Teasing Apart Overclaiming, Overconfidence, and Socially Desirable Responding

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Abstract

Contamination with positivity bias is a potential problem in virtually all areas of psychological assessment. To determine the impact of positivity bias, one common approach is to embed special indicators within one's assessment battery. Such tools range from social desirability scales to overconfidence measures to the so-called overclaiming technique. Despite the large literature on these different approaches and underlying theoretical notions, little is known about the overall nomological network—in particular, the degree to which these constructs overlap. To this end, a broad spectrum of positivity bias detection tools was administered in low-stakes settings (*N* = 798) along with measures of the Big Five, grandiose narcissism, and cognitive ability. Exploratory factor analyses revealed six first-order and two second-order factors. Overclaiming was not loaded by any of the six first-order factors and overconfidence was not explained by either of the two second-order factors. All other measures were confounded with personality and/or cognitive ability. Based on our findings, overclaiming is the most distinct potential indicator of positivity bias and independent of known personality measures.

Response bias has been defined as a "systematic tendency to answer questionnaire items on some basis that interferes with accurate self-reports" (Paulhus, 2002, p. 49). Self-reports are often used in psychological research and that is why it is important to investigate response biases. One response bias is socially desirable responding (SDR); that is, the tendency to give overly positive self-descriptions (Holden & Passey, 2010). Paulhus (2002) also distinguished between intentional and unintentional distortion as well as an egoistic (or agentic) and a moralistic (communal) theme. Whereas much psychological research is concerned about unintentional distortions, real-life assessments can be hampered by intentional distortions or faking (Ziegler, MacCann, & Roberts, 2011). In order to capture variance due to such response sets, lie scales and other methods such as the overclaiming technique have been developed (Bing, Kluemper, Kristl Davison, Taylor, & Novicevic, 2011). Within research on cognitive biases, a method is used which captures overconfidence (e.g., Koriat, Lichtenstein, & Fischhoff, 1980; Moore & Healy, 2008). Similar to SDR, overconfidence reflects a positive deviation between estimated and actual performance (Stankov & Crawford, 1997). Thus, there is a theoretical parallel between the two construct areas. Finally, the overclaiming technique (Paulhus, 2011) was initially introduced as an alternative methodology for capturing SDR. Interestingly, the actual operationalization of overclaiming is very similar to the operationalization of overconfidence. In fact, some studies have utilized overclaiming to operationalize overconfidence (e.g., Anderson, Brion, Moore, & Kennedy, 2012). Thus, there are theoretical as well as methodological parallels between measures of SDR, overconfidence, and overclaiming. In particular, they all purport to tap a positive distortion in self-reports. For simplicity, we will use the term *positivity bias* as a generic term for all of these measures.

This shared feature (positive distortion), implies that scores from all of these measures share a common core or are at least closely related within a nomological network (Cronbach & Meehl, 1955). Cronbach and Meehl (1955) put forward necessary steps for laying out a nomological network. Among other aspects, they emphasized that a nomological network

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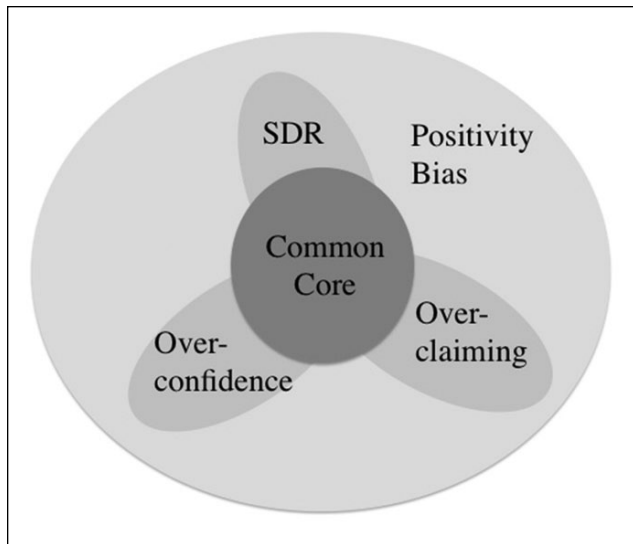Email: benschdx@hu-berlin.de

Figure 1. The nomological network of positivity bias including SDR, overclaiming, and overconfidence depicted as a Venn diagram (Ziegler, Maaß, Griffith, & Gammon, 2015).
Note. SDR = socially desirable responding.

Figure 2. Paulhus's (2002) socially desirable responding (SDR) model.

needs to make clear how theoretical constructs relate to each other. Moreover, they stated "We can say that 'operations' which are qualitatively very different 'overlap' or 'measure the same thing' if their positions in the nomological net tie them to the same construct variable" (p. 290-291). Thus, the current research tries to determine whether SDR, overclaiming, and overconfidence share a common core that ties together the seemingly different operations. In Figure 1, the nomological network of positivity bias with three measurements named SDR, overclaiming and overconfidence is illustrated (Ziegler & Bäckström, 2016). Unfortunately, actual research testing this hypothesis of a common core is scarce. To close this gap, the present study was conducted to explore whether standard positivity bias measures share a common nomological network in low-stakes settings. Of course, our reliance on data captured in a low-stake setting cannot automatically be generalized to high-stakes settings. This limitation also means that we are more likely to pick up conscious rather than conscious distortion. Nonetheless, most psychological research utilizes low-stakes data, making this study an important first step in charting the map of positivity bias measures.

