 is significantly and positively correlated to NPI-40 ($r = .87$, $p < .001$) and to NPI-16 ($r = .83$, $p < .001$). According to Gentile et al. (2013), "NPI-13 may be favoured over the NPI-16 because it

allows for the extraction of 3 subscales, consistent with the use of its parent measure" (p. 1120).

Insert Figure 1b about here

Unobtrusive indicators of narcissism. According to Webb & Weick (1979), the prevalence of self-report measures in organization research has several disadvantages. "Heavy prior reliance on self-report has excluded crucial populations from organizational inquiry, postponed cross-checking of propositions, inflated the apparent consequentiality of minor irritations in the workplace, and imposed a homogeneity of method which raises the prospect that the findings of the field are method-specific" (Webb & Weick, 1979, p. 658). Webb & Weick (1979) suggested that unobtrusive measures (**Figure 1b**) can be a good alternative to self-report and the use of them can improve the situation.

The first study that tried to measure narcissism with an unobtrusive indicator, was the study of Chatterjee & Hambrick (2007). In particular, they measured CEO's narcissism with 5-dimensional indicator: (1) prominence of CEO's photograph (equal to "four points if the CEO's photo was of him or her alone and occupied more than half a page; three points if the photo was of the CEO alone and occupied less than half a page; two points if the CEO was photographed with one or more fellow executives; and one point if there was no photograph of the CEO", p. 363); (2) CEO prominence in company press releases; (3) CEO's use of first-person singular pronouns; CEO relative cash (4) and non-cash (5) pay.

Chatterjee & Hambrick (2007) articulated their five dimensions with the four dimensions of NPI-37 (Emmons, 1987), and noticed that the correlations between all the five items are positive and significant ($p<.05$). Chatterjee & Hambrick (2007) also ran a confirmatory factor analysis and found their indicator to have a good fit (CFI=.94, RMSEA=.09, NNFI=.92, SRMSR=.05, alpha=.75).

In their upcoming research (Chatterjee & Hambrick, 2011), they slightly changed the indicator: at that point it had only four dimensions, they refused to use "CEO's use of first-person singular pronouns".

The indicator of Chatterjee & Hamrick was widely used in further research on CEO's narcissism in Management, Accounting, and Finance (Chatterjee & Hambrick, 2011; Scrand & Zechman, 2012; Olsen et al., 2014; Zhu & Chen, 2015; Aktas et al., 2016). However, these researchers not necessarily used the full version of the indicator. In particular, Zhu & Chen (2015) used both 4-item (2011) and 5-item (2007) versions of Chatterjee & Hambrick's indicator. Scrand & Zechman (2012) and Olsen et al. (2014) focused on the three dimensions: (1) prominence of CEO's photograph, CEO relative cash (2) and non-cash (3) pay. Aktas et al. (2016) considered only CEO's use of first-person singular pronouns in the transcription of the interviews.

Another indicator created to measure CEO's narcissism was Ham's et al. (2018) CEO's signature size. In contrast to Chatterjee & Hambrick (2007), they ran two validation studies and found their indicator to be correlated to NPI-16: the correlation was stronger in the first study ($r=.36$, $p<.01$) in comparison to the second one ($r=.23$, $p=.071$). The procedure of measuring the size of the signature was the following one: "a rectangle was drawn around each participant's signature, wherein each side of the rectangle touched the most extreme endpoint of the signature. The area consumed by the signature was then determined by multiplying the length and width (in centimeters) of the rectangle" (p. 240).

Other two groups of researchers (Aabo & Ericksen, 2018; Grijalva et al., 2019) used social networks to capture the level of narcissism.

Aabo & Ericksen (2018) in their paper capture CEOs' level of narcissism by using their Linkedin profiles. Their indicator include six dimensions: (1) number of skills added to "Skills and endorsements" section of Linkedin profile; (2) the number of professionals that the user is connected to on the Linkedin network; (3) the number of previous positions listed; (4) whether or not the picture is added to the Linkedin profile; (5) inclusion of a summary; (6) inclusion of interests. The first three indicators are continuous variables (then converted to continuous variables in a range of 0 to 1 by taking the $\log(x+1)$, whereas the last three are binary; the final indicator is equal to the sum of the six variables. The six specific indicators are also all highly and positively correlated ($.16\leq r\leq.58$, $p<.01$, $n=475$).

While all other researchers studied CEO's, Grijalva et al. (2019) constructed their indicator to measure the level of narcissism of NBA players, who can be considered as

celebrities. Grijalva et al. (2019) used the same approach as Aabo & Ericksen (2018): they also looked at social network but used Twitter in order to construct an unobtrusive indicator. The indicator included two dimensions: (1) narcissistic content of tweets and (2) narcissistic/non-narcissistic profile photos.

In order to calculate the first dimension, they randomly selected 134 tweets from each profile and asked their coders to evaluate these tweets as narcissistic or non-narcissistic basing on the definition of narcissism from "Diagnostic and Statistical Manual of Mental Disorders-IV". In order to calculate the second dimension, the researchers considered the photos "asserting physical dominance (e.g., flexing muscles) and/or displaying their bodies (e.g., shirtless) as narcissistic, and photos with family or friends as non-narcissistic. Both variables were binary, and agreement among coders was equal to 87%. Grijalva et al. (2019) also validated their indicator with NPI-40 ($r=.31$, $p<.01$).

The last indicator created by Rovenpor et al. (2016) is different from others as it is aimed to measure narcissism at the level of society rather than of an individual (Chatterjee & Hambrick, 2007; Chatterjee & Hambrick, 2011; Scrand & Zechman, 2012; Olsen et al., 2014; Zhu & Chen, 2015; Aktas et al., 2016; Aabo & Ericksen, 2018) or a dyad (Grijalva et al., 2019). Rovenpor et al. (2016) considered that belonging of literature bestsellers to DDC categories pertain to various aspects of self.

Why do we need Instagram-based indicator of narcissism. We suggest that if we'll construct and validate an unobtrusive Instagram-based indicator of narcissism, it will fill a certain gap in the present research by the following reasons.

First, the literature agreed that there is a link between social media activity and the level of narcissism (McKinney et al., 2012; Panek et al., 2013; Davenport et al., 2014). The researchers found that there is a strong positive correlation between the level of narcissism (measured with NPI-40) and particular types of social media behavior: status posting on Facebook (Panek et al., 2013; Davenport et al., 2014), tweeting (McKinney et al., 2012; Davenport et al., 2014), and having many Facebook friends (McKinney et al., 2012). Moreover, some individuals use social network accounts as blogs, and blogging is an activity with a narcissistic nature (Boklage, 2014).

Second, this insight had already been realized in the research on unobtrusive indicators of narcissism, as the most recent research on unobtrusive indicators of narcissism considered the use of social networks as an effective approach to capture someone's level of narcissism (Aabo & Ericksen, 2018; Grijalva et al., 2019). However, this research considered only the use of Twitter and LinkedIn but not of Instagram, nevertheless by the moment Instagram has outperformed the both Twitter and LinkedIn in terms of monthly active users – 800 million of Instagram to 317 of Twitter and 106 of LinkedIn in 2018 (Khoros, 2018).

Third, the researchers, who constructed unobtrusive indicators of narcissism, widely considered personal photos in order to derive his/her level of narcissism. For example, the researchers considered such characteristics of CEO's photos in annual reports as size, presence/absence of other individuals and presence/absence of CEO himself/herself (Chatterjee & Hambrick, 2007; Chatterjee & Hambrick, 2011; Scrand & Zechman, 2012; Olsen et al., 2014; Zhu & Chen, 2015). Moreover, narcissistic Twitter's profile pics (Grijalva et al., 2019) and the presence of photo in Linkedin profile (Aabo & Ericksen, 2018) were also considered as a signal of narcissism. As Instagram positions itself as photo- and video-sharing social networking service, and so contains a lot more graphical information about individuals, it is more likely to provide more opportunities to capture someone's level of narcissism and even to distinguish between different dimensions of narcissism.

For example, exhibitionism was considered as an important dimension of narcissism in different factor structures of NPI (Emmons, 1987; Raskin & Terry, 1988; Ackerman et al., 2011). After developing a list of criteria, we can code Instagram photos as exhibitionistic (or not) and by this means to capture someone's level of exhibitionism. The exact same thing seems easy to be realized on Instagram with its focus on graphic content, and much more difficult in other social networks as Twitter and LinkedIn.

Finally, an Instagram-based indicator can be free of several limitations present in extant indicators. The majority of indicators were constructed to study CEOs (Chatterjee & Hambrick, 2007; Chatterjee & Hambrick, 2011; Scrand & Zechman, 2012; Olsen et al., 2014; Zhu & Chen, 2015; Aktas et al., 2016; Aabo & Ericksen, 2018). Thus, they use specific sources of information (annual reports, interview scripts, relative pay) and are difficult to be adopted to other categories of individuals. As Instagram has a huge audience, an Instagram-

based indicator can be applied to a much more general audience than those adopted to CEOs. Moreover, Instagram-based indicator can be very helpful in studying particular categories of individuals, as, for example, young adults (Huang & Su, 2018) and celebrities, due to its popularity among these categories. Finally, as many companies, brands, Internet shops have their accounts on Instagram, an Instagram-based indicator can make it easier to measure narcissism at the levels different from the level of individual (e.g., Duchon & Drake, 2009; Grijalva et al., 2019).

METHOD

Procedure and participants. Our study was designed as an online survey and offered to either Bachelor or Master students of Bocconi University (Italy). Before the study was launched, it had received an "Ethical Approval Declaration" from Bocconi Ethics Committee.

Our sample is composed of 139 participants (detailed information about the participants is provided in **Table 1** and **Table 2)** with a mean age of 21.53. The majority of participants were Italians (*Italian* = 1, 57,55%), female (*male = 0*, 54,68%), and evaluated their level of English as advanced (*level of English =2*, 67,63%).

All survey participants automatically became participants of a lottery, where the prizes were four vouchers for 50-euro purchase in an online retailer. 41,01% of the participants were additionally offered a partial course credit (*no course credit=0*, n=57). In any case, participation in the survey was voluntary. Students were able and were allowed to drop the survey on every stage; those students who participated in the survey in exchange for the course credit were offered an alternative assignment in case they did not want to participate in our study.

For each group of students we conducted five minutes in-class presentation about the survey, informing them that the idea of our study is that "we can 'measure' somebody's personality looking at this person's profile in social networks" and that the goal of our study is to test our measure of "some personality characteristics". We did not specify that personality characteristic we are interested in is narcissism, but we mentioned it in line with other personality traits (agreeableness, neuroticism) when provided the examples of personality traits.

After the in-class presentation, students received an e-mail with the link to the online questionnaire and were invited to participate. The students were informed that, on average, they need 40 minutes to complete the survey.

Insert Figure 2 about here

The detailed information about the structure of the online survey is provided in **Figure 2**. The survey included 11 parts and 192 questions in total (in average, 17,45 questions per

part). Before starting the survey, participants were asked to agree with the rules of this study and with the rules of data privacy and management (if a participant did not accept any of them, he/she was directed to the page with the end message). At this initial step, we also included single-item self-esteem measure (Robins et al., 2001) to control whether the early drop was associated with the level of narcissism.

In general, the survey can be divided into three main parts: first, informed consent and identification; second, information about Instagram and Twitter activity; and third, psychological questionnaires. In the part "Instagram and Twitter Activity", students were asked to provide links to their Instagram and/or Twitter account. If a student provided neither a link on Twitter nor a link on his/her Instagram, this student was not able to visualize following parts of the survey containing psychological inventories and was directed to the final message of the survey. We considered participants who completed the "short version of our survey" (*Short version=1*, n=3) and those who dropped early (n=27) as those who did not complete the survey (*Incomplete survey=1*, n=30). Other participants (n=109, 78,42%) completed the full version of our survey. Moreover, we did not find the level of narcissism (measured by its proxy, *1-item self-esteem*) to be significantly correlated with the early drop (r=-.11, p=.19, n=139).

Measures. Our measures include two main categories – psychological questionnaires and Instagram and Twitter activity measures. A summary of descriptive statistics for all the variables is provided in **Table 1**, for categorical variables – in **Table 2**, alpha coefficients are provided in **Table 3**.

Insert Table 1 about here

Insert Table 2 about here

Insert Table 3 about here

Measures: self-report psychological measures. In order to establish convergent and discriminant validity of a future Instagram-based unobtrusive indicator, we included the following psychological questionnaires into our online survey (consult **Figure 2** for details). The measures of narcissism, self-esteem, personality, empathy, and self-monitoring were included in our survey to establish convergent validity of unobtrusive indicators of narcissism. Just World Scale was included in our survey in order to establish discriminant validity. In doing this we followed the approach of Ames et al. (2006), who used Just World Scale in order to establish discriminant validity of NPI-16, and did not found it to be significantly correlated with neither NPI-16 (r=.04, n=776) nor NPI-40 (r=.06, n=776).

Narcissism measures: NPI-40 and NPI-16. Narcissistic Personality Inventory (NPI-40, Raskin & Terry, 1988) is a 40-item self-report measure of trait narcissism. NPI-16 (Ames et al., 2006) is a 16-item self-report measure of trait narcissism, the short version of NPI-40. Both measures include pairs of forced-choice statements. We chose NPI-40 as it's considered as the most commonly used measure of non-pathological narcissism and NPI-16 as it's the most commonly used short version of NPI-40.

The average level of narcissism in our sample measured by NPI-40 (M=17.73, SD=6.57, α = .8174, n=118) seem to be higher than in Raskin & Terry's (1988) sample of college students (M= 15.55, n=1018). Indeed, the average score of narcissism in our sample is closer to the average level of narcissism in the sample of celebrities of Young & Pinsky (2006) (M=17.84, n=186). As our sample consists of young adults, we suggest that this idiosyncrasy of our sample is consistent with the generational increase in narcissism argued by Twenge & Foster (2008).

Regarding NPI-40, in this study we considered its original 7-dimensional factor structure (Raskin & Terry, 1988). According to this, NPI-40 include the following seven dimensions: Authority (M=5.05, SD=2.06, α =.70), Self-Sufficiency (M=2.41, SD=1.33, α = .30), Superiority (M=2.30, SD=1.46, α = .57), Exhibitionism (M=2.19, SD=1.74, α = .61), Exploitativeness (M=2.08, SD=1.37, α = .47), Vanity (M=1.15, SD=.94, α = .66), and Entitlement (M=2.41, SD=1.50, α = .52).

The average level of narcissism in our sample measured by NPI-16 (M=6.19, SD=3.19, α = .70) is consistent with that estimated by Ames et al. (2006) (M=.39, n=776).

Self-esteem measures: RSE and single-item measure of self-esteem. Rosenberg Self-Esteem Scale (RSE, Rosenberg, 1965) is a 10-item self-report measure of global self-esteem, which uses a 4-point Likert scale. Single-item measure of self-esteem (Robins et al., 2001) is a 1-item self-report measure of global self-esteem, which uses a 5-item Likert scale.

Personality: BFI Inventory and Hexaco Inventory. Big Five Inventory (BFI, John et al., 1991) is a 44-item self-report measure consisting of Big Five personality traits: Openness to experience, Consciousness, Agreeableness, Neuroticism, and Extraversion. BFI is answered on a 5-item Likert scale. Moreover, we included two subscales from Hexaco Personality Inventory (Hexaco PI, Ashton & Lee, 2009) to our survey – these scales are Honesty-Humility (10 items) and Extraversion (10 items). Hexaco PI uses 5-item Likert scale.

Empathy: IRI. Davis's Interpersonal Reactivity Index (Davis IRI, Davis, 1983) is a 28-item measure of general empathic tendencies consisting of four subscales – Personal Distress (PD), Fantasy Scale (FS), perspective Taking (PT), and Empathic Concern (EC). Items are evaluated on 5-item Likert scale.

Self-monitoring: self-monitoring scale. Self-monitoring scale (Lennox & Wolfe, 1984) is a 13-item self-report measure designed to assess the ability to modify self-presentation and sensitivity to others' expressive behavior. It uses 6-item Likert scale.

Belief in just world: Just World Scale. Just World Scale (Rubin & Peplau, 1973) is a 28-item self-report measure of belief in just world. Its items are evaluated on 6-item Likert scale.

Measures: Instagram and Twitter Activity. In this section we asked students to answer the following eight questions: whether they have an Instagram/Twitter profile, is their Instagram/Twitter profile private or open, what language do they use in their Instagram/Twitter profile, and whether they could provide us the link to their Instagram/Twitter profile. For those students, who allowed us to consider their Instagram accounts in our research, we collected the following data about their profiles: number of friends and following, number of postings, number of photo and video postings in the account. Throughout all the participants who answered to this question (n=138), 94,93% participants have an Instagram an Instagram account (*have Instagram* = 1, n=131), whereas 5,07% participants (*have Instagram* = 0, n=7) do not. 82,73% of participants provided the link

to their accounts (*Instagram link* = 1, n=115). In comparison, only 30.43% of our participants have Twitter accounts (have Twitter, n=42), confirming our premise that Instagram-based indicator would be more suitable to study narcissism across young adults.

We check each Instagram account twice (with an average gap of 77.52 days) in order to know the following information: whether the account was deleted between the first and the second check date (*deletion*=1, n=9) and whether its privacy was changed (*change of privacy*=1, n=13). We considered the change either from open to private (*change to private*=1, n=8) or from private to open (*change to open*=1, n=5) as a privacy change. However, the majority (87.74%) of accounts did not change their privacy and were open (*always open* = 1, n=53) or private (*always private* = 1, n=40) at both check dates.

Considering the both open and private accounts (n=108), each Instagram profile in our sample included in average 137,4 postings ($postings_{min}$=0, $postings_{max}$ =563), 605,17 followers ($followers_{min}$=1, $followers_{max}$=5311), and 440,94 followings ($followings_{min}$=0, $followings_{max}$=1509). The average followers-to-followings ratio was equal to 1,31. However, the number of followings was greater than number of followers in 70 profiles, the reverse situation appeared in 37 profiles.

We also considered the postings of the participants who had an open Instagram profile at least at one of the check dates (n=68). The average share of photos in these accounts was equal to 97,13% ($photos\ share_{min}$=85,29%, $photos\ share_{max}$=100%), the average share of videos (*videos share*) – to 3,01%.

In order to construct and validate unobtrusive Instagram-based indicators of narcissism, we codified all the photos in these accounts (between the 2nd and the 26th of November, 2018). For the "multipic" postings, we codified only the first photo in this posting (due to the limitation of our automatic tool). This way of considering only the first photo in a multipic posting can be reasonable as it is more visible than all the others. Overall, we codified 10.721 photographs (99.23% of all the photos, the rest of the photos was not codified due to the limitation of our tool).

Codification criteria. We codified each photo in every open account using the following four criteria – face, multiface, exhibitionism, and interaction – that are supposed to be the future dimensions of our Instagram-based unobtrusive indicator of narcissism. For each criterion, only the two code values are possible: zero (criterion is absent for the photo) or one (criterion is present for the photo).

Here below, we will explain why each dimension contributes in establishing face and content validity of our indicator. The full list of rules we used to codify the photos is provided **in Appendix 1**.

Face (*face*) is equal to one if a photo contains an image of the face of a focal person (owner of an Instagram profile). We suggest that a high number of pictures containing the image of the face is a sign of a high level of narcissism by the following reasons.

First, we chose the presence of face and not, for example, self-image, etc., because the presence of face allows us to decrease the number of identification errors. We preferred "presence of face" to "selfie", because it's not always possible to define whether a photo was made by the person himself/herself.

Second, narcissistic individuals were often considered as attractive (Morf & Rhodewalt, 2001; Holzman & Strube, 2010; Sedikides et al., 2011; Dufner et al., 2013) because they "put effort into an attractive appearance by grooming and wearing fashionable clothes" (Dufner et al., 2013, p. 3). Moreover, narcissistic individuals perceive themselves as attractive. For example, Bleske-Rechek et al. (2008) found a strong positive correlation between the level of narcissism and self-rated facial attractiveness for both men and women.

Third, self-admiration, i.e., admiration of one's own personality and appearance, including the face, is considered as one of the dimensions of narcissism (Emmons, 1987).

Fourth, the extant research found a positive and significant correlation between the level of narcissism and selfie-posting behavior. For example, Weiser (2015) found a positive and significant association between selfie-posting frequency and the three dimensions of narcissism – Leadership/Authority, Superiority/Arrogance, and Self-Absorption/Self-Admiration – for women, and all the four dimensions – for men. Sorokowski et al. (2015) found that "men's overall narcissism scores positively predicted posting own selfies, selfies with a partner, and group selfies" (p. 123).

Finally, similar dimensions ("prominence of photograph" of Chatterjee & Hambrick, 2007; "whether or not the picture is added to the Linkedin profile" of Aabo & Ericksen, 2018; "narcissistic profile photos" of Grijalva et al., 2019) have been already introduced in other unobtrusive indicators.

Multiface (*multiface*) is equal to one if a photo contains multiple images of the face of a focal person. This dimension is very similar to *face*, but represents a more extreme degree of adoration of one's own face that is typical for narcissistic individuals.

Exhibitionism (*exhibitionism*) is equal to one if a photo contains an image of a focal person being "half-naked": shirtless in case of male individuals, wearing swimsuit or underwear in case of female individuals (consult **Appendix 1** for more detailed information). We suggest that the presence of such "exhibitionistic" photos is an important signal of narcissism for the following reasons. First, exhibitionism was considered as a dimension of narcissism in different versions of the factor structure of NPI-40 (Raskin & Terry, 1988; Ackerman et al., 2011). Second, posting exhibitionistic photos, again, represents that an individual is sure in his/her high attractiveness that is typical for narcissistic individuals (Bleske-Rechek et al., 2008).

Interaction (*interaction*) is equal to one if a photo contains the image of a focal person interacting with another individual. In contrast to Grijalva et al. (2019), who considered the photos with family or friends as non-narcissistic, we suggest that "interaction" photos is a sign of someone's narcissism for the following reasons.

First, publishing photos with friends may contribute to maintaining positive self-views, which is one of the crucial things for narcissistic individuals, by demonstrating them as popular and socially successful. For example, according to Jonason & Schmitt (2012), "one way to validate one's "ego" might be surrounding oneself with many friends and the best way to do that is to have friends for many reasons; the more reasons, the more potential friends and potential ego-validation. So while the overarching reason narcissists may have friends is to validate their ego, this should manifest itself in a variety of ways" (p. 402).

Second, narcissism was found to be positively and significantly correlated with extraversion (e.g., Lee & Ashton, 2005), so, in general, narcissistic individuals are likely to have many acquaintances and to appear in photos with other individuals. Indeed, Jonason &

Schmitt (2012) found that for both opposite-sex and same-sex friends, narcissistic individuals found relatively more reasons to form friendships than individuals with psychopathy or Machiavellianism. Moreover, narcissists have an approach orientation towards other individuals and, in particular, towards their friends, as exploitation (exploitativeness) was considered as an important dimension of narcissism in its different factor structures (Emmons, 1987; Raskin & Terry, 1988; Ackerman et al., 2011). A narcissist finds it easy to start new relationships and may pursue exploitative short-term-matings (Jonason et al., 2009).

Third, Sorokowski et al. (2015) found that not only selfies alone but also selfies with a partner or group selfies are positive predictors of narcissism.

Finally, in our sample *interaction* is positively correlated with NPI-40 (r=.1989, p=.1094, n=68), NPI-16 (r=.1822, p=.1430, n=68) and all the seven dimensions of NPI-40. The correlations with Self-Sufficiency (r=.3267, p<.01, n=66), and Exploitativeness (r=.2262, p=.0678, n=66) are the greatest across all the dimensions.

After calculating the codes for each photograph, we summed them up at the level of an account (*face absolute, multiface absolute, exhibitionism absolute, interaction absolute*) and then divided by the number of photos per each profile (*photos codified*, M=157.66, SD=151.41) in order to get the dimensions of our future unobtrusive indicators of narcissism: *face* (M=.49, SD=27), *multiface* (M=.0088, SD=0.014), *exhibitionism* (M=.0265, SD=.0537), and *interaction* (M=.27, SD=.21).

Studies. In order to fulfill the aim of this study – to construct and validate Instagram-based unobtrusive indicators of narcissism – we ran up four studies. **Study 1** has its aim to understand whether our sample is homogeneous in terms of the level of narcissism and suitable to validate the indicators. **Study 2** is necessary to construct the unobtrusive indicators. **Study 3** checks the validity of the simpler versions of our unobtrusive indicators. **Study 4** is aimed to establish convergent and discriminant validity. For all the studies we used the same sample, but its size varies across different studies and estimations.

Sample size. According to the fact that some participants did not complete the survey, and some participants have private Instagram accounts, the size of our sample varied across different studies (**Figure 3**). First, our sample included at least 109 observations when we checked relations between self-report psychological variables (*incomplete survey*=0, n=109).

The sample included 106 observations for "Instagram and Twitter activity variables", as 115 participants completed this part, and nine of them further deleted their Instagram profiles. We had 68 observations for the dimensions of a future unobtrusive indicator (*face, multiface, exhibitionism, interaction*), as only 48.92% participants (n=68) had their Instagram accounts open at one or both of the check dates. Finally, when we checked the relations between psychological self-report variables and our unobtrusive measures, the number of observations varied from 60 to 68, as 11,76% of owners of open accounts did not complete the survey.

Insert Figure 3 about here

STUDY 1

Aim. We ran Study 1 in order to check whether our sample is homogenous in terms of the level of narcissism across different groups in the sample and so suitable to validate the new unobtrusive indicators.

Method. In order to control for heterogeneity, we used one-way ANOVA with narcissism (measured by NPI-40 and NPI-16) as a response variable **(Table 5**). Ten-factor variables included demographic characteristics (*male, Italian*), incentives for survey participants (*no course credit*), self-reported level of English (*level of English*), and different aspects of social media behavior (*have Twitter, have Instagram, always open, Instagram link, privacy change, deletion*).

Insert Table 5 about here

Results and discussion. Primarily, we did not find any statistically significant differences across different groups in our sample (for either $p<.05$, $p<.01$, and $p<.001$). We suggest that due to this, our sample can be considered as homogeneous and, from this perspective, suitable to validate a new measure of narcissism. At the same time, we recognize that the absence of statistically significant differences can be the result of the low sample size.

Gender. Male students in our sample are more narcissistic than their female colleagues according to the both NPI-40 ($F_{1, 116} = .43$, $p=.51$) and NPI-16 ($F_{1, 116} = 1,05$,

p=.31). This is consistent with the narcissism-gender sample differences in the important measurement studies (Raskin & Terry, 1988; Ames et al., 2006).

Nationality. Across the three groups (Italian, non-Italian and half-Italian), half-Italian resulted as the most narcissistic. However, we do not consider it as a remarkable difference due to the small sample size of this group (n=2, 2.5% of the sample). In average, non-Italian students in our sample were more narcissistic than Italian students according to the both NPI-40 ($F_{2, 115}$ = .94, p=.3936) and NPI-16 ($F_{2, 115}$ = 1,15, p=.3218).

Incentives. According to both NPI-40 ($F_{1, 116}$ = .08, p=.7723) and NPI-16 ($F_{1, 116}$ = .24, p=.6235) the students who did not get the course credit were in average a little bit more narcissistic than those who got it.

Level of English. We found that self-reported level of English was associated with the level of narcissism. Participants who responded that English is their native language had the highest level of narcissism according to both NPI-40 ($F_{2, 115}$ = 1,33, p=.2679) and NPI-16 ($F_{2, 115}$ = .49, p=.6155); those who evaluated their level of English as proficient had a lower level of narcissism than advanced and native speakers.

Other differences (**Table 5**, lines 5-10) will refer to different aspects of social media behavior. Here we also found no statistically significant differences across the groups.

