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In the mind of the beholder: Narcissism relates to a distorted and enhanced self-image[☆]

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ABSTRACT

To date, prominent theories still disagree on whether the pathological grandiosity that underlies narcissism stems from a defensive, compensatory process in response to insecurity or from years of unjustified overvaluation during formative stages of development. Across two studies, we introduce a novel method to test these theories by examining visual representations of self. In Study 1, we measured Self-Concept Clarity and the distortion of ($n = 96$) participants' self-images (generated using the reverse correlation technique) relative to their actual appearances. In Study 2, we then compared attractiveness ratings of the actual photographs of participants with their self-images generated in Study 1, through judgments made by independent raters ($n = 45$). Our work revealed that a) lower Self-Concept Clarity predicts self-image distortion, b) the narcissistic desire to conceal flaws mediates this association, and c) self-image distortion led to self-enhancement, consistent with a compensatory reaction to insecurity.

1. Introduction

Recently, there has been increased attention on the concept of narcissism (i.e., the personality disorder characterized by an inflated sense of self-importance; see [Morris, 2017](#); [Wetzel et al., 2017](#)). Narcissism is particularly insidious because those higher in this trait are often unable to function in society in a manner consistent with their grandiose views of themselves and lofty aspirations. Thus, despite a strong outward belief in oneself and an air of confidence that can rise to the levels of haughtiness, for those high in narcissism, this is often belied by poor performance at work and interpersonal conflict. For instance, in the private sector, those high in narcissism tend to overvalue their abilities to lead people, are more prone to ethical violations, have unhappy employees, ignore constructive criticism, manipulate others, take greater compensation than merited, and create destructive workplaces ([Brunell et al., 2008](#); [Gerstner, König, Enders, & Hambrick, 2013](#)). This discrepancy between the ideal self and the actual self, when extreme, has been called pathological grandiosity ([Kernberg, 1985](#); [Kohut, 1971](#);

[Millon, 1981](#); see [Pincus & Lukowitsky, 2010](#), for a review).

The negative consequences of narcissism with its pathological grandiosity are well documented (e.g., negative emotions and aggression in response to ego-threat; [Stucke & Sporer, 2002](#)). However, the source of pathological grandiosity underlying narcissism is not well understood (for review, see [Rhodewalt, 2014](#)). Grandiose and vulnerable presentations of narcissism have been observed, and are conceptualized by some as two distinct phenotypic expressions of narcissism ([Cain, Pincus, & Ansell, 2008](#)). In this conceptualization, the grandiose presentation of narcissism, which is more consistent with conventional conceptualizations of narcissism ("true narcissism"), masks the underlying vulnerable aspects of narcissism. Similarly, the vulnerable presentation of narcissism can mask or hide the more grandiose expressions, as in "I am the most suffering" or "most aggrieved and mistreated person".

When considering grandiose presentations, many theories, particularly from a psychoanalytic or psychodynamic perspective, propose that the grandiosity seen in highly narcissistic or pathologic narcissism is

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part of a defensive process that helps the individual deal with high levels of insecurity and vulnerability (Akhtar & Thompson, 1982; Kernberg, 1985; Kohut, 1977). In contrast to the outward appearance, the pathologically narcissistic individual is believed to feel small, weak, and insignificant, and counters these feelings through grandiosity. Overt displays of happiness and a carefree attitude often mask a proneness to self-doubt, feelings of humiliation, and a tendency to lash out in response to perceived slights—even very minor ones. This perspective of the narcissist's self-concept as vulnerable, in need of defensive self-aggrandizing, has been referred to as the mask model (Kuchynka & Bosson, 2018; Zeigler-Hill & Jordan, 2011). Despite considerable interest, the evidence for the mask model has been mixed or inconclusive. However, several social-personality psychologist argue that overemphasis on explicit measures as opposed to implicit ones, the lack of intensive repeated measure designs that could untangle unfolding processes over time, and the reliance on non-clinical samples rather than clinical ones has muddied the waters (Bosson et al., 2008; Kuchynka & Bosson, 2018; Zeigler-Hill & Jordan, 2011). Several recent studies using intensive measurement and experimental designs have found evidence consistent with the mask model (Edershile et al., 2019; Myers & Zeigler-Hill, 2012; Zeigler-Hill, Myers, & Clark, 2010).

In contrast to the psychodynamic mask model view of narcissism as a defensive process, social learning theory posits that the grandiosity characteristic of pathological narcissism is not a defense that results from fragile self-esteem but the result of years of unjustified overvaluation that has been integrated into one's self-concept (e.g., Millon, 1992). Rather than being emotionally deprived—as proposed in mask models—those who develop high levels of narcissism were instead doted upon, indulged, and overvalued. Recently, Brummelman et al. (2015), examined these two competing theories with regard to the experience of deprivation vs. doting in childhood and found that parental overvaluation predicted child narcissism over time but not vice versa and a lack of parental warmth did not predict narcissism. The authors interpreted these findings as favoring the social learning theory model, however the reliance on self-report by parents and child limits the conclusions that can be drawn—calling on the need for a comparison of these theories using implicit measures (Shedler, Mayman, & Manis, 1993).