Socially Desirable Responding

A summary of the history of the construct and its development in research are beyond the scope of the present article (for a recent summary, see Paulhus, 2002). Response distortion via SDR allows the responder to achieve more desirable scores than would be obtained by responding honestly. This means that answers to personality questionnaires
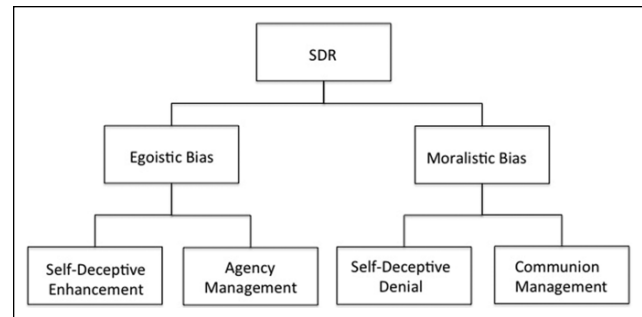
potentially contain extraneous variance due to SDR. With regard to the nomological network of SDR as expressed by its factor structure, most researchers agree on a two-factor solution (Wiggins, 1964). A more complex model from Paulhus (2002) is shown in Figure 2. SDR is positioned at the top of the hierarchy. Below, the two-tier model differentiates between the theme of the bias (egoistic vs. moralistic) and type of audience (self or others). Egoistic bias is defined as a "tendency to exaggerate one's social and intellectual status" (Paulhus, 2002, p. 63), and moralistic bias as a "tendency to deny socially-deviant impulses and claim sanctimonious, 'saint-like' attributes" (p. 64). The outcomes of this combination are four types of SDR. Paulhus (2002) replicated the two-factor structure reported by Wiggins (1964), who had named the factors Alpha and Gamma. Alpha is associated with egoistic bias, and Paulhus showed that it was correlated with openness, extraversion, and intelligence. Gamma involves a moralistic bias and was correlated with conscientiousness and agreeableness.

Different approaches have been suggested for measuring the tendency to answer in a socially desirable way and thereby to capture the assumed bias. However, there is great diversity in the operationalizations of these approaches. On the one hand, there are stand-alone tests consisting of items describing socially desirable behaviors (Crowne & Marlowe, 1960; Edwards, 1957). On the other hand, SDR scales are also embedded within commercial personality inventories such as the Minnesota Multiphasic Personality Inventory's Lie scale (Hathaway & McKinley, 1951). The form of such approaches is usually a self-report questionnaire.

Despite the outlined theoretical foundations, the actual items used to measure SDR are often criticized. The major concern is that it is difficult to differentiate between variance due to substantial personality differences and SDR within typical SDR measures. For example, there are people who truly possess socially desirable characteristics. Furthermore, various studies (Converse, Peterson, & Griffith, 2009; Ones, Viswesvaran, & Reiss, 1996; Pauls & Stemmler, 2003) have revealed strong relations between

personality measures and SDR measures. Disentangling the different sources of variance within the measures is difficult and requires sophisticated statistical methods and elaborate research designs (Ziegler & Bühner, 2009). Most researchers agree that it seems impossible to construct an SDR scale that does not capture substantial amounts of variance that are due to real individual differences in personality (Holden & Passey, 2010). Thus, in order to explore the joint nomological network of SDR measures, researchers need to include personality measures in their research in order to disentangle SDR and substantial personality variance.

Overclaiming

As a response to the problems associated with traditional SDR scales, a different approach to capture SDR was developed, namely, the overclaiming technique. "Over-claiming is the tendency to claim knowledge about nonexistent items" (Paulhus, Harms, Bruce, & Lysy, 2003, p. 891). In a typical overclaiming test, respondents rate their familiarity with items that reflect content from science, engineering, music, and so on. A unique aspect of this method is the use of nonexistent items (at most 20%) called foils. The tendency to claim such items provides a concrete index of overclaiming. Application of this technique permits researchers to measure both knowledge exaggeration (Bias = [Hits + False alarms]/2) and knowledge accuracy (Accuracy = Hits − False alarms; Paulhus & Dubois, 2014). This is a significant advantage over other instruments that test for response biases only. On the one hand, the overclaiming questionnaire is a self-report method. On the other hand, it is an objective measure whose accuracy index can act as a proxy for intelligence, especially crystallized intelligence (Ziegler, Kemper, & Rammstedt, 2013). If people show a tendency to claim knowledge of items that are predominantly foils, their bias score will be high, but if they mostly claim familiarity with real items, they will receive a high-accuracy score. With regard to the SDR model in Figure 2, overclaiming was empirically related to self-deceptive enhancement (SDE; Paulhus et al., 2003).

The overclaiming has been used to operationalize impression management (IM) and thus the deception of others (Bing et al., 2011). Yet this claim has not remained without critique (Feeney & Goffin, 2015; Kam, Risavy, & Perunovic, 2015; Ludeke & Makransky, 2015). Finally, other empirical evidence suggests a stronger relationship of overclaiming with an egoistic bias and not a moralistic bias (Tonković, Galić, & Jernеić, 2011). Thus, despite mixed empirical evidence, there are strong theoretical reasons to locate overclaiming within the same nomological network as other SDR measures.

Overconfidence

For ability tests, there is a method that measures the overestimation of one's own capabilities, namely, overconfidence.

By this definition, it sounds like another potential candidate for the nomological network in focus here. Stankov and Crawford (1997) postulated the existence of a separate self-confidence trait that, combined with accuracy, defines a continuum from overconfidence to underconfidence. Of interest to us, here is the method used to assess overconfidence because it resembles other methods used to capture positivity bias. After completing an item from an ability test, participants are asked to indicate, using a percentage scale, how confident they are about the correctness of their answer. Again, two pieces of information are captured with each item: the correctness of the answer and the confidence rating. The percentage of correctly answered items in the test can then be subtracted from the average of confidence ratings across all items in the test. The result can be used as an estimate of a person's calibration. Positive scores indicate that people are overconfident about their performance. Besides the similarity to overclaiming in terms of operationalization, there are studies that have used overclaiming to capture overconfidence (Anderson et al., 2012). Using six studies, Anderson and colleagues wanted to investigate whether overconfident behavior serves to enhance one's status in groups. In their second study, overconfidence was operationalized with an overclaiming questionnaire. Apparently, those authors view overclaiming tests as an alternative operationalization of overconfidence. Again, this opens up the possibility that overconfidence is part of the nomological network of positivity bias. It has to be stressed here that the authors of the method (Koriat et al., 1980; Moore & Healy, 2008) never formulated such a claim.