Having a Twitter profile. According to the both measures of narcissism NPI-40 ($F_{1, 116}$ = .00, p=,9597) and NPI-16 ($F_{1, 116}$ = .9, p=.3435), students who have a Twitter account are less narcissistic than those who do not.

Having an Instagram profile. Surprisingly, the students in our sample, who did not have an Instagram profile, were more narcissistic than their peers who have an Instagram profile, according to both measures of narcissism NPI-40 ($F_{1, 116}$ = 1,30, p=.2559) and NPI-16 ($F_{1, 116}$ = .99, p=.3229). Although this difference was not statistically significant, we recommend it to be tested in future research on a bigger sample in order to distinguish a small sample bias from a more serious problem that can partially invalidate the use of our unobtrusive indicators.

Having an open Instagram profile. We found that students who have an open Instagram profile and did not change its privacy (*always open*=1, n=51) have higher level of narcissism measured by either NPI-40 ($F_{1, 101}$ = 1,00, p=.3199) or NPI-16 ($F_{1, 101}$ = 2,86,

p=.0937). This difference is only marginally significant if we estimate the level of narcissism with NPI-16. This result makes sense because individuals having an open Instagram account are more prone to show themselves off to other individuals, i.e., are more exhibitionistic. Indeed, in our sample, we found a positive and significant correlation between having an open Instagram account and NPI-40 Exhibitionism (r=.2154, p<.05, n=103).

Providing the link to the Instagram profile. The students who did and who did not provide the link to their Instagram profiles do not differ in terms of their level of narcissism according to NPI-40 ($F_{1, 116}$ = .00, p=.9952) and NPI-16 ($F_{1, 116}$ = .01, p=.9385).

Deletion. According to NPI-40 ($F_{1, 109}$ = .03, p=.8739) and NPI-16 ($F_{1, 109}$ = .16, p=.6868), 7.21% of students who deleted their account before the 2nd check date (*deletion*=1, n=8) were less narcissistic than other students in the sample.

Changing privacy. 11,5% of students who changed privacy of their Instagram account either from private to open or from open to private (*privacy change*=1, n=13) were more narcissistic than their peers who did not change privacy settings according to NPI-40 ($F_{1, 101}$ = 1,06, p=.3053) and NPI-16 ($F_{1, 101}$ = 2,61, p=.1092).

Since ANOVA did not reveal any significant difference between different groups in our sample, we may conclude that our sample of students can be used to validate the future unobtrusive indicators of narcissism. The level of narcissism of individuals in the sample (measured by NPI-40 and NPI-16) is not interlocked with other group characteristics and is not the strong predictor of the aspects of social media behavior we considered. The only difference that may affect construction and validation of an unobtrusive indicator is that participants who had their Instagram account always open (consist 77.94% of the sample used to validate the indicator) are more narcissistic than others. This difference may make the future indicator more adaptive to the individuals with a high level of narcissism rather than to individuals with its low level. However, we should notice that this difference is only marginally significant. The additional analysis did not reveal any significant differences in narcissism of the individuals who had an open Instagram profile at one of the check dates and other individuals in the sample according to the both NPI-40 ($F_{1, 116}$ = .23, p=.6355) and NPI-16 ($F_{1, 116}$ = .28, p=.5975).

STUDY 2.1

Aim. We ran Study 2.1 in order to test inter-rater reliability and so, to understand, whether the codification rules and future unobtrusive indicator are clear and will be easy to use for other researchers in the future.

Method. We invited another codifier (codifier 2) in order to test inter-rater reliability. For this purpose we selected 2658 photos from the initial sample; in particular, we included all the accounts including more than 50 pictures and 50 latest pictures from the bigger accounts. We provided codifier 2 with the rules of codifying (**Appendix 1**) and some examples (consisting of publicly available pictures) and asked her to codify the selected photos. The two codifiers were both females, had the same level of education (PhD students), and mean age of 27.5 years old. We used Cohen's kappa coefficients to calculate the agreement between the two codifiers.

Insert Table 6 about here

Results and discussion. For our sample (**Table 6**), the agreement between the two codifiers differed across the dimensions of a future indicator. According to kappa's interpretations of McHugh (2012), the two codifiers had almost perfect agreement for face (κ=.9447, p<.0001), exhibitionism (κ=.9139, p<.0001), and interaction dimensions (κ=.9327, p<.0001), and substantial agreement for multiface dimension (κ=.7846, p<.0001).

STUDY 2.2

Aim. We ran Study 2.2 in order to construct a multidimensional indicator unobtrusive indicator of narcissism, test its internal consistency and convergence with extant self-report measures of narcissism, NPI-40 and NPI-16.

Method. Our first step was to identify whether the factor structure of the future indicator is consistent with four (*face*, *multiface*, *exhibitionism*, and *interaction*), three, or two factors. We found that across all the combinations, the Cronbach's Alpha was the highest for the combination of *face*, *exhibitionism*, and i*nteraction* (α=.6920, n=68). Internal consistency of the four-factor indicator is below the recommended threshold of α>0,65 (α=.6241, n=68).

Thus, we decided to further proceed with the three-factor version of INUI (Instagram-based unobtrusive indicator of narcissism), including face, exhibitionism, and interaction.

Insert Table 7 about here

Insert Table 8 about here

In order to validate the three-dimensional INUI, we constructed a structural equation model (SEM) with two latent variables: self-reported narcissism (represented by 40 items of NPI-40) and Instagram-based narcissism (represented by three items of INUI). The two latent variables are supposed to have positive and significant covariance (**Figure 5**).

Regarding the item-structure of NPI-40, here we did not take into account the multidimensionality of NPI-40 since the bigger sample is required for multilevel models. Thus, we settled on the one-level SEM, as the sample of 50-70 observations was considered as sufficient to test the model with up to four latent variables (Sideridis et al., 2014).

As NPI-40 includes 40 items, we used its partially aggregated model in order to minimize the number of covariances between different items that should be taken into consideration. We aggregated the items inside each of NPI-40 dimension into two groups, incorporating items that were highly correlated with each other (consult **Table 7** for detailed information). We did not aggregate items inside the Vanity dimension, as it included only three items. In such a way, we ended up with 15 aggregated items.

We also included covariances between INUI items and NPI-40 aggregated items into our model (**Table 8**). We consider only those pairs where the aggregated items were correlated at 0,1% level ($p \leq .001$).

We also constructed a second structural equation model to further validate INUI and check whether it converges with NPI-16 as well (**Figure 6**). We did not aggregate the items of NPI-16 and included the covariances between INUI and NPI-16 items, having positive and significant correlations at .05% level ($p \leq .0005$).

Sample. We eliminated five outlier observations (in terms of Instagram exhibitionism and Instagram interaction) from our dataset, as they may lead to "inflated fit indices and biases in the estimates of parameters" (Yuan & Bentler, 1998). The dataset that we use in this study includes 63 observations.

Results and discussion. The standardized estimates (factor loadings and covariances) are reported in **Figure 5** and **Figure 6.**

Insert Figure 5 about here

INUI and NPI-40. The model, including INUI and NPI-40 (α=.8199, n=63) self-reported narcissism, has acceptable model goodness of fit indices (CFI=.991, TLI=.983, RMSEA=.032, SRMR=.085). The standardized factor loadings for NPI-40 aggregated items range from .17 to .74 (**Figure 5**). The standardized factor loadings for face, exhibitionism, and interaction range from .53 to .76 and are significant at 1% level ($p<.01$); face and interaction dimensions are strongly related to each other (cov(face, interaction) = .62, $p<.01$). INUI and NPI-40 narcissism were confirmed to be strongly related to each other (cov(INUI, NPI-40) = .54, $p<.01$).

Insert Figure 6 about here

INUI and NPI-16. Unfortunately, the second model (**Figure 6**), including INUI and NPI-16 self-reported narcissism (α=.7014, n=63) has worse goodness of all the fit indices (CFI=.887, TLI=.866, RMSEA=.052, SRMR=.099), where only the value of RMSEA (RMSEA<.08) is acceptable. The standardized factor loadings for NPI-16 items range from .18 to .53 (except for item six); the majority of them were significant at least at 5% level ($p<.05$). The standardized factor loadings for face, exhibitionism, and interaction range from .40 to .99 but were not statistically significant. Neither were the covariance between INUI and NPI-16 (cov(INUI, NPI-16) = .3), which was also lower than the one in the first model.

We can conclude that INUI three-dimensional indicator can be considered as an internally consistent unobtrusive indicator of narcissism, according to the values of

Cronbach's alpha and standardized factor loadings in both models. Both structural equation models demonstrated that INUI is positively related to extant measures of self-reported narcissism. However, INUI has a statistically significant relation only with NPI-40. We suggest that convergence of INUI with NPI-16 should be further tested on a bigger sample. Since we consider the first model as superior to the second one (as NPI-40 is more widely used than NPI-16), we also consider the results of this model as more important.

STUDY 2.3

Aim. We ran Study 2.3 in order to check the relation between the dimensions of self-report and unobtrusive measures of narcissism.

Method. We ran the analysis on our full sample (n=68) and calculated Pearson's correlation coefficients in order to check the relation between NPI-16, NPI-40 (and its dimensions Authority, Self-Sufficiency, Superiority, Exhibitionism, Exploitativeness, Vanity, and Entitlement), and INUI (and its dimensions face, exhibitionism, and interaction).

Insert Table 9 about here

Results and discussion. The results are reported in **Table 9.**

First, all the correlations between NPI-16, NPI-40, INUI, and its dimensions are positive. INUI is positively and significantly correlated with all its dimensions: exhibitionism (r=.4287, p=.0003), interaction (r=.9050, p<.0001), but mostly with face (r=.9569, p<.0001). Face itself is positively and significantly correlated with the other two dimensions of INUI: exhibitionism (r=.4034, p=.0006) and interaction (r=.7615, p<.0001).

Regarding the relations between INUI items and NPI-40 items, INUI exhibitionism is significantly correlated with NPI-40 (r=.2888, p=.0187), with NPI Exhibitionism, as expected (r=.2596, p=.0353), and NPI Vanity (r=.4354, p=.0003). INUI interaction is significantly correlated with NPI Self-Sufficiency (r=.3267, p=.0074).

Face is significantly correlated with NPI-16 (r=.2806, p=.0225), NPI-40 (r=.3228, p=.0082), NPI Authority (r=.2477, p=.0450), NPI Self-Sufficiency (r=.2962, p=.0158), NPI Exhibitionism (r=2695, p=.0287), and NPI Exploitativeness (r=.2758, p=.0250). In such a way, face has the best correlation patter among all the dimensions of INUI (it is positively and

significantly correlated with four out of seven NPI-40 dimensions) and INUI itself (as the correlations of INUI with NPI-Authority and NPI-Exhibitionism are not significant at 5% level). Moreover, comparing to INUI correlations with NPI-40 (r=.3052, p=.0127) and NPI-16 (r=.2685, p>.05), face has stronger correlations with the both NPI-40 (r=.3228, p<.01) and NPI-16 (r=.2806, p<.05).

In such a way, we suggest that face alone can be considered as an alternative or a complement to INUI. As being a single-item measure, face, understandably, has lower internal consistency, validity, and reliability rather than INUI, especially considering the fact that narcissism is a multidimensional concept. However, it can be better applicable for studies with a big sample size or when a face recognition software (instead of a human codifier) is used to codify the pictures. Thus, we will further validate both INUI and face.

STUDY 2.4

Aim. We ran study 2.4 in order to check whether the relation between our unobtrusive indicators (INUI and face) and self-report measures of narcissism (NPI-40 and NPI-16) varies across different groups in the sample. In other words, we check whether our indicators are equally applicable for different population groups or whether the strength of this correlation is affected by some other factors.

Method. In order to control for these intergroup differences, we calculated Pearson's correlation coefficients for our four pairs of variables: NPI-40 and INUI, NPI-40 and face, NPI-16 and INUI, and NPI-16 and face. Then we ran up Fisher's Z-test (Eid et al., 2011) in order to check whether there was a significant difference in correlation coefficients for different groups in our sample. We controlled for the differences in terms of gender (*male*), nationality (*Italian*), incentives (*no course credit*), and Instagram privacy change (*privacy change*).

Insert Table 10 about here

Results and discussion. The results are reported in **Table 10a** (for NPI-40) and **Table 10b** (for NPI-16). Primarily, we did not find any statistically significant differences in NPI-INUI/face correlations across different groups in our sample (for either $p<.05$, $p<.01$, and $p<.001$).We suggest that due to this, both unobtrusive indicators can be considered as "unbiased" in terms of their applicability to different population groups. At the same time, we recognize that the absence of statistically significant differences can be the result of the low sample size.

Gender. First of all, the researchers came to the conclusion that there are gender differences in social network representations of narcissism (Sorokowski et al., 2015; Weiser, 2015). For example, Sorokowski et al. (2015) found that the frequency of posting selfies correlates with the level of narcissism for men but not for women; Weiser (2015) found that narcissism is associated with all the four dimensions for men (according to the factor structure suggested by Emmons, 1987), and with three NPI dimensions for women (all except for Exploitation/Entitlement). The correlation between our measures (face, INUI) and NPI-measures is stronger in case of men (n=36) rather than women (n=30) in all the 4 pairs of measures: NPI-40 and INUI (z=.912, p=.181), NPI-40 and Face (z=1,129, p=.129), NPI-16 and INUI (z=.387, p=.246), and NPI-16 and Face (z=.696, p=.243). This is consistent with previous research that found more social network representations of narcissism for men rather than for women.

Nationality. In order to check for correlations differences in terms of nationality, we excluded the group of half-Italian participants due to its small proportion in our sample (n=2). The correlation between of INUI and NPI measures is stronger for non-Italian students (n=26) rather than for Italians (n=39): NPI-40 and INUI (z=0,743, p=0,229), NPI-16 and INUI (z=.315, p=.376). This difference is absent in the case of face measure.

Incentives. The correlation between our measures (face, INUI) and NPI-40 is stronger in the case of students who did not get a course credit (n=35) rather than those who did (n=31): NPI-40 and INUI (z=-.626, p=.266), NPI-40 and Face (z=-.647, p=.259). This difference is absent in the case of NPI-16 measure.

Instagram privacy change. We found that participants who changed the privacy of their Instagram profiles (n=13) were more narcissistic than their peers (n=51): NPI-40 and

INUI (z=-07, p=.472), NPI-40 and Face (z=-.591, p=.277), NPI-16 and INUI (z=.472, p=.319), and NPI-16 and Face (z=.988, p=.162). However, the group of participants who changed the privacy of their accounts is relatively small, that makes this difference less reliable.

According to the results of **Study 1**, we should notice that we observed stronger correlations between NPI and unobtrusive measures for less narcissistic groups in our sample: women (in comparison to men), non-Italian participants, and participants who did not get a course credit (**Table 5**). We should also consider that participants with open Instagram accounts (who consist of our sample in **Studies 2.1-2.4**) are more narcissistic than those having closed the Instagram account. These two results imply that INUI and face better capture narcissism for individuals with either low or medium levels of narcissism. However, in case of very high levels of non-pathological narcissism, in other words, when an individual is likely to have a narcissistic personality disorder, our measures are less efficient to capture the level of the narcissism of these people.

STUDY 3.1

Aim. We ran Study 3.1 in order to test the validity and reliability of simplified versions of INUI and face indicators. This "simplification" implies using a smaller number of pictures from an Instagram account in order to evaluate someone's level of narcissism.

Method. In order to calculate the values of INUI and face, we considered all the photos from the Instagram accounts of our participants. In our sample, the average number of pictures per person (*photos codified*) was relatively small (M=158.88, SD=151.41); only 12 accounts in our sample contained more than 300 photos. However, in the case of having an account with a very high number of photos (e.g., in case of celebrities, models, or very old Instagram accounts), calculating INUI and face may become time-consuming and is not consistent with our initial idea of having a highly applicable and simple measure of narcissism. In order to solve this limitation, we checked whether INUI/face considering all the photos from someone's Instagram profile are statistically different from INUI/face considering a limited number of pictures (either 30, 50, or 100).

We realized this idea in the following way. First, we recalculated INUI and face, using 30, 50, and 100 photos from Instagram accounts; moreover, we used latest, oldest, and

random pictures in each account, ending up with nine short versions for each indicator (e.g., *INUI_30_latest, INUI_30_oldest, INUI_30_random, INUI_50_latest, INUI_50_oldest, INUI_50_random, INUI_100_latest, INUI_100_oldest, INUI_100_random*). Second, we used four versions of our sample in order to check the differences: full sample (n=68); partial sample, including only the having over 30 pictures (n=50); partial sample, including only the having over 50 pictures (n=44); partial sample, including only the having over 100 pictures (n=35). Partial samples are important because, in the case of small accounts (e.g., having less than 30 pictures), different versions of INUI/face will be equal to each other (*INUI_30_latest= INUI_30_oldest= INUI_30_random*) that will lead to underestimation of t-values. Finally, we ran Student's t-test in order to check the differences between full versions of INUI/face and their short versions in each of the four samples.

Results and discussion. The results are reported in **Table 11** (face) and **Table 12** INUI).

Insert Table 11 about here

Face. In general, the results showed that there is no significant difference between the full version of face and its short versions, based on either 30, 50, or 100 **random** photos ($p \geq .1703$). However, there is always a significant difference between the full version of face and its short versions, based on either 30, 50, or 100 **latest or oldest** photos ($p \leq .0316$).

Considering the full dataset means and standard deviations of short versions of face – *face_30_random* (M=.4953, SD=.2749), *face_50_random* (M=.4967, SD = .2697) and *face_100_random* (M=.4931, SD=.2763) – are slightly higher than the mean and standard deviation of the original face indicator (M=.4889, SD=.2699). The smallest mean difference was detected between *face_100_random* and *face* (mean difference=-.0042, t=-1,1467, p=.2556, df=67). The smallest mean difference across all the partial datasets was also detected between *face_100_random* and face (mean difference=-.0082, t=-.1493, p=.2584, df=34) in the dataset, which included only accounts containing 100 photos and more.

In such a way, face_30_random, face_50_random, and face_100_random can be used as reliable substitutes for face unobtrusive indicators; face_100_random should be considered as the most precise across the three.

Insert Table 12 about here

INUI. Across all the short versions of INUI, eight out of nine had acceptable internal consistency (α>.65, n=68) except for INUI_30_latest (α=.6453, n=68); detailed information about all the Cronbach's alpha coefficients is provided in **Table 3**; information about the correlations between the three dimensions in each short version of INUI is provided in **Table 4.**

Insert Table 4 about here

Considering the results we got for face indicator, i.e. significant difference between the full version of face and either of its versions based on latest or oldest photos from an Instagram account, we did not further test the difference between the full version of INUI and its short version with 30 or 50 latest or oldest photos. Thus, we tested five remaining versions of INUI (*INUI_30_random*, *INUI_50_random*, *INUI_100_random*, *INUI_100_latest*, *INUI_100_oldest*). In the majority of cases, short versions of INUI have greater mean values (except for inui_100_oldest) and greater standard deviation (except for *INUI_100_oldest* and *INUI_50_random*) than original INUI.

Overall, we did not find any statistically significant differences (p≤.05) between any of the short versions and the original INUI. However, the difference between INUI and *INUI_100_oldes*t is significant at 8% level (mean dif=.0257, t=1,7998, p=.0764, df=67).

In contrast to face, INUI_100_latest did not differ significantly from INUI either in case of the full (t=-1,6353, p=.1067. mean dif=-.0226, df=67) or partial sample (md=.0440, t=-1,6552, p=.1071, df=34). We suggest that INUI_100_latest can be considered as the most easy-to-use indicator in terms of codifying the photos, as using it allows to avoid randomization or scrolling down all over the account to reach the latest photos.

In terms of the mean differences between INUI and its short versions, similar to face, INUI_30_random, INUI_50_random, and INUI_100_random were the most efficient across the five. Surprisingly, this time INUI_30_random was the most precise in case of either full (t=-.4814, p=.6318, md=-.0050, df=67) or partial sample (t=-.4804, p=.6331, md=-.0068, df=49).

In such a way, we can conclude that even 30 **random** photos from an Instagram profile are sufficient to calculate either face or INUI and evaluate the level of narcissism; the difference between using 30 random photos and all the photos from someone's Instagram profile is not statistically significant. However, this difference becomes significant in case we use the oldest or latest photos in an Instagram profile. Although using only 30 pictures is enough, the mean difference between the short version and the original version of INUI or face shorten if we use 50 or 100 random photos from an Instagram accounts; using *INUI_100_random* or *face_100_random* would be strongly recommended for the accounts with a high number of pictures. The biggest Instagram account in our sample includes 558 photos and 563 postings; if short versions of INUI and face will ever be used on an account with a higher number of pictures, and additional validity test is strongly recommended.

STUDY 3.2

Aim. We ran Study 3.2 in order to check the test-retest reliability of unobtrusive measures of narcissism (*face* and *INUI*).

Method. Test-retest reliability of self-report measures is normally obtained by administering the same test twice over a period of time to a group of individuals. In the case of our unobtrusive measures, we decided to adopt an alternative strategy that allows us to compare INUI/face estimated at two different moments, but without administering the survey twice. As photos on Instagram are published in chronological order, we suggest that the short versions of INUI and face that are based on oldest and latest pictures from a profile actually appear to be INUI/face indicators estimated in two different moments. However, this strategy has the number of limitations: test-retest period is different for each participant (as some accounts are older than others); some older photos can be deleted over time and not taken into consideration.

In such a way, in order to check test-retest reliability of our measures, we calculated Pearson's correlation coefficient for the pairs of face/INUI variables based on the same number (30, 50 or 100) of latest and oldest pictures. As in **Study 3.1**, we used full and partial samples.

Insert Table 13 about here

Results and discussion. Our results are reported in **Table 13.** The values of correlation coefficients estimated on the full sample (n=68) range from .75 to .90 ($p<0.0001$). In such a way 50- and 100-photos versions of INUI and face had good reliability ($r\geq.8054$), whereas the 30-photos version of INUI and face had only acceptable test-retest reliability ($.7480\leq r\leq.7624$).

Considering partial samples, only 100-photos versions of INUI and face had acceptable test-retest reliability ($r=.7723$ for face and $r=.7752$ for INUI, $p<.0001$), whereas 30- and 50-photos versions of face and INUI had only questionable test-retest reliability ($.6162\leq r\leq.6825$, $p<.0001$).

Based on the results of **Study 3.1** and **Study 3.2**, we may conclude that across all the short versions of INUI and face, *INUI_100_random* and *face_100_random* are the most reliable ones. We strongly recommend to use them for Instagram accounts containing less than 558 photos. For bigger accounts, this general rule can be applicable: than more photos from an account are considered, than more reliable INUI and face measures become.

STUDY 4

Aim. We run Study 4 in order to test discriminant and convergent validity of our unobtrusive measures of narcissism, and compare their correlation pattern with those of NPI-16 and NPI-40.

Method. We used Pearson's correlation coefficients in order to test convergent and discriminant validity of our unobtrusive measures (*INUI, face, INUI_100_random,* and *face_100_random*). We estimated the correlations between our unobtrusive measures and self-report measures of narcissism (*NPI-16*, *NPI-40* and its seven dimensions), self-esteem (*Rosenberg self-esteem, 1-item self-esteem*), Personality (Hexaco *extraversion, honesty-*

humility and its facets of *modesty, greed-avoidance, sincerity*, and *fairness*; BFI *agreeableness, consciousness, neuroticism, openness to experience*, and *extraversion*), Empathy (Davis IRI *empathic concern*, *perspective taking*, *fantasy scale*, and *personal distress*), Self-Monitoring, and believe in just world. Moreover, we also estimated correlations between self-report measures of narcissism (*NPI-16*, *NPI-40*) and other psychological self-report measures in order to compare the correlation patterns of unobtrusive measures with the one of self-report measures of narcissism.

Insert Table 14 about here

Results and discussion. The results are reported in **Table 14.**

In the majority of cases, the correlation pattern of NPI-measures (with other psychological self-report measures) and same correlation pattern of unobtrusive measures were identic in terms of their signs. However, the values of correlation coefficients for NPI-measures exceeded those for unobtrusive measures as ecpected.

Convergent validity.

Narcissism. All the measures of narcissism – either self-report or unobtrusive, including the short versions of the later – are positively and significantly correlated to each other as expected (Ames et al., 2006). Correlations between NPI-measures and short versions of INUI and face are slightly lower than those between NPI and the full measures of INUI and face (e.g., r(*NPI-40, face*)=.3228, p=.0082; r(*NPI-40, face_100_random*)=.3212, p=.0086). Considering the two correlation patterns of INUI/face with 7 dimensions of NPI-40, and of INUI_100_random/face_100_random with 7 dimensions of NPI-40, they were almost identic in terms of the coefficient values and their significance levels.

Empathy. We found both self-report and unobtrusive measures of narcissism to be negatively correlated to all the four facets of Davis's IRI, as expected and as consistent with the findings of previous research, which found narcissism to be negatively correlated to empathy (e.g., Watson et al., 1988). All the measures have the strongest negative correlation with Personal Distress Facet (-.3490≥r≥-.1955). In comparison to self-report measures,

unobtrusive measures have a stronger correlation with Fantasy scale facet. On the other hand, self-report measures have a stronger correlation with Empathic Concern.

Self-esteem. As expected and consistent with prior research (Raskin et al., 1991; Campbell et al., 2002; Ames et al., 2006), both self-report and unobtrusive measures of narcissism were found to be positively correlated to the measures of self-esteem (*Rosenberg Self-esteem* and *1-item self-esteem*). However, self-report measures have stronger and highly significant correlations with these measures ($.3684 \leq r \leq .5075$, $p < .0001$), whereas unobtrusive measure have lower but positive correlations with *Rosenberg Self-esteem* and *1-item self-esteem* ($.1364 \leq r \leq .2176$); the correlations between INUI ($p = .0816$) INUI_100_random ($p = .0919$) and Rosenberg's self-esteem are only marginally significant.

Self-monitoring. As expected and consistent with the prior research (Ames et al., 2006), self-monitoring was found to be positively correlated with the both self-reported ($.1062 \leq r \leq .2378$) and unobtrusive measures ($.2194 \leq r \leq .2619$) of narcissism. The coefficients for NPI-40 ($p = .0128$) and Face_100_random ($p = .0432$) are significant at 5% level.

Extraversion. All the measures in both groups of narcissism measures are strongly and positively correlated with both measure of extraversion we used in this study: BFI extraversion ($.3249 \leq r \leq .4966$, $p \leq .0045$) and Hexaco extraversion ($.4638 \leq r \leq .5707$, $p \leq .0002$). This is consistent with the previous findings that narcissism is strongly and positively correlated to extraversion (Lee & Ashton, 2005; Ames et al., 2006).

Neuroticism. As expected and consistent with prior studies (Ames et al., 2006), all the measures of narcissism were negatively correlated with BFI Neuroticism. Correlations for NPI measures ($-.1684 \geq r \geq -.2433$) were higher than for unobtrusive measures ($-.0755 \geq r \geq -.1472$).

Agreeableness. Self-report and unobtrusive measures showed completely different results in terms of their relation to BFI agreeableness ($-.2292 \geq r \geq -.2468$, $p < .02$). NPI-40 and NPI-16 were positively and significantly correlated with BFI Agreeableness. However, our unobtrusive measures had very low positive and not statistically significant correlation with agreeableness ($.0008 \leq r \leq .0248$). The results we got for our unobtrusive measures are consistent with prior results of Lee & Ashton (2005) who found a very low (but negative) correlation between NPI-40 and BFI Agreeableness. The results we got for our self-report

measures are consistent with those of Ames et al. (2006); however, they used NEO Agreeableness (Costa & McCrae, 1992) instead of BFI one.

