



Vol 13, N° 2

<https://revistas.usb.edu.co/index.php/IJPR>

ISSN 2011-2084

E-ISSN 2011-7922

# The Narcissistic Personality Inventory 8: Validation of a Brief Measure of Narcissistic Personality

**El Inventario de Personalidad Narcisista 8: Validación de una breve medida de personalidad narcisista**

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## OPEN ACCESS

### Editor-in-Chief:

Mauricio Cuartas-Arias. MSc. PhD.

**Manuscript received:** 16-01-2019

**Revised:** 09-04-2020

**Accepted:** 24-04-2020

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**Declaration of data availability:** All relevant data are within the article, as well as the information support files.

**Conflict of interests:** The authors have declared that there is no conflict of interest.

### How to Cite:

Schmalbach, B., Zenger, M., Tibubos, A. N., Borkenhagen, A., Strauss, B. & Brähler, E. (2020). The Narcissistic Personality Inventory 8: Validation of a Brief Measure of Narcissistic Personality. *International Journal of Psychological Research*, 13(2), 68–77. <https://doi.org/10.21500/20112084.4855>

## Abstract.

The present study was conducted with the aim of constructing and validating a short form of the Narcissistic Personality Inventory (NPI). The NPI is the most widely-applied measure for the assessment of narcissistic personality traits and, therefore, it is of great relevance for many research questions in personality and social psychology. To develop the short scale, we first found the optimal eight-item solution among all valid combinations of the NPI-15 items in an exploratory subsample ( $n = 1,165$ ) of our complete representative sample of the German general population. We then validated this model in a confirmatory subsample ( $n = 1,126$ ). Additionally, we examined its invariance across age groups and sex, as well as its reliability, as well as construct and predictive validity –comparing it to the NPI-15. Our results indicate that the NPI-8 is a valid and reliable measure of narcissistic personality with minimal losses compared to the 15-item version. Particularly where brevity and an economical assessment are desired, the NPI-8 should be considered.

## Resumen.

El presente estudio se realizó con el objetivo de construir y validar una forma corta del Inventario de Personalidad Narcisista (NPI). El NPI es la medida más ampliamente aplicada para la evaluación de los rasgos narcisistas de la personalidad y, por lo tanto, es de gran relevancia para muchas preguntas de investigación en personalidad y psicología social. Para desarrollar la escala corta, primero encontramos la solución óptima de ocho ítems entre todas las combinaciones válidas de los ítems NPI-15 en una submuestra exploratoria ( $n = 1,165$ ) de nuestra muestra representativa completa de la población general alemana. Luego validamos este modelo en una submuestra confirmatoria ( $n = 1,126$ ). Además, examinamos su invariancia entre grupos de edad y sexo, así como su confiabilidad y validez constructiva y predictiva, comparándola con el NPI-15. Nuestros resultados indican que el NPI-8 es una medida válida y confiable de la personalidad narcisista con pérdidas mínimas en comparación con la versión de 15 ítems. Particularmente donde se desea brevedad y una evaluación económica, se debe considerar el NPI-8.

## Keywords.

Narcissism; Personality Trait; Assessment; Short scale; Norm values.

## Palabras Clave.

Narcisismo; rasgo de la personalidad; evaluación; escala corta, valores de la norma.

## 1. Introduction

Narcissism is generally understood as pronounced self-involvement (Freud, 1955). In psychological research it has been regarded as both, a personality trait and as a clinically relevant disorder (Hermann et al., 2018). The present study deals with narcissism in the former sense. In their Extended Agency Model, Campbell and Foster (2007) consider a number of fundamental qualities of the narcissistic self: a strongly positive self-concept, to the point of exaggeration, pronounced agency, feeling of uniqueness compared to others, selfishness, and achievement orientation. Generational increases in narcissism have been observed (Twenge, 2013), prompting Lasch (2018) to dub the present zeitgeist the “culture of narcissism”, and making this subject all the more significant for psychological research.