Despite the differences between these theories, both attribute core aspects of narcissistic dysfunction to underlying self-concept and suggest that narcissists engage in behaviors consistent with their pathological grandiosity. In social learning theory, the overly positive valence of the self-concept is unearned and based on false information. From a psychoanalytic perspective, Kernberg (1993) and others posit that the pathologically grandiose self-concept is a result of a brittle, diffuse sense of self (see also Levy, 2012). Kernberg, referred to this diffuse and brittle sense of self as identity diffusion. In social psychology, this concept was conceptualized in terms of the extent to which self-beliefs are clearly and confidently defined, internally consistent, and stable (i.e., self-concept clarity; Campbell, Assanand, & Di Paula, 2003). Thus, from this perspective, those high in narcissism counter these feelings through the use of facades that mask their latent insecurities and shield their fragile self-concepts (Akhtar & Thompson, 1982; Kernberg, 1993; Raskin, Novacek, & Hogan, 1991).

1.1. Self-image

Another aspect of self-concept that may help resolve the conflict between social learning and psychoanalytic conceptions of narcissism—and the process by which those high in narcissism self-aggrandize—is self-image (i.e., one's imagined appearance). Despite the important role that self-image processing likely played in the evolution of the social brain, to date, social vision research has primarily focused on how we process and perceive others with little emphasis on how we process and perceive our own visual representations of self.

To date, there have been a few studies that have examined self-image

in narcissism. Gabriel, Critelli, and Ee (1994) found that those high in narcissism rated themselves as more physically attractive than the average person. Robins and John (1997) found that narcissists not only report enjoying situations where they can see themselves, but they self-reported that these situations boosted their self-confidence and self-admiration. These findings are consistent with both social learning and psychodynamic mask model hypotheses.

Jauk, Benedek, Koschutnig, Kedia, and Neubauer (2017), however, found evidence consistent with narcissism as a defense (i.e., the mask model) and inconsistent with a social learning approach. These authors found that when narcissists looked at their own image compared to images of friends or strangers, they displayed brain activation in regions known to be involved in negative affect and emotional conflict, suggesting narcissists' vulnerability towards their appearance (Jauk et al., 2017). Why would those high in narcissism show negative emotion or conflict when viewing themselves? As social learning posits, their view of themselves should be positive, albeit based on incorrect information.

1.2. The current work

To test these competing theories, we utilized a methodology that has not been used previously to address these types of research questions: the reverse correlation paradigm (for review, see Brinkman, Todorov, & Dotsch, 2017). Reverse correlation is now becoming regularly used in social psychology as a method to detect implicit bias and to assess implicit biases' effects on people's mental representations of particular constructs. Though there have been no studies, to our knowledge, that have directly assessed the capability of reverse correlation to illustrate individual differences as they relate to how people visualize themselves, it has been asserted that this method can be used to create a visual representation of implicit biases towards one's in-group by creating an amalgam of multiple self-images (Imhoff & Dotsch, 2013). Through the use of this methodology we can further disentangle how people high in narcissistic traits view themselves, and it allows us to assess this construct implicitly in addition to self-report measures.

The present research aims to address these gaps by examining the distortion and enhancement of self-image as it relates to self-concept clarity (SCC) and the defensive and vulnerable side of narcissism. Thus, this research integrates an individual difference construct from personality and clinical psychology, research on the self, and social vision in order to compare and contrast two major theories against each other: the social learning theory and psychoanalytic theory. Recall, both the social learning theory and the psychoanalytic theory attribute core aspects of narcissistic dysfunction to underlying fragility of the self-concept (i.e., as self-concept clarity decreases, narcissistic traits increase). Critically, however, the social learning theory suggests that the relation between low SCC and increased self-image distortion is mediated by a narcissistic insecurity; whereas the psychoanalytic theory suggests the relation between low SCC and increased self-image distortion is mediated by grandiose fantasization of the self. Thus, in Experiment 1, we predicted that SCC and self-image distortion would be negatively associated with one another.

We then examined whether narcissistic insecurity or grandiose fantasy served as a mediator between SCC and self-image distortion. Next, we examined the direction of this self-image distortion as it relates to self-image enhancement through narcissistic insecurity and/or grandiose fantasization of the self. Notably, both the social learning theory and the psychoanalytic theory suggest that the self-image distortion would occur in the direction of self-enhancement, albeit via different core aspects of narcissistic dysfunction. Specifically, the social learning theory suggests that we would find that self-image distortion relates to self-image enhancement via narcissistic insecurity. In contrast, the psychoanalytic theory suggests that we would instead find that self-image distortion would relate to self-image enhancement via grandiose fantasization of the self. Thus, in Experiment 2, we predicted that self-image distortion would be positively associated with self-image

enhancement. Again, we then examined whether this relationship is driven by narcissistic insecurity or grandiose fantasy utilizing path analyses.