Consciousness. Consistent with prior findings (Lee & Ashton, 2005; Ames et al., 2006), we found a positive correlation between BFI Consciousness and our unobtrusive measures ($.2359 \leq r \leq .2694$, $p < .07$). Correlation between NPI-40 and BFI Consciousness was low but still positive ($r = .0318$), however, the correlation between NPI-16 and BFI Consciousness was low but negative ($r = -.0122$), which contradict the prior finding of (Ames et al., 2006), who, however, used NEO Consciousness instead of BFI one.

Openness to experience. Consistent with prior findings (Lee & Ashton, 2005; Ames et al., 2006), we found a positive correlation between BFI Openness and NPI-measures ($.1767 \leq r \leq .2294$, $p < .06$). However, contradictory to prior findings, we found a negative but low correlation between BFI openness and our unobtrusive measures ($-.0025 \geq r \geq -.0906$).

Honesty-Humility. In the majority of cases, we found all the measures of narcissism to be negatively correlated to Hexaco Honesty-Humility and its four facets which is consistent with prior research (Lee & Ashton, 2005). However, the correlations for NPI-variables were higher in absolute value ($-.1653 \geq r \geq -.5707$) and often significant. Inconsistent with prior findings, all the unobtrusive measures had a positive (but low) correlation with the first face of Honesty – Fairness ($.0506 \leq r \leq .0826$); face measures also had positive (but low) correlation with the second facet of Honesty – Sincerity ($.0096 \leq r \leq .0402$). However, we should highlight, the correlation with humility facets remained negative for all the unobtrusive measures. Negative correlation with humility and its facets is more important (Modesty and Greed-Avoidance), as several researchers consider narcissism and humility as "unlikely to coexist in one individual" (Zhang et al., 2017) and sometimes as the opposites of each other.

Discriminant validity. In order to test discriminant validity of our unobtrusive indicators, we checked the correlation of all the measures of narcissism (*NPI-16*, *NPI-40*, *INUI*, *face*, *INUI_100_random*, and *face_100_random*) with belief in just world, that was found to be correlated to neither NPI-16 nor NPI-40. As expected we found a very low correlation between self-report measures of narcissism and belief in just world ($.0079 \leq r \leq .0605$). However, the correlation between unobtrusive measures and belief in just world was higher for both face

measures (.1471≤r≤.1506) and INUI measures (.2346≤r≤.2365); the coefficients for INUI variables are marginally significant.

We may conclude that our measure of narcissism demonstrated acceptable convergent validity (r≥.3) with NPI-40, the most widespread measure of narcissism. INUI (r=.2689, p=.0293) and face (r=.2806, p=.0225) are also positively correlated to NPI-16. However, in our **Study 2.4** INUI and face did not achieve have acceptable convergent validity (r≤.2806) with NPI-16. We suggest that the relation between the measures should be further tested on a different sample.

We found that self-report measures and our new unobtrusive measures, in the majority of cases, had similar correlation patterns. In other words, our measures demonstrated convergent validity with other variables, in particular, with self-esteem measures (Rosenberg's Self-Esteem and 1-item self-esteem), self-monitoring, all the facets of Davis's IRI, the measures of extraversion (Hexaco Extraversion and BFI Extraversion), Hexaco Humiliy and its facets, BFI Neuroticism, and BFI Consciousness.

We found that our measures of face (face, face_100_random) have adequate (r≤.2) discriminant validity in terms of just world scale. As INUI had a higher correlation with Just World Scale (.2346≤r≤.2365) its discriminant validity should be further validated on a bigger sample or with other variables.

Correlation of INUI and face measures with several personality measures in some cases differed from the findings of previous studies. However, it can be explained by the use of a different inventory (e.g., BFI versus NEO consciousness), a different sign of a correlation coefficient close to zero (e.g., BFI Agreeableness). The results that differed from the findings of previous studies should be further tested on another sample.

GENERAL DISCUSSION AND CONCLUSION

Although self-report measures of narcissism (Raskin & Hall, 1979; Emmons, 1987; Raskin & Terry, 1988; Ames et al., 2006; Gentile et al., 2013) and, in particular, NPI-40 (Raskin & Terry, 1988) are widely used in the research, in the last two decades the researchers often chose another way to measure narcissism - by constructing and applying unobtrusive indicators (Chatterjee & Hambrick, 2011; Scrand & Zechman, 2012; Olsen et al., 2014; Zhu & Chen, 2015; Aktas et al., 2016; Rovenpor et al., 2016; Aabo & Ericksen, 2018; Ham et al., 2018; Grijalva et al., 2019). In line with the most recent studies on unobtrusive measures of narcissism, that capture its level from LinkedIn (Aabo & Ericksen, 2018) or Twitter profiles (Grijalva et al., 2019), we introduced Instagram-based measures and argued that they may fill in the important gap in extant research.

In the methodological part we ran a number of studies in order to confirm the homogeneity of our sample (Study 1), to test inter-rater reliability of our picture codification criteria (Study 2.1), to construct a multidimensional Instagram-based measure of narcissism (*INUI*), that should converge with NPI-40 and should be internally consistent (Study 2.2). Except for a multidimensional indicator, we provided a rationale for a unidimensional Instagram-based unobtrusive indicator of narcissism (*face*) in Study 2.3, and tested correlation differences between unobtrusive and self-report measures of narcissism in Study 2.4. In Study 3.1 we confirmed that INUI and face can be further simplified and showed that their versions with only 100 photos do not differ significantly from the full versions. In Study 3.2 we established test-retest reliability of the 100-photos versions of face and INUI. In Study 4 we tested convergent and discriminant validity of unobtrusive measures of narcissism.

We found that our sample was homogeneous, and that the average level of narcissism did not differ significantly ($p<.05$) between groups in terms of gender, nationality, incentives, level of English, and different aspects of social media behavior (having Twitter or Instagram profile, having open Instagram profile, providing the link to an Instagram profile, changing privacy or deleting an Instagram account).

In order to establish face validity of our measures, we chose picture codification criteria (face, exhibitionism, and interaction) that represent different facets of a narcissistic personality – self-admiration, perceived self-attractiveness, exhibitionism, maintaining

positive self-view, and being exploitative with other individuals. We found that agreement across the two codifiers for the three criteria was very high ($k \geq .9139$, $p < .0001$), i.e. we established inter-rater reliability of our measures.

We found that the measure consisting of the three dimensions (face, exhibitionism, and interaction) will have the highest internal consistency (α=0,6920, n=68). Our structural equation model, including INUI and NPI-40, that should be positively and significantly related to each other, had acceptable goodness of fit indices (CFI=.991, TLI=.983, RMSEA=.032, SRMR=.085). The standardized factor loadings for face, exhibitionism, and interaction ranged from .53 to .76 and were significant at 1% level ($p < .01$). INUI and NPI-40 narcissism were confirmed to be strongly related to each other (cov(INUI, NPI-40) = .54, $p < .01$).

All the three dimensions of INUI – face-interaction ($r = .7615$, $p < .0001$), face-exhibitionism ($r = .4034$, $p = .0006$), and exhibitionism/interaction ($r = .1921$, $p = .1921$) - were strongly positively correlated to each other. INUI ($r = .3051$, $p = .0127$) and face ($r = .3228$, $p = .0082$) were strongly and positively correlated with NPI-40, and so had acceptable convergent validity ($r \geq .3$) with NPI-40 measure of narcissism. That is similar to the correlation between NPI-40 and unobtrusive indicator ($r = .31$, $p < .01$) of Grijalva et al. (2019). INUI ($r = .2689$, $p = .0293$) and face ($r = .2806$, $p = .0225$) are also positively correlated to NPI-16; convergence with this measure should be further tested on a different sample. We consider convergence with NPI-40 as a primary thing, as NPI-40 is more widespread and is a multidimensional measure of narcissism.

Face dimension had a positive and significant correlation ($p < .05$) with the both NPI-16 and NPI-40, and also has positive and significant correlation with four out of seven dimensions of NPI-40, Authority, Self-Sufficiency, Exhibitionism, and Exploitativeness. In comparison to this, INUI had significant correlations ($p < .05$) with two out of seven dimensions of NPI-40 (Self-Sufficiency and Exploitativeness). Basing on this result, we suggest that face can be used as a complement to INUI or a substitutive of INUI in case of bigger samples, or when the face recognition software is used to codify the photos. However, as all single-item measures, face is supposed to have lower internal consistency and face validity (than INUI).

We controlled for the correlation differences between our unobtrusive (INUI, face) and self-report measures of narcissism (NPI-16, NPI-40) across different groups (in terms of gender, nationality, incentives, and privacy change) and did not find any statistically significant differences ($p \leq .1$). However, we found that face and INUI better work for individuals with either low or medium levels of non-pathological narcissism but are less efficient at very high levels of non-pathological narcissism, when there is a possibility of individual having a narcissistic personality disorder.

We found that face and INUI will capture someone's level of narcissism even if we will take not all, but only 100 random photos from someone Instagram account, as we did not find any statistically significant differences between INUI_100_random, face_100_random and the full versions in case of either full or partial sample. As the biggest account in our sample includes 558 photos, this finding should be further validated for bigger accounts.

We also found that INUI and face based on 100 random photos have acceptable test-retest reliability ($.7723 \leq r \leq .7752$, $p < .0001$).

Finally, we tested convergent and discriminant validity of INUI, face and their short versions with different self-report measures of personality. We found that correlation patterns of our unobtrusive (INUI, face, INUI_100_random, face_100_random) and self-report measures (NPI-40, NPI-16) have same signs in the majority of cases; in particular, with self-esteem measures (Rosenberg's Self-Esteem and 1-item self-esteem), self-monitoring, the facets of Davis's IRI, the measures of extraversion (Hexaco Extraversion and BFI Extraversion), Hexaco Humiliy and its facets, BFI Neuroticism, and BFI Consciousness. We suggest that the relation between INUI, face, and such constructs as Hexaco Honesty, BFI Consciousness and Agreeableness should be further tested on a different sample.

Regarding, discriminant validity, we found face and face_100_random to have adequate ($r \leq .2$) discriminant validity with Just World Scale. However, as we found INUI to have a substantial correlation with the belief in just world ($.2346 \leq r \leq .2365$), we suggest that discriminant validity of INUI should be further validated on a different sample.

Limitations and future research. Our study has a number of limitations that can be improved in future work. First of all, due to the number of reasons (financial, organizational, and data sensitivity), only one sample had been used in this research. We suggest that all the

most important (INUI structural equation model) or confusing (INUI's discriminant validity, correlations between INUI/ face and Hexaco Honesty, BFI Consciousness, and BFI Agreeableness) results should be further tested on at least one bigger sample. Moreover, our sample consists of students, so our findings can have limited generalizability to individuals of a different age or educational background.

Second, we considered only two variations of NPI (NPI-16 and NPI-40). The correlation of INUI and face with other variations of NPI (NPI-52, NPI-37, NPI-13) can be further tested. Moreover, we used only one, the most widespread seven-dimensional structure of NPI-40 (Raskin &Terry). Our results can be further reconsidered on a different factor structure (i.e. the recent popular three-dimensional structure by Ackerman et al., 2011). Testing convergence of our measure with other unobtrusive indicators can also complement extant research.

Third, predictive validity of our unobtrusive measures should be further tested and compared to those of NPI-40 and NPI-16 (**Chapter 2**).

Finally, different aspects of Instagram activity also matter. First, as only open Instagram accounts were used in order to construct and validate our unobtrusive indicators, our measures should be further validated on a sample of closed accounts. Second, as the biggest account in our sample included maximum of 558 photos, our measures should be further validated on bigger Instagram accounts. Moreover, applying the measure to a completely different population category rather than students (i.e., celebrities, bloggers, and persons with confirmed Instagram account) can shed more light on face and INUI applicability.

Contributions. We suggest that our study may have the following contributions. First, we found empirical support that, in the trainer-trainee relationship, trainer's levels of narcissism and exhibitionism positively affect trainee performance; these findings may extend a few literature on the positive implications of narcissism at the workplace. Second, we found empirical support that trainer's level of narcissism negatively affects training transfer, thus confirming the detrimental long-term effect of narcissism in organizational contexts. Finally, we empirically confirmed the presence of role-modeling mechanism in the relationship between trainer's narcissism and training transfer.

In this paper, we suggest that excessive use of social media represents a risk but also an opportunity for the scholars. One the one hand, excessive use of social media has a narcissistic nature (McKinney et al., 2012; Panek et al., 2013; Davenport et al., 2014), it represents the increase of the level of narcissism in the society (Twenge & Foster, 2008) and, correspondingly, the exposure of the society to the dark side of narcissism. On the other hand, excessive use of social media means that individuals include "more of them" to their social network profiles, which allows scientists to more precisely capture their personality traits by simply looking at these profiles. We suggest that for the particular case of narcissism personality trait and Instagram social network it's even possible to catch such subtleties as the prominence of some dimensions of a personality trait (i.e. exhibitionism dimension of narcissism). We hope that our Instagram-based unobtrusive indicators and, in general, future development of unobtrusive indicators approach and future use of Instagram in order to study narcissism, will help scholars to better understand the implications of narcissism becoming widespread in today's society.

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Figure 1a. Self-report measures of narcissism

#	Authors & Year	Measure	Number of items	Subscales (original)
1	Raskin & Hall, 1979	NPI-52	52	no
2	Emmons, 1987	NPI-37	37	1. Leadership/Authority 2. Superiority/Arrogance 3. Self-Absorption/Self-Admiration 4. Exploitativeness/Entitlement
3	Raskin & Terry, 1988	NPI-40	40	1. Authority 2. Self-Sufficiency 3. Superiority 4. Exhibitionism 5. Exploitativeness 6. Vanity 7. Entitlement
4	Ames et al., 2006	NPI-16	16	no
5	Gentile et al., 2013	NPI-13	13	1. Leadership/Authority 2. Grandiose Exhibitionism 3.Entitlement/Exploitativeness

Figure 1b. Unobtrusive measures of narcissism

#	Authors & Year	Number of dimensions	Dimensions
1	Chatterjee & Hambrick, 2007	5	1. Prominence of CEO's photograph 2. CEO prominence in company press releases 3. CEO's use of first-person singular pronouns 4. CEO relative cash pay 5. CEO relative non-cash pay
2	Chatterjee & Hambrick, 2011	4	1. Prominence of CEO's photograph 2. CEO prominence in company press releases 3. CEO relative cash pay 4. CEO relative non-cash pay
3	Scrand & Zechman, 2012	3	1. Prominence of CEO's photograph 2. CEO relative cash pay 3. CEO relative non-cash pay
4	Olsen et al., 2014	3	#3
5	Zhu & Chen, 2015	4 and 5	#1 and #2
6	Aktas et al., 2016	1	CEO's use of first-person singular pronouns in the transcription of the interviews
7	Aabo & Ericksen, 2018	6	1. Number of skills added to "Skills and endorsements" section of Linkedin profile 2. The number of professionals that the user is connected to on the Linkedin network 3. The number of previous positions listed 4. Whether or not the picture is added to the Linkedin profile 5. Inclusion of a summary 6. Inclusion of interests
8	Ham's et al., 2018	1	CEO's signature size
9	Grijalva et al., 2019	2	1. Narcissistic content of tweets 2. Narcissistic/non-narcissistic Twitter profile photo

Figure 2. Structure of the Survey

Note: the research instrument was an online survey named "SURVEY: Social Media Activity & Personality". The link to it was provided to the students via e-mail. If the participants did not agree with the rules of this study or the rules of data privacy and management, or if the participants provided neither the link to their Twitter nor the link to their Instagram profile, they were directed to the page with the end message.

	Part	Number of questions	Items in the Likert scale	Options
1	1-point self-esteem	1	5	1 – "Not very true of me" 5 – "Very true of me"
2	Informed consent, Data privacy & Management	2	-	a. Accept b. Do not accept
3	Identification: name, age, gender, nationality, level of English	6	-	-
4	Instagram and Twitter Activity	8	-	-
5	NPI-40 (including NPI-16)	40	-	Pairs of forced choice statements
6	Rosenberg Self-Esteem Scale	10	4	1="Strongly Disagree" 4="Strongly Agree"
7	BFI	44	5	1="Strongly Disagree" 3="Neither agree nor Disagree" 5="Strongly Agree"
8	Hexaco Honesty Humility & Hexaco Extraversion	20	5	1="Strongly Disagree" 3="Neutral (Neither agree nor Disagree)" 5="Strongly Agree"
9	Davis IRI	28	5	1="Does not describe me well" 5="Describes me very well"
10	Just World Scale	20	6	1="Strongly Disagree" 6="Strongly Agree"
11	Self-monitoring scale	13	6	1="Certainly, always false" 6="Certainly, always true"

Figure 3. Structure of the survey participants

		Completed the survey		All
		Yes	No	
Have open Instagram account	**Yes**	60	8	68
	No	49	22	71
All		109	30	139

Figure 4. Confirmatory factor analysis: aggregation of NPI-40 items

#	NPI-40 items	Dimension	Aggregated group name (Figure 5)
1	1, 10, 32, 36	Authority	AU_1
2	8, 11, 12, 33	Authority	AU_2
3	17, 21, 22	Self-Sufficiency	SS_1
4	31, 34, 39	Self-Sufficiency	SS_2
5	4, 26, 37	Superiority	SUP_1
6	9, 40	Superiority	SUP_2
7	2, 7, 20, 30	Exhibitionism	EXHI_1
8	3, 28, 38	Exhibitionism	EXHI_2
9	6, 13, 23	Exploitativeness	EXPLO_1
10	16, 35	Exploitativeness	EXPLO_2
11	15	Vanity	VA_1
12	19	Vanity	VA_2
13	29	Vanity	VA_3
14	18, 25, 27	Entitlement	ENTI_1
15	5, 14, 24	Entitlement	ENTI_2

Figure 5. Confirmatory Factor Analysis: INUI - NPI-40

Note: N=63. All the estimates are standardized. Aggregation of NPI-40 items is explained in **Figure 4**. Covariances between the groups of items that are significantly and positively correlated at 0,1% level (p≤.001) are considered in the model (**Table 8**). Covariances between the groups of NPI-40 items are provided in the additional table. *p≤.05, **p≤.01, ***p≤.001.

Variable 1	Variable 2	Covariance
AU_1	AU_2	0.43***
AU_1	EXPLO_1	0.25*
AU_1	EXPLO_2	0.12
AU_2	SUP_2	0.05
AU_2	ENTI_1	0.17
AU_2	ENTI_2	0.22
SUP_1	EXHI_1	0.24*
SUP_1	EXHI_2	0.38**
SUP_2	EXHI_1	0.36**
SUP_2	ENTI_2	0.19
EXHI_1	EXHI_2	0.18
EXHI_2	VA_1	0.14
EXPLO_1	ENTI_2	0.11
VA_1	VA_2	0.31**
VA_2	VA_3	0.42***

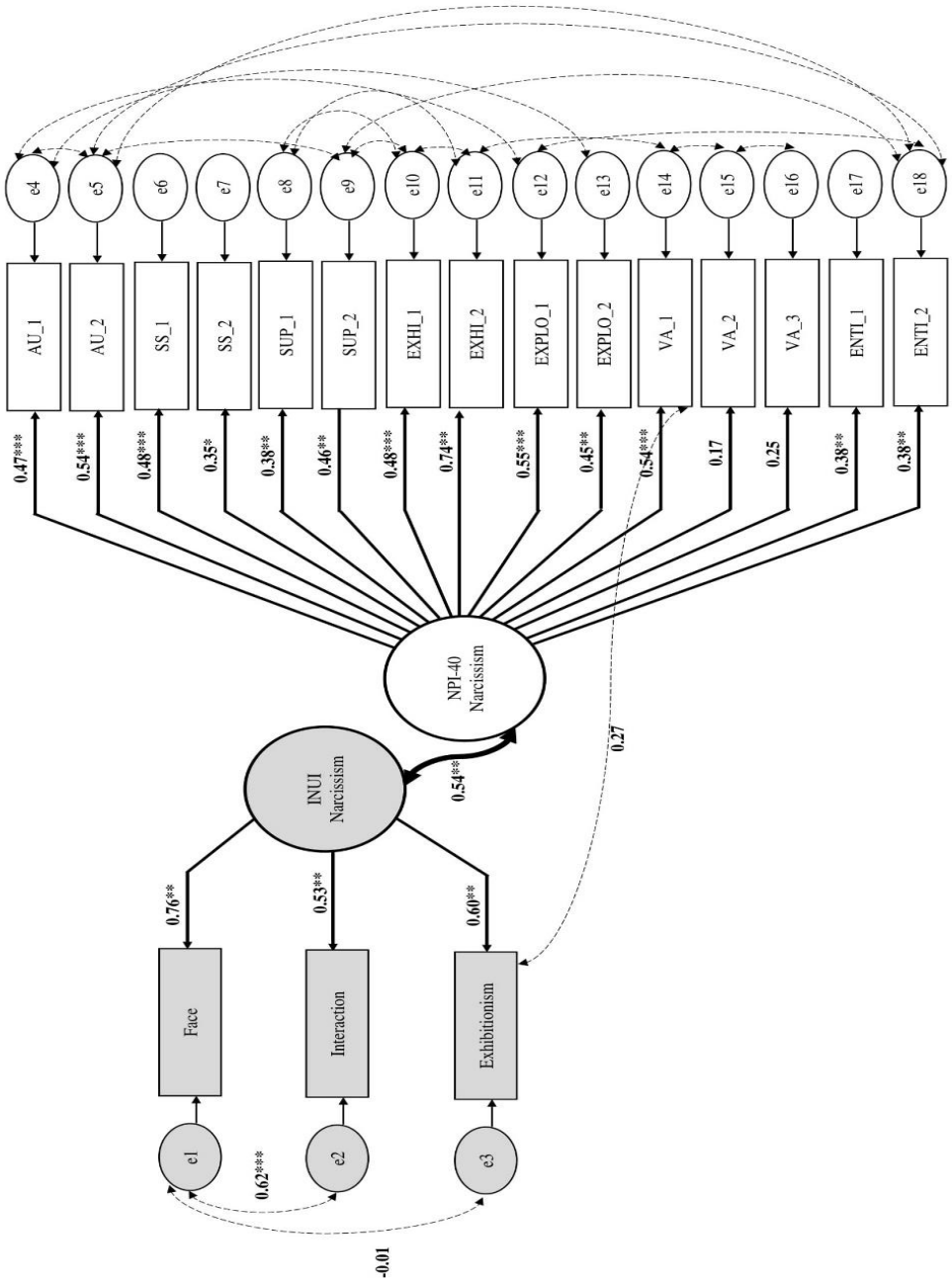

Figure 6. Confirmatory Factor Analysis: INUI - NPI-16

Note: N=63. All the estimates are standardized. Covariances between the groups of items that are significantly and positively correlated at .05% level (p≤.0005) are considered in the model. *p≤.05, **p≤.01, ***p≤.001.

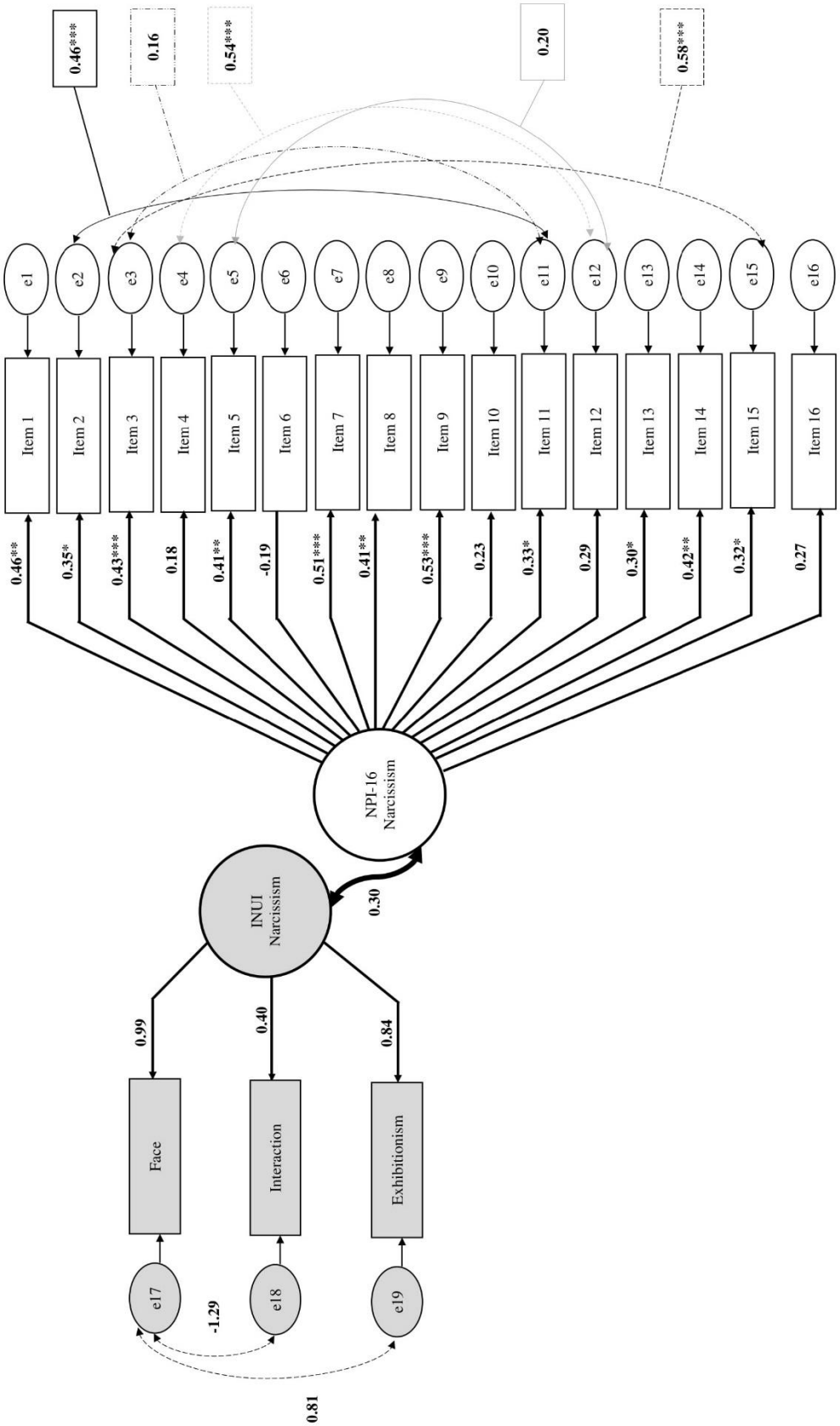

Table 1. Descriptive statistics

Variable	Obs	Mean	SD	Min	Max
Age	139	21,5252	2,6191	17	30
Male	139	0,4532	0,4996	0	1
No course credit	139	0,5899	0,4936	0	1
Italian	139	0,5647	0,4921	0	1
Level of English	139	1,9065	0,5633	1	3
NPI-16	118	6,1949	3,1899	0	15
NPI-40	118	17,7288	6,5720	2	34
NPI-40 Authority	118	5,0508	2,0583	0	8
NPI-40 Self-Sufficiency	118	2,4068	1,3349	0	6
NPI-40 Superiority	118	2,2966	1,4577	0	5
NPI-40 Exhibitionism	118	2,1864	1,7441	0	7
NPI-40 Exploitativeness	118	2,0763	1,3722	0	5
NPI-40 Vanity	118	1,1525	0,9394	0	3
NPI-40 Entitlement	118	2,4068	1,4978	0	6
Rosenberg Self-Esteem	117	30,8291	4,1818	16	39
1-item Self-Esteem	139	3,6115	0,9964	1	5
Belief in Just World	109	52,3578	7,6576	33	71
Self-monitoring	109	43,4862	7,1215	24	63
BFI Agreeableness	115	32,8348	5,913	17	44
BFI Consciousness	115	33,3044	5,7707	15	45
BFI Neuroticism	115	22,9304	6,2586	8	40
BFI Openness to experience	115	37,7217	5,6655	25	50
BFI Extraversion	115	28,2696	6,1321	13	39
Hexaco Extraversion	110	37,7909	5,9833	18	50
Hexaco Honesty-Humility	110	33,1091	6,4229	19	45
Hexaco Modesty (Honesty-Humility)	110	6,6818	1,8619	2	10
Hexaco Greed-Avoidance (Honesty-Humility)	110	5,2182	1,8982	2	10
Hexaco Sincerity (Honesty-Humility)	110	10,1	2,6229	4	15
Hexaco Fairness (Honesty-Humility)	110	11,1091	3,0117	4	15
IRI Empathic Concern	109	18,7706	5,0747	5	28
IRI Perspective Taking	109	18,6147	4,7647	6	26
IRI Fantasy Scale	109	17,8165	5,4112	7	28
IRI Personal Distress	109	11,7615	5,1007	2	27
Incomplete survey	139	0,2158	0,4129	0	1
Short version	139	0,0216	0,1458	0	1
Have Twitter	138	0,3043	0,4618	0	1
Twitter link	139	0,1727	0,3793	0	1
Have Instagram	138	0,9493	0,2202	0	1
Instagram link	139	0,8273	0,3793	0	1
Not deleted at 1st check	115	0,9913	0,0933	0	1
Open at 1st check	114	0,5526	0,4994	0	1
Not deleted at 2nd check	115	0,9217	0,2698	0	1
Open at 2nd check	106	0,5472	0,5001	0	1
Deletion	115	0,0783	0,2698	0	1