The most widely-applied measure of narcissism is the Narcissistic Personality Inventory 40 (NPI-40; Raskin & Hall, 1979). The NPI-16 and -13 were constructed as more economical, brief measures of narcissism (Ames et al., 2006; Gentile et al., 2013). They are, however, not acceptable in terms of model fit and factorial validity. Žemojtel-Piotrowska et al. (2018) tested the NPI-13’s measurement invariance across cultures and constructed the NPI-9 by removing those items from the 13-item version that varied the most between cultures. However, model fit was also questionable in two of three samples. (Grijalva et al., 2015) also mention six- and seven-item versions of the measure (Burton & Hoobler, 2011; Jonkman et al., 2012). These scales were, however, constructed ad hoc for specific research designs and never evaluated psychometrically. A German translation of the NPI is provided by Schütz et al. (2004). The 15-item version they constructed was furthermore analyzed by Spangenberg and colleagues (2013), where it evinced very good fit for a two factor solution with the components “Grandiose Exhibitionism” (GE) and “Leadership/Authority” (L/A).

The present study aimed to construct a factorially valid short form of the NPI –based on the work on the German NPI by Spangenberg et al. (2013)– to allow for the economical assessment of narcissistic personality traits. To this end, we constructed and compared subsets containing four items per scale and tested the optimal solution in confirmatory factor analysis (CFA), reliability analysis, as well as an investigation of measurement invariance across age groups and respondent sex. We chose to analyze these two sociodemographic variables because they are not modifiable compared to more fluctuating variables employment and income. As a result, they are of great interest for a wide variety of research questions and represent the causal basis for many other observable differences. Other grouping variables, such as employment status or income, should be investigated in future studies.

In addition, we examined the correlation patterns with related constructs. Namely, we expected negative associations between narcissistic leadership and depression as well as overall psychological distress Spangenberg et al. (2013). In addition, we hypothesized positive correlations between depersonalization and narcissism – in particular exhibitionistic tendencies (Frances et al., 1977; Michal et al., 2006). Furthermore, we investigated the NPIs predictive power of several external criteria, including appearance orientation. Here we expected positive associations between narcissism investments into self-beautification (Davis et al., 2001).

## 2. Methods

### 2.1 Participants and Procedure

The present study sample was collected by the demographic consulting company USUMA by order of the University of Leipzig.  $n = 2,433$  participants were collected using a multistage sampling method based on electoral districts, households, and persons in the household. Households were selected via random route procedure and household members were selected using the Kish selection grid. The goal of this procedure was to obtain a sample that would be representative of the German general population in terms of distribution of participant sex, age, and education. We confirmed this by comparing the distributions with data provided by the Federal Statistical Office of Germany (2019). Descriptive statistics are reported in Table 1. Only participants with sufficient command of the German language and at the age of 18 or older were included. All participants were interviewed face-to-face by an USUMA employee, who assessed their language skills prior to the interview. After being informed of the general purpose of the survey, participants filled out the questionnaires mentioned below.

### 2.2 Ethics statement

Prior to participating, all participants were informed of the general purpose and procedure of the investigation and that data storage would be anonymized. In addition, they received a detailed data protection statement. The study included questionnaires inquiring into mental well-being of respondents. However, since no medical or psychological interventions were applied, there was no risk involved for participants. In accordance with German law, all participants gave their verbal consent to participate. Additionally, the study followed the ICC/ESOMAR International Code of Marketing and Social Research Practice.

### 2.3 Measures

The Narcissistic Personality Inventory-15 (Spangenberg et al., 2013) was employed to measure narcissistic personality traits. It consists of 15 items using a binary forced-choice response format. Participants select between two phrases, representing a narcissistic (e.g. “1 =

Table 1

Sample description with group comparisons for the Narcissistic Personality Inventory-8 (NPI-8) subscales