2. Experiment 1

Participants first had their photograph taken, then completed a reverse correlation task designed to create a self-image composite reflecting their own mental representation of self (for a tutorial on the reverse correlation procedure & data processing steps, see Brinkman et al., 2017). In this study, we examined individual differences in SCC to test the hypothesis that self-image distortion and clarity of self-concept are negatively related. Next, we tested the competing hypotheses that either narcissistic insecurity or grandiose fantasy mediates the relation between clarity of self-concept and self-image distortion. We operationalized distortion of mental representations of the self by measuring the similarity between each participants' actual photograph and a self-generated composite image of the self; we measured the clarity of self-concept by utilizing the self-concept clarity scale (Campbell et al., 2003). Once participants completed the reverse correlation task, they completed the SCC scale and the Pathological Narcissism Inventory (PNI; Pincus et al., 2009). Lastly, we employed the Structural Similarity Index Metric (SSIM) to measure the similarity between the participants' photographs and their self-image composites; the SSIM measures key elements of human visual perception including luminance masking, contrast masking, and image structure in order to calculate the similarity (cf. distortion) between images (Wang, Bovik, Sheikh, & Simoncelli, 2004; for a tutorial on calculating the similarity/distortion between images using the SSIM, see <https://www.mathworks.com/help/images/ref/ssim.html>). Thus, we were able to objectively examine the relation between an accurate versus distorted self-image and SCC.

2.1. Methods

2.1.1. Participants

Sample size was determined prior to data collection via a power analysis of previous work examining the influence of individual difference on images constructed via the reverse correlation paradigm ($r = 0.38$ Dotsch, Wigboldus, & van Knippenberg, 2011). A sample size of 49 was determined to be sufficient to detect effects as small as $f = 0.22$. However, in order to see the variation in scores on the NPI we doubled the suggested sample size because here we examined a “clinical” population, we thought it wise to oversample as our effect might be smaller than the cited reference. Participants were 96 White undergraduates (56 women, 40 men) at [The Pennsylvania State University], who completed the experiment to receive credit towards their introductory psychology class research participation requirement. Participants were 18 to 25 years old ($M = 19.09$ years, $SD = 1.31$).

2.1.2. Stimuli

To create the base image utilized in the reverse correlation task, fifty-eight faces with neutral expressions (29 women, 29 men) were selected from the FACES database (see Ebner, Riediger, & Lindenberger, 2010) and averaged into a single androgynous image using the psychomorph face morphing software (see Tiddeman, Burt, & Perrett, 2001). This image was cropped to display only the face and resized to 512×512 pixels. We then used the rcircr package (Dotsch, 2016) to create 500 pairs of randomized noise samples. Each pair consisted of a single created noise pattern and the inverse of that pattern. Each noise sample was superimposed on the androgynous image resulting in 500 pairs of images (see Dotsch, 2016).

Using the rcircr package (Dotsch, 2016), participants' responses during the reverse correlation task (see the section on Data processing below for more detail) were utilized to construct composite images of each participants' self-image (see Fig. 1). Furthermore, photographs of each participant were taken. These photographs were cropped to the face and resized to 512×512 pixels (see Fig. 1).