(continued)

Variable	Obs	Mean	SD	Min	Max
Change to open	106	0,0472	0,213	0	1
Change to private	106	0,0755	0,2654	0	1
Privacy change	106	0,1226	0,3296	0	1
Always open	106	0,5	0,5024	0	1
Always private	106	0,3774	0,487	0	1
Postings	108	137,3981	143,6233	0	563
Followers	108	605,1667	732,0137	1	5311
Followings	108	440,9352	279,2624	0	1509
Followers-to-followings ratio	108	1,31	3,8865	0	41
Hashtags	68	3,603	4,417	0	21,1846
Likes	68	61,1595	83,2285	0	666,751
Comments	68	2,0853	1,5729	0	8
Photos codified	68	157,6618	151,4059	1	558
Videos	68	4,8971	6,2489	0	26
Photos share	68	0,9713	0,0331	0,8529	1
Videos share	68	0,0301	0,0345	0	0,1471
Face absolute	68	71,5588	84,6216	0	368
Exhibitionism absolute	68	5,6029	14,7963	0	99
Interation absolute	68	37,1029	44,7761	0	199
Multiface absolute	68	2,1765	3,5616	0	13
Face	68	0,4889	0,2699	0	1
Exhibitionism	68	0,0265	0,0537	0	0,2573
Interaction	68	0,274	0,2141	0	1
Multiface	68	0,0088	0,014	0	0,0661
INUI	68	0,7895	0,4751	0	2,0715
Face_30_latest	68	0,5449	0,2946	0	1
Face_30_oldest	68	0,4414	0,2918	0	1
Face_30_random	68	0,4953	0,2749	0	1
Face_50_latest	68	0,5329	0,2822	0	1
Face_50_oldest	68	0,4532	0,28	0	1
Face_50_random	68	0,4967	0,2697	0	1
Face_100_latest	68	0,5105	0,2746	0	1
Face_100_oldest	68	0,4699	0,2705	0	1
Face_100_random	68	0,4931	0,2763	0	1
INUI_30_latest	68	0,8484	0,5091	0	2,0714
INUI_30_oldest	68	0,7092	0,5037	0	2,0714
INUI_30_random	68	0,7945	0,4837	0	2,0714
INUI_50_latest	68	0,8378	0,4929	0	2,0714
INUI_50_oldest	68	0,7351	0,4851	0	2,0714
INUI_50_random	68	0,7983	0,473	0	2,0714
INUI_100_latest	68	0,8122	0,4815	0	2,0714
INUI_100_oldest	68	0,7638	0,4732	0	2,0714
INUI_100_random	68	0,7985	0,4852	0	2,0714

Table 2. Categorical variables

Dummy variables	Frequency				Obs
	Dummy = 0		Dummy =1		
Male	76	54,68%	63	45,32%	139
No course credit	57	41,01%	82	58,99%	139
Incomplete survey	109	78.42%	30	21.58%	139
Short version	136	97,84%	3	2,16%	139
Have Twitter	96	69,57%	42	30,43%	138
Link to Twitter	115	82,73%	24	17,27%	139
Have Instagram	7	5,07%	131	94,93%	138
Link to Instagram	24	17,27%	115	82,73%	139
Not deleted at 1st check	1	0,87%	114	99,13%	115
Open at 1st check	51	44,74%	63	55,26%	114
Not deleted at 2nd check	9	7,83%	106	92,17%	115
Open at 2nd check	48	45,28%	58	54,72%	106
Deletion	106	92,17%	9	7,83%	115
Change to open	101	95,28%	5	4,72%	106
Change to private	98	92,45%	8	7,55%	106
Change of privacy	93	87,74%	13	12,26%	106
Always open	53	50,00%	53	50,00%	106
Always private	66	62,26%	40	37,74%	106

Table 2a. Italian

	Variable: Italian			
	Non-italian	Half-italian	Italian	All
Frequency	59	3	77	139
	42,45%	2,16%	55,40%	100%

Table 2b. Level of English

	Variable: Level of English			
	Fluent	Advanced	Native	All
Frequency	29	94	16	139
	20,86%	67,63%	11,51%	100%

Table 3. Alpha coefficients

Measure	Number of items	Obs	Alpha	Interim cov
NPI-16	16	118	0.6992	0.0278
NPI-40	40	118	0.8174	0.0221
NPI-40 Authority	8	118	0.7019	0.0465
NPI-40 Self-sufficiency	6	118	0.2957	0.0146
NPI-40 Superiority	5	118	0.5673	0.0482
NPI-40 Exhibitionism	7	118	0.6122	0.0380
NPI-40 Exploitativeness	5	118	0.4740	0.0357
NPI-40 Vanity	3	118	0.6627	0.0888
NPI-40 Entitlement	6	118	0.5186	0.0342
Rosenberg Self-esteem Scale	10	117	0.8000	0.1399
BFI Extraversion	8	115	0.8378	0.4923
BFI Agreeableness	9	115	0.7686	0.3318
BFI Consciousness	9	115	0.7851	0.3228
BFI Neuroticism	8	115	0.8175	0.5004
BFI Openness to experience	10	115	0.7486	0.2403
Hexaco Honesty-Humility	10	110	0.7285	0.3005
Hexaco Sincerity (Honesty-Humility)	3	110	0.5082	0.3885
Hexaco Fairness Honesty-Humility	3	110	0.7447	0.7505
Hexaco Greed-Avoidance Honesty-Humility	2	110	0.5273	0.4750
Hexaco Modesty Honesty-Humility	2	110	0.5951	0.5158
Hexaco Extraversion	10	110	0.8002	0.2865
IRI Empathic Concern	7	109	0.8078	0.4245
IRI Perspective Taking	7	109	0.7858	0.3641
IRI Fantasy Scale	7	109	0.7853	0.4693
IRI Personal Distress	7	109	0.7612	0.4042
Belief in just world	20	109	0.5683	0.1063
Self-monitoring	13	109	0.7528	0.2259
INUI_30_latest	3	68	0.6453	0.0186
INUI_30_oldest	3	68	0.6801	0.0192
INUI_30_random	3	68	0.6835	0.0178
INUI_50_latest	3	68	0.6548	0.0177
INUI_50_oldest	3	68	0.6814	0.0178
INUI_50_random	3	68	0.6829	0.0170
INUI_100_latest	3	68	0.6725	0.0173
INUI_100_oldest	3	68	0.6847	0.0170
INUI_100_random	3	68	0.6901	0.0180

Table 4. Correlations between INUI dimensions.

Note: N=68. P-values are in parentheses, *p≤.05, **p≤.01, ***p≤.001.

	Face-Interaction	**Face-Exhibitionism**	**Exhibitionism-Interaction**
INUI	**0,7615*** ** (0,0000)	**0,4034*** ** (0,0006)	**0,1921** (0,1167)
INUI_30_latest	**0,6511*** ** (0,0000)	**0,3994** (0,0007)	**0,0743** (0,5469)
INUI_30_oldest	**0,7603*** ** (0,0000)	**0,4361*** ** (0,0002)	**0,2987*** (0,0134)
INUI_30_random	**0,7580*** ** (0,0000)	**0,3114** ** (0,0044)	**0,1445** (0,2398)
INUI_50_latest	**0,6692*** ** (0,0000)	**0,3946*** ** (0,0009)	**0,0977** (0,4278)
INUI_50_oldest	**0,7622*** ** (0,0000)	**0,4169*** ** (0,0004)	**0,2312** (0,0579)
INUI_50_random	**0,7489*** ** (0,0000)	**0,3764** ** (0,0016)	**0,1604** (0,1913)
INUI_100_latest	**0,7064*** ** (0,0000)	**0,4004*** ** (0,0007)	**0,1316** (0,2848)
INUI_100_oldest	**0,7618*** ** (0,0000)	**0,3741** ** (0,0017)	**0,1876** (0,1255)
INUI_100_random	**0,7523*** ** (0,0000)	**0,3940*** ** (0,0009)	**0,1522** (0,2154)

Table 5. Intergroup differences in narcissism

Note: One-way Anova with narcissism (measured by NPI-16 or NPI-40) being the response variable. P-values are in parentheses, *p≤.05, **p≤.01, ***p≤.001.

Variable	Value	NPI-40				NPI-16			
		Mean	**SD**	**N**	**F (p)**	**Mean**	**SD**	**N**	**F (p)**
Male	0	17.3692	7.1906	65	**0.43**	5.9231	3.237	65	**1.05**
	1	18.1698	5.7604	53	(0.5127)	6.5283	3.1293	53	(0.3073)
Italian	0	18.3962	6.4341	53	**0.94**	6.6226	3.2947	53	**1.15**
	0,5	21.5	12.0208	2	(0.3936)	7.5	4.9497	2	(0.3218)
	1	17.0476	6.5683	63		5.7937	3.0541	63	
No course credit	0	17.537	6.5321	54	**0.08**	6.037	3.1858	54	**0.24**
	1	17.8906	6.6526	64	(0.7723)	6.3281	3.2124	64	(0.6235)
Level of English	1	16.0417	6.6756	24	**1.33**	5.625	2.9608	24	**0.49**
	2	17.9383	6.5275	81	(0.2679)	6.321	3.1852	81	(0.6155)
	3	19.5385	6.4886	13		6.4615	3.7331	13	
Have Twitter	0	17.75	6.1982	80	**0.00**	6.3875	3.2237	80	**0.90**
	1	17.6842	7.3855	38	(0.9597)	5.7895	3.1206	38	(0.3435)
Have Instagram	0	22	1	3	**1.30**	8	1	3	**0.99**
	1	17.6174	6.6195	115	(0.2559)	6.1478	3.2152	115	(0.3229)
Always open	0	17.1154	6.3791	52	**1.00**	5.7115	3.1332	52	**2.86**
	1	18.4118	6.7799	51	(0.3199)	6.7451	3.0649	51	(0.0937)
Instagram link	0	17.7143	7.9522	7	**0.00**	6.2857	3.6384	7	**0.01**
	1	17.7297	6.5184	111	(0.9952)	6.1892	3.1781	111	(0.9385)
Privacy change	0	18.0111	6.2288	90	**1.06**	6.4111	2.9902	90	**2.61**
	1	16	8.7464	13	(0.3053)	4.9231	3.8397	13	(0.1092)
Deletion	0	17.7573	6.5805	103	**0.03**	6.2233	3.1278	103	**0.16**
	1	17.375	6.046	8	(0.8739)	5.75	3.9911	8	(0.6868)

Table 6. Inter-rater reliability

Note: N=2.658, the number of photos codified. Standard errors are in parentheses. All the Cohen's kappa coefficients are significant at .01% level (p<.0001), *p≤.05, **p≤.01, ***p≤.001.

Dimension	Mean (codifier 1)	Mean (codifier 2)	Cohen's kappa
Face	**0,5421** (0,4983)	**0,5432** (0,4982)	0,9447***
Exhibitionism	**0,0421** (0,2009)	**0,0399** (0,1957)	0,9139***
Interaction	**0,2585** (0,4379)	**0,2524** (0,4345)	0,9327***
Multiface	**0,0056** (0,0749)	**0,0049** (0,0698)	0,7846***

Table 7. Correlations between NPI-40 items

Note: N=63, ** (p≤.001). NPI-16 items in NPI-40: 4, 7, 9, 12, 13, 14, 20, 21, 23, 24, 30, 32, 34, 35, 39, 40

Item	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1)	1.000																			
(2)	0.017	1.000																		
(3)	0.074	0.089	1.000																	
(4)	0.030	0.236	0.129	1.000																
(5)	0.306**	0.205	0.070	0.052	1.000															
(6)	0.154	0.031	0.046	0.012	0.159	1.000														
(7)	0.273	0.158	0.090	0.180	0.159	0.099	1.000													
(8)	0.170	0.049	0.067	0.060	0.179	0.012	0.054	1.000												
(9)	0.180	0.285	0.105	0.216	0.209	0.004	0.184	0.180	1.000											
(10)	0.385**	0.060	0.077	0.071	0.411**	0.239	0.113	0.039	0.201	1.000										
(11)	0.195	0.082	0.125	0.012	0.152	-0.050	0.134	0.091	0.168	0.202	1.000									
(12)	0.059	-0.008	0.044	-0.040	0.268	0.185	0.185	0.100	0.180	0.356**	0.042	1.000								
(13)	0.230	0.200	0.128	0.307**	0.283	0.273	0.091	0.101	0.120	0.329**	0.154	0.140	1.000							
(14)	-0.073	-0.067	0.072	-0.077	-0.109	0.090	0.001	0.067	0.061	-0.129	0.034	0.044	0.038	1.000						
(15)	-0.106	0.179	0.275	0.064	0.131	0.113	0.070	-0.025	0.123	0.088	0.273	0.105	0.064	0.006	1.000					
(16)	0.163	-0.200	0.088	0.030	-0.050	0.117	-0.027	-0.012	0.139	0.180	0.050	0.127	0.055	-0.046	-0.026	1.000				
(17)	0.264	0.123	0.170	0.154	0.092	0.045	0.282	0.110	0.096	0.214	0.169	0.070	0.171	-0.123	-0.086	0.074	1.000			
(18)	0.139	0.038	0.092	0.106	0.195	0.107	0.144	0.135	0.177	0.107	0.215	0.168	0.203	-0.043	0.118	0.076	0.022	1.000		
(19)	0.074	-0.012	0.046	-0.030	0.050	-0.009	0.063	-0.073	0.076	-0.054	0.171	0.068	0.018	0.046	0.419**	-0.027	-0.035	0.070	1.000	
(20)	-0.030	0.301	0.037	0.187	0.035	0.031	0.285	0.049	0.158	0.060	-0.005	0.084	0.200	0.037	0.230	-0.073	0.076	0.038	-0.096	1.000
(21)	0.126	0.090	0.142	-0.014	0.159	0.078	-0.034	0.043	0.135	0.189	-0.044	0.070	0.056	0.003	-0.149	0.147	0.039	0.107	-0.072	0.045
(22)	-0.035	-0.073	-0.046	-0.012	0.059	-0.063	0.009	-0.012	0.104	0.222	0.087	0.205	-0.091	0.043	0.018	0.207	-0.124	-0.070	0.009	0.054
(23)	0.157	0.051	0.246	0.285	0.205	0.158	0.243	-0.101	0.158	0.109	0.039	0.175	0.200	-0.015	0.282	0.054	0.030	0.124	0.116	0.251
(24)	-0.022	0.290	0.044	0.227	0.101	0.121	-0.000	0.091	0.102	-0.039	0.017	0.176	0.166	-0.005	0.080	-0.081	-0.022	0.136	-0.000	0.147
(25)	-0.033	0.021	0.125	0.086	0.065	-0.060	-0.096	0.191	0.128	0.040	0.038	0.118	0.112	0.081	0.060	0.060	-0.006	0.312**	-0.132	0.148
(26)	0.192	0.229	0.190	0.371**	0.201	0.162	0.237	0.123	0.147	0.149	-0.008	0.039	0.186	0.007	0.113	-0.088	0.178	0.022	0.050	0.229
(27)	0.202	0.163	0.105	0.182	0.241	0.046	0.153	0.257	0.239	0.233	0.098	0.237	0.228	-0.070	0.169	0.240	0.112	0.283	-0.026	0.247
(28)	0.036	-0.072	0.066	0.041	0.055	-0.045	0.140	0.072	-0.002	-0.041	0.037	-0.014	-0.102	0.021	0.093	-0.103	0.045	0.024	-0.045	0.189
(29)	0.010	0.144	0.052	0.074	0.010	0.092	0.165	-0.015	0.170	0.053	0.070	0.097	0.071	0.052	0.246	-0.019	0.070	0.094	0.456**	0.187
(30)	0.143	0.338**	0.099	0.316**	0.217	0.151	0.549**	0.044	0.348**	0.188	-0.064	0.095	0.069	0.010	0.167	-0.043	0.255	0.122	0.043	0.211
(31)	-0.017	0.015	0.167	-0.047	0.247	0.220	-0.066	-0.141	-0.077	0.172	0.143	0.060	0.112	-0.053	0.187	0.030	-0.023	0.094	0.148	-0.070
(32)	0.382**	0.144	-0.000	0.038	0.271	0.194	0.229	0.150	0.236	0.295	0.199	0.493**	0.380**	-0.000	0.020	0.092	0.129	0.292	-0.092	0.144
(33)	0.156	0.138	0.155	0.055	0.347**	0.162	0.203	0.147	0.260	0.368**	0.230	0.567**	0.284	0.105	0.067	0.081	0.289	0.192	0.000	0.091
(34)	-0.101	-0.015	-0.035	0.006	0.220	0.066	0.030	0.099	0.113	0.202	0.112	0.133	0.033	0.097	0.073	-0.066	0.062	0.051	0.138	-0.099
(35)	0.201	-0.025	0.207	0.127	0.114	0.111	0.075	-0.061	0.064	0.211	0.093	0.190	0.209	-0.106	0.142	0.253	0.239	0.336**	0.075	0.146
(36)	0.297	-0.049	0.246	0.039	0.163	0.031	0.200	-0.001	0.200	0.306**	0.125	0.267	0.157	-0.015	0.076	0.266	0.170	-0.048	0.031	0.201
(37)	0.081	0.103	0.252	0.043	0.297	0.038	0.111	0.196	0.209	0.084	0.093	0.072	0.099	-0.016	0.142	-0.038	0.079	0.040	-0.071	0.061
(38)	-0.094	0.076	0.066	0.159	0.193	0.242	0.284	0.119	0.191	0.081	-0.141	0.198	0.203	0.117	0.253	-0.036	0.049	0.004	0.077	0.368**
(39)	0.098	0.117	0.041	0.319**	0.172	0.087	-0.005	0.099	0.159	0.001	-0.141	-0.034	0.262	-0.016	-0.192	0.051	0.003	-0.008	-0.189	0.117
(40)	0.125	0.275	-0.052	0.169	0.318**	0.047	0.191	0.148	0.557**	0.165	0.111	0.157	0.149	0.125	0.104	-0.047	0.073	0.129	-0.024	0.148

(continued)

Item	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)
(21)	1.000																			
(22)	0.222	1.000																		
(23)	0.134	0.054	1.000																	
(24)	0.238	-0.081	0.147	1.000																
(25)	-0.010	-0.047	0.021	0.191	1.000															
(26)	-0.124	-0.162	0.141	0.152	0.101	1.000														
(27)	0.198	0.061	0.163	0.155	0.455**	0.229	1.000													
(28)	-0.289	-0.066	0.058	-0.006	0.273	0.263	0.140	1.000												
(29)	0.020	-0.019	0.058	0.243	-0.112	0.229	-0.011	0.027	1.000											
(30)	-0.021	-0.043	0.211	0.010	-0.045	0.337**	0.207	0.080	0.187	1.000										
(31)	0.075	0.102	0.099	-0.064	0.059	-0.057	-0.097	-0.016	-0.076	-0.120	1.000									
(32)	0.098	0.057	0.186	0.134	0.175	0.181	0.398**	0.039	0.054	0.141	0.045	1.000								
(33)	0.184	0.161	0.138	0.089	0.172	0.142	0.406**	0.006	0.125	0.152	0.104	0.508**	1.000							
(34)	0.111	0.077	0.028	-0.176	-0.059	0.020	-0.080	-0.130	0.040	0.085	0.204	-0.010	0.016	1.000						
(35)	0.156	0.034	0.189	0.114	0.132	0.048	0.209	0.108	0.232	-0.020	0.166	0.216	0.172	0.086	1.000					
(36)	0.001	0.139	0.201	-0.138	0.106	0.185	0.247	0.189	0.144	0.126	0.015	0.270	0.233	0.028	0.061	1.000				
(37)	0.080	-0.075	0.103	0.154	0.060	0.274	0.173	0.071	0.085	0.199	0.130	0.108	0.253	-0.058	-0.027	0.103	1.000			
(38)	-0.115	-0.036	0.368**	0.212	0.149	0.296	0.159	0.237	0.132	0.336**	0.015	0.016	0.113	-0.015	-0.058	0.222	0.150	1.000		
(39)	0.180	0.051	0.171	0.176	0.216	0.259	0.201	-0.038	-0.169	0.142	-0.192	0.093	0.030	0.101	-0.118	0.063	0.114	0.147	1.000	
(40)	0.028	0.060	0.063	0.110	0.103	0.138	0.170	0.089	0.033	0.280	0.059	0.210	0.253	0.155	0.023	0.106	-0.013	0.232	0.124	1.000

Table 8. Correlations between grouped NPI-40 items and INUI dimensions

Note: N=63, ** (p≤.001). Aggregation of NPI-40 items is explained in **Figure 4**. Correlations considered in the structural equation model (**Figure 5**) are highlighted by grey color.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) INUI Face	1.000																	
(2) INUI Interaction	0.751**	1.000																
(3) INUI Exhibitionism	0.468**	0.326	1.000															
(4) NPI-40 AU_1	0.277	0.276	0.194	1.000														
(5) NPI-40 AU_2	0.235	0.200	0.159	0.509**	1.000													
(6) NPI-40 SS_1	0.314	0.372	0.190	0.301	0.288	1.000												
(7) NPI-40 SS_2	0.095	0.047	0.077	0.109	0.117	0.193	1.000											
(8) NPI-40 SUP_1	0.058	0.150	0.188	0.219	0.190	0.017	0.149	1.000										
(9) NPI-40 SUP_2	0.107	0.011	0.064	0.290	0.326**	0.155	0.157	0.231	1.000									
(10) NPI-40 EXHI_1	0.235	0.069	0.292	0.262	0.185	0.145	0.011	0.416**	0.381**	1.000								
(11) NPI-40 EXHI_2	0.168	0.008	0.266	0.144	0.150	-0.061	0.021	0.381**	0.163	0.319**	1.000							
(12) NPI-40 EXPLO_1	0.083	0.076	0.101	0.414**	0.242	0.102	0.276	0.299	0.146	0.276	0.259	1.000						
(13) NPI-40 EXPLO_2	0.253	0.172	0.061	0.311**	0.164	0.297	0.061	0.010	0.064	-0.036	0.059	0.224	1.000					
(14) NPI-40 ENTI_1	0.086	0.101	-0.067	0.303	0.387**	0.088	0.074	0.210	0.238	0.179	0.248	0.201	0.294	1.000				
(15) NPI-40 ENTI_2	0.062	0.002	0.140	0.214	0.372**	0.131	0.201	0.296	0.313**	0.224	0.228	0.349**	-0.012	0.256	1.000			
(16) NPI-40 VA_1	0.355	0.167	0.439**	0.025	0.176	-0.117	0.065	0.155	0.129	0.226	0.310**	0.212	0.073	0.153	0.132	1.000		
(17) NPI-40 VA_2	-0.122	-0.218	0.080	-0.018	0.073	-0.053	0.082	-0.024	0.029	0.005	0.035	0.055	0.030	-0.040	0.055	0.419**	1.000	
(18) NPI-40 VA_3	-0.028	-0.136	0.038	0.091	0.112	0.037	-0.099	0.188	0.115	0.245	0.107	0.108	0.134	-0.014	0.173	0.246	0.456**	1.000

Table 9. Correlations between INUI dimensions and self-report measures of narcissism.

Note: Pearson correlation coefficients, p-values are in parentheses. P-values are in parentheses, *p≤0.05, **p≤0.01, ***p≤0.001. N=68.

	(1) INUI	(2) Face	(3) Exhibitionism	(4) Interaction	Obs
Face	**0,9569*** ** (0,0000)				68
Exhibitionism	**0,4287*** ** (0,0003)	**0,4034*** ** (0,0006)			68
Interaction	**0,9050*** ** (0,0000)	**0,7615*** ** (0,0000)	**0,1921** (0,1167)		68
NPI-16	**0,2685*** (0,0293)	**0,2806*** (0,0225)	**0,2411** (0,0511)	**0,1822** (0,1430)	66
NPI-40	**0,3052*** (0,0127)	**0,3228**** (0,0082)	**0,2888*** (0,0187)	**0,1989** (0,1094)	66
NPI-40 Authority	**0,2314** (0,0615)	**0,2477*** (0,0450)	**0,1480** (0,2355)	**0,1650** (0,1850)	66
NPI-40 Self-Sufficiency	**0,3239**** (0,0080)	**0,2962*** (0,0158)	**0,0746** (0,5516)	**0,3267**** (0,0074)	66
NPI-40 Superiority	**0,1016** (0,4167)	**0,0968** (0,4396)	**0,1610** (0,1965)	**0,0632** (0,6143)	66
NPI-40 Exhibitionism	**0,2204** (0,0753)	**0,2695*** (0,0287)	**0,2596*** (0,0353)	**0,0858** (0,4932)	66
NPI-40 Exploitativeness	**0,2850*** (0,0204)	**0,2758*** (0,0250)	**0,2346** (0,0579)	**0,2262** (0,0678)	66
NPI-40 Vanity	**0,1929** (0,1208)	**0,1987** (0,1098)	**0,4354***** (0,0003)	**0,0686** (0,5843)	66
NPI-40 Entitlement	**0,0670** (0,5931)	**0,0833** (0,5061)	**0,1025** (0,4126)	**0,0184** (0,8835)	66

Table 10a. Correlation differences: NPI-40 vs. Face and INUI

Note: Fisher's Z-test of correlations between NPI-40 and unobtrusive indicators of narcissism (INUI and Face). P-values are in parentheses, *p≤0.05, **p≤0.01, ***p≤0.001.

Variable	Value	NPI-40 & INUI			NPI-40 & Face		
		r	N	Z (p)	r	N	Z (p)
Male	0	0.4199*	36	**0.912**	0.4693**	36	**1.129**
	1	0.2079	30	(0,181)	0.2129	30	(0,129)
Italian	0	0.4153*	26	**0.743**	0.3282	26	**0.146**
	1	0.2390	39	(0,229)	0.293	39	(0,442)
No course credit	0	0.2358	31	**-0.626**	0.2521	31	**-0.647**
	1	0.3819*	35	(0,266)	0.4012*	35	(0,259)
Privacy change	0	0.3234*	51	**-0.07**	0.2921*	51	**-0.591**
	1	0.3449	13	(0,472)	0.467	13	(0,277)

Table 10b. Correlation differences: NPI-16 vs. Face and INUI

Note: Fisher's Z-test of correlations between NPI-16 and unobtrusive indicators of narcissism (INUI and Face). P-values are in parentheses, *p≤0.05, **p≤0.01, ***p≤0.001.