	<i>n</i>	%	<b>NPI-8 L/A</b>	<b>NPI-8 GE</b>
<b>Sex</b>			$F(1,2289) = 38, p < .001,$ $\eta_p^2 = .017$	$F(1,2289) = 20.34, p < .001,$ $\eta_p^2 = .009$
Female	1278	55.8	5.31 (1.22)	4.49 (.89)
Male	1013	44.2	5.64 (1.36)	4.67 (1.05)
<b>Age (in years; M=50.33; SD=17.47)</b>			$F(5,2285) = 7.72, p < .001,$ $\eta_p^2 = .017$	$F(5,2285) = 8.74, p < .001,$ $\eta_p^2 = .019$
18–29	336	14.7	5.61 (1.36)	4.71 (1.07)
30–39	358	15.6	5.55 (1.33)	4.66 (1.02)
40–49	446	19.5	5.65 (1.29)	4.68 (1.00)
50–59	392	17.1	5.38 (1.27)	4.54 (.97)
60–69	375	16.4	5.33 (1.23)	4.49 (.91)
≥70	384	16.8	5.19 (1.23)	4.33 (.77)
<b>Education</b>			$F(3,2287) = 62.35, p < .001,$ $\eta_p^2 = .076$	$F(3,2287) = 15.82, p < .001,$ $\eta_p^2 = .020$
≤ 8 years	1035	45.2	5.15 (1.20)	4.49 (.92)
9–11 years	853	37.2	5.50 (1.25)	4.53 (.93)
≥ 12 years	390	17.0	6.14 (1.34)	4.83 (1.09)
School students	13	.6	6.23 (1.17)	5.46 (1.56)
<b>Family</b>			$F(2,2285) = 8.19, p < .001,$ $\eta_p^2 = .018$	$F(2,2285) = 4.46, p < .001,$ $\eta_p^2 = .010$
Married	1168	51.0	5.49 (1.29)	4.57 (.97)
Committed relationship	97	4.2	5.58 (1.38)	4.57 (.90)
Single	446	19.5	5.54 (1.34)	4.70 (1.04)
Separated	23	1.0	4.78 (.85)	4.35 (.88)
Divorced	271	11.8	5.58 (1.32)	4.58 (.99)
Widowed	286	12.5	5.05 (1.11)	4.37 (.81)
<b>Employment</b>			$F(4,2286) = 21.47, p < .001,$ $\eta_p^2 = .036$	$F(4,2286) = 17.88, p < .001,$ $\eta_p^2 = .030$
Working full time	892	38.9	5.71 (1.32)	4.75 (1.07)
Working part time	255	11.1	5.40 (1.22)	4.47 (.88)
Unemployed	353	15.4	5.18 (1.21)	4.45 (.82)
Retired	30.8	30.8	5.23 (1.23)	4.39 (.5)
In training	3.8	3.8	5.92 (1.42)	4.86 (1.16)
<b>Monthly net income</b>			$F(5,2285) = 11.44, p < .001,$ $\eta_p^2 = .024$	$F(5,2285) = 9.70, p < .001,$ $\eta_p^2 = .021$
<1000€	323	14.1	5.22 (1.24)	4.45 (.85)
<1500€	507	22.1	5.21 (1.19)	4.41 (.81)
<2000€	501	21.9	5.47 (1.28)	4.58 (.97)
<2500€	395	17.2	5.63 (1.35)	4.61 (.99)
≥2500€	510	22.3	5.71 (1.35)	4.78 (1.12)
Refused to answer	55	2.4	5.35 (1.08)	4.38 (.73)

Note. L/A = Leadership/Authority; GE = Grandiose Exhibitionism.

I really like to be the center of attention.”) and a non-narcissistic (e.g. “2 = It makes me uncomfortable to be the center of attention.”) alternative. Some of the items have to be reverse-coded (see Table 2) before obtaining the subscale scores by summing up the item scores.

The Hospital Anxiety and Depression Scale (HADS-D; Herrmann et al., 1991; Hinz & Brähler, 2011; Zigmond & Snaith, 1983) was used to assess symptoms of

depression and anxiety as well as general psychological distress. It consists of 14 items in total, of which seven each measure depression ( $\omega$  in the present sample is .846 [.836; .857]) and anxiety ( $\omega = .811$  [.797; .824]), respectively. Individual items inquire into the frequency of symptoms, ranging from 0 to 3 with varied phrasing.

The Copenhagen Burnout Inventory (CBI; Tibubos et al., 2018) –which is part of the Copenhagen Psychoso-

cial Questionnaire (Kristensen et al., 2005; Nübling et al., 2006)– measures psychological fatigue and distress. It uses six items ( $\omega = .925$  [.919; .930]) that ask for the frequency of several states of exhaustion. Response options range from 1 (“Never/Almost never”) to 5 (“Always”).

The Cambridge Depersonalization Scale-2 (CDS-2; Michal et al., 2010; Sierra & Berrios, 2000) is a brief two-item measure ( $\omega = .846$  [.819; .872]) of symptoms of depersonalization. Respondents rate how often they experienced these types of symptoms on a scale from 0 (“Not at all”) to 3 (“Almost every day”).