Relations Between Socially Desirable Responding, Overclaiming, and Overconfidence

When considering the definitions of the three constructs described above, that is SDR, overclaiming, and overconfidence, a number of similarities become apparent. SDR was defined as an overly positive self-portrayal. Similarly, overclaiming also results in a distorted (i.e., more knowledgeable) self-portrayal. Also similar is the overestimation of one's performance indexed by overconfidence measures. Both overclaiming and overconfidence are similar to SDR but restricted to a specific ability domain. Overclaiming is also directly linked to self-enhancement, which is part of the SDR model suggested by Paulhus (2002). Overclaiming and overconfidence also share a further feature. Both are measured by using a performance test, and both measures capture ability exaggeration. In short, based on theoretical grounds as well as methodological similarities, it is reasonable to assume that overclaiming, and overconfidence are part of the same nomological network. In particular, if all measures capture positivity bias as defined earlier, they should have a common core within a shared nomological network.

Table 1. Descriptive Statistic of all Measures.

Scale	Min	Max	*M*	*SD*	Ω_W
Extraversion (P)	5	20 (20)	13.79	3.50	0.86
Agreeableness (P)	5	20 (20)	12.17	3.03	0.75
Conscientiousness (P)	6	20 (20)	14.20	2.85	0.72
Neuroticism (P)	4	20 (20)	12.63	3.40	0.76
Openness (P)	8	25 (25)	20.63	3.28	0.88
Grandiose narcissism (P)	52	70 (80)	61.06	3.02	0.85
Edwards SDR scale (SDR)	25	97 (120)	59.55	12.88	0.88
First-factor Marlowe–Crowne scale (SDR; attribution of desirable behavior)	20	50 (50)	36.29	4.42	0.65
Second-factor Marlowe–Crowne scale (SDR; denial of undesirable behavior)	23	54 (65)	39.02	5.24	0.71
Self-deceptive enhancement (SDR)	51	120 (140)	83.98	9.11	0.73
Impression management (SDR)	46	120 (140)	78.80	9.36	0.78
Lie scale (SDR)	29	73 (75)	53.37	7.12	0.74
Confidence bias (OCO)	−72	41.33	−1.48	12.69	
Crystallized intelligence (I)	20	96.67 (100)	69.19	12.48	
Overclaiming (OCL)	0.76	4	2.32	0.64	

Note. Ω_W = McDonald's Omega. In parenthesis (Max) = maximal possible range for every measure. In parenthesis (Scale): P = Personality; SDR = socially desirable responding; OCO = Overconfidence; I = Intelligence; OCL = Overclaiming. Openness, Extraversion, Agreeableness, Conscientiousness, Neuroticism were measured with the Big Five Inventory (BFI-K).

Aims of the Present Study and Hypothesis

The last comprehensive exploration of the nomological net of social desirability (SDR) measures was conducted by Paulhus (2002) and resulted in the two-tiered model described above. Since then, the overclaiming technique has been developed as a novel measure of positivity bias. Finally, an operationally similar construct, namely, overconfidence has served a similar role, primarily in cognitive psychology. As described above, all three constructs (SDR, overclaiming, and overconfidence) appear to share one feature—a positive departure from reality. We will use the term *positivity bias* to refer this shared feature.

The aim of the current study is to empirically test whether the conceptual and operational overlap can be recovered when analyzing the shared correlation matrix. The preceding overview of theoretical foundations and operationalizations suggests that all three constructs tap a response distortion related to a positivity bias. We could find no studies that providing empirical verification of whether SDR, overclaiming, and overconfidence are really part of one nomological network sharing a common core. Such a finding would *not* preclude specific variance, that is, additional variance unique to each measure. In this way, the three measures could represent facets of positivity bias. As Ziegler and Bäckström (2016) put it when discussing traits and facets: "[. . .] the trait score reflects a common core and facet scores a proportion of this core plus some specific variance" (p. 108).

In sum, we hypothesize a common core between measures of social desirability, overclaiming, and overconfidence—all reflecting a positivity bias. Furthermore, we assume that each

measure also captures specific variance. Clear demonstration of a common core would support the interchangeable use of positivity bias measures. In addition, inclusion of closely related constructs such as intelligence, the Big Five and grandiose narcissism, should help clarify the unique information tapped by each of the three positivity bias measures.

Method

Sample and Procedure

Students of different fields of study from a large German university took part in an online survey. Originally, the sample consisted of $N = 1.617$ students. We excluded participants who stopped at the first or second page and those who had a very short response time. In the end, a data set of $N = 798$ (female $N = 572$) were analyzed. Average age was 24.9 ($SD = 5.16$).

Measures

A total of nine measures were employed. Structured in categories of SDR, overclaiming, overconfidence, crystallized intelligence, and personality, each test is described in detail below. Descriptive statistics and reliability estimates are provided in Table 1.

Socially Desirable Responding. We used four SDR instruments that are often applied in research and practice to capture SDR. To assess SDE and IM, we used a German version of the Balanced Inventory of Desirable Responding (BIDR) "Ein Inventar zur Erfassung von zwei Faktoren sozialer Erwünschtheit" [An Inventory Assessing Two Factors of

Socially Desirable Responding] (Musch, Brockhaus, & Bröder, 2002). Each scale consists of 10 items. Respondents rate the extent to which items are relatively consistent with their typical behaviors or attitudes. Items were rated on a 7-point Likert-type scale (1 = *not true* to 7 = *absolutely true*). The total scores for each scale were used as representations of SDE and IM. One example for the SDE scale is "I am really certain of my judgments" and for the IM scale, "I never swear."