Variable	Value	NPI-16 & INUI			NPI-16 & Face		
		r	N	z	r	N	z
Male	0	0.3718*	36	**0.687**	0.3998*	36	**0.696**
	1	0.2091	30	(0,246)	0.2382	30	(0,243)
Italian	0	0.3321	26	**0.315**	0.2879	26	**0.059**
	1	0.2554	39	(0,376)	0.2743	39	(0,477)
No course credit	0	0.2786	31	**0.069**	0.293	31	**0.036**
	1	0.2621	35	(0,473)	0.2844	35	(0,486)
Privacy change	0	0.2632	51	**0.472**	0.2318	51	**0.988**
	1	0.4082	13	(0,319)	0.5222	13	(0,162)

Table 11. Validity of Face-measures with a limited number of pictures

Note: Student's T-test for mean differences between Face unobtrusive indicator of narcissism and Face-measures with a limited number (30, 50, or 100) of pictures. Student's Ts are absolute values. Mean differences are in parentheses, *p≤0.05, **p≤0.01, ***p≤0.001. Full dataset includes all the Instagram accounts (N=68); partial datasets include only the accounts equal to or greater than 30 pictures (N=50), 50 pictures (N=44), or 100 pictures (N=35).

	Full dataset	Partial dataset (accounts less than 30 pictures excluded)		Partial dataset (accounts less than 50 pictures excluded)		Partial dataset (accounts less than 100 pictures excluded)	
	(1) Face (all photos)	(2) Face (all photos)	Obs	(3) Face (all photos)	Obs	(4) Face (all photos)	Obs
Face_30_latest	3,6309*** (0,0559)	3,7566*** (0,0760)	50				
Face_30_oldest	3,0887** (0,0475)	3,1626** (0,0027)	50				
Face_30_random	1,0614 (0,0439)	1,0617 (0,0087)	50				
Face_50_latest	3,6159*** (0,0439)			3,8096*** (0,0679)	44		
Face_50_oldest	2,9745* (0,0358)			3,0752** (0,0553)	44		
Face_50_random	1,3862 (0,0077)			1,3915 (0,0120)	44		
Face_100_latest	2,4723* (0,0216)					2,5678* (0,0419)	35
Face_100_oldest	2,1948* (0,0190)					2,2572* (0,0370)	35
Face_100_random	1,1467 (0,0042)					1,1493 (0,0082)	35

Table 12. Validity of INUI-measures with a limited number of pictures

Note: Student's T-test for mean differences between INUI unobtrusive indicator of narcissism and INUI-measures with a limited number (30, 50, or 100) of pictures. Student's Ts are absolute values. Mean differences are in parentheses, *p≤0.05, **p≤0.01, ***p≤0.001. Full dataset includes all the Instagram accounts (N=68); partial datasets include only the accounts equal to or greater than 30 pictures (N=50), 50 pictures (N=44), or 100 pictures (N=35).

	Full dataset	Partial dataset (accounts less than 30 pictures excluded)		Partial dataset (accounts less than 50 pictures excluded)		Partial dataset (accounts less than 100 pictures excluded)	
	(1) INUI (all photos)	(2) INUI (all photos)	Obs	(3) INUI (all photos)	Obs	(4) INUI (all photos)	Obs
INUI_30_random	0,4814 (0,0050)	0,4804 (0,0068)	50				
INUI_50_random	0,9229 (0,0088)			0,9224 (0,0137)	44		
INUI_100_random	1,4503 (0,0090)					1,4618 (0,0174)	35
INUI_100_latest	1,6353 (0,0226)					1,6552 (0,0440)	35
INUI_100_oldest	1,7998 (0,0257)					1,8292 (0,0500)	35

Table 13. Test-retest reliabilityy of Face and INUI

Note: Pearson correlation coefficients, p-values are in parentheses, *p≤0.05, **p≤0.01, ***p≤0.001. Full dataset includes all the Instagram accounts (N=68); partial datasets include only the accounts equal to or greater than 30 pictures (N=50), 50 pictures (N=44), or 100 pictures (N=35)

	Full dataset						Partial dataset (accounts less than 30 obs excluded)		Partial dataset (accounts less than 50 obs excluded)		Partial dataset (accounts less than 100 obs excluded)	
	Face_30_oldest	Face_50_oldest	Face_100_oldest	INUI_30_oldest	INUI_50_oldest	INUI_100_oldest	Face_30_oldest	INUI_30_oldest	Face_50_oldest	INUI_50_oldest	Face_100_oldest	INUI_100_oldest
Face_30_latest	0.7480*** (0.0000)						0.6501*** (0.0000)					
Face_50_latest		0.8054*** (0.0000)							0.6825*** (0.0000)			
Face_100_latest			0.8781*** (0.0000)								0.7723*** (0.0000)	
INUI_30_latest				0.7624*** (0.0000)				0.6162*** (0.0000)				
INUI_50_latest					0.8313*** (0.0000)					0.6776*** (0.0000)		
INUI_100_latest						0.8983*** (0.0000)						0.7752*** (0.0000)
Obs	68	68	68	68	68	68	50	50	44	44	35	35

Table 14. Convergent validity of Face and INUI

Note: Pearson correlation coefficients, p-values are in parentheses, *p≤0.05, **p≤0.01, ***p≤0.001. Correlations not consistent with prior findings are highlighted by grey color.

	(1) NPI-16	(2) NPI-40	Obs	(3) INUI (all photos)	(4) INUI (100 random photos)	(5) Face (all photos)	(6) Face (100 random photos)	Obs
NPI-16		**0.8754*** ** (0.0000)	118	**0.2685*** (0.0293)	**0.2635*** (0.0325)	**0.2803*** (0.0225)	**0.2736*** (0.0262)	66
NPI-40	**0.8754*** ** (0.0000)		118	**0.3052*** (0.0127)	**0.3035*** (0.0132)	**0.3228** ** (0.0082)	**0.3212** ** (0.0086)	66
NPI-40 Authority	**0.5608*** ** (0.0000)	**0.7333*** ** (0.0000)	118	**0.2314** (0.0615)	**0.2235** (0.0712)	**0.2477*** 0.0450	**0.2498*** (0.0431)	66
NPI-40 Self-Sufficiency	**0.4509*** ** (0.0000)	**0.4589*** ** (0.0000)	118	**0.3239** ** (0.0080)	**0.3282** ** (0.0071)	**0.2962*** 0.0158	**0.3011*** (0.0140)	66
NPI-40 Superiority	**0.6878*** ** (0.0000)	**0.6892*** ** (0.0000)	118	**0.1016** (0.4167)	**0.0989** (0.4294)	**0.0968** 0.4396	**0.0923** (0.4610)	66
NPI-40 Exhibitionism	**0.6233*** ** (0.0000)	**0.6577*** ** (0.0000)	118	**0.2204** (0.0753)	**0.2208** (0.0748)	**0.2695*** 0.0287	**0.2678*** (0.0297)	66
NPI-40 Exploitativeness	**0.5882*** ** (0.0000)	**0.6335*** ** (0.0000)	118	**0.2850*** (0.0204)	**0.2872*** (0.0194)	**0.2758*** 0.025	**0.2751*** (0.0254)	66
NPI-40 Vanity	**0.2467** ** (0.0071)	**0.4456*** ** (0.0000)	118	**0.1929** (0.1208)	**0.1980** (0.1110)	**0.1987** 0.1098	**0.1986** (0.1099)	66
NPI-40 Entitlement	**0.5700*** ** (0.0000)	**0.6755*** ** (0.0000)	118	**0.0670** (0.5931)	**0.0649** (0.6049)	**0.0833** (0.5061)	**0.0824** (0.5108)	66
Rosenberg Self-Esteem	**0.3684*** ** (0.0000)	**0.4208*** ** (0.0000)	117	**0.2176** (0.0816)	**0.2108** (0.0919)	**0.2020** (0.1065)	**0.1922** (0.1251)	65
1-item Self-Esteem	**0.4639*** ** (0.0000)	**0.5075*** ** (0.0000)	118	**0.1818** (0.1378)	**0.1741** (0.1556)	**0.1921** (0.1166)	**0.1364** (0.1506)	68
Just World Scale	**0.0079** (0.9350)	**0.0605** (0.5321)	109	**0.2346** (0.0712)	**0.2365** (0.0688)	**0.1471** (0.2620)	**0.1506** (0.2507)	60
Self-monitoring	**0.1062** (0.2719)	**0.2378*** (0.0128)	109	**0.2194** (0.0921)	**0.2289** (0.0785)	**0.2537** (0.0505)	**0.2619*** (0.0432)	60
BFI Agreeableness	**-0.2468** ** (0.0078)	**-0.2292*** (0.0137)	115	**0.0248** (0.8458)	**0.0073** (0.9544)	**0.0144** (0.9099)	**0.0008** (0.9952)	64
BFI Consciousness	**-0.0122** (0.8973)	**0.0318** (0.7357)	115	**0.2694*** (0.0312)	**0.2500*** (0.0463)	**0.2495*** (0.0467)	**0.2359** (0.0606)	64
BFI Neuroticism	**-0.1684** (0.0720)	**-0.2433** ** (0.0088)	115	**-0.1472** (0.2459)	**-0.1321** (0.2980)	**-0.0893** (0.4828)	**-0.0755** (0.5533)	64
BFI Openness to experience	**0.1767** (0.0589)	**0.2294*** (0.0137)	115	**-0.0903** (0.4763)	**-0.0906** (0.4764)	**-0.0025** (0.9842)	**-0.0073** (0.9545)	64
BFI Extraversion	**0.3429*** ** (0.0002)	**0.4966*** ** (0.0000)	115	**0.3633** ** (0.0032)	**0.3670*** ** (0.0029)	**0.3507** ** (0.0045)	**0.3569** (0.0038)	64

(continued)

	(1) NPI-16	(2) NPI-40	Obs	(3) INUI (all photos)	(4) INUI (100 random photos)	(5) Face (all photos)	(6) Face (100 random photos)	Obs
Hexaco Extraversion	**0.4783*** ** (0.0000)	**0.5707*** ** (0.0000)	110	**0.4697*** ** (0.0001)	**0.4638*** ** (0.0002)	**0.4714*** ** (0.0001)	**0.4674*** ** (0.0001)	61
Hexaco Honesty-Humility	**-0.3481*** ** (0.0002)	**-0.3713*** ** (0.0001)	110	**-0.0562** (0.6672)	**-0.0459** (0.7256)	**-0.0051** (0.9689)	**0.0093** (0.9431)	61
Hexaco Modesty	**-0.4024*** ** (0.0000)	**-0.4458*** ** (0.0000)	110	**-0.1282** (0.3247)	**-0.1282** (0.3250)	**-0.0884** (0.4982)	**-0.0837** (0.5214)	61
Hexaco Greed-Avoidance	**-0.1928*** (0.0436)	**-0.2663*** * (0.0049)	110	**-0.0268** (0.8378)	**-0.0351** (0.7881)	**-0.0568** (0.6635)	**-0.0693** (0.5956)	61
Hexaco Sincerity	**-0.1859** (0.0519)	**-0.1652** (0.0847)	110	**-0.0827** (0.5261)	**-0.0602** (0.6449)	**0.0096** (0.9414)	**0.0402** (0.7586)	61
Hexaco Fairness	**-0.2101*** (0.0276)	**-0.2046*** (0.0320)	110	**0.0506** (0.6984)	**0.0584** (0.6551)	**0.0734** (0.5742)	**0.0826** (0.5268)	61
Davis IRI Empathic Concern	**-0.2157*** (0.0243)	**-0.2607*** * (0.0062)	109	**-0.0099** (0.9399)	**-0.0159** (0.9041)	**-0.0397** (0.7631)	**-0.0386** (0.7699)	60
Davis IRI Perspective Taking	**-0.1725** (0.0728)	**-0.1451** (0.1322)	109	**-0.0466** (0.7237)	**-0.0548** (0.6774)	**-0.0924** (0.4824)	**-0.0975** (0.4586)	60
Davis IRI Fantasy Scale	**-0.023** (0.8127)	**0.0454** (0.6389)	109	**-0.1049** (0.4251)	**-0.0934** (0.4776)	**-0.0915** (0.4870)	**-0.0787** (0.5500)	60
Davis IRI Personal Distress	**-0.2431*** (0.0109)	**-0.3490*** ** (0.0002)	109	**-0.2088** (0.1093)	**-0.1955** (0.1344)	**-0.2655*** 0.0404	**-0.2558*** (0.0485)	60

Appendix 1. Rules of codifying.

1. In the following rules we use the term "*focal person*" towards an owner of the Instagram profile we are collecting the data from.
2. When assigning the codes, only the focal person should be taken into consideration.
3. There are only 2 possible code values: 0 (=criteria is absent) and 1 (=criteria is present).
4. Baby pictures of the focal person are considered as other pictures containing the image of the focal person if only the focal person is recognizable.
5. **"Face" category:**
   - 5.1. By "*the image of face*" we mean the photo of face of a focal person, which should include at least the image of either his/her mouth, eye(s) or nose. Most importantly, the **person should be recognizable** from this image. Either front, profile or half-turned views (but not the back view) may contain the image of face. We consider the face as present even if it's covered by sunglasses or carnival, skiing or diving mask.
   - 5.2. **Face = 1** if a photo contains the image of face of the focal person. The photo may be taken from far, edited as painting in graphic editors, have a poor quality, face features can be poorly visible, but it's still considered as containing the image of face if the focal person is recognizable.
   - 5.3. **Face = 1** if the image of the face is located on a billboard/journal/book/box or is a reflection in the mirror.
   - 5.4. **Face = 0** if a photo does not contain the image of the face of the focal person. This is possible if the focal person is not present in the photo, is not recognizable in the photo (due to bad quality or other reasons), or the image of his/her face is not present in the photo (e.g., the photo is taken from the back, we see only legs of the focal person).
6. **"Exhibitionism" category:**
   - 6.1. **Exhibitionism = 1** if a photo contains the image of the focal person wearing a swimsuit (or its "alternatives" with a similar extent of nakedness, see p. 6.2-6.3) **and** his/her body is visible below the red line (see p. 6.4-6.5).
   - 6.2. Male alternatives to swimsuit: not wearing a T-shirt.
   - 6.3. Female alternatives to swimsuit: wearing underwear (or only bra/knickers with a "normal" bottom/top part of the garment), a body (without bottom part of the

garment), a highly transparent clothing. Sports bra, crop tops, and shorts are not considered as alternatives to swimsuit.

6.4. Red line for males: horizontal nipples line.

6.5. Red line for females: horizontal underbreast line.

6.6. **Exhibitionism = 0** if the focal person does not wear a swimsuit/it's alternatives or if the focal person wears a swimsuit/it's alternatives but his/her body is visible only above the red line.

7. **"Interaction" category:**

7.1. **Interaction=1** if a photo contains the image of a focal person interacting with other individuals.

7.2. **Interaction=1** if a photo contains the screenshot of a Skype talk of the focal person.

7.3. **Interaction =0** if a photo does not contain the image of the focal person; if the focal person is the only person in the photo; or if the focal person does not interact with other individuals in the photo (e.g., with strangers who crept into the photo by accident).

8. "Multiface" category:

8.1. **Multiface=1** if we in the photo we may observe multiple images of face of the focal person (e.g. collages; the focal person standing next to the billboard containing his/her image; the focal person handling a book containing his/her image, multiple reflections in the mirror).

8.2. **Multiface=0** in all other cases.

Chapter 2

"Too good to train". Narcissism and Performance on the Training: Empirical Evidence from "The Biggest Loser" International

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ABSTRACT

Drawing on expectancy theory and social learning theory, we hypothesized that narcissistic trainees would have lower training performance and training results, whereas trainees working with a narcissistic trainer would have higher training performance and training results. In order to empirically test these relationships, we focused on the weight loss training program and used the data from "The Biggest Loser" (TBL) International. We considered TBL coach-contestant relationship as trainer-trainee relationship, contestants' weekly results as training performance, and their final results as training results. We found empirical support for the negative effect of trainees' narcissism on their training results and for the positive effect of trainers' narcissism on their trainees' training performance and results. Moreover, we found that the training performance is higher when a trainer is more narcissistic than his/her trainee and that the greater is the difference, the higher is the performance.

Key words: trainer characteristics, trainee characteristics, training results, training performance, narcissism, unobtrusive indicator.

INTRODUCTION

"He was my boss. And my employee. And both times I learned from him,"

Dr. Eric Foreman about Dr. House

"Dr. James Wilson: Why are you punishing me worse than him?

Dr. Lisa Cuddy: Because House never learns. You might"

Despite $90.6 billion being spent on training interventions in 2017 (Elfond, 2018) and $83 billion being spent in 2019 (Freifeld, 2019), only 37% of the U.S. companies considered their training activities to be effective (Elfond, 2018). Additionally, only 12% of employees reported that they are applying new skills learned in training to their jobs, while 70% of employees admitted that "they don't have mastery of the skills needed to do their jobs" (Glaveski, 2019). Among other things, this frustrating evidence calls for a better understanding of what determines training effectiveness.

The extant research agrees that both trainers' and trainees' characteristics such as age, gender, personality traits, and others determine training effectiveness (e.g., Noe, 1986; Cannon-Bowers et al., 1995; Holladay & Quinones, 2005; Sitzmann et al., 2008). However, almost no attention has been devoted to the personality trait of narcissism. Indeed, the research has not yet considered the implications of narcissism of either trainees or trainers, although it may alter the way individuals learn.

One example here is a fictional character Dr. Gregory House, whose narcissistic personality enabled his team's learning while preventing his own. Although Doctor House being described as a manipulative and self-centered narcissist, his employees acknowledged "to learn a lot" from his, and further advanced their careers after leaving his team. Some of this success should be attributed to House's being "one of the best diagnosticians in the world"; however, its other part, paradoxically, can be caused by his narcissistic behaviors. Indeed, because of House's attention-seeking and refusing to generate ideas without his team listening, his employees participated in the decision-making process and received immediate feedback on their ideas. His attitude to blame others for failure made them spent time on medical textbooks and in the laboratory. Finally, due to House's charisma and self-

confidence, they have never questioned his skills and expertise in medicine and became more open-minded towards his unconventional methods. At the same time, House was unwilling to learn from interaction with his patients because he "doesn't care" or from his mistakes because he typically attributed them to other reasons. In other words, although enabling the learning of others, House's narcissism, however, impeded his own.

In this study, we are going to explore this paradox and explain why being a narcissist impedes learning on training and why learning from a narcissist facilitates it. Drawing upon expectancy theory (Vroom, 1964), we argue that narcissistic trainees are likely to perceive training activities unhelpful for their development and unpleasant experience, an invitation for training and negative feedback as an offense, and interactions with other trainees as problematic. Based on Bandura's (1977) social learning theory, we argue that trainees dealing with a narcissistic trainer would be more likely to perceive a narcissistic trainer as more visible, as an appropriate model to learn from, as easy to imitate from, and easy to encode the behavior. Thus, we hypothesize that while trainees' narcissism would negatively influence their training performance and training results, trainers' narcissism would positively influence them. Moreover, we argue that the training performance would be higher if a trainer is more narcissistic than a trainee and that the greater is the difference in their level of narcissism, the better would be the training performance.

In order to test hypothesized relationships, we focus on the weight loss training program and collect the data on 22 seasons of "The Biggest Loser" (TBL) from four countries – the U.S., South Africa, Russia, and Ukraine. In particular, we focus on the relationship between TBL coaches (trainers) and TBL contestants (trainees) and analyze the implications of trainers' and trainees' narcissism in the three levels of analysis – dyad-week, dyad, and contestant. We consider contestants' results at weekly weigh-ins as training performance and the results in the season finale as their training results. We use the Instagram-based unobtrusive indicator INUI (Chapter 1) to measure the level of narcissism.

Our research has the following three contributions to the literature. First, we deviate from prior literature, which has mostly been focused on the negative implications of narcissism in the workplace (Back et al., 2013; Küfner et al., 2013; Rogoza et al., 2016; Rogoza et al., 2018). Indeed, our findings suggest the opposite, as appointing a narcissist to be

a trainer will lead to an increase in training performance and training results. That implies that organizations do not necessarily experience a cost from hiring narcissistic employees and that getting rid of narcissists is not the only strategy to increase effectiveness. Instead, a company can benefit if it appoints narcissists to the positions that allow them to play their strengths. For example, by appointing a narcissist to the position of a trainer, a company can exploit his/her charm, bold behavior, and the ability to attract followers.

Second, earlier studies on trainers' and trainees' characteristics have not considered the effects of trainers' and trainees' personalities simultaneously, although the research in other domains emphasized the importance of personality fit. For example, the research on leadership found that a leader and a follower both having a proactive personality will positively influence a follower's work engagement (Yang et al., 2017), job satisfaction, affective commitment, and job performance (Zhang et al., 2012). Our findings, however, demonstrated that the personalities of trainers and trainees should be different to achieve the fit, as the training performance was higher for a narcissistic trainer working with a non-narcissistic trainee. This result is consistent with the narcissistic hypocrisy hypothesis (Adams et al., 2015).

Finally, although the studies in the educational domain found evidence that students' narcissism impedes learning (e.g., Hoover, 2011), there was no empirical evidence confirming that the same is true in the training domain. Indeed, training motivation and learning outcomes in organizations are affected by a range of training-specific variables, such as training content (e.g., Noe, 1986; Hollday & Quinones, 2008) or pre-training self-efficacy (Esfandagheh et al., 2012), that can potentially mitigate the effect of narcissism. In this study, we found that trainees' narcissism indeed has a negative effect on their training results, thus building a bridge between the two domains.

THEORY AND HYPOTHESES

Trainer and trainee characteristics

Trainer and trainee characteristics such as race (Doerner et al., 1989; Holladay & Quinones, 2008; Roberson et al., 2009; Bienart et al., 2010; Bell et al., 2011), age (Gist et al., 1988; Tannenbaum et al., 1991; Delgoulet et al., 1997; Colquitt et al., 2000), gender (Doerner et al., 1989; Holladay et al., 2003; Shapiro et al., 2007; Holladay & Quinones, 2008; Bienart et al., 2010; Bell et al., 2011; Liberman et al., 2011), attitudes (Cooper, 1969; Noe, 1986, Noe & Schmitt, 1986; Mathieu et al., 1992; Cannon-Bowers et al., 1995; Warr & Bunce, 1995; Holladay et al., 2003; Landers & Armstrong, 2017), abilities (Cannon-Bowers et al., 1995; Colquitt et al., 2000), and personality (Colquitt et al. 2000; Tziner et al., 2007; Nikandrou et al., 2009; Bauer et al., 2012; Huang & Bramble, 2016; Roberts et al., 2018) have a significant effect on various training outcomes.

Although several studies have given equal attention to both trainer and trainee characteristics (Cooper, 1969, 1977; Shapiro et al., 2007; Towler & Dipboye, 2001; Towler, 2009; Bell et al., 2011; Harris et al., 2014a; Harris et al., 2014b; Choi et al., 2015; Rangel et al., 2015), the majority of studies have paid more attention to trainee characteristics. Indeed, Shapiro et al. (2007) noticed that "there is a dearth of research examining how trainer characteristics might influence these antecedent factors and ultimately influence trainee task performance" (p. 239).

Trainee characteristics. Indeed, trainee characteristics have been considered in various conceptual models of training effectiveness (e.g., Noe, 1986; Mathieu et al., 1992). The researchers linked them to trainee's motivation (Noe & Schmitt, 1986; Mathieu et al., 1992; Cannon-Bowers's et al., 1995; Roberts et al., 2018), expectancies (Noe & Schmitt, 1986; Mathieu et al., 1992), reactions (Sitzmann et al., 2008; Esfandagheh et al., 2012), and career goals (Nikandrou et al., 2009). Moreover, several studies have found a direct effect of trainee characteristics on ultimate training outcomes, such as training performance (Bauer et al., 2012), training transfer (Lim & Morris, 2006; Huang & Bramble, 2016; Roberts et al., 2018), and overall training effectiveness (Tziner et al., 2007).

Although the most attention in the literature on covert trainees' characteristics has been given to trainees' self-efficacy (Noe, 1986, Noe & Schmitt, 1986; Gist et al., 1989;

Tannenbaum et al., 1991; Karl et al., 1993; Martocchio, 1994; Cannon-Bowers et al. 1995; Quinones, 1995; Saks, 1997; Stevens & Gist, 1997; Christoph et al., 1998; Colquitt et al., 2000; Holladay & Quinones, 2003; Chiaburu & Marinova, 2005; Johnson et al. 2005; Switzer et al., 2005; Vancouver & Kendall, 2006; Tai, 2006; Tziner et al., 2007; Sookhai & Budworth, 2010; Esfandagheh et al., 2012; Choi et al., 2015), multiple studies have examined the effects personality traits on various training outcomes. In particular, the most attention has been given to Big Five personality traits (Colquitt et al. 2000; Brown, 2005; Tziner et al., 2007; Nerdrum & Hoglend, 2008; Sitzmann et al., 2008; Bauer et al., 2012; Esfandagheh et al., 2012; Huang & Bramble, 2016; Roberts et al., 2018).

***Conscientiousness*.** Across all the studies on trainees' personality traits, the most attention has been given to conscientiousness (Colquitt et al. 2000; Tziner et al., 2007; Bauer et al., 2012; Huang & Bramble, 2016; Roberts et al., 2018). Drawing on expectancy theory (Vroom, 1964), the theorists found support for their predictions that trainee's conscientiousness affects their motivation to learn, transfer intentions (Roberts et al., 2018), and training effectiveness (Tziner et al., 2007). In their meta-analysis, Colquitt et al. (2000) argued that trainee's conscientiousness affects his/her self-efficacy, valence, and "job/career variables." Moreover, Huang & Bramble (2016) found that the positive relationship between trait conscientiousness and training transfer is mediated by the state or task-contingent conscientiousness. Other studies have considered conscientiousness as a mediator in the relationship between other trainees or training-content variables. For example, Bauer et al. (2012) hypothesized that conscientiousness would moderate the relationship between task difficulty condition and performance, "such that trainees lower in conscientiousness will perform better over time in the adaptive training" (p. 152). However, they did not find empirical support for their prediction. Roberts et al. (2018) considered that the relationship between proactive personality and transfer intentions is moderated by an individual's level of conscientiousness. Although they did not find empirical support for their prediction, they argued that conscientiousness has a buffering effect on the proactive personality–motivation relationship.

***Extraversion* (**Brown, 2005; Nerdrum & Hoglend, 2008; Esfandagheh et al., 2012**).** Esfandagheh et al. (2012) found that trainee's extraversion positively affects a trainee's pre-

training self-efficacy. They argued that it happens because the training setting "basically involves social interaction among trainees and trainer and among trainees themselves" (p. 177). Moreover, they argued that self-efficacy is the mediator in the positive relationship between extraversion, work-related performance, and job success. Two other hypothesized effects have not been supported empirically. Nerdrum & Hoglend (2008) hypothesized that trainee's extraversion would have a positive effect on "short- and long-term effects of training in empathic communication." Brown (2005) expected extraverted learners to report more positive reactions to a training program.

Neuroticism (Brown, 2005; Nerdrum & Hoglend, 2008; Bauer et al., 2012). Although not supported empirically, Nerdrum & Hoglend (2008) argued that neuroticism would have a negative effect on "short- and long-term effects of training in empathic communication" (p. 4). Bauer et al. (2012) found partial support to their prediction that neuroticism moderates the relationship between task difficulty condition and performance, "such that trainees higher in neuroticism will perform better over time in the adaptive training" (p. 152). Brown (2005) expected neurotic learners to report less positive reactions to a training program, although this prediction did not receive empirical support.