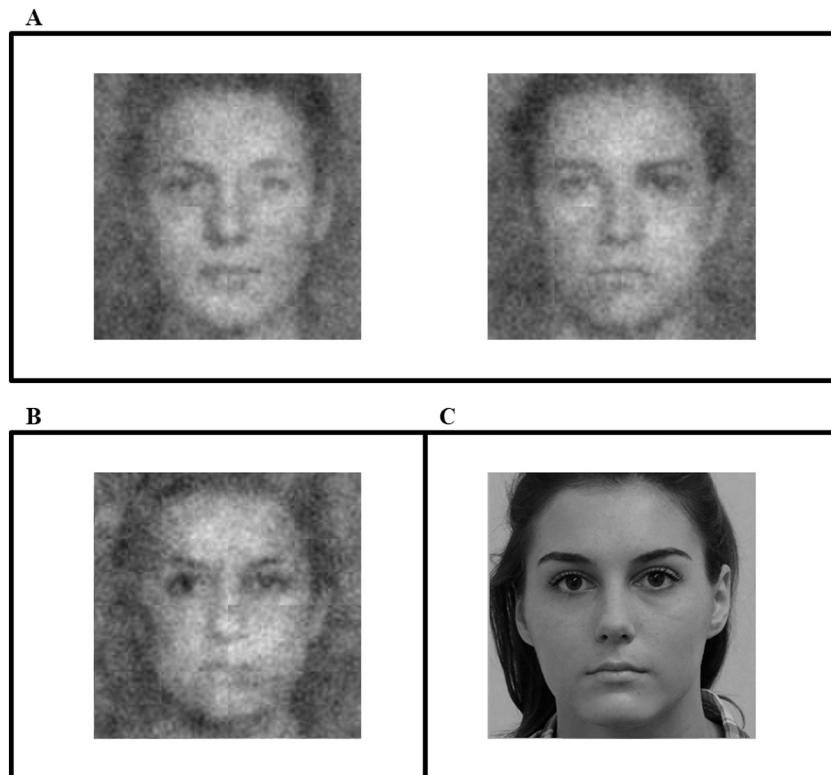


Fig. 1. Panel A depicts an example of the pair of images utilized in the reverse correlation tasks (i.e., two of the images the participants were presented and asked to choose between for which one looked more like them). Participants' responses to the reverse correlation tasks were utilized to create each participant's self-image; Panel B depicts an example of a participants' self-image. Panel C depicts an example photograph of a participant from Experiment 1. The same participant serves as the example in Panels B and C.

2.1.3. Measures

Participants completed the SCC scale (Campbell et al., 2003), a 12-item measure designed to assess the extent to which a person's self-beliefs are clearly and confidently defined, internally consistent, and stable. Items are rated on a 5-point Likert-type scale ranging from "Strongly disagree" to "Strongly agree." Examples of items include "my beliefs about myself often conflict with one another," "sometimes I feel that I am not really the person that I appear to be;" "even if I wanted to, I don't think I could tell someone what I'm really like." The SCC scale has shown high internal consistency (Cronbach's $\alpha = 0.86$) and predicts the actual consistency of individuals' self-attribute ratings (Campbell et al., 2003). SCC has also been shown to relate to various measures of psychological adjustment (Campbell et al., 2003).

Participants then completed the PNI (Pincus et al., 2009); the PNI consists of fifty-two statements with which the participants are asked to indicate how strongly the statement describes themselves on a 6-point scale (1 = not at all like me; 6 = very much like me). The PNI assesses the two dimensions of narcissism and their subdimensions: narcissistic grandiosity (entitlement rage, exploitativeness, self-sacrificing self-enhancement, & grandiose fantasy, Cronbach's $\alpha = 0.78$) and narcissistic vulnerability (contingent self-esteem, devaluing, and hiding-the-self, Cronbach's $\alpha = 0.79$). The grandiose fantasy subdimension of the PNI measures the extent to which a person is engrossed in self-serving beliefs (e.g., fantasies of receiving respect, admiration, & recognition from others); here, we utilize this subdimension to measure the narcissistic grandiosity characterized by social learning theory. On the other hand, the hiding-the-self subdimension of the PNI measures the narcissistic insecurity characterized by psychoanalytic theory (e.g., an unwillingness to show others one's faults and depending on others results in feelings of shame and weakness). Notably, the hiding-the-self subdimension predicts an increased fixation on one's physical appearance (Barry, Doucette, Loflin, Rivera-Hudson, & Herrington, 2017).

2.1.4. Procedure

Upon arrival, participants were greeted by an experimenter and signed an IRB approved consent statement. Participants directed their gaze towards and had their picture taken utilizing a Canon EOS REBEL SL1 camera (resolution of 72×72 DPI), which was approximately 100 in. from the participant. Participants were then led to a computer room and completed a reverse correlation task.

In the reverse correlation task, 500 pairs of images were presented side by side. On each trial, participants select the image that most closely resembled their own appearance. The 500 pairs of images were presented in random order and, on each trial, image screen placements (left or right) were randomized. A 150-ms centered fixation cross preceded each trial.

After completing the reverse correlation task, participants completed the SCC scale (Campbell et al., 2003), and then the PNI (Pincus et al., 2009). Finally, participants then completed demographic questionnaires. Participants were then thanked and debriefed.

2.1.5. Data processing

Responses during the RC task were then used to create a composite image (CI)—also known as a classification image—for each participant. Each CI is an amalgam of the selected images that best resembles the intended target (i.e., the image that most resembles the participant to the participant). Distortion of the CIs was calculated by measuring the similarity between each participant's CI and their photograph. Using the SSIM, described above, we analyzed the participant's photograph and CI then compared the two to create an objective measure of distortion. We measured distortion using the SSIM. Thus, distortion was a continuous variable, on a range of zero (no distortion) to 100 (complete distortion).

2.2. Results and discussion

We sought to test the hypothesis that SCC was negatively correlated

with self-image distortion and thus conducted a two-tailed correlation. An outlier analysis of this relation identified two participants with Cook's D coefficients greater than three standard deviations from the mean; these two participants were removed from all further analyses. The analysis supported our hypothesis that SCC was negatively correlated with self-image distortion, $r(92) = 0.28$, $p = .006$. In other words, our analysis suggested that individuals with a less stable sense-of-self also have more distorted self-images.