The second measure of SDR was the Lie scale (15 items) from the German version of the Minnesota Multiphasic Personality Inventory–2 (MMPI-2; Hathaway, McKinley, & Engel, 2000). According to the manual, this scale can be used to judge whether other MMPI-2 scales are valid and whether a response distortion has occurred. A 5-point Likert-type scale (1 = *very inapplicable* to 5 = *very applicable*) and the sum score (Lie scale) were used in this study. One example item is "I do not always tell the truth."

Finally, German versions of the Edwards SDR scale (24 items) and the Marlowe–Crowne scale (23 items; Lück & Timaeus, 1969) were administered in the same 5-point Likert format as above. For the Edwards scale (e.g., "I tend to have a restless sleep and often awake during the night") the items were summed. The total scores for each Marlowe–Crowne subscale were used as representations of *attribution* of desirable behavior (first factor; e.g., "No matter who I am talking to, I am always a good listener") and the *denial* of undesirable behavior (second factor; e.g., "I often have dreams that I better keep to myself).

Overclaiming. Two German overclaiming questionnaires were used. Paulhus (2011, p. 160) pointed out that whereas real items are relatively stable, the status of foils could change overnight. Items whose content is from popular culture are especially unstable, which is why it is necessary to use a culturally relevant version. The first version was made available by the Institut zur Qualitätsentwicklung im Bildungswesen [Institute for quality development in education] in Berlin (see Hülür, Wilhelm, & Schipolowski, 2011). It is a self-report measure of academic and everyday knowledge including foils. Each item is rated on a 7-point Likert-type scale (1 = *never heard of it* to 7 = *know it very well*). Item content includes three categories: physical sciences, civics, and humanities. Responses were dichotomized between 1 and 2. If a "real" item was given a rating of 2 or higher, it was classified as a hit. Similarly, such a response to a foil was rated as a false alarm. For example, participants have to rate their familiarity with the item "prosa."

The second overclaiming questionnaire was the Vocabulary and Overclaiming Test (VOC-T, Ziegler et al., 2013). This test consists of 15 items (e.g., "warning") containing three foils. The VOC-T discriminates between the four knowledge domains of science, humanities, civics, and mechanics. Two indices labeled *accuracy* (the hits considering the false alarms) and *bias* (generally answered: yes, I know it) can be calculated over these two measurements. However, lack of independence of these two indices would be a severe violation of the assumptions underlying exploratory factor analysis (EFA). Therefore, only the bias score from each overclaiming measure was used in the analyses.[1]

Overconfidence and Crystallized Intelligence (gc). Participants had to answer 30 items (verbal, numeric, and figural; each with 10 items) from the knowledge extension module of the Intelligence-Structure-Test 2000 R (Amthauer, Brocke, Liepmann, & Beauducel, 2001). For each item, the correct answer had to be chosen from five options. A total score based on the percentage of correct answers was employed. One example of a verbal item is "The first chancellor of the Federal Republic of Germany was. . . . " To measure overconfidence, participants indicated how confident they were that each answer to an item was correct (as in Stankov & Crawford, 1997) by entering a rounded percentage after answering each item. The overconfidence scores were then calculated as the difference between the mean of all overconfidence ratings and the IST total score based on all items. Negative scores therefore indicate underconfidence and positive scores overconfidence.[2]

Personality Inventories. To tap fundamental personality traits, a brief version of the Big Five Inventory (Rammstedt & John, 2005) was used. It comprises 21 items designed to measure the Big Five—four from each domain except five for Openness. The items are rated on a 5-point Likert-type scale (1 = *very inapplicable* to 5 = *very applicable*). Total scores for the five personality scales were used in statistical analyses. An example of an extraversion item is "I am full of energy and drive."

The German version of the 40-item Narcissistic Personality Inventory (Schuetz, Marcus, & Sellin, 2004) was also included. In a forced-choice format, participants have to decide between an extremely positive, narcissistic (grandiose narcissism) alternative solution and a "normal" one. One example for the forced-choice format is "Modesty does not become me" versus "I am essentially a modest person." Each respondent received a total score out of 40.

Statistical Analyses

Descriptive statistics were computed with SPSS. EFA using maximum likelihood estimation was applied to all of the measures as described above. To determine the number of factors, we applied Velicer's (1976) Minimum Average Partial test (MAP test) and parallel analysis (Horn, 1965) using the psych package (Revelle, 2016) in R. Additionally, the eigenvalue >1 rule was applied. The best solution was chosen based on interpretability. The first EFA included

Table 2. Correlation Matrix of all Measures.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Extraversion (P)														
2. Agreeableness (P)	.16*	—												
3. Conscientiousness (P)	.14*	.04	—											
4. Neuroticism (P)	−.24*	−.17*	−.11*	—										
5. Openness (P)	.22*	.05	.09*	.03	—									
6. Grandiose narcissism (P)	−.07	−.05	−.06	.11*	<.01	—								
7. Edwards SDR scale (SDR)	−.36*	−.25*	−.34*	.68*	−.04	.15*	—							
8. First-factor Marlowe–Crowne scale (attribution of desirable behavior; SDR)	.16*	.29*	.33*	−.08*	.21*	−.06	−.22*	—						
9. Second-factor Marlowe–Crowne scale (denial of undesirable behavior; SDR)	−.02	−.29*	−.22*	.35*	−.04	.03	.47*	−.20*	—					
10. Self-deceptive enhancement (SDR)	−.12*	−.22*	−.14*	.22*	.03	.01	.36*	<.01	.34*	—				
11. Impression management (SDR)	−.04	−.11*	.06	.10*	−.01	−.01	.11*	.03	.21*	.26*	—			
12. Lie scale (SDR)	.07	−.22*	−.29*	.22*	−.03	.09*	.32*	−.29*	.52*	.25*	.11*	—		
13. Confidence bias (OCO)	.07*	−.07	.01	−.11*	.05	−.08*	−.06	.03	.02	−.03	.11*	−.02	—	
14. Crystallized intelligence (I)	−.02	.05	−.02	.04	.02	−.05	.32*	.19*	.21*	.38*	.48*	.43*	.46*	—
15. Overclaiming (OCL)	−.11*	−.02	−.06	−.05	.02	−.01	.07*	−.03	−.04	.03	.35*	.15*	.26*	.38*

Note. In parenthesis (Scale): P = Personality; SDR = socially desirable responding; OCO = Overconfidence; I = Intelligence; OCL = Overclaiming.
*p < .05.

only the positivity bias measures. This step should reveal any common core and how the specific variances cluster. In a second EFA, all other measures were also included allowing more clarity of the specific variance within each positivity bias measure.