Openness to experience (Brown, 2005; Bauer et al., 2012). Bauer et al. (2012) found openness to experience to moderate the relationship between task difficulty condition and performance, "such that trainees higher in openness to experience will perform better over time in the adaptive training" (p. 152). Brown (2005) expected that learners high in openness would report a more positive reaction to a training program. However, this prediction did not received empirical support.

Agreeableness. Considering the link between a trainee's personality and their reactions, Sitzmann et al. (2008) hypothesized that trainees with a high level of agreeableness should have a more positive view of an instructor and of a course, and "should be more sympathetic to minor training inconveniences" (p. 281). However, they did not find empirical support for this prediction.

Other traits. Several other traits have been examined – locus of control (Noe, 1986, Noe & Schmitt, 1986; Colquitt et al. 2000; Smith-Jentsch et al., 2001), latent (trait) empathy (Nerdrum & Hoglend, 2008), proactive personality (Roberts et al., 2018), goal orientation

(Brown, 2005; Chiabutu & Marinova, 2005; Johnson et al., 2005; Tziner et al., 2007; Sitzmann et al., 2008).

Trainer personality and behavior. Trainer characteristics are less prominent in the extant literature on training and, in several cases, are considered as a part of training content (e.g., Noe, 1986). Indeed, Bono & Judge (2004) have pointed out that "an understanding of the role of personality can aid in determining which individuals might gain the most from such training and how training approaches might differ on the basis of trainee personality" (p. 901).

Until now, the researchers have paid the most attention to overt rather than covert trainer characteristics such as gender and race (Shapiro et al., 2007; Holladay & Quinones, 2008; Liberman et al., 2011) and few behavioral and personality variables. Although the research on trainers' personality and behavior is rather scarce, several interesting findings have been reported in Delphi studies (Boendemaeker et al., 2000, 2003; Ghosh et al., 2012), the studies on trainers' expressiveness (Towler & Dipboye, 2001; Towler, 2009; Rangel et al., 2015), and other characteristics (Cooper, 1969, 1977; Bolman, 1973; Harris et al., 2014a; Harris et al., 2014b; Choi et al., 2015).

Delphi studies. Several Delphi and Delphi-like studies (Boendemaeker et al., 2000, 2003; Ghosh et al., 2012) have raised the question on what characteristics make the trainer competent (Boendemaeker et al., 2000, 2003) and positively affect training effectiveness (Ghosh et al., 2012). In reference to general practice training, Boendemaeker et al. (2000, 2003) tried to unveil what makes a trainer look competent to their trainees, as s competent general practice trainer "is critical of the trainee and his/her learning process" (Boendemaeker et al., 2003). They found that competent general practice trainers are characterized by the ability to reflect, enthusiasm, flexibility, integrity, self-insight, self-knowledge, and enjoy their role as a general practice trainer (Boendemaeker et al., 2000). Boendemaeker et al. (2003) added to these findings, suggesting that competent general practice trainers dare to give feedback and are good at it. Moreover, they should be good at communicating with the trainees and have respect for the trainees. Ghosh et al. (2012) found that the trainer's comfort level with the subject matter and the trainer's rapport with trainees were significant predictors of trainee satisfaction.

Expressiveness. Trainers high in expressiveness (Towler & Dipboye, 2001; Towler, 2009; Rangel et al., 2015) show appropriate vocal intonations and are generally fluent (Towler & Dipboye, 2001). Drawing on adult learning theory (Cross, 1981), the researchers suggested that expressiveness positively affects training performance (Towler, 2009), including problem-solving and recall (Towler & Dipboye, 2001), and also with training transfer intention (Rangel et al., 2015). However, this positive effect was unveiled only in interaction with the other trainer- and trainee-related characteristics, such as good lecture organization (Towler & Dipboye, 2001), trainee's mastery goal orientation and the presence of "seductive detail in the training material (Towler, 2009), and trainees' high experiential learning style (Rangel et al., 2015).

Other characteristics (Cooper, 1969, 1977; Bolman, 1973; Harris et al., 2014a; Harris et al., 2014b; Choi et al., 2015). Harris et al. (2014a, 2014b) examined the predictors of trainee satisfaction (Harris et al., 2014a, 2014b) and training transfer (Harris et al., 2014a). First, they examined the effect of trainers' directive behaviors, "aimed at structuring learning, outlining goals and providing feedback" (Harris et al., 2014a, p. 332). They found that trainer directiveness (either in interaction with trainees' learning goal orientation or alone) has a positive effect on trainee satisfaction and training transfer. Drawing on achievement goal theory, they found empirical support for their prediction that "trainee satisfaction is an interactive function of both instructor competence and trainee orientations, with instructor competence being more important for trainees with high autonomy" (Harris et al., 2014b, p. 270). In line with that, Choi et al. (2015) found that trainer expertise and trainer commitment positively affect structured on-the-job training activities.

Cooper (1969, 1977) examined the link between the trainer's characteristics and trainee's "change," as "the participant's view of the trainer, therefore, seemed a logical starting point assessing participant change" (Cooper, 1969, p. 528). They found that in the case of relaxed, self-sufficient, and tranquil trainers, trainees' s change in subsequent work performance and relationship at work was "the most positive" (or "the least negative") (Cooper, 1969, p.1121). Cooper (1977) examined the link between the trainer's attractiveness (in terms of power, affection, and task) and congruence of his/her self-concept and trainee's attitudinal and behavioral change. They hypothesized that a participant would change in his

attitudes and behaviors toward being more like the trainer if the trainer is attractive to him. Moreover, they found empirical support for their prediction that "a participant will not necessarily show an increased consistency in his self-concept if the trainer is attractive to him" (p. 517). Finally, they also found empirical support for the hypothesis that "a participant will show an increased consistency in his self-concept if the trainer is seen by him as congruent." (p. 517)

Bolman (1973) examined the associations of trainers' behavior with trainees' reactions to the trainer and their learning. They found that such reaction as liking for the partner was significantly related to congruence-empathy, affection, and openness. Group tension was negatively related to trainers' congruence-empathy and openness, and positively related to the trainer's conditionality, a tendency to reward and punish group members. Moreover, Bolman (1973) found positive correlations between the trainer's congruence-empathy and trainee's perception of having learned from the experience, and between trainer conditionality and group tension.

In our opinion, there is an important gap in the literature on trainers' and trainees' characteristics, that can be further addressed in this study. First, it seems that trainers' and trainees' characteristics are rarely considered together. And although the research on trainers' characteristics often controls for trainees' characteristics or examines the interactions between trainers' and trainees' characteristics (Towler & Dipboye, 2001; Towler, 2009; Harris et al., 2014b; Harris et al., 2014b), more work could be done in this direction. One more argument towards this is that the research on trainees' characteristics often lacked empirical support (e.g., Brown, 2005; Sitzmann et al., 2008). Perhaps some part of the variation in these studies can be explained by trainer characteristics.

Second, although the literature on trainee's characteristics has examined the effect of multiple personality traits, it's still has a significant gap. Indeed, the research on either trainee or trainer characteristics have not yet examined the effect of either trainers' or trainees' dark triad personality traits (e.g., Paulhus & Williams, 2002) on training outcomes.

Narcissism. In this study, we are going to focus on trainees' and trainers' narcissism. The concept of narcissism derives from "the Greek myth of Narcissus, a young man fated to fall in love exclusively with the perfection of his own reflection" (Rosenthal & Pittinsky,

2006). The term "narcissism" has been first coined by Ellis (1898) to describe "a clinical condition of perverse self-love (i.e., auto-eroticism)" and further elaborated by Freud (1914). Since there is a huge debate on what narcissism is, we will next specify how we define narcissism in this paper.

We have decided to focus on narcissism and examine the effect of trainees' and trainers' level of narcissism on training outcomes, because it has been acknowledged becoming epidemic (Twenge & Foster, 2008; Twenge & Campbell, 2009), resulting in potential employees being more narcissistic (Westerman et al., 2012), and being more present in the workplace than ever before. Moreover, while the research in management has mostly been focused on the dark side of a narcissistic personality (Back et al., 2013; Küfner et al., 2013; Rogoza et al., 2016; Rogoza et al., 2018), we expect that considering narcissism in the domain on training may contribute to the literature on positive implications of narcissism.

And before we dive into explaining the mechanism behind the relationship between narcissism and training, let us first clarify how we will define narcissism in this study. First, we follow the most common approach of considering narcissism as a personality trait (Bergman et al., 2011; Campbell et al., 2011; Grijalva et al., 2015, etc.), i.e., we consider the level of narcissism as being stable during the lifespan. Second, we focus on non-pathological narcissism rather than on narcissistic psychological disorder (NPD), as "NPD is a rare character disorder that affects less than 1% of the general population" (APA, 1994; Campbell et al., 2005). Finally, we consider narcissism as a complex and multidimensional concept. In other words, we recognize that narcissism consists of multiple dimensions, such as, for instance, vanity or entitlement. Moreover, we acknowledge that it may have different forms, such as vulnerable or grandiose narcissism (Gentile et al., 2013; Watts et al., 2013, etc.). However, we do not particularly focus on any of these forms.

The mechanism.

Narcissistic trainees. In line with other studies that examined the effects of personality traits on training outcomes (e.g., Tziner et al., 2007; Roberts et al., 2018), we draw on expectancy theory (Vroom, 1964) and expect that a trainee's level of narcissism would affect his/her expectancy of training. That is, we argue that their "belief that efforts in training will result in mastering the training content" (Roberts et al., 2018, p. 130) would be reduced.

Narcissistic employees usually have a "highly favorable self-view" (Baumeister et al., 2000) and, in particular, a high level of self-esteem (e.g., Campbell et al., 2002) and job-related self-esteem (Marcus et al., 2006). In other words, narcissistic employees are unlikely to believe that their knowledge and skills are insufficient for their job and that any training is needed. The core characteristic of the narcissistic personality is self-serving bias (Sedikides et al., 1998; Campbell & Sedikides, 1999). In other words, narcissistic employees are unlikely to ascribe their low performance on the job to an internal cause, such as lack of skills and knowledge. Thus, even if a narcissistic employee recognizes his/her performance is below the requirements, he/she'd be likely to attribute it to external causes. In other words, a narcissistic employee would rather blame others than acknowledges he/she has to be trained.

Assessment feedback, either positive or negative, has been recognized as an essential part of training activities in multiple studies (Noe, 1986; Noe & Schmitt, 1986; Boendemaeker et al., 2003). However, previous studies have found that narcissists do not tolerate criticisms (e.g., Jorstad, 1996) and often negatively react on feedback (Kernis & Sun, 1994; Barry et al., 2006; Martinez et al., 2008). Moreover, they can express anger and aggression in the workplace (Penney and Spector, 2002; Meier & Semmer, 2013; Martinez et al., 2008). Taken this together, we suggest that narcissistic trainees are likely to consider training rather an unpleasant experience than a useful opportunity to learn the new information. Although having "good social skills" (Brunell et al., 2008) and a high level of extraversion (e.g., Ames, 2006), narcissistic individuals are used to exploit others (e.g., Reidy, et al., 2008) and less likely to experience empathy (Watson et al., 2008). It can potentially harm their social interactions on the training, as empathy has been found to have a positive effect on training results (Nerdrum & Hoglend, 2008). Thus, we expect that narcissistic trainees would not expect to perform well on training, especially if it involves empathic interaction with other trainees.

In such a way, we argue that narcissistic trainees are likely to perceive training activities unhelpful for their development and unpleasant experience, an invitation for training and negative feedback as an offense, and interactions with other trainees as problematic. Taken together, this low expectancy about training would reduce their motivation to learn that will further have a negative effect on narcissistic trainees' performance and training results.

Hypothesis 1a: trainees' narcissism would negatively affect their training performance.

Hypothesis 1b: trainees' narcissism would negatively affect their training results.

Narcissistic trainers. Drawing on social learning theory (Bandura, 1977), we expect that trainers having a higher level of narcissism would positively affect their trainees' motivation to learn.

First, social learning theory emphasizes the role of observation, acknowledging that it influences human thought, affect, and behavior (Bandura, 2001); moreover, *observational learning depends on the visibility* of an individual in the environment. While being on training, trainees have an opportunity to observe other trainees and the trainer, and we would argue that a narcissistic trainer has more chances to be noticed during observational learning. First of all, the position of a trainer distinguishes himself/herself from other participants of the training. Bandura (1977) himself noticed that children are likely to select "teachers" and parents as models to learn from. Moreover, narcissistic individuals typically engage in socially bold behavior (Dufner et al., 2013), i.e., displays of confidence, charm, charisma, etc. It originates from narcissists' self-enhancing cognition and approach orientation and usually evokes positive evaluations by interaction partners, that is, training participants.

Second, we argue that a narcissistic trainer has more chances than others to be selected as *a model to learn from*. One reason is that narcissistic individuals typically have good social skills, and are physically attractive (Maccoby, 2000; Lee & Ashton, 2005; Brunell et al., 2008; Dufner et al., 2013); indeed, they "put effort into an attractive appearance by grooming and wearing fashionable clothes" (Dufner et al., 2013, p. 3). Second, several researchers directly highlighted that narcissists could inspire others (Maccoby, 2000; Rosenthal & Pittinsky, 2006) and have charisma (Maccoby, 2000; Rosenthal & Pittinsky, 2006; Campbell & Campbell, 2009; Campbell et al., 2011). Moreover, we suggest that narcissistic trainers are more likely to have higher job satisfaction and be successful in their training career. The profession of a trainer allows narcissists to draw the attention of trainees, to stay in the spotlight on the stage, to potentially change the behavior of trainees by making them learn new skills, and demonstrate other employees that they have higher expertise. Thus, the

profession of a trainer provides narcissists with the means for their typical attention-seeking behavior (DeWall et al., 2011) and satisfies their need for self-enhancement. Trainees will be more likely to perceive a narcissistic trainer, who gives the impression of being successful and enjoying his/her job, and thus, the right model to be imitated.

Thirds, trainees are easier to *imitate and encode the behavior* of narcissistic trainers for several reasons. First of all, the aforementioned socially bold behavior (Dufner et al., 2013), (Raskin & Terry, 1988; Brunell et al., 2011), and attention-seeking (DeWall et al., 2011; Golbeck, 2016; Hawk et al., 2019) on social media, makes their everyday actions highly visible to others. Second, as argued by Bandura (1977), the choice of the model to imitate depends on similarity. In other words, a trainee would be likely to choose a model of the same gender or sharing similar experiences. We would argue that in the training domain, a trainer and a trainee have a higher chance of sharing several characteristics, such as industry background, interests, the stage of career development, qualifications, and etc. Moreover, a narcissistic trainer, due to his/her good social skills, ability to manipulate (Nagler et al., 2014) and exploit (Raskin & Terry, 1988; Konrath et al., 2014) others, would have more chances to take advantage of this similarity.

In such a way, we argue that trainees would be more likely to perceive a narcissistic trainer as more visible, as an appropriate model to learn from, as easy to imitate from, and easy to encode the behavior. Taken these together, a trainee of a narcissistic trainer would have a higher motivation to learn, which will further have a positive and significant effect on trainees' performance and training results.

Hypothesis 2a: trainers' narcissism would positively affect the training performance of their trainees.

Hypothesis 2b: trainers' narcissism would positively affect the training results of their trainees.

Finally, we have to understand what is the best "combination" in terms of a trainee's and a trainer's level of narcissism. For simplicity, we assume that four different combinations of a trainer's and a trainee's level of narcissism are possible: high-high, high-low, low-high, and low-low. According to our previous arguments, trainees have the highest level of training motivation when his/her level of narcissism is relatively low, and his/her trainer's level of

narcissism is relatively high (high-low). However, as now we are considering them simultaneously, we should also account for a possible interaction effect between a trainer's and a trainee's level of narcissism.

The evidence on this potential interaction effect comes from different bodies of literature and is rather mixed. First of all, according to the literature on team- and group-level narcissism (Lyons et al., 2010; Cichocka, 2016; Grijalva et al., 2020), the average level of the narcissism of two individuals would stand for their level of narcissism as a dyad. According to the findings, higher collective narcissism will result in a lack of coordination (Grijalva et al., 2020), the frustration of individual needs, and out-group aggressiveness (Cichocka, 2016). According to this evidence, the "low-low" combination would be the most beneficial.

Second, according to the narcissistic tolerance hypothesis (Hart & Adams, 2014), narcissists are more tolerant and fond of their narcissistic peers due to a perceived similarity. Moreover, a positive reaction to other narcissists helps them to maintain their self-esteem (Burton et al., 2017). In contrast to that, the narcissistic hypocrisy hypothesis (Adams et al., 2015) proposes that narcissists only claim to be tolerant of others' narcissistic traits. In reality, they do not behave in line with this claim. These two contradicting hypotheses provide support for high-high, high-low, and low-high options.

However, these findings have only limited applicability in our context, as the majority of the aforementioned studies didn't account for narcissists' status; indeed, some of them used the samples of undergraduate students (e.g., Hart & Adams, 2014, Cichocka, 2016). According to the definition of training as an experience designed to bring a change in an individual's knowledge, attitudes, or skills (Noe, 1986), trainers are supposed to have a superior level of trained skills over the trainees, and, thus, have an expert power over them (e.g., Reed, 1996). Given that narcissists are striving for power and high status (Hansbrough & Jones, 2015; Braun, 2017; Lemaitre, 2017), and that they negatively react to being assigned to a subordinate role (Benson et al., 2016), narcissistic trainees are more likely to envy (Czarna et al., 2018) their trainer than to learn from him/her. Thus, regardless of their trainer's level of narcissism, trainees having a high level of narcissism will experience a drop in motivation due to their negative emotions.

Finally, it leaves us with a low-low and a high-low trainers'-trainees' narcissism options. Although the research has found that role model similarity encourages learning (e.g., Marx & Ko, 2012), in the education domain, individuals often learn more from those who are distinct from them (e.g., Umbach & Kuh, 2006). Indeed, in this case, trainees are likely to believe that they don't possess and should acquire certain knowledge, attitudes, or skills, and if their trainer's behavior is distinct from their own. Thus, a non-narcissistic trainee would be more likely to learn from a narcissistic trainer; the combination of the trainer's high and trainee's low level of narcissism would have the greatest positive effect on a trainee's motivation to learn.

Hypothesis 3: a trainer being more narcissistic than a trainee would positively affect a trainee's performance on the training. Moreover, the larger is the difference; the better would be the training performance.

METHOD

Domain.

In order to empirically test the hypothesized relationships between narcissism and training outcomes, we will focus on a *weight loss training program*. In particular, we will test the relationship using the data on "The Biggest Loser" (TBL) International. TBL features overweight contestants working with fitness coaches (and other professionals) to make them lose weight. Almost every week, a contestant, who showed the worst result on weekly weight-in, leaves "the ranch." The last three contestants (called finalists) and at-home players compete for two money prizes. The winner of the ranch and the at-home winner are the two contestants who showed the greatest percentage weight loss relative to their initial weight.

We suggest that focus on such a weight loss training program has several advantages. First of all, an important role of training for the results of TBL contestants has been acknowledged in health research (Yoo, 2012; Berry et al., 2013; Hall, 2013). Second, training performance and training results in the domain of losing weight are supposed to be objective (in contrast to self-reported measures or "perceived outcomes") and easy-to-be-measured. Third, the fact that participants literally live on the ranch during the TV-show allows us to minimize the number of alternative predictors of training performance. Indeed, all the participants are following the same weight loss training program, are communicating with the same persons (trainers, trainees, and other professionals), and they are not affected by their job, lifestyle, economic conditions of the family, supportiveness of friends, etc. Fourth, the domain of losing weight allows us to consider various training outcomes (absolute weight loss, percentage weight loss, performance in the competitions, and in the final episode). Finally, the duration of the training process differs across contestants in either the same or different seasons, which allows us to examine the implications of training duration as well.

In the scope of this domain, we considered the relationship between *a TBL coach and a contestant*, exercising with this coach, *as trainer-trainee relationship*, their weekly performance (results on the weekly weigh-ins) as *training performance*, and their final results in the final episode of the season as *training results*. In order to analyze the hypothesized effects, we simultaneously used *three levels of analysis*. First, we used the *dyad-week* (coach-contestant-week) level of analysis to analyze the effect of coaches' and contestants'

narcissism on the weekly performance on the ranch. Second, we used *dyad* (coach contestant) level of analysis to capture the effect of coaches' and contestants' narcissism on the training results. Finally, we used the *contestant* level of analysis to study the effect of contestants' narcissism on their training results.

Data collection

The data we had collected can be aggregated in two main categories*:* TBL data, collected from Wikipedia, other open sources, and directly from TBL episodes; and Instagram data, collected from open Instagram profiles of TBL coaches and contestants.

TBL data

As TBL is an international reality television format, we collected the data on multiple countries to account for cross-country differences. In order to construct our dataset, we considered 22 seasons from four countries: US (17 seasons), Ukraine (two seasons), Russia (two seasons), and South Africa (one season). In the majority of cases, one episode of TBL refers to one week on the ranch, plus each season also includes the final episode. The duration of a season varied between 56 and 140 days (M=99.63 days, min=56 days. From each of these episodes, we collected the data on contestants' short-term performance and on the collaborations of coaches and contestants.

The total number of coaches, who participated in these 22 seasons, was 21. 43% of them were from the US, 24% from Russia and Ukraine, and 10% from South Africa. We collected the information about their gender, information on their experience before coming to TBL (whether a coach is a former athlete or has ever been overweight), and their dates of birth (the data about age was not available for two coaches) from Wikipedia or their interviews.

The original pool of contestants included 434 individuals. However, we did not include 71 contestants of TBL US in our sample for the following reasons. First, we did not include those contestants who had never been on the ranch to our sample. Those are the three teenagers from season fourteen of TBL US (who had only Skype sessions with their coaches) and 34 contestants from "The 36 at Home" in season three of TBL US (except for two contestants who showed the best results and came to the ranch). Second, we have excluded one contestant who left the show in the first week without reporting the final weight. Third,

we considered only those weeks, when a contestant has been working with only one coach, as our theoretical model assumes followers to have a *single* role model. For this reason, 33 contestants from TBL US, who had never worked with only one coach were excluded from our sample. In such a way, the final pool included 363 contestants: 268 from US (73,83%), 36 from Russia (9,92%), 45 from Ukraine (12,40%), and 14 from South Africa (3,86%). We collected the information on their names, age, starting BMI, gender, information about their weekly "performance" (absolute and percentage weight loss), and their final results (whether a contestant became a finalist or a winner, his/her final weight and BMI) from TBL episodes.

The size and structure of our datasets were the following. The dyad-week level dataset included 2686 dyad-week observations, including 1818 for the US, 443 for Ukraine, 331 for Russia, and 94 for South Africa. Dyad level dataset included 453 dyads, 323 refer to the US, 14 to South Africa, 56 to Russia, and 60 to Ukraine. Finally, the contestant level dataset included 363 observations. 268 contestants were from the US, 45 were from Ukraine, 31 from Russia, and 14 from South Africa.

We collected the data on collaborations, i.e., coach-contestant dyads directly from episodes. In this study, we define dyad as a pair of a contestant and a coach, who had been working together for at least one week of the ranch and the duration of training (*Duration of a dyad*) to be equal to the duration of their collaboration (in weeks). "Working together" means not only staying on the ranch and exercising with a coach but also standing together in the weekly weigh-in and considering a contestant as an official member of a coach's team. Defining collaboration in this way guarantees that a trainee (contestant) was constantly interacting and, so was being affected by only one narcissistic trainer (coach). According to this definition, we did not consider several weeks as weeks of "collaboration." In particular, we had not considered the weeks, when a contestant officially had more than one coach; weeks outside the ranch; weeks, when a contestant withdrew before reporting the weight; finales; and some of the semi-finales. In particular, we had not considered those semi-finales, before which contestants were sent home for a long period (in seasons seven, eight, nine, ten, thirteen, and fourteen of TBL US).

Instagram data on coaches and contestants

We assume that TBL coaches and TBL contestants vary in their level of narcissism and that such a difference may result in the difference in training outcomes. As all the 21 coaches in our sample and many of the contestants have open Instagram profiles, we decided to measure their level of narcissism with an unobtrusive indicator of narcissism, INUI (**Chapter 1**). In order to do that, we collected and codified 100 latest photo postings from each profile for each of the profiles we found. The data on coaches had been collected between 16/05/2019 and 27/05/2019, whereas the data on contestants had been collected between 18/05/2020 and 31/05/2020.

Across 363 contestants in our sample, we found profiles of 213 contestants (58.95%). However, 8 of them were further deleted, 54 were private (25.35%), and one contained only videos and, thus, was not relevant for our analysis. Our final sample included Instagram profiles of 150 contestants (41.33%), which accounts for 193 dyads (42.60%), and 1208 dyad-week observations (44.97%).

Variables

Independent variable: narcissism. As TBL coaches in our sample can be considered as celebrities who usually care about their privacy, we decided to measure their level of narcissism via an unobtrusive indicator as has already been done in some previous studies (Chatterjee & Hambrick, 2011; Scrand & Zechman, 2012; Olsen et al., 2014; Zhu & Chen, 2015; Aktas et al., 2016; Rovenpor et al., 2016; Aabo & Ericksen, 2018; Ham et al., 2018; Grijalva et al., 2019). We decided to use *INUI* (**Chapter 1**) as our main independent variable and *face* (**Chapter 1**) in order to run a robustness check. We decided to use INUI_100_latest and face_100_latest (and not shorter versions) as coaches' Instagram accounts in our sample include, on average, 1446.05 postings.

Dependent variables

Our dependent variables differed across the levels of analysis. In particular, we used *weekly percentage weight loss (previous)* and *weekly percentage weight loss (initial)* as our dependent variables for the dyad-week level of analysis. *Finale, Winner of the ranch*, and *Total percentage weight loss* have been used on the dyad level of analysis. *Finale, Final weight in kilograms, and Ending BMI* have been used on the contestant level of analysis.

Weekly percentage weight loss (previous) is percentage weight loss calculated at the end of every week on the ranch. The weight at the end of the previous (n-1) is used in the denominator in order to account for the fact that it is easier to lose more weight (in absolute value) at the beginning of the ranch. For convenience, we multiplied the value by minus one; in other words, the higher is the percentage weight loss, the higher is the ***Weekly percentage weight loss (previous)***. As TBL history includes some cases of gaining weight, the value of ***Weekly percentage weight loss (previous)*** can be smaller than zero (min=-.0479, max= .1044).

$$Weekly\ percentage\ weight\ loss\ (previous) = (-1) * \frac{Weekly\ weight\ loss}{Weight\ at\ the\ end\ of\ the\ previous\ week} \quad (1)$$

Weekly percentage weight loss (initial). The only difference between ***Weekly percentage weight loss (initial)*** and ***Weekly percentage weight loss (previous)*** is that the former does not account for the effect of easier losing weight at the beginning of the ranch, as we included starting weight in the denominator of this variable. In other words, the denominator does not differ across the weeks for the same contestant.

$$Weekly\ percentage\ weight\ loss\ (initial) = (-1) * \frac{Weekly\ weight\ loss}{Starting\ weight} \quad (2)$$

Dyad and contestant levels of analysis. On the other two levels of analysis, we have used two dummy variables. In particular, *Finale* was equal to one for the finalists of each season, and *Winner ranch* was equal to one for the contestants who won the ranch. Except for the dummy variables, we have also used three continuous variables. *Final weight in kilograms* referred to contestants' weight in the final episode of the season. Similarly, *Ending BMI* referred to their body mass index in the finale episode. Unfortunately, we did not find any information about the height and, thus, ending BMI for the contestants from TBL South Africa (n=14). Finally, *Total percentage weight loss* represents the percentage weight loss during the whole season (on the ranch as well as at home), multiplied by minus one for the convenience.

$$Total\ percentage\ weight\ loss = (-1) * \frac{Final\ weight - Starting\ weight}{Starting\ weight} \quad (3)$$

As 12 contestants did not come to the final episode, the size of our dyad-level dataset drops from 453 to 437 observations in the regressions with *Total Percentage Weight Loss,* and to 423 observations with *Ending BMI* as a dependent variable.