Next, we sought to test the two competing hypotheses: whether narcissistic insecurity or grandiose fantasy mediated the relation between SCC and self-image distortion. Recall, psychoanalytic theory states that the lack of SCC promotes self-concept distortion due to narcissistic insecurity, whereas the social learning theory states that the lack of SCC promotes self-concept distortion due to grandiose and self-serving beliefs. We used Hayes's (2017) PROCESS macro in IBM SPSS version 25 (Model 4) to test both mediation models. Confidence intervals were estimated using 5000 bootstrapped samples. We report the standardized regression coefficients below. Two participants did not complete the PNI and thus had to be removed from all further analyses.

First, we examined if, as psychoanalytic theory posits, narcissistic insecurity mediated the relation between SCC and self-image distortion. We subjected our data to the four conditions for mediation (Liebe, 1916). Specifically, we found that low SCC predicted greater narcissistic insecurity, $\beta = -0.66$, $t(90) = -8.28$, $p < .001$, 95% CI [-0.75, -0.53] and self-image distortion, $\beta = -0.29$, $t(90) = -2.82$, $p = .002$, [-0.44, -0.10]. Additionally, narcissistic insecurity predicted greater self-image distortion when controlling for SCC, $\beta = 0.32$, $t(89) = 2.49$, $p = .020$, [-0.58, -0.05]. When controlling for narcissistic insecurity, however, the relation between SCC and self-image distortion was reduced to statistical insignificance, $\beta = -0.07$, $t(89) = -0.55$, $p = .602$, [-0.13, 0.07]. Furthermore, there was an indirect effect of SCC on self-image distortion through narcissistic insecurity, $\beta = -0.21$, $p = .018$, [-0.41, -0.04], $P_M = 0.75$. Together, these findings suggest that, as psychoanalytic theory predicts, SCC's positive relation with self-image distortion is fully mediated by one's level of narcissistic insecurity (see Fig. 2); more specifically, we found that narcissistic insecurity accounted for 75% of the relation between SCC and self-image distortion.

Next, we examined if, as social learning theory posits, grandiose fantasy mediated the relation between SCC and self-image distortion. Again, we subjected our data to the four conditions for mediation (Liebe, 1916). Specifically, we found that low SCC predicted greater grandiose fantasy, $\beta = -0.33$, $t(90) = -3.34$, $p = .002$, [-0.50, -0.13]. Additionally, grandiose fantasy predicted less self-image distortion when controlling for SCC, $\beta = -0.22$, $t(89) = -2.10$, $p = .039$, [-0.39, -0.04]. When controlling for grandiose fantasy, however, the relation between SCC and self-image distortion remained significant, $\beta = -0.36$, $t(89) = -3.40$, $p = .001$, [-0.52, -0.17]. Notably, there was a positive indirect effect of SCC on self-image distortion through grandiose fantasy, $\beta = 0.07$, $p = .008$, [0.01, 0.16], $P_M = -0.25$. Together, these findings—conflicting with social learning theory—suggest that grandiose fantasy is partially suppressing the relation between SCC and self-image distortion (an effect that MacKinnon, Fairchild, & Fritz, 2007 refer to as inconsistent mediation; see Fig. 3); more specifically, we found that grandiose fantasy suppressed roughly 25% of the relation between SCC and self-image distortion.

Lastly, we compared the two indirect paths. Narcissistic insecurity is a superior mediator between SCC and self-image distortion than grandiose fantasy, $\beta = -0.36$, [-0.59, -0.15].

2.2.1. A note on the order of mediation designs

Because there was concern that asking questions about one's self-concept clarity and narcissistic traits might influence the generation of one's self-image, and because there was no a priori reason to suspect that posing for a photograph or the generation of one's self-image would influence self-concept clarity or narcissistic traits, the photograph collection and reverse correlation paradigm were conducted at the

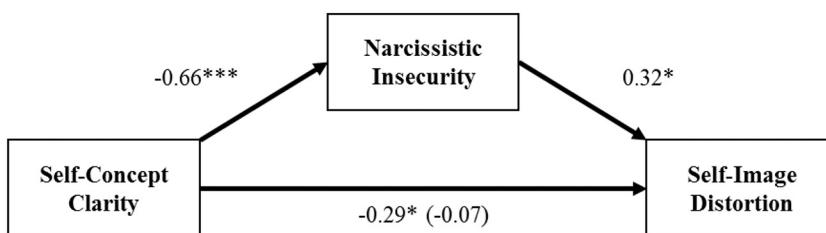


Fig. 2. Standardized regression coefficients for the relation between self-concept clarity and self-image distortion as mediated by narcissistic insecurity (the standardized regression coefficient between self-concept clarity and self-image distortion, controlling for narcissistic insecurity, is in parentheses). There was a significant indirect effect of self-concept clarity on self-image distortion through narcissistic insecurity, $ab = -0.21$, $p = .018$, $[-0.41, -0.04]$, $P_M = 0.75$; suggesting that narcissistic insecurity accounted for 75% of the relation between self-concept clarity and self-image distortion. * $p < .05$; *** $p < .001$.