Results

Table 2 presents the correlation matrix of all measures. Among notable values were the correlation between the Edwards SDR scale and neuroticism ($r = .68$, $p < .05$) and the correlation between the MMPI Lie scale and the first factor of the Marlowe–Crowne scale (attribution of desirable behavior; $r = .52$, $p < .05$).

The correlations between the SDR scales and the overclaiming scale were mostly low. The sole exception was a moderate and significant correlation ($r = .35$) between overclaiming and the IM scale. Similar size correlations were found for the relations between the SDR scales and the overconfidence bias. The highest and significant correlation was between overconfidence bias and IM ($r = .11$). The correlation between overconfidence and overclaiming was moderate and significant ($r = .26$). Thus, there was no strong evidence for convergent validity.

The correlations among the personality scales (apart from openness and grandiose narcissism) were consistently moderate. The highest correlation between overclaiming and personality occurred for extraversion ($r = .11$, $p < .05$).

For overconfidence, the highest correlation was with neuroticism ($r = .11$, $p < .05$). This pattern can be considered discriminant validity evidence. For the SDR measures such supposedly discriminant, correlations with personality scores were often much larger, especially for the Edwards scale. Thus, discriminant validity evidence for those scales is problematic at best. Notably, crystallized intelligence correlated substantially with overconfidence ($r = .46$), overclaiming ($r = .38$), and the SDR scales ($.19 < r < .48$).

Two EFAs were calculated. In the first step, all eight measurements of positivity bias were analyzed. According to the chosen factor retention rules, factor solutions with one (MAP test), two factors (parallel analysis), and three factors (eigenvalue >1 rule) were extracted using a Promax rotation. After inspecting the three solutions, the three-factor solution was chosen as the most interpretable. The first three eigenvalues were 2.34, 1.22, and 1.05. The amount of variance explained by this solution was 57.63%. Table 3 presents the factor loadings and shows that the first factor was marked by the Marlowe–Crowne scale "denial of undesirable behavior" and the MMPI Lie scale. Furthermore, a small loading was on the Edwards SDR scale. This factor was called *Denying common faults*. The second factor comprised SDE and a small loading on IM and was named *Self-deceptive enhancement* (SDE). Finally, the third factor included the Marlowe–Crowne scale "attribution of desirable behavior" and a small negative loading on the MMPI Lie scale and was named *Claiming unlikely virtues*. In this

Table 3. Factor Loadings After Promax Rotation (First Step).

	Denying common faults	Self-deceptive enhancement	Claiming unlikely virtues
Edwards SDR scale	0.39		
Second-factor Marlowe–Crowne scale (denial of undesirable behavior)	1.04		
Minnesota Multiphasic Personality Inventory Lie scale	0.48		−0.27
First-factor Marlowe–Crowne scale (attribution of desirable behavior)			0.50
Self-deceptive enhancement		0.99	
Impression management		0.23	
Confidence bias			
Overclaiming			

Note. SDR = socially desirable responding. Loadings smaller than .20 are not displayed.

Table 4. Intercorrelations of Positivity Factors.

	Denying common faults	SDE	Claiming unlikely virtues
Denying common faults	—		
SDE	.33	—	
Claiming unlikely virtues	−.31	−.15	—

Note. SDE = self-deceptive enhancement.

analysis, overclaiming and overconfidence were not explained substantially by any of the factors. Table 4 presents the factor intercorrelations between all three factors. Most of the correlations were small to moderate. The highest correlation ($r = .33$) occurred between the *Denying common faults* and the *SDE* factor.

In a next step, an EFA with the eight measurements of positivity bias, personality, and crystallized intelligence was investigated. According to the chosen factor retention rules, factor solutions with two (MAP test) to six factors (parallel analysis and eigenvalue >1 rule) were extracted using a Promax rotation. After inspecting each of the factor solutions, the six-factor solution was chosen as the most plausible. The first six eigenvalues were 3.12, 1.61, 1.31, 1.20, 1.13, and 1.06. The amount of variance explained by this solution was 62.88%. Table 5 presents the factor loadings. The table shows that the first factor was marked by neuroticism and the Edwards SDR scale. Additionally, there were small loadings on grandiose narcissism and a small negative cross-loading on extraversion. This factor was called *Alpha bias* following Wiggins (1964). The second factor included the Lie scale, both (attribution of desirable behavior and denial of undesirable behavior) Marlowe–Crowne scales, extraversion, and low agreeableness. Again referring to Wiggins (1964) the factor was called *Gamma bias*. The third factor was marked by SDE and IM and was labeled *egoistic bias* (see Paulhus, 2002). The third factor is

a pure SDR factor as it only loads SDR scales. The fourth factor was characterized by conscientiousness (C). The fifth factor comprised the Marlowe–Crowne scale attribution of desirable behavior, extraversion, openness, and agreeableness and was named *Plasticity* (DeYoung, 2006). Finally, the sixth factor included the overconfidence bias and a negative loading from crystallized intelligence. Following Stankov and Crawford (1997), we labeled this factor *Confidence*. Of importance, the overclaiming score was again not explained substantially by any of the factors.