Controls

As the research is rich with explanations of why individuals lose more or less weight, we decided to consider the following groups of control variables in our analysis.

Controls (Contestant). We included the variable for contestants' age (*Contestant age*), the variables for contestants' starting BMI (*Starting BMI*), and the dummy for a contestant being male (*Male contestant*). We expect the coefficient for age to be negative and significant, and the coefficients for starting BMI and being male to be positive and significant, as males, young people, and more overweight individuals are easier to lose weight. Moreover, trainers were found to have lower expectations about overweight trainees and, thus, negatively influence their training outcomes (Shapiro et al., 2007).

Controls (Trainer). Moreover, the effect that contestants lose different amounts of weight may come from coaches. Therefore, we created three variables characterizing coaches' past *experience*: *Trainer Experience* (number of seasons for which a person has been a TBL coach by the moment), *Trainer age* (average), and *Trainer athlete* (equal to one for those coaches who are former athletes). We did not find the information about the age of two coaches in our sample. Thus the sample size drops to 436 observations when we include this variable to the regressions.

Controls (Similarity). According to social learning theory, the model-subject similarity is "a potent determinant of imitation" (Bussey & Perry, 1976). Thus, we accounted for three types of coach-contestant similarity. Firstly, we created a dummy for a contestant and a coach having the same gender, either male or female (*Same gender*), in order to account for gender similarity, which is consistent with prior research on the trainer's characteristics (Bell et al., 2011). We expect the coefficient for this variable to be positive that is consistent with social learning theory. Secondly, we controlled for the age difference between a coach and a contestant. *Age similarity* was equal to one divided by the absolute age difference between a coach and a contestant. Thus, the greater is the age difference (either a contestant is older than a coach or the other way around), the lower is age similarity.

$$Age\ similarity = \frac{1}{|Contestants'\ age - Trainer\ age|} \quad (4)$$

Finally, we found out that three TBL coaches were overweight in their past. We assume that these coaches may better understand the problems of the contestants and expect the coefficient for the corresponding dummy variable (*Overweight trainer*) to be positive.

Controls (other). Last but not least, contestants are easier to lose more weight at the beginning of ranch (here we are following the same logic as in the case with Starting BMI). For this reason, we will control for the number of the week (*Week of season*) in the regressions with dyad-week level data, and we expect the coefficient to be negative and significant. Similarly, for all the regressions on the dyad level of analysis, we controlled for the *Duration of a dyad*, a number of weeks for which a pair of a contestant and a coach had been working together on the ranch. We expect the coefficient for it to be positive and significant. On the contestant level of analysis, we used the variable *Weeks on the ranch*, equal to the number of weeks a contestant had spent on the ranch. We expect that it will have a positive effect on training outcomes.

Finally, we used season fixed effects on all the levels of analysis. On the dyad-week level of analysis, we additionally used the week of season fixed effects in order to account for the differences across seasons and countries (as seasons were nested within countries). We used trainer-clustered standard errors on the dyad-week and dyad levels of analysis, and robust standard errors on contestant level of analysis.

RESULTS

We first ran the analysis on the dyad-week level of analysis to examine the effect of trainers' and trainees' narcissism on the training performance. **Table 1, Table 1a**, and **Table 2** present the descriptive statistics and intercorrelations among all the variables in the dyad-week dataset.

Insert Table 1 about here

Insert Table 1a about here

Insert Table 2 about here

Insert Table 3 about here

Narcissism and training performance. Regression results are reported in **Table 3**. First, we tested the effects of trainers' and trainees' narcissism on training performance (columns 1 and 2). The coefficient for the coach's level of narcissism was positive and significant in both cases (β=12.41, p=.049; β=9.41, p=.039), thus supporting H2a. Although the coefficient for the contestant's level of narcissism was negative as predicted, the effect was only marginally significant (β=-2.04, p=.067; β=-1.58, p=.067). Thus, H1a was not supported.

Second, we tested H3 (columns 3-6). The difference between a coach's and a contestant's level of narcissism positively and significantly affected weekly percentage weight loss (β=12.41, p=.049; β=9.41, p=.039). Moreover, a coach being more narcissistic than his/her contestant positively affected both of our dependent variables as well (β=3.17, p=.015; β=2.81, p=.011) as well. Thus, H3 is supported.

As expected, male contestants performed better than female contestants; contestants' with high starting BMI had lower weekly percentage weight loss. Contestants working with former athletes (column 2; β=2.89, p=.095) and older coaches (column 6; β=0.15, p=.069) performed better than others. Contrary to our predictions, a lower age difference between a trainer and a trainee negatively affected training performance (column 3; β=-0.49, p=.076). However, the later effects were only marginally significant. Other factors did not have a significant effect on weekly percentage weight loss.

Insert Table 4 about here

In order to test the robustness of our results, we repeated this analysis (**Table 4**) and used another unobtrusive indicator (*face*) to measure TBL coaches' and contestants' narcissism, and also the difference in their level of narcissism. We confirmed that that the effect of a contestant's narcissism was negative (β=-2.98, p=.053; β=-2.35, p=.043), the effect of a coach's narcissism was positive (β=9.25, p=.045; β=6.45, p=.097), and the effect of the difference in narcissism was positive as well (column 3; β=2.34, p=.043). Moreover, in one of our regressions, the effect of a contestant's narcissism on weekly percentage weight loss was significant. However, the effect of the coach's narcissism lacked significance.

Insert Table 5 about here

Insert Table 5a about here

Insert Table 6 about here

Narcissism and training results. In order to test the relationship between trainers' narcissism, trainees' narcissism, and training results, we first ran the analysis on dyad- and contestant- levels. **Table 5, Table 5a**, and **Table 6** present the descriptive statistics and intercorrelations among all the variables in the dyad-level dataset.

Insert Table 7 about here

We found (**Table 7**) that narcissistic contestants demonstrated a lower total percentage weight loss (β=-.05, p=.035) that is consistent with H1b. More narcissistic TBL contestants were less likely to become finalists and to win the ranch; however, these effects were not statistically significant. Instead, a contestant working with a narcissistic coach was more likely to become either a finalist (β=4.84, p=.021) or a winner (β=5.65, p=.028). That is consistent with H1b. However, the effect of a coach's narcissism on one of the dependent variables, the total percentage weight loss, was not statistically significant.

Robustness check (columns 4 and 5) demonstrated that the effect of the trainer's level of narcissism (β=6.02, p<.001; β=5.52, p=.002) and the one of a trainee's level of narcissism (β=-0.89; β=-0.91) remained positive and negative, respectfully. However, the effect of a trainee's level of narcissism lacked significance.

In line with our predictions, contestants who had been working with former overweight coaches (column 1; β=1.07, p=.002) and the coaches of a similar age (column 1; β=.25, p=.046), showed better results than their counterparts. TBL contestants, who had been working with a trainer for a longer period (column 1; β=.21, p=.039), demonstrated better results as well. So did male and younger contestants. Contrary to our predictions, contestants working with more experienced coaches (column 3; β=-.01, p=.024) and former athletes (column 1; β=-1.64, p=.007) showed lower results than others.

Insert Table 8 about here

Insert Table 9 about here

Insert Table 10 about here

Analysis on the contestant level (**Table 10**; descriptive statistics and correlations are reported in **Table 8** and **Table 9**) provided support for H1b, as training results of narcissistic trainees were lower than those of their peers. Indeed, more narcissistic TBL contestants were less likely to become finalists (β=-2.57, p=.015), and had higher weight (β=8.31, p=.015) and BMI (β=1.66, p=.080) in the final episode of TBL. TBL contestants who spent more weeks on the ranch typically showed higher results (β=2.16, p=.036; β=-1.69, p<.001; β=-.59, p<.001). Consistent with our predictions, women (column 2; β=13.76, p<.001) and contestants with a higher BMI (β=1.65, p<.001; β=.61, p<.001) had lost less weight, while older contestants were less likely to become finalists (column 1; β=-.11, p=.068).

Summing up, we found empirical support for H2a, and H3; H1b and H2b were partially supported. We did not find empirical support for H1a.

DISCUSSION AND CONCLUSION

We can interpret the results of our analysis in the following way.

Narcissistic trainers. First of all, we found that the trainer's level of narcissism positively affects both training performance and training results that were consistent with our predictions. Moreover, our results on training results (**Table 7**) seem to be consistent with the proposed mechanism, coming from social learning theory (Bandura, 1977). Indeed, trainees who had been working with trainers of a similar age (column 1, 4), same gender (columns 1, 3, 4), and trainers who had a similar experience of having been overweight, received higher results. In other words, consistent with social learning theory, trainees were more likely to learn from trainers who were similar to them in terms of age, gender, or experience. By being more visible, narcissistic trainees are likely to demonstrate them being similar to their trainees in terms of some covert characteristics (e.g., experiences, interests).

However, the positive effect of a trainer's level of narcissism on training performance (**Table 3**) seems to be underlined by a different mechanism. Indeed, trainees working with trainers of a different gender, former athletes, and those with a greater age difference seem to outperform their counterparts. An alternative mechanism may come from the literature on romantic attraction (e.g., Campbell, 1999). Indeed, because of narcissists being physically attractive, charismatic, socially bold, and successful in short-term mating (Holtzman & Strube, 2010, 2011), trainees could be more likely to be attracted to them, and, thus, work harder to deserve their attention. However, this effect would be unlikely to persist in a longer-term (in the case of training results), as in the long term, narcissistic individuals typically show their dark side.

Narcissistic trainees. Although the effect of a traineer's level of narcissism on training performance lacked significance, we found support for our prediction on the contestant level of analysis. Indeed, more narcissistic TBL contestants were less likely to

become finalists, to have a lower weight, and BMI at the end of their training. These results demonstrate that even if a narcissistic trainee were not motivated to attain a high final training score, he/she would care more about his/her training performance. One possible explanation is the following. While training results can be hidden from other trainees (e.g., Wright&Belcourt, 1995), training performance can be more easily observed by them. One example here an academic or diversity training; whereas trainees ask questions in front of the others and participate together in group tasks, the results of the final quiz are usually private. Summing up, narcissistic trainees can be motivated to perform well in order to ensure their superiority (Byrne &Worthy, 2013), but not because they are motivated to learn new knowledge and skills.

Limitations. We acknowledge that our study has a number of limitations that can be further improved. First of all, we set a number of theoretical assumptions that can be further tested. For example, we focused on non-pathological narcissism; assumed that the information in trainers' and trainees' Instagram profiles is reliable; assumed the duration of a TBL season on TV to be equal to its duration in the real-time. Second, despite the warning, we applied unobtrusive indicators of narcissism to the profiles with more than 600 postings. We suggest that another measure of narcissism could be used in order to establish the reliability of the values of narcissism in our study. Third, we found open Instagram profiles of less than 50% of TBL contestants and, thus, were not be able to consider the whole sample. Fourth, we outlined but did not fully test the mechanism and the full set of relationships considered in our theoretical model (e.g., those between motivation to learn and the training performance, etc.).

Last but not least, we have chosen rather a specific setting - a weight loss program – to test our predictions. We recommend these relationships to be further tested in other domains, especially in the organizational domain. Although in our opinion, the setting choice

would not affect the relationship between a trainee's level of narcissism and training results, it may affect the relationship between a trainer's level of narcissism and training outcomes. Indeed, organizational norms and values may create boundaries for a narcissistic trainer demonstrating bold behavior, seeking attention, and engaging in exhibitionism, whereas a weight loss program is rather an informal setting that does not restrict these behaviors. In other words, we expect that in an organizational setting, narcissistic trainers would have fewer chances to be visible and, thus, be easily selected as a model. However, a weight loss program is more likely to bring together individuals having a different background, whereas, in an organizational setting, employees are likely to share values and assumptions and subject to the same requirements and standards. Thus, we expect that in an organizational setting, trainees would be easier to perceive their trainers and trainees as similar to themselves. Moreover, they'd be likely to consider rather covert or job-related characteristics (job position, experience, interests) than gender or age.

Contributions. Our study could have the following contributions to the literature. First, we found empirical support for the positive effect of the trainer's level of narcissism on training performance and results, thus contributing to the literature on the positive implications of narcissism. Second, we found empirical support for the negative relationship between a trainee's level of narcissism and training results. Finally, we outlined the mechanism that may underlie the relationship between trainers' and trainee's narcissism and training outcomes.

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Table 1. Descriptive statistics, dyad-week-level data.

Variable	Obs	Mean	SD	Min	Max
Weekly WL (p)	2686	.03	.02	-.05	.10
Weekly WL (i)	2686	.02	.01	-.04	.10
Narcissism of trainers	2686	.78	.15	.47	1.23
Narcissism of trainers (face)	2686	.69	.13	.40	.98
Narcissism of trainees	1208	.72	.42	.00	2.00
Narcissism of trainees (face)	1208	.47	.27	.00	1.00
Difference in narcissism	1208	.35	.23	-.35	1.01
Difference in narcissism (face)	1208	.26	.23	-.44	.81
More narcissistic trainer	1208	.92	.27	.00	1.00
Same gender	2686	.49	.50	.00	1.00
Overweight trainer	2686	.26	.44	.00	1.00
Age similarity	2586	.29	.75	.03	7.42
Trainer athlete	2686	.11	.31	.00	1.00
Trainer age	2586	39.03	5.07	29.10	49.26
Trainer experience	2686	3.46	3.81	.00	15.00
Male contestant	2686	.48	.5	.00	1.00
Contestants' age	2686	33.48	10.01	17.00	73.00
Starting BMI	2592	46.8	7.61	27.80	72.40

Table 1a. Dummy variables, dyad-week-level data.

Dummy variables	Obs	Frequency			
		= 0		=1	
Coach athlete	1208	93	7.70%	1115	92.30%
Same gender	2686	1380	51.38%	1306	48.62%
Overweight coach	2686	1996	74.31%	690	25.69%
Male contestant	2686	1393	51.86%	1293	48.14%

Table 2. Correlations, dyad-week-level data.

Note: N_{max} = 2686. ^p<.10, *p≤.05, **p≤.01, ***p≤.001

	1.Weekly WL (p)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2.Weekly WL (i)	.98***																
3.Narcissism of trainers	-.03^	-.03^															
4.Narcissism of trainers (face)	-.04*	-.04*	.96***														
5.Narcissism of trainees	-.08**	-.07*	.42***	.43***													
6.Narcissism of trainees (face)	-.09**	-.08**	.51***	.51***	.96***												
7.Difference in narcissism	.08**	.07*	.10***	.06*	-.82***	-.81***											
8.Difference in narcissism (face)	.07*	.06*	-.02	.01	-.85***	-.86***	.98***										
9.More narcissistic trainer	.10***	.08**	.12***	.11	-.43***	-.42***	.56***	.55***									
10.Same gender	-.01	-.02	-.01	-.01	-.16***	-.16***	.19***	.20***	.10***								
11.Overweight trainer	.03	.02	-.04^	-.01	-.08**	-.13***	.09**	.09**	.09**	.04*							
12.Age similarity	.003	.001	.13***	.09	-.04	-.03	.16*	.10***	.06*	.08***	-.01						
13.Trainer athlete	-.04^	-.04^	.11***	.06**	.08**	.09**	-.07**	-.10***	-.04	-.03^	-.21***	-.01					
14.Trainer age	.03	.02	-.08***	-.10***	.01	.01	-.10***	-.08**	-.08**	.01	-.43***	-.12***	-.25***				
15.Trainer experience	.04^	.03	-.44***	-.44***	-.25***	-.28***	-.06***	-.02	-.04	.04^	-.04^	-.04*	-.21***	.53***			
16.Male contestant	.08***	.06**	.02	.01	-.09**	-.12***	.15***	.14***	.13***	.20***	-.03^	-.06**	-.02	.001	-.03^		
17.Contestants' age	.02	.03	-.05**	-.03^	-.15***	-.19***	.14***	.14***	-.01	-.02	-.03	.10***	.09***	-.08***	.04*	.07***	
18.Starting BMI	-.05**	-.06**	.17***	.16***	-.02	.004	.15***	.11***	.07*	.10***	-.12***	-.04*	-.03	.11***	-.01	.39***	-.02

Table 3. Narcissism and training performance.

Note: N=1206. OLS regressions with season fixed effects, number of the week (in a season) fixed effects, and standard errors clusterted by trainer. Standard errors are in parentheses, ^p<.10, *p≤.05, **p≤.01, ***p≤.001. All the coefficients are multiplied by 1000 for the convenience.

	(1) **Weekly WL (p)**	(2) **Weekly WL (i)**	(3) **Weekly WL (p)**	(4) **Weekly WL (i)**	(5) **Weekly WL (p)**	(6) **Weekly WL (i)**
Narcissism of trainers	**15.15*** **	**11.58*** **	**12.41** **	**9.41** **	**13.37*** **	**10.01** **
	(2.62)	(2.36)	(3.43)	(3.02)	(3.17)	(2.72)
Narcissism of trainees	**-2.04^**	**-1.58^**			**-.77**	**-.46**
	(1.04)	(.81)			(1.13)	(.86)
Difference in narcissism			**3.09***	**2.45***		
			(1.45)	(1.09)		
More narcissistic trainer					**3.17***	**2.81***
					(1.17)	(.99)
Same gender	**-.56**	**-.43**	**-.52**	**-.41**	**-.50**	**-.38**
	(.65)	(.45)	(.65)	(.45)	(.71)	(.49)
Overweight trainer	**1.13**	**1.08**	**1.07**	**1.02**	**0.95**	**0.92**
	(.84)	(.68)	(.86)	(.69)	(.80)	(.64)
Age similarity	**-.48^**	**-.31**	**-.49^**	**-.32**	**-.48**	**-.31**
	(.26)	(.19)	(.26)	(.19)	(.26)	(.20)
Trainer athlete	**2.84**	**2.89^**	**2.83**	**2.88**	**2.85**	**2.90^**
	(1.96)	(1.63)	(1.97)	(1.64)	(1.83)	(1.51)
Trainer age	**.14**	**.14**	**.10**	**.14**	**.16**	**.15^**
	(.10)	(.08)	(-1.49)	(.08)	(.10)	(.08)
Trainer experience	**.05**	**.03**	**.05**	**.04**	**.04**	**.02**
	(.12)	(.10)	(.12)	(.10)	(.12)	(.10)
Male contestant	**3.57*** **	**2.68*** **	**3.49*** **	**2.65*** **	**3.32*** **	**2.49*** **
	(.76)	(.55)	(.77)	(.55)	(.79)	(.57)
Contestants' age	**-.06**	**-.05**	**-.06**	**-.05**	**-.05**	**-.04**
	(.05)	(.04)	(.05)	(.04)	(.05)	(.04)
Starting BMI	**-.12***	**-.08***	**-.12***	**-.08***	**-.11***	**-.08^**
	(.05)	(.04)	(.05)	(.04)	(.05)	(.04)
Const	**33.61*** **	**36.10*** **	**33.39*** **	**35.98*** **	**30.13*** **	**33.01*** **
	(6.16)	(5.49)	(6.13)	(5.37)	(6.36)	(5.41)
R^2	30.28%	41.64%	30.25%	41.62%	30.46%	41.80%

Table 4. Narcissism and training performance (robustness check)

Note: N=1206. OLS regressions with season fixed effects, number of the week (in a season) fixed effects, and standard errors clusterted by trainer. Standard errors are in parentheses, ^p<.10, *p≤.05, **p≤.01, ***p≤.001. All the coefficients are multiplied by 1000 for the convenience.

	(1) **Weekly WL (p)**	(2) **Weekly WL (i)**	(2) **Weekly WL (i)**
Narcissism of trainers (face)	**9.25***	**6.45^**	**4.10**
	(4.28)	(3.67)	(4.13)
Narcissism of trainees (face)	**-2.98^**	**-2.34***	
	(1.43)	(1.08)	
Difference in narcissism (face)			**2.35***
			(1.08)
Same gender	**-.64**	**-.50**	**-.50**
	(.65)	(.45)	(.45)
Overweight trainer	**1419.00**	**1290.00**	**1290.00^**
	(.85)	(.70)	(.70)
Age similarity	**-.28**	**-.15**	**-.15**
	(.27)	(.21)	(.21)
Trainer athlete	**3.28**	**3.19^**	**3.19^**
	(1.96)	(1.62)	(1.62)
Trainer age	**.11**	**.11**	**.11**
	(.11)	(.09)	(.09)
Trainer experience	**.02**	**.003**	**.003**
	(.16)	(.13)	(.13)
Male contestant	**3.63*****	**2.75*****	**2.75*****
	(.75)	(.54)	(.54)
Contestants' age	**-.06**	**-.05**	**-.05**
	(.05)	(.04)	(.04)
Starting BMI	**-.12***	**-.08***	**-.08***
	(.05)	(.04)	(.04)
Const	**43.06*****	**44.09*****	**44.09*****
	(6.28)	(5.65)	(5.65)
R^2	29.99%	41.43%	41.43%

Table 5. Descriptive statistics, dyad-level data.

Variable	Obs	Mean	SD	Min	Max
Finale	453	.20	.40	.00	1.00
Winner of the ranch	453	.07	.25	.00	1.00
Total % WL	437	.36	.10	-.06	.60
Narcissism of trainers	453	.76	.15	.47	1.23
Narcissism of trainers (face)	453	.68	.13	.40	.98
Narcissism of trainees	193	.69	.40	.00	2.00
Narcissism of trainees (face)	193	.45	.26	.00	1.00
Same gender	453	.48	.50	.00	1.00
Overweight trainer	453	.26	.44	.00	1.00
Age similarity	436	.28	.70	.03	7.42
Trainer athlete	453	.09	.29	.00	1.00
Trainer age	436	39.01	5.32	29.10	49.26
Trainer experience	453	3.91	4.10	.00	15.00
Male contestant	453	.48	.50	.00	1.00
Contestants' age	453	34.16	10.48	17.00	73.00
Starting BMI	439	46.67	7.63	27.80	72.4

Table 5a. Dummy variables, dyad-level data.

Note: N=453.

Dummy variables	Frequency			
	= 0		=1	
Finale	363	80.13%	90	19.87%
Winner of the ranch	422	93.16%	31	6.84%
Same gender	237	52.32%	216	47.68%
Overweight trainer	336	74.17%	117	25.83%
Male contestant	235	51.88%	218	48.12%

Table 6. Correlations, dyad-level data.

Note: N_{max} = 453. ^p<.10, *p≤.05, **p≤.01, ***p≤.001

	1.Finale	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2.Winner of the ranch	.54***														
3.Total % WL	.45***	.36***													
4.Narcissism of trainers	.08^	.03	-.04												
5.Narcissism of trainers (face)	.08^	.04	-.04	.96***											
6.Narcissism of trainees	-.02	-.02	-.19**	.34***	.33***										
7.Narcissism of trainees (face)	-.04	-.03	-.19**	.43***	.42***	.96***									
8.Same gender	.09^	.02	.09^	-.01	-.02	-.12	-.13^								
9.Overweight trainer	.07	.06	.10*	-.06	-.02	-.12^	-.16*	.002							
10.Age similarity	.10*	.01	.10*	.04	.03	-.09	-.09	.11*	-.03						
11.Trainer athlete	-.02	-.06	-.04	.11*	.07	.08	.09	-.01	-.19***	-.01					
12.Trainer age	-.04	-.03	.002	-.11*	-.14**	.02	.01	.01	-.44***	-.09^	-.25***				
13.Trainer experience	-.05	-.01	.08	-.43***	-.44***	-.2**	-.23**	.03	-.02	-.04	-.22***	.58***			
14.Male contestant	.05	.12**	.18***	.02	.02	-.1	-.13^	.17***	.02	.001	-.03	-.02	-.01		
15.Contestants' age	-.14**	-.03	-.01	-.10*	-.08^	-.18*	-.19**	.02	-.02	.08^	.11*	-.08^	.06	.07	
16.Starting BMI	.02	.06	.23***	.21***	.21***	-.06	-.01	.07	-.08^	-.02	-.09^	.08	.002	.38***	-.03

Table 7. Narcissism and training results

Note: Logistic (columns 1-2 and 4-5) and OLS regressions (column 3) with season fixed effects and trainer-clustered standard errors. Standard errors are in parentheses, ^p<.10, *p≤.05, **p≤.01, ***p≤.001.

	(1) Finale	(2) Winner of the ranch	(3) Total % WL	(4) Finale	(5) Winner of the ranch
Narcissism of trainers	**4.83***	**5.65***	**-.06**		
	(2.09)	(2.58)	(.12)		
Narcissism of trainers (face)				**6.03*****	**5.52****
				(1.64)	(1.82)
Narcissism of trainees	**-.43**	**-.76**	**-.03***		
	(.43)	(.72)	(.01)		
Narcissism of trainees (face)				**-.89**	**-.91**
				(.73)	(1.17)
Duration of a dyad	**.21***	**.15**	**.01**	**.22***	**.15**
	(.10)	(.11)	(.003)	(.10)	(.11)
Same gender	**.45**	**-.04**	**.004**	**.42**	**-.07**
	(.40)	(.33)	(.01)	(.38)	(.35)
Overweight trainer	**1.08****	**.169**	**.004**	**1.20*****	**.25**
	(.34)	(.59)	(.02)	(.33)	(.56)
Age similarity	**.25***	**-.56**	**.01**	**.26***	**-.44**
	(.12)	(.55)	(.006)	(.12)	(.46)
Trainer athlete	**-1.64****		**.01**	**-1.42***	
	(.60)		(.05)	(.60)	
Trainer age	**.03**	**-.02**	**.002**	**.03**	**-.04**
	(.06)	(.08)	(.003)	(.05)	(.06)
Trainer experience	**.009**	**.03**	**-.01***	**.04**	**.06**
	(.05)	(.08)	(.002)	(.05)	(.06)
Male contestant	**.29**	**1.99***	**.04^**	**.31**	**2.02***
	(.45)	(.87)	(.02)	(.44)	(.86)
Contestants' age	**-.06****	**-.08***	**-.001**	**-.06****	**-.08***
	(.02)	(.04)	(.001)	(.02)	(.04)
Starting BMI	**-.004**	**-.006**	**.001**	**-.003**	**-.007**
	(.05)	(.07)	(.001)	(.05)	(.07)
Const	**-6.71^**	**-7.43**	**.25**	**-6.91***	**-5.63**
	(4.00)	(5.92)	(.22)	(3.02	(3.68)
Obs	189	148	188	189	148
R^2 (Pseudo R^2)	20.49%	20.33%	32.24%	21.07%	20.03%

Table 8. Descriptive statistics, contestant-level data.

Variable	Obs	Mean	SD	Min	Max
Finale	363	.19	.40	.00	1.00
Final weight in kg	351	.20	22.29	47.63	166.00
Ending BMI	337	29.58	5.97	18.00	58.90
Trainees' narcissism	150	.68	.41	.00	2.00
Starting BMI	349	46.13	7.53	27.80	72.40
Contestants' age	363	34.20	10.62	17.00	73.00
Male contestant	363	.47	.50	.00	1.00
Weeks on the ranch	363	8.84	4.82	.00	20.00

Table 9. Correlations, contestant-level data.

Note: N_{max} = 363. ^p<.10, *p≤.05, **p≤.01, ***p≤.001

	1. Finale	2	3	4	5	6	7
2. Final weight in kg	**-.2621*** **						
3. Ending BMI	**-.3274*** **	**.8620*** **					
4. Trainees' narcissism	-0.0405	0.0953	0.1311				
5. Starting BMI	0.0271	**.6045*** **	**.6168*** **	-0.0594			
6. Contestants' age	**-.1416** **	-0.0137	-0.0415	**-.1357^**	-0.0309		
7. Male contestant	0.0757	**.4787*** **	**.1556** **	-0.1192	**.3973*** **	**.1010^**	
8. Weeks on the ranch	**.4683*** **	**-.2232*** **	**-.2642*** **	0.0439	**.2102*** **	**-.1302***	0.0740

Table 10. Trainees' narcissism and training results.