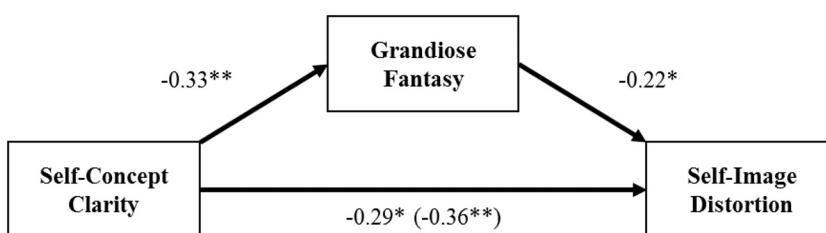


Fig. 3. Standardized regression coefficients for the relation between self-concept clarity and self-image distortion as mediated by grandiose fantasy (the standardized regression coefficient between self-concept clarity and self-image distortion, controlling for grandiose fantasy, is in parentheses). There was a significant indirect effect of self-concept clarity on self-image distortion through grandiose fantasy, $ab = 0.07$, $p = .008$, $[0.01, 0.16]$, $P_M = -0.25$; suggesting that grandiose fantasy suppressed roughly 25% of the relation between self-concept clarity and self-image distortion. * $p < .05$; ** $p < .01$.

beginning of the experiment. Thus, the mediator was assessed after the task utilized to create the causal variable was conducted. Our study therefore does not have a conventional mediational design, but rather tests the a priori models proposed within the two contrasting theories following recent analytic strategies (e.g., Goff, Steele, & Davies, 2008; Keller & Dauenheimer, 2003). Keller and Dauenheimer (2003) found that since there was no a priori reason that their dependent variable should influence their mediator variable, they could switch their mediator and dependent variables in the analyses and have a more compelling statistical model and overlook their design irregularity.

Specifically, in the present research, since there was no a priori reason to believe that self-image distortion would influence narcissistic traits, the data were submitted to two reverse mediational analyses, with self-concept clarity as the causal variable, self-image distortion as the mediator, and narcissistic traits (narcissistic insecurity & grandiose fantasization, respectively) as the outcome variables. Both reverse mediation analyses produced the same pattern of results as their respective hypothesized models—albeit the effects of the reversal mediation models were considerably smaller. Therefore, since the hypothesized models are more logically consistent, and the primary objective of this paper was to compare and contrast the models proposed by two prominent theories, we concluded that although the study design is not a traditional mediational design, the hypothesized mediational analyses are appropriate for the present data.

3. Experiment 2

Experiment 2 extends Experiment 1. It explores the relation between the self-image distortion and self-image enhancement and examines the roles of narcissistic insecurity and grandiose fantasy in this relation. We operationalized self-image enhancement as having a more attractive self-image relative to one's genuine appearance (as rated by independent judges). Two groups of independent raters judged the attractiveness of Experiment 1 participants' photographs and classification images, respectively.

3.1. Methods

3.1.1. Participants

The first group rated the photographs on attractiveness and consisted of twenty-two participants (19 women, 3 men) 18 to 36 years old ($M_{age} = 23.95$ years, $SD = 6.16$). The second group rated the classification

images on attractiveness and consisted of twenty-three participants (16 women, 7 men) 18 to 36 years old ($M_{age} = 26.04$ years, $SD = 6.12$). We note that there are more female than male raters in our two samples. Previous literature has demonstrated that gender of the perceiver does not impact ratings of facial attractiveness (e.g., Bronstad & Russell, 2007; Grant, Button, Hannah, & Ross, 2002; Korthase & Trenholme, 1982; for a meta-analytic review, see Langlois et al., 2000; Wernick & Manaster, 1984). All participants were undergraduates from [The Pennsylvania State University], who completed the experiment for course credit.

3.1.2. Stimuli

Experiment 2 consisted of the 96 photographs and 96 classification images also utilized in Experiment 1 (see Fig. 1).

3.1.3. Procedure

Participants rated each image within their assigned group on its attractiveness using a 7-point scale (1 = not at all; 7 = very much so). Participants were randomly assigned to group 1 (i.e., rating the photographs; $ICC = 0.99$) or group 2 (rating the classification images; $ICC = 0.99$). The mean ratings of each sample were then used as a metric to compute self-image enhancement. Finally, participants completed a demographic questionnaire and were debriefed.

3.2. Results and discussion

Again, we sought to test the two competing hypotheses: whether self-image distortion relates to self-image enhancement via narcissistic insecurity or via grandiose fantasy. Recall, psychoanalytic theory states that self-image distortion occurs in order to enhance self-image as a means to compensate for narcissistic insecurity, whereas social learning theory states that self-image distortion occurs in order to enhance self-image due to one's grandiose and self-serving beliefs. We used Hayes's (2017) PROCESS macro in IBM SPSS version 25 (Model 4) to test both pathway models and confidence intervals were estimated using 5000 bootstrapped samples. We report the standardized regression coefficients below.