Table 6 presents the factor intercorrelations among all six factors. Most of the correlations were moderate—apart from the small correlation between Confidence and all other factors ($-.04 < r < .15$). The highest correlation ($r = .58$) occurred between the Alpha bias and the egoistic bias. A second-order EFA of these correlations resulted in a two-factor solution (Table 7). Confidence was not substantially explained by either of the two factors. The other five first-order factors mostly fell on the first factor. Only the egoistic bias factor was strongly loaded by the second factor but also had a substantial loading from the first factor. Thus, the first second-order factor contained a mixture of SDR variance and personality (see Ziegler & Bühner, 2009) and was labeled *General SDR factor*. The second higher order factor basically reflected *Egoistic bias*.

Discussion

The main goal of this study was to investigate the nomological network of SDR, overclaiming, and overconfidence measures in low-stakes settings. Based on the theoretical underpinnings and similarities in operationalization, a common core reflecting positivity bias was hypothesized. Personality, grandiose narcissism, and crystallized intelligence were also assessed to further specify unique variance for the different measures. To this end, a test battery including a variety of measures from all domains as well as

Table 5. Factor Loadings After Promax Rotation.

	Alpha bias	Gamma bias	Egoistic bias	Conscientiousness	Plasticity	Confidence
Neuroticism	.88					
Edwards SDR scale	.85					
Grandiose narcissism	.21					
Lie scale		.67				
Second-factor Marlowe–Crowne scale (denial of undesirable behavior)		.55	.25			
Self-deceptive enhancement			.65			
Impression management			.46			
Conscientiousness				.91		
First-factor Marlowe–Crowne scale (attribution of desirable behavior)		−.34	.26		.55	
Extraversion	−.21	.38			.49	
Openness					.40	
Agreeableness		−.26			.39	
Confidence bias						.74
Crystallized intelligence						−.45
Overclaiming						

Note. SDR = socially desirable responding. Loadings smaller than .20 are not displayed.

Table 6. Factor Intercorrelations.

	Alpha	Gamma	Egoistic	Conscientiousness	Plasticity	Confidence
Alpha	—					
Gamma	.28	—				
Egoistic	.58	.22	—			
Conscientiousness	−.31	−.26	−.11	—		
Plasticity	−.39	−.15	−.21	.37	—	
Confidence	−.04	.15	.11	.08	.05	—

Table 7. A Second-Order EFA.

	1	2
Alpha	.72	.41
Gamma	.36	
Egoistic bias	.51	.72
Conscientiousness	−.63	.26
Plasticity	−.55	

Note. EFA = exploratory factor analysis. Loadings smaller than .20 are not displayed.

personality and crystallized intelligence was administered to a large sample of students.

Based on the current findings with our specific sample, empirical support for the idea of a common core could not be found. Instead, the findings showed that there were three factors underlying the different measures of positivity bias. Interestingly, overclaiming and overconfidence did not load on any of the three factors, indicating that these measures have more specific than shared variance. In a second step,

six factors were extracted from all positivity bias measures, a Big Five measure, and a test of crystallized intelligence. Again, overclaiming was not explained by any of those factors. Moreover, only one of the factors was exclusively marked by SDR scales. This factor was labeled egoistic bias and contained the scales SDE, IM, and both (attribution of desirable behavior and denial of undesirable behavior) Marlowe–Crowne scales. A second-order factor analysis of the intercorrelations between the first-order factors revealed two second-order factors. Here, overconfidence was no longer explained by either factor. Moreover, the measures of SDR, overclaiming, and overconfidence did not fall onto the same factor. Again, the egoistic bias factor separated itself and marked the second factor. To sum up, the different positivity bias measures were not closely related, and they clearly did not share a common core.

Measures of Socially Desirable Responding

SDR was operationalized in the current study with four different commonly used scales: the Marlowe–Crowne Scale

(Crowne & Marlowe, 1960), the Edwards (1957) SD scale, the BIDR (Paulhus, 1998), and the Lie scale from the MMPI. In the first step, variance in theses scales was explained by three factors—not the expected one-factor solution reflecting the shared common core. Consequently, the content of each measure captures unique variance. To account for the often reported shared variance with personality, a Big Five and a grandiose narcissism measure were added as well. This step also allowed to further characterize the specific variance composition of each measure. A second EFA yielded a six-factor solution. Four of them were marked by SDR measures. The first factor, Alpha bias, was marked by the Edwards SDR scale, neuroticism, grandiose narcissism, and by a negative cross loading on extraversion. In accordance with Wiggins, who also found the Edward's scale marking his first factor, the factor was labeled Alpha bias. Second, the Gamma bias was characterized by the Lie scale, the first and the second factors of the Marlowe–Crowne scale, and two personality scales extraversion and agreeableness. Again labeling was based on Wiggins's findings, which showed a factor marked by the Lie scale. Factor three was labeled egoistic bias factor and the fifth factor, labeled plasticity, was marked by the first scale of the Marlowe–Crowne scale (attribution of desirable behavior) and the three personality scales extraversion, openness, and agreeableness. The term *egoistic bias* was borrowed from Paulhus's (2002) taxonomy and reflects the theme inherent in SDE and IM (agency). The label "plasticity" was borrowed from DeYoung (2006). Interestingly, this factor has no substantial loadings on any of the SDR or other positivity bias measures. It has to be noted here that Paulhus (2002) argued that the egoistic bias is associated with Alpha. This, however, does not mean that the factors are isomorphic. In fact, our results replicate those findings revealing a correlation of .58 between the factors.

Importantly, the factor intercorrelations in Table 6 underline the problematic overlap between the SDR scales and personality test scores. Thus, the present findings are further evidence showing that the social desirability scales and personality measures are difficult to differentiate—which originally caused the debate on substance versus style. Exceptions were the SDE and the IM scale, which yielded the egoistic bias factor. This factor was virtually free of substantial overlap with the other measures used, specifically the personality measures. However, the factor correlated with the Alpha bias reflecting shared variance most likely due to SDR (see Paulhus, 2002). Thus, there seems to be a common core here that reflects an egoistic theme (Paulhus, 2002) free of substantial overlaps with personality.