Note: Logistic (column 1) and OLS regressions (columns 2 and 3) with season fixed effects and robust standard errors. Standard errors are in parentheses, ^p<.10, *p≤.05, **p≤.01, ***p≤.001.

	(1) **Finale**	(2) **Final weight in kg**	(3) **Ending BMI**
Trainee's narcissism	**-2.57***	**8.31***	**1.66^**
	(1.27)	(3.36)	(.94)
Starting BMI	**-.09**	**1.66*** **	**.61*** **
	(.06)	(.22)	(.06)
Contestants' age	**-.11^**	**.03**	**-.02**
	(.06)	(.14)	(.03)
Male contestant	**.36**	**13.76*** **	**-1.120**
	(.85)	(2.88)	(.78)
Weeks on the ranch	**2.16***	**-1.69*** **	**-.59*** **
	(1.03)	(.35)	(.09)
R^2 (Pseudo R^2)	61.99%	68.13%	70.06%
Obs	148	147	147

Chapter 3

Narcissistic Leaders and Individual Performance of Their Followers: The Conceptual Model

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ABSTRACT

This paper seeks to explore the impact of a leader's narcissism on his/her followers' individual performance. Building on the role model literature, we propose that a narcissistic leader is likely to become a positive role model for his/her followers in the short term. It will lead to an increase in motivation and, consequently, superior individual performance of the followers. In contrast, we argue that the effect of a leader's narcissism on the followers' long-term individual performance is negative. In the long term, followers are likely to experience the dark side of a narcissistic personality and perceive their leader as an incongruent role model.

Key words: Narcissism, Narcissistic Leadership, Individual Performance, Role Models, Dark Side of Narcissism, Short Term, Long Term

Narcissistic Leaders and Individual Performance of Their Followers:

The Conceptual Model

INTRODUCTION

Recent research on narcissism agreed that narcissism is becoming an "epidemic" (Twenge & Foster, 2008; Twenge & Campbell, 2009; Twenge et al., 2014), having found empirical support for a generational increase in narcissism. However, it's not only the *proliferation* that matters but also the fact that narcissists prevail in the positions of *leaders* "in all sectors of society and throughout the world" (Rosenthal & Pittinsky, 2006, p. 622), including the positions of head of state (Deluga, 1997; Watts et al., 2013) and CEO (Chatterjee & Hambrick, 2007, 2011). The most important implication of this fact is that if placed in the positions of leaders, *narcissists may affect* not only their own lives and the lives of their entourage but also *the lives of everybody of us*.

Due to the importance of the phenomenon, it is not surprising that research on narcissistic leaders has generated a plethora of insights. Among others research has discussed how to assess the level of narcissism (Raskin & Terry, 1988; Wink & Gough, 1990; Ames et al., 2006; Chatterjee & Hambrick, 2007), what the idiosyncrasies of their behavior are (Maccoby, 2000; Rosenthal & Pittinsky, 2006; Jonason et al., 2009; Ouimet, 2010; Campbell et al., 2011; Dufner et al., 2013), what psychological mechanisms induce them to behave in such a way (Rosenthal & Pittinsky, 2006), how narcissism is distributed throughout different generations (Twenge & Foster, 2008) and occupations (Young & Pinsky, 2006).

Although we know what is so special about a narcissistic leader, the evidence of what will happen with followers of such a leader, whether they will perform better or worse under the guidance of a narcissist, is still missing. By now the researchers have only considered the *joint performance* of followers of a narcissistic leader, i.e., the researchers found what happens at the level of county governed by a narcissistic president (Deluga, 1997; Watts et al., 2013); what cost narcissistic leaders impose on a society (Campbell et al., 2005); what happens with different dimensions of organizational performance like strategic dynamism, number and size of acquisitions, or volatility (Chatterjee & Hambrick, 2007, 2011). However, we think that current research is still lacking empirical evidence coming from the individual level. In such a way, in the scope of this paper, we would like to answer the following

research question: *how does a leader's narcissism affect his/her followers' performance on the individual level?*

In order to address the following research question, we outlined the possible mechanism for the relation between leader's narcissism and followers' individual performance and came up with a number of propositions. Drawing on the role models literature (Lockwood et al., 2002, 2004, 2005), we propose that a narcissistic leader is likely to become a positive role model for his/her followers in the short term. By emphasizing his/her successes and blaming others for his/her own failures, being exhibitionistic, having good social skills, and inspirational power, a narcissist, makes his/her strategy for attaining success highly visible to his/her followers. That, in turn, leads to enhanced motivation and, consequently, superior individual performance of the followers in the short term.

As the dark side of a narcissistic personality is more likely to be prominent in the long term, we suggest that followers will be likely to perceive a narcissistic leader as an incongruent role model. The presence of an incongruent role model leads to decreased motivation and, consequently, inferior individual performance of the followers in the long term.

Our study may have the following *contributions* to research. First, we argued that a leader's narcissism positively affects the individual performance of followers in the short term, and negatively affects the individual performance of followers in the long term. Second, we outlined the possible mechanism for the proposed relationship.

LITERATURE REVIEW

The idea that leaders' personality and, in particular, their level of narcissism, may affect the performance of their followers is not new (Aronson et al., 2006; Chatterjee & Hambrick, 2007, 2011; Brunell et al., 2008; Ouimet, 2010; Nevicka et al., 2011). However, by now the research has been considered the followers' performance only at the levels of organization (Chatterjee & Hambrick, 2007, 2011; Ouimet, 2010; Campbell et al., 2011) and group (Brunel et al., 2008; Nevicka et al., 2011), though lacking empirical evidence coming from the level of the individual. Therefore, in this research, we are going to address the following research question – *How a leader's narcissism affects his/her followers' performance on the individual level?* – by proposing a mechanism for the relationship between a leader's narcissism and follower's individual performance and providing the empirical evidence.

Narcissism and narcissistic leadership

The studies on narcissistic leadership have their origins from applying the construct of narcissism to a study on leadership (Rosenthal and Pittinsky, 2006). *The concept of narcissism* derives from "the Greek myth of Narcissus, a young man fated to fall in love exclusively with the perfection of his own reflection" (Rosenthal & Pittinsky, 2006). The term "narcissism" has been first coined by Ellis (1898) to describe "a clinical condition of perverse self-love (i.e., auto-eroticism)" and further elaborated by Freud (1914). As the research on narcissism comprises the huge debate on what narcissism is, we found it necessary to set three *assumptions* on what we understand by the term "narcissism" in the scope of this research. Firstly, we will follow the most common approach of considering narcissism as a personality trait (Bergman et al., 2011; Campbell et al., 2011; Grijalva et al., 2015, etc.), i.e., as the level of narcissism being *stable* during the life of an individual. Secondly, we will focus only on *non-pathological* narcissism, and not on the narcissistic psychological disorder (NPD), as "NPD is a rare character disorder that affects less than 1% of the general population" (APA, 1994; Campbell et al., 2005). Finally, we will consider narcissism as a complex and *multidimensional* concept, that may have various representations, instead of focusing on a particular dimension or type of narcissism like, for example, in the research on grandiose narcissism (Gentile et al., 2013; Watts et al., 2013, etc.).

As it was reasonably highlighted by Rosenthal & Pittinsky (2006), "narcissism is not a trait-without-a-theory, as are some other personality traits linked to leadership (e.g., Big Five personality traits)" (p. 629). According to this view, narcissistic leadership deserves to exist as a leadership theory due to the unique mechanism and may stay in line with such leadership theories as power motivation or charismatic leadership. This mechanism is well demonstrated in the definition of narcissistic leadership they provided: "narcissistic leadership occurs when leaders' actions are principally motivated by their own egomaniacal needs and beliefs, superseding the needs and interests of the constituents and institutions they lead" (p. 629).

As it was conceptualized by Ouimet (2010), the research on narcissistic leadership (Deluga, 1997; Maccoby, 2000; Rosenthal & Pittinsky, 2006; Chatterjee & Hambrick, 2007; Brunell et al., 2008; Ouimet, 2010; Chatterjee & Hambrick, 2011; Watts et al., 2013) is considering three main aspects: the causes, the nature, and the effects of narcissistic leadership.

Considering the causes, Rosenthal & Pittinsky (2006) have summarized all the psychological components that underlie narcissists' behavior into the following eight groups: arrogance, feelings of inferiority, an insatiable need for recognition and superiority, hypersensitivity and anger, lack of empathy, amorality, irrationality, and inflexibility, and paranoia. Another group of studies, considering the nature and the effects of narcissistic leadership, is more relevant for the scope of our research, as it provides some (mostly theoretical) evidence on how a narcissistic leader affects other individuals.

How narcissistic leaders affect other individuals

According to Maccoby (2000), "most people still think of narcissists in a primarily negative way" (p. 70), and, indeed, this group of studies contains many arguments in support that *narcissistic leaders negatively affect other individuals*.

Several negative consequences for the followers have their origins from narcissists' lack of empathy (Maccoby, 2000; Rosenthal & Pittinsky, 2006; Ouimet, 2010). According to Maccoby (2000), "narcissistic leaders typically keep others at arm's length" (p. 73) and feel uncomfortable when other individuals express their own feelings. Lack of empathy may lead to such consequences as narcissists usually being poor listeners, getting used to competing with others, and preferring to control others rather than recognize their personalities. In the

commons dilemma situation, narcissists "approached the situation with an acquisitive, competitive orientation" and "gained a relative victory over the others in their group" (Campbell et al., 2005, p. 1366) due to the lack of empathy. "The cost of this victory, however, was carried by the other competitive group members and the common resource, both of which suffered" (p. 1366).

According to Ouimet (2010), in organizational contexts, the lack of empathy and coldness towards colleagues and staff may result in a "toxic work atmosphere" (p. 717). Moreover, narcissistic leadership in the workplace is concomitant with "destruction of subordinates' trust" and "inflicting damage on others (bullying, coercion, and damage to the psychological well-being of subordinates)" (p. 717). Maccoby (2000) suggested that narcissists are difficult to mentor and be mentored and that "even those narcissists […] who are held up as strong mentors are usually more interested in instructing than in coaching" (p.74). Moreover, on the example of Steve Jobs, who publicly humiliated his employees, Maccoby (2000) drew on the conclusion that narcissistic leaders "cannot tolerate the dissent" (p. 73).

Apart from the lack of empathy, negative consequences for the entourage of a narcissistic leader may originate from self-serving bias – the tendency to take credit for success from others but to blame others for failure (Campbell & Sedikides, 1999). The studies, considering the link between the level of narcissism and self-serving bias (Campbell & Sedikides, 1999; Tamborski et al., 2012), found that they are strongly positively correlated.

Several studies on narcissists and narcissistic leaders highlighted their aggressiveness towards others (Bushman & Baumeister, 1998; Maccoby, 2000; Rosenthal & Pittinsky, 2006; Ouimet, 2010; Campbell et al., 2011). Bushman & Baumeister (1998), who studied the link between narcissism and aggression in detail, found that there are "no significant correlations between narcissism and aggression toward a new, third-person," but that "narcissists became exceptionally aggressive toward a person who had given them a negative, insulting evaluation" (p. 227). In line with Bushman & Baumeister (1998), Brunell et al. (2008) suggested that "narcissists are willing to derogate others to maintain self-esteem and aggress against those who provide them with negative feedback" (p. 1664). Several studies highlighted a number of conditions that trigger narcissists' aggressiveness. For example,

Maccoby (2000) suggested that narcissistic leaders are "aggressive in pursuit of their goals" (p. 72); Bushman & Baumeister (1998) added that "narcissism combined with ego threat yielded the highest levels of aggression" (p.227). Finally, several studies found that narcissism predicts not only aggression but also violence against other individuals (Bushman & Baumeister, 1998; Campbell et al., 2011).

Although the literature on narcissistic leaders affecting others in a negative way is rich with examples, "the prevalence of narcissistic leaders in all sectors of society and throughout the world suggests that there must be some positive aspects of narcissistic leaders as well" (Rosenthal & Pittinsky, 2006, p. 622). Let us summarize the main ways of how *narcissistic leaders positively affect other individuals*

First and foremost, the vast majority of research on narcissism highlights that narcissists are very strong charismatic leaders (Deluga, 1997; Maccoby, 2000; Rosenthal & Pittinsky, 2006; Ouimet, 2010; Campbell et al., 2011). Maccoby (2002) noticed that narcissists are "charmers," they "have always emerged to inspire people" (p. 70), and are "specially gifted in attracting followers" (p. 72).

Second, several researchers highlighted that narcissists are more likely to emerge as leaders of a new group (Rosenthal & Pittinsky, 2006; Brunell et al., 2008; Dufner et al., 2013). Thus, Brunell et al. (2008) found that "narcissists are more likely to emerge as leaders during leaderless group discussions" (p. 1672) because "confidence exhibited by narcissists might cause their group members to perceive them as competent and effective" (p. 1673). Dufner et al. (2013) have also posed that "in new groups, narcissists behave in an expressive and self-confident fashion and are willing to take up leadership positions. Even in socially stressful situations, narcissists exhibit self-confident, expressive, and charming behavior" (p. 2).

Finally, it is worth mentioning that narcissists "are typically very socially skilled" (Brunell et al., 2008, pp. 1664). Brunell et al. (2008) summarized that "narcissists are energetic, socially extraverted, socially confident and entertaining" (pp. 1664) and suggested that "their social relationships often serve the function of self-enhancement rather than to develop intimacy" (p. 1664). Maccoby (2000) suggested that narcissists attract their followers

"through language" (p. 72), referring to their outstanding oratory skills, "personal magnetism" and "ability to stir enthusiasm among audiences" (p. 71).

Several studies applied a *time-contingent approach*, suggesting that narcissists positively affect others in the short term, but negatively in a long one. For example, narcissists were considered to be more likely to acquire a position of a leader in a new group (Rosenthal & Pittinsky, 2006; Brunell et al., 2008; Dufner et al., 2013), but they are "not necessarily to performing well in that position" (Rosenthal & Pittinsky, 2006, p. 624) or can even become destructive leaders in a long term (Brunell et al., 2008). Campbell et al. (2005) suggest that the root of such a difference comes from the strategies that narcissists implement in order to maintain their inflated self-beliefs: "these strategies may work well in the short term, but they tend to deteriorate over time as others "see-through" the narcissists' act" (Campbell et al., 2005, p. 1359).

Even more evidence for this time-contingent approach is provided by the studies on narcissistic friends or romantic partners (Campbell et al., 2002; Campbell & Foster, 2002; Jonason et al., 2009; Dufner et al., 2013). According to Brunell et al. (2008), "during initial encounters, they [narcissists] are liked by others, but this initial liking disappears over the course of time, resulting in a pattern where narcissists have more frequent relationships but of shorter duration and less emotional intimacy" (pp. 1664-1665).

According to the research on narcissism and mating, narcissism "may facilitate a social style geared towards exploiting others in short-term social contexts," as narcissists "tend to have a sense of entitlement and seek admiration, attention, prestige and status" (Jonason et al., 2009, p. 3), but such a success dies out in a long-term: as narcissism is associated with low agreeableness, it provokes conflicts in long-term relationships. Dufner et al. (2013) explained that narcissists are successful in short-term mating due to physical attractiveness and that such a physical attractiveness comes from them to "put effort into an attractive appearance by grooming and wearing fashionable clothes" (p. 3). Another reason why narcissists are successful in short-term mating is social boldness. Socially bold behavior (i.e., displays of confidence, charm, charisma, etc.) originates from narcissists' self-enhancing cognition and approach orientation and usually evokes positive evaluations by interaction partners.

Similarly, Brunell et al. (2008) summarized that a narcissist is initially viewed by his/her partner in a romantic relationship as "attractive, charming, and fun" (p. 1665). However, "narcissists quickly lose their appeal as romantic partners because they lack commitment and play games" (p. 1665).

In our opinion, the aforementioned studies contain two important *limitations that can be addressed in our study.* Firstly, the studies, providing evidence on how narcissistic leaders affect others, pay more attention to the behaviors of narcissistic leaders rather than to "final effects" of these behaviors. In other words, in order to understand how narcissistic leaders affect their followers, the researchers have looked mostly at narcissists rather than at their followers. In our study, we hope to address this limitation in the current literature by looking at the individual performance of the followers.

Second, the literature on narcissistic leadership often follows the logic of black-and-white thinking, with the preponderance of the black side. In particular, several studies have considered narcissism as one of the "Dark Triad Personality Traits" (e.g., Jonason et al., 2009; Jonason & Webster, 2012), so being narcissist has been considered as something bad by default as dark triad traits "are linked to negative personal and societal outcomes" (Jonason et al., 2009, p. 5). Another group of studies distinguished between the bright and the dark sides of narcissism (Maccoby, 2000; Rosenthal & Pittinsky, 2006; Campbell & Campbell, 2009), suggesting that several behaviors and their effects represent the bright side, whereas others – the dark side of a narcissistic personality. However, even the former, a more compromised group of studies came to the pessimistic conclusion: "in all, narcissism provided a benefit to the self, but at a long-term cost to other individuals and to the commons" (Campbell et al., 2005, p. 1258). In our opinion, overfocusing on the dark side without recognizing the positive implications of narcissism may lead to overpessimism in the discussion. In order to address this problem, we will follow the time-contingent approach, recognizing that narcissists positively affect others in the short term but negatively in the long one.

CONCEPTUAL MODEL

The studies that followed the time-contingent approach (Campbell et al., 2002; Campbell & Foster, 2002; Rosenthal & Pittinsky, 2006; Brunell et al. 2008; Jonason et al., 2009; Dufner et al., 2013) came from different domains and considered different behaviors. However, the effect of how narcissistic leaders influence others was always the same: it is positive in the short term, and negative in a long one. We propose that a potential reason why it happened is that there is a *common mechanism* of how a narcissistic leader affects his/her followers and that this logic can be further applied to the individual performance of these followers. In the rest of this chapter, we will try to outline this mechanism for the focal case of individual-level performance. The graphical representation of the mechanism is provided in **Figure 1.**

Insert Figure 1 about here

Motivation and individual performance. Although the predictors of individual performance are often domain-dependent, *such predictor as motivation persists through different domains*. For example, the researchers confirmed the existence of the positive effect of academic motivation on academic performance in the domain of education (e.g., Fortier et al., 1995; Mueller & Dweck, 1998); achievement motivation on entrepreneurial performance in the domain of business (Sadler-Smith et al., 2003; Collins et al., 2004; Poon & Ainuddin, 2006; Zhao et al., 2010; Shane et al., 2003); intrinsic motivation (Kelloway, 2001) or self-determined motivation (Gillet et al., 2010) on athlete performance in the domain of sports. Taking all together, we suggest that the *enhanced motivation of an individual is associated with superior performance*.

Proposition 1: follower's motivation will positively affect the follower's individual performance.

Motivation and positive role models. Rather than focusing on the link between motivation and individual performance, several studies on determinants of individual performance considered motivation as the mechanism in a relation of some third factor affecting individual performance (e.g., Kelloway, 2001; Gillet et al., 2010). Here we follow

the same approach, suggesting that *narcissistic leaders are likely to become positive role models for their followers, enhance their motivation, and, in turn, their individual performance*. We propose that this effect is only applicable for short-term performance, but dies out in the long term.

The literature on role models (Lockwood et al., 2002, 2004, 2005) suggests that depending on the goal of an individual, either positive or negative role models may enhance his/her motivation. Lockwood et al. (2002) found that the majority of individuals are prone to be motivated by positive role models, where "positive role models can inspire by illustrating an ideal, desired self, highlighting possible achievements that one can strive for, and demonstrating the route for achieving them" (Lockwood et al., 2002, p. 854).

Proposition 2: the presence of a positive role model will positively affect follower's motivation

We suggest that a *narcissistic leader is likely to become a positive role model* for his/her followers and enhance their motivation for the following *reasons*.

First, narcissists are likely to become positive role models because of the greater visibility of their success and low visibility of their failure. Narcissists are convinced that their success is their due because they "made greater internal attributions for success than failure" (Campbell et al., 2000, p. 341). At the same time, narcissists blame others for failure (Campbell & Sedikides, 1999) and aggressively react to negative feedback (Brunell et al., 2008), though denying that they failed. Moreover, narcissists typically make a good impression: they usually are physically attractive as they "put effort into an attractive appearance by grooming and wearing fashionable clothes" (Dufner et al., 2013, p. 3) and charming (Maccoby, 2000; Brunell et al., 2008). Taking together, it seems that followers will definitely be aware of all the successes of a narcissistic leader due to his/her exhibitionism (Raskin & Terry, 1988); these successes are likely to be hyperbolized due to narcissist's self-aggrandizement (Rhodewalt & Morf, 1998). At the same time, the followers will be less likely to reveal or to believe in the existence of the dark side of such a charming person.

Second, positive role models motivate individuals by highlighting their strategies for achieving success (Lockwood et al., 2002). We suggest that in the case of narcissistic leaders, not only the success but also the *strategies* towards this success become clearer to the

followers. Again, due to exhibitionism, narcissists provide more information about their everyday lives that can be perceived by their followers as the steps to do in order to achieve success. They may do it by means of social media like Facebook or Twitter as these networks "provide an easy way for narcissists to engage in the exhibitionistic, attention-seeking, and self-promoting behaviors that assist them in maintaining their inflated self-views" (Davenport et al., 2014, p. 214). Moreover, narcissists are likely to choose jobs involving publicity (Deluga, 1997; Young & Pinsky, 2006; Chatterjee & Hambrick, 2007, 2011; Watts et al., 2013).

Another reason why narcissists' strategies for achieving success are highly visible for their followers comes from their good social skills, extraversion (Brunell et al., 2008), and socially bold behavior (Dufner et al., 2013). Due to these characteristics, narcissists are likely to become mates or even sweethearts of their followers in the short term (Campbell et al., 2002; Campbell & Foster, 2002; Jonason et al., 2009; Dufner et al., 2013). Frequent communication with narcissists, in which they are likely to provide more information about themselves, will increase followers' understanding of how narcissists achieved their success.

Third, Lockwood et al. (2002) suggested that positive role models "prompt inspiration only when their achievements seem attainable" (p.855). Although a narcissistic leader and his followers differ in their status, in order leader-follower relationship to be born, a leader and a follower should belong to the same group (e.g., a manager and an employee of the same department) and stay in contact. Moreover, the individuals belonging to the same group, are more likely to have congruent goals. As suggested by Lockwood et al. (2002), goal-congruent role models are supposed to enhance an individual's motivation. We suggest that in case of this day-by-day interaction, belonging to the same group and having congruent goals, a narcissistic leader and his/her followers should share several characteristics; in other words, a follower will perceive a narcissist as somebody similar to him/her and will perceive the narcissist's successes as *attainable*.

Finally, several researchers directly highlighted that narcissists have an ability to inspire others (Maccoby, 2000; Rosenthal & Pittinsky, 2006) and have charisma (Maccoby, 2000; Rosenthal & Pittinsky, 2006; Campbell & Campbell, 2009; Campbell et al., 2011).

Proposition 3: a more narcissistic leader will be more likely to become a positive role model for his/her followers.

Although we argue that there is this positive effect of a leader being narcissist on the individual performance of his/her followers, *we suggest that this effect will be positive only in the short term*, and will *change its direction in the long term.*

Firstly, in the long term, the followers will gain more experience of interacting with a narcissistic leader and will be likely to know his/her true personality instead of a positive image surrounded by charisma and charm. In fact, true narcissistic personality includes such dimensions as exploitativeness and arrogance (Emmons, 1984; Raskin & Terry, 1989) and is often associated with aggressiveness (Bushman & Baumeister, 1998; Maccoby, 2000; Rosenthal & Pittinsky, 2006; Ouimet, 2010; Campbell et al., 2011).

Secondly, several negative characteristics of personality can be observed only in the longer term. For example, the pattern of a narcissist not searching for intimacy with his/her romantic partner cannot be considered as something detrimental in the short term, but can only be considered so in the long term.

Finally, we suggest that when followers recognize these negative characteristics of their narcissistic leader, they will not perceive him/her as a positive role model. Conversely, as being frustrated and disappointed, they will be more likely to perceive a narcissistic leader as extremely dissimilar to them, in terms of beliefs, values, and goals. And, as summarized by Lockwood et al. (2002), goal-incongruent role models decrease someone's motivation, in comparison to either having no role model or having a goal-congruent role model.

Taking it together, we suggest that in the long term, followers will be more likely to acknowledge the dark side of a narcissistic leader's personality and will perceive him/her as an incongruent role model. Thus, we suggest that a *narcissistic leader will negatively affect the individual performance of his/her followers in the long term*.

Proposition 4: the level of the narcissism of a leader will positively affect the short-term individual performance of his/her followers.

Proposition 5: the level of the narcissism of a leader will negatively affect the long-term individual performance of his/her followers.

CONCLUSION

As a consequence of narcissism becoming epidemic, narcissistic leadership is becoming a more and more common phenomenon, meaning that narcissists may potentially affect the lives of everybody of us. Current research contains the evidence what are the implications of narcissistic leadership at the levels of organization and group but lacks the same evidence coming from the individual level. In order to compensate for this lack of evidence, in the scope of this study, we addressed the following research question – how leader's narcissism affects his/her followers' performance on the individual level?

In order to address our research question, we analyzed the studies, considering how a narcissistic leader affects other individuals. We came to the conclusion that the number of studies, considering different aspects of narcissists' behavior, found the same evidence that narcissists positively affect others in the short term, but negatively affect others in the long one. We assumed that the same time-contingent approach might be applicable to the case of followers' individual performance and outlined the mechanism underlying the relation between leader's narcissism and followers' individual performance.

We suggested that a narcissistic leader is likely to become a positive role model for his/her followers as a result of emphasizing his/her successes and blaming others for his/her own failures, being exhibitionistic, having good social skills, and inspirational power. Positive role models enhance the motivation of individuals, whereas motivation has been considered as a very strong positive determinant of individual performance across different domains. In such a way, we proposed that the level of the narcissism of a leader is positively related to the individual performance of his/her followers in the short term. We argued that in the long term, followers will be likely to discover the dark side of a narcissistic leader's personality, and, thus, consider a narcissistic leader as an incongruent role model. Thus, we proposed that the level of the narcissism of a leader is negatively related to the individual performance of his/her followers in the long term.

We suggest that our research may *contribute to the literature* in the following ways.

First, we argued that a leader's narcissism positively affects the individual performance of followers in the short term, and negatively affects the individual performance of followers in the long term. We constructed a simple conceptual model that can be further

empirically tested in future research. Moreover, we suggest that the proposed positive effect can extend the few literature on the positive implications of narcissism.

Second, we outlined the possible mechanism for the proposed relationship and considered the narcissistic leader-follower relationship into role models' theoretical framework. We suggest that this theoretical framework can be further used in other studies, considering how narcissistic leaders affect other individuals.

The following study also has a number of *limitations* that may be addressed in future research. First and foremost, we didn't test the proposed relationship between the leader's narcissism and followers' individual performance and the suggested mechanism empirically. Second, we set several assumptions (e.g., we have focused only on non-pathological narcissists) that can be further tested in future research.

Moreover, we suggest that our study may also have several *implications for practitioners*. We argued that placing a narcissist on the position of a leader is not necessarily a "dead-end road." Conversely, it may even be the optimal solution; however, under the two following conditions. First, the "project" that a narcissist is supposed to lead should be a short-term one; second, in the scope of this "project," the individual performance of the participants should be more important than team performance or the overall performance of an organization or an institution. For example, we suggest that narcissistic leaders may suit short-term educational courses, modeling schools, express fitness and dieting programs, and short-term software development projects.

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Figure 1. Theoretical model