First, we examined if, as psychoanalytic theory posits, self-image distortion relates to self-image enhancement via narcissistic insecurity. Self-image distortion was calculated by measuring the similarity between each participant's CI and their photograph as measured in Experiment 1. We created a self-image enhancement variable by

subtracting each photograph's average attractiveness score from the complementary CI's average attractiveness score. Thus, this variable represents the enhancement of one's imagined appearance relative to their actual appearance as determined by objective raters. The narcissistic insecurity metric that we used to complete the mediation model is a subscore on the hiding-the-self subdimension on the PNI measure as measured in Experiment 1. We subjected our data to a path analysis (Fig. 4). Specifically, we found that greater self-image distortion predicted greater narcissistic insecurity, $\beta = 0.37$, $t(90) = 3.81$, $p < .001$, 95% CI [0.17, 0.54] but self-image distortion was not predictive of self-image enhancement, $\beta = -0.12$, $t(90) = -1.15$, $p = .196$, [-0.29, 0.06]—please note that most contemporary analysts believe that the causal variable (i.e., self-image distortion) does not need to significantly predict the outcome variable (i.e., self-image enhancement) in order to establish a significant pathway model (Kenny, Kashy, & Bolger, 1998). Additionally, greater narcissistic insecurity predicted greater self-image enhancement when controlling for self-image distortion, $\beta = 0.24$, $t(89) = 2.17$, $p = .019$, [0.05, 0.42]. When controlling for narcissistic insecurity, the relation between self-image distortion and self-image enhancement was significant (i.e., the direct effect), $\beta = -0.21$, $t(89) = -1.91$, $p = .038$, [-0.38, -0.01]; however, there was a significant indirect effect of self-image distortion on self-image enhancement via narcissistic insecurity, $\beta = 0.09$, $p = .008$, [0.03, 0.20]. It is important to note in models where the indirect and direct effects are both significant but have opposite effects, that the relation between the causal and outcome variables is often underestimated and not significant—as is the case here (MacKinnon et al., 2007). Furthermore, because the relation between the causal and outcome variables was not significant, the percent of the total effect mediated could not be calculated (Kenny, 2015). Together, these findings suggest that, as psychoanalytic theory predicts, greater self-image distortion relates to greater self-image enhancement via greater narcissistic insecurity.

Next, we examined if, as social learning theory posits, self-image distortion relates to self-image enhancement via grandiose fantasy. We subjected our data to a path analysis. Specifically, we found that—conflicting with social learning theory—the relation between self-image distortion and grandiose fantasy was not significant, $\beta = -0.10$, $t(90) = -0.97$, $p = .334$. However, there was a direct relation between grandiose fantasy and self-image enhancement, $\beta = 0.22$, $t(90) = -2.12$, $p = .041$, [0.01, 0.41]. Thus, we can infer that while grandiose fantasy is associated with self-image enhancement, it does not account for self-image distortion.

4. General discussion

With regard to narcissism, a central debate in the field concerns whether it derives from unjustified information about the self-provided by doting, overindulging, and overvaluing caregivers or if it is a defensive process that masks feelings of vulnerability and weakness, thought to be the result of invalidating caregiving. As discussed earlier, although two prominent studies examined these competing hypotheses (i.e., Brummelman et al., 2015 who found that parental overvaluation predicted child narcissism & Jauk et al., 2017 whose findings support narcissism as a vulnerable defense) the conclusion that can be drawn

from the existing data remains equivocal. Our findings provide additional evidence for narcissism as a defense theory (i.e., the mask model).

Across our two experiments, our findings indicate that 1) individuals with low SCC have more distorted self-images (Experiments 1 & 2), 2) the relation between low SCC and distortion of one's self-image is mediated by the hiding-the-self dimension on the vulnerable narcissism factor (Experiments 1 & 2), and 3) this distortion of one's self-image, via vulnerable narcissism, is one of enhancement (Experiment 2). In total, our findings demonstrate that the discrepancy between how one visualizes their physical appearance relative to their actual observable physical appearance is related to the individual's SCC and, importantly, vulnerable narcissism is associated with the self-image enhancements that drive this discrepancy. These findings are consistent with psychodynamic and social psychological theories that posit that the self-aggrandizement observed in those high in narcissism is the result of a defensive process (Kernberg, 1993; Raskin & Hall, 1979).

Additionally, our findings are not easily explained by a social learning perspective—which deemphasizes the defensive dynamic and does not posit a sense of vulnerability or insecurity in highly narcissistic individuals. Although the social learning theory perspective is elegant and parsimonious, it cannot easily explain the overt and covert vulnerability seen in narcissism, whereas the psychodynamic perspective can explain this aspect, though at first glance seems counterintuitive.