Thus, the first-order EFA revealed interesting loading patterns with regard to the pairings of SDR measures and personality. Only neuroticism and the Edwards scale both were exclusively explained by the same latent factor, Alpha. This is somewhat surprising considering Paulhus's (2002)

earlier findings which put the Edwards scale on Alpha but Emotional Stability somewhere between Alpha and Gamma. However, Paulhus used residuals of self-ratings where other-ratings had been partialed out. Thus, bias variance was operationalized more directly as the deviation of the self-rating from the view others have. This idea was recently propagated in a more differentiated way by McAbee and Connelly (2016). Those authors used the term *identity* to describe the deviation of the self-rating from the view shared by the self and others on the target. Our finding, that is, the Edward's scale and neuroticism loaded by the same factor, indicates that the substance overlap between the Edwards scale and personality might lie within the domain of neuroticism.

Similar arguments could be made for the second factor, Gamma bias. Here it was Extraversion that loaded on the factor otherwise dominated by SDR scales. The plasticity factor was mainly marked by personality test scores (Extraversion, Openness, Agreeableness). However, the strongest loading occurred for the Marlowe–Crowne scale claiming positive behavior. Thus, this factor also represents a mixture of substance and style. Here, the agentic theme is very obvious. The third factor, egoistic bias, did not explain substantial amounts of variance within any of the personality scores. This could at first glance be viewed as support for these scales as hinted at above. However, two arguments counter this initial impression. First, this factor was strongly correlated with the Alpha bias factor. Second, the second-order factor analysis located this factor on both second-order dimensions. Thus, despite the strong common core reflecting an egoistic bias, both measures still contain substantial amounts of substantive variance evident in the cross-loading in the second-order EFA as well as in the correlation between egoistic bias and alpha bias. However, the latter two findings again underscore the role of neuroticism in bridging the gap between SDR and personality measures. This seems intuitive considering the clearly undesirable connotation of neuroticism even under low-stakes conditions. To sum up, the first-order EFA revealed interesting loading patterns confirming prior research findings in terms of general SD factors (Alpha and Gamma) and themes (especially egoistic). The previously reported problematic overlap between personality and SDR measures was also replicated in a second EFA. However, a more fine-grained picture revealed that specific personality–SDR relations could be distilled.

Of further importance is the second-order EFA based on the intercorrelations between the six first-order factors. The results speak against the possibility of completely disentangling SDR and personality. We found a very strong first factor with substantial loadings from all first-order factors (including Conscientiousness showing that there also was variance due to SDR). In addition, we found a second higher order factor mostly reflecting egoistic bias. Perhaps Paulhus's

idea of two themes might be reflected in the emergence of two higher order factors (also see Wiggins, 1964). It could even be argued that the second higher order factor might have more substance and less style.

Alternatively, the first factor could reflect a general SDR factor (Bäckström, 2007). The fact that the egoistic bias formed an additional factor might be due to the anonymous situation. Had the data been collected in a high-stakes assessment situation where people are likely to distort a broader variety of personality traits, a different result might have occurred (Schmit & Ryan, 1993). In such a setting, a one-factor solution may be just as likely as a two-factor solution clearly reflecting the two themes agentic and moralistic (communal). The latter could occur if specific job profiles would call for those themes (Pauls & Crost, 2005). In fact, Pauls and Crost (2004) argued that "in faking conditions social desirability scales do not seem to provide additional diagnostic information beyond that derived from personality scales." (Pauls & Crost, 2004, p. 1149).

Regardless of these interesting loading patterns and specific relations between measures of substance and style, a first conclusion with this special sample is that typical SDR measures form a close nomological network. Moreover, this network is strongly entwined with substance, that is, personality measures. As a consequence of the present study, those scales should not be used in low-stakes settings until the substance versus style question is answered. The current findings dispute the possibility of using SDR scales to measure a positivity bias that is independent of substance.

Interestingly, neither overclaiming nor overconfidence was related to either of the factors described so far. Therefore, it is reasonable to assume that there is no overlap between the constructs behind these operationalizations negating the assumptions of a common core or even a shared nomological net.

Overclaiming

No factor explained substantial variance in overclaiming despite some overlap at the level of zero-order correlations (e.g., with crystallized intelligence). This shows the importance of analyzing correlational patterns instead of relying on single zero-order correlations when trying to explore the nomological net of several related constructs. In fact, the communality for overclaiming was nearly zero. This supports the notion that overclaiming can be measured free from personality or cognitive ability. Ziegler et al. (2013) also confirmed the independence of overclaiming and fluid intelligence. This also means, though, that overclaiming has its own nomological network not including relationships with SDR scales, personality nor intelligence. In Paulhus's (2002) model of SDR, overclaiming can be located within self-enhancement (Paulhus et al., 2003). The current results show that this earlier finding by Paulhus et al. could not be replicated, at least when self-enhancement is measured with common SDR scales. It is important to note that this does not necessarily show that overclaiming does not capture self-enhancement or SDR. In fact, the opposite might be true. Due to the critical overlap between SDR scales and personality, overclaiming measures might allow a more direct access to the actual psychological process underlying self-enhancement. However, further research utilizing experimental designs and not only relying on correlational analyses is necessary to test this assumption. Nevertheless, the finding that overclaiming and SDR measures do not share a common core or nomological network also means that overclaiming measures are free of the typical problems associated with SDR measures namely the substance versus style issue.

Overconfidence

The sixth factor, Confidence, was characterized by the overconfidence scale, and the crystallized intelligence measure. This factor is therefore best described as a knowledge factor or a metacognitive ability factor. More important though, there was no substantial loading of this factor on overclaiming indices or SDR scales. Moreover, the correlations of this factor with the factors representing SDR and personality were very low. In fact, within the second-order EFA no substantial loading on either of the two factors occurred. Thus, based on the current findings, overconfidence cannot be recommended as a way to operationalize overclaiming. Likewise, overconfidence cannot be regarded as part of the nomological net of SDR measures. The findings support the notion of self-confidence as a metacognition (see, e.g., Kleitman & Stankov, 2007) rather than the idea of using overconfidence as a measure of deception (Anderson et al., 2012).