Our work is the first, to our knowledge, to examine self-image as a visual percept, and we do so in both experiments using reverse correlation methodology; critically, this paradigm does not rely on self-report, but rather reveals implicit characteristics—a cardinal strength of our studies since we are analyzing self-image in relation to narcissism. Our findings have important implications for the field of social vision and for understanding a central mechanism underlying narcissism. The current work is unique in the field of social visual processing, which has almost exclusively focused on the visual perception and representations of others, not of the self (see Adams, Albohn, & Kveraga, 2017). Although DeBruine (2004) examined impressions of others who are self-resembling, this work still focused on perceptions of the other, not perception of the self (albeit in the context of the self). Social vision research on how malleable visual self-representations are, whether it varies as a function of interpersonal and/or intrapersonal factors, has previously been unaddressed.

Despite these strengths and the novelty of the current work, we acknowledge that there are limitations of the current work that could be addressed in future research. Chief among them are the use of a nonclinical sample and in that regard, sample size. The use of a non-clinical student sample may limit the generalizability of our findings. It will be important in future research to extend our methodology and explore these questions in a relevant clinical sample, such as those with narcissistic personality features, in order to ensure that our findings extend to relevant phenomena. Additionally, although our power analysis suggested sufficient power to detect effects, when examining clinical constructs in non-clinical samples, a larger sample would allow for greater variance and extremes, thereby potentially enabling greater precision in teasing apart these phenomena. For instance, future work might control for negative appraisal of the self—as it has been linked to

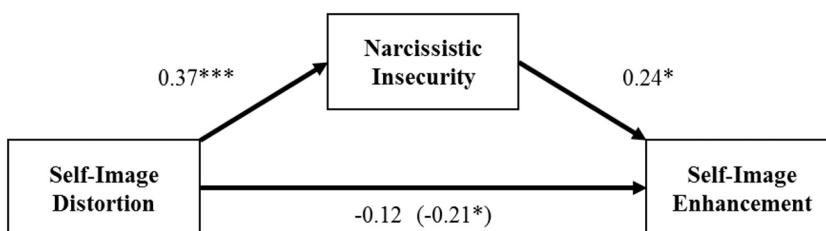


Fig. 4. Standardized regression coefficients for the relation between self-image distortion and self-image enhancement as mediated by narcissistic insecurity (the standardized regression coefficient between self-image distortion and self-image enhancement, controlling for narcissistic insecurity, is in parentheses). There was a significant indirect effect of self-image distortion on self-image enhancement through narcissistic insecurity, $ab = 0.09$, $p = .008$, [0.03, 0.20]. Because the total effect did not reach significance, the percent of the total effect mediated could not be calculated.
^{*} $p < .05$; ^{***} $p < .001$.

dysfunction in narcissism and eating disorders (see Waller, Sines, Meyer, Foster, & Skelton, 2007). Future work could also specifically examine body dissatisfaction in narcissism in relation to the self (Purton et al., 2018). Some work has already examined reverse correlation as it relates to sex-typed body image (Lick, Carpinella, Preciado, Spunt, & Johnson, 2013).

SCC is critical to psychological well-being for all—it not only positively predicts subjective well-being; but also mediates the relation between stress and subjective well-being (Ritchie, Sedikides, Wildschut, Arndt, & Gidron, 2011); facilitates self-regulation; and increases relationship satisfaction and commitment (Lewandowski, Nardone, & Raines, 2010; McConnell & Strain, 2007). Our experiments have broader impacts for well-being as it relates to SCC, as we examine self-image and the discrepancy between self-image and one's actual appearance. Discrepancies between characteristics of the self often result in mental anguish and physiological ailments (Higgins, Vookles, & Tykocinski, 1992) and here, we have found that SCC predicts a discrepancy between one's actual and their imagined appearance utilizing computer-vision methodology.

Notably, even though people consider how they feel about their appearance as crucial to their overall quality of life, people are reluctant to disclose this dissatisfaction to trained professionals (Skevington, Dehner, Gillison, McGrath, & Lovell, 2014). Unsurprisingly, satisfaction with one's appearance is consistently ranked as one of the domains of life with the lowest satisfaction (Skevington et al., 2014). Our work highlights a new methodology in the study and identification of a particularly insidious symptom of narcissism among the general and specific clinical populations.

4.1. Conclusion

In conclusion, our work highlights a novel methodology for studying and assessing narcissism, which can be difficult to study through reliance on self-report. From a social vision framework and through the use of reverse correlation methodology, we examine two competing theories of narcissism and in doing so address gaps at the cross-section of self-concept and social vision. Our findings suggest a dynamic relation between an aspect of vulnerable narcissism and grandiose aspects and highlight a defensive process where feelings of vulnerability are expressed in self-aggrandizement.

CRediT authorship contribution statement

Troy G. Steiner: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition. **Kenneth N. Levy:** Conceptualization, Methodology, Resources, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition. **Joseph C. Brandenburg:** Conceptualization, Investigation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration. **Reginald B. Adams:** Conceptualization, Methodology, Resources, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition.

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