To sum up, six first-order factors named Alpha bias, Gamma bias, Egoistic bias, conscientiousness, plasticity, and confidence were found. Overclaiming was not explained by any of the six factors. Table 4 shows that the four factors of SDR were correlated with each other but not with the metacognitive ability factor confidence. Taken together, this shows that the investigated constructs do not overlap. Thus, different operationalizations of positivity bias (SDR scales, overclaiming, and overconfidence) do not share a common core or have entwined nomological networks.

Practical Implications

With regard to the nomological network and only in low-stakes settings it is possible to separate overclaiming from personality and crystallized intelligence. By contrast, SDR measures did not turn out to be distinct from personality in this study. As discussed above, as long as it remains unclear whether the factors found represent substance or style, the

SDR measures cannot be recommended to be used in low-stakes research settings. Exceptions here might be the scales loaded by egoistic bias—the SDE and IM scales. These two scales seem to be free of personality. However, the assessment here was conducted under anonymous and low-stakes conditions. Generalizing to other settings is not warranted. In fact, there is research supporting the use of MMPI validity scales in clinical settings (e.g., Steffan, Morgan, Lee, & Sellbom, 2010), which can be considered high stakes. A similar conclusion may be drawn regarding overconfidence, which was unrelated to any of the other SDR measures. Considering that it was not even constructed to actually capture such response distortions, we conclude that it should not be used to capture forms of positivity bias in personality research.

The outlook for overclaiming is more promising. Researchers interested in whether their respondents have a tendency to present themselves in an overly positive way could try to gauge this by integrating an overclaiming measure. There is empirical evidence supporting this claim. Bing et al. (2011) provided first empirical evidence to lend support to the notion of overclaiming capturing SDR. In their study, hierarchical regression analyses were used to examine whether two SDR measures or overclaiming acted as supressor when predicting performance. In the first step, cognitive ability was entered as a covariate and was a significant predictor of performance. In a next step, achievement striving was added and incrementally predicted performance. In the third step, two SDR measures failed to add to the prediction of performance. These results were illustrated for both instruction conditions: honest and fake good response described above. Only when adding overclaiming in the fake good condition did a case of classical suppression occur. This result was interpreted as showing that the overclaiming technique taps individual differences in faking.

Additional validation comes from Kemper and Menold (2014), who showed that self-enhancement measurements, among them an overclaiming test (VOC-T), are good predictors for identifying falsification in surveys. Those authors investigated the stylistic responding between genuine and falsified interviews and the results showed that "falsifiers generally overestimate the putative interviewees' tendency to self-enhance by exaggerating positive and minimizing negative attributes or by overclaiming knowledge" (Kemper & Menold, 2014, p. 97). Finally, Paulhus and Dubois (2014) demonstrated the value of measuring overclaiming tendencies in assessing class performance. Whereas knowledge accuracy predicted better final course grades, knowledge overclaiming predicted poorer final grades. Apparently, those who exaggerate their abilities pay a price in overall educational performance.

It should be mentioned that there are also studies casting a less positive light on the interpretation of overclaiming as a positivity bias. For example, Feeney and Goffin (2015) did not advise the use of overclaiming for detecting general faking but suggested instead to use overclaiming items with specific job-relevant contents. Whether this suggestion really improves the ability to capture positivity bias still needs be seen. Regardless, the current study, as well as the cited research, indicates that overclaiming is more likely than SDR or overconfidence to capture positivity bias independent of personality and crystallized intelligence.

Limitations and Outlook

For the first time, a nomological network of SDR, overclaiming, and overconfidence was empirically investigated. Further studies are needed to confirm these results by conducting a confirmatory factor analysis and by varying samples and contexts. Note that the disproportionate representation of the three types of positivity bias may have affected our results. In particular, we included more SDR tests than other tests to cover the broader variety in these measures.

Only aggregated scores for overclaiming, overconfidence, and crystallized intelligence were used. A more fine-grained approach differentiating between different knowledge areas should be conducted in the future to ensure that specific relations were not obliterated by aggregating. We would argue, however, that overclaiming and overconfidence are much more homogeneous, and it seems unlikely that using more of these measures would substantially change the findings.

In addition, the inclusion of more extensive inventories[3] for measuring personality and intelligence will be important for broadening the nomological network. Of interest would be a detailed description of which personality facets explain variance in the different constructs. This extension would further help disentangle substance and style. Moreover, we cannot make a general statement about narcissism because we used the NPI that captures only grandiose narcissism and neglects the vulnerable form of narcissism.

As described, SDR is dependent on the kind of receiver. The current study was an anonymous online survey where there was no clear audience. Hence, the IM component of SDR may not play a role in our results. Without an audience, one cannot implicate this most blatant kind of SDR, often called faking (Ziegler et al., 2015). However, research by Pauls and Crost (2004) indicated that distorted self-presentation depends on the situational context and not on the audience. Their example deals with managerial skills which are expected to reflect high agency. Pauls and Crost could demonstrate that SDR scores were faked just as personality scales were. Future research should therefore investigate the nomological network of these constructs in different settings such as real applicant settings.

To sum up, the current study found that the implicit assumption of a common core within a shared nomological network of SDR measures, overclaiming, and overconfidence could not be empirically supported. Of all the measures, only overclaiming turned out to be fully independent of personality and crystallized intelligence.

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Notes

1. We also conducted the EFA with the linearly dependent scores, but the results were the same.
2. We also conducted the EFA with separated overconfidence and g_c, but the results were the same.
3. It should be mentioned that the Lie scale of the MMPI-2 was originally not developed or validated as a stand-alone tool or a Likert-type scale.

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