As external criteria, we let participants estimate the time they spent per day on improving their physical appearance on a five-point scale ranging from 1 (*less than half an hour per day*) to 5 (*more than two hours per day*) and the amount of money per month they spent for the same purpose on a seven-point scale from 1 (*less than 60€*) to 7 (*more than 600€*). In addition, we posed several yes-or-no questions at participants to examine what specific measures of beautification they are employing (e.g., diet, exercise, etc.).

### 2.4 Statistical Analyses

We used R (version 3.6.3) and the packages *lavaan*, *semTools*, and *stuart* to conduct all statistical analyses (Jorgensen et al., 2018; Rosseel, 2012; Schultze, 2018). First, we removed all respondents who exhibited one or more missing values on the NPI items ( $n = 142$ ) from the analysis, yielding a final sample of  $n = 2,291$ .

Second, we randomly split our total sample ( $n = 2,291$ ) into an exploratory ( $n = 1,165$ ) and a confirmatory subsample ( $n = 1,126$ ). We then used *stuart*’s bruteforce option to test all 1050 possible subsets, consisting of two four-item scales, in the exploratory subsample. We utilized the standard objective function for this purpose, which maximizes model fit (in the form of Root Mean Square Error of Approximation [RMSEA] and Standardized Root Mean Square Residual [SRMR]) and composite reliability in equal measures. Moreover, we constrained the models to be strictly invariant across participant sex. We then tested the resulting solution in the confirmatory subsample. All remaining analyses, such as the tests for measurement invariance across participant sex and age, were conducted using the complete sample.

Since the data format is dichotomous, we conducted factor analysis using robust diagonally weighted least squares estimation and theta parametrization (WLSMV in *lavaan*; Li, 2016). We utilized the following criteria for judging model fit as acceptable: an ideally non-significant  $\chi^2$ -test, Comparative Fit Index (CFI)  $> .95$ , Tucker-Lewis Index (TLI)  $> .95$ , RMSEA and its 90% confidence interval (90% CI)  $< .08$ , and SRMR  $< .08$  (Schermelleh-Engel et al., 2003). As a measure of internal consistency, we report  $\omega$ , which should be larger than .70 per common recommendation (Dunn et al., 2014).

For ordered categorical data, this is done using the formula provided by Green and Yang (2009, Formula 21).

For the test of measurement invariance, we used the common procedure of comparing increasingly restrictive models in a stepwise fashion (Chen, 2007; Milfont & Fischer, 2010).

Here we used the cutoff of a model fit decay of .01 in CFI and .015 in RMSEA, in addition to the  $\chi^2$ -test, to judge whether two models are significantly different from one another. However, it should be noted that because of the dichotomous nature of the indicator variable invariance of the item intercepts –otherwise known as strong invariance– cannot be assessed because constraints are already necessary for the identification of the baseline configural model, we thus focus on configural, weak, and strict invariance models. The exact procedure has been documented by previous research (Millsap & Yun-Tein, 2004; Wu & Estabrook, 2016).

### 3. Results

Using *stuart*’s bruteforce algorithm, we arrived at a solution with satisfactory model fit for the strict invariance model:  $\chi^2(58) = 105.033$ ,  $p < .001$ , CFI=.951, TLI=.953, RMSEA=.042 [.029; .055], SRMR=.048. The remaining items and descriptive statistics are provided in Table 2. As it was to be expected, most items have higher proportions of negation (vs. affirmation) with the exception of Item 1, which has a relatively even distribution. Furthermore, corrected item-total correlations exceeded the commonly used cutoff of .300 for all items –except Item 13, which is just below the cutoff.

**Table 2**

*Item descriptive statistics of the Narcissistic Personality Inventory-8 (NPI-8) subscales*

	<i>M</i>	<i>r<sub>it</sub></i>	$\lambda$	$\omega$
1 <sup>r</sup>	1.515	.394	.648	
7 <sup>r</sup>	1.273	.446	.787	
10 <sup>r</sup>	1.354	.421	.754	
11	1.312	.354	-.636	
Leadership/Authority	5.454			.670
4	1.135	.492	.840	
8	1.149	.432	.753	
13 <sup>r</sup>	1.147	.294	-.576	
15	1.137	.467	.823	
Grandiose Exhibitionism	4.568			.829

*Note.* <sup>r</sup>=reverse-coded, *M*=mean item score for the full sample *r<sub>it</sub>*=corrected item-total correlation for the full sample;  $\lambda$ =standardized factor loading from the confirmatory factor analysis of the two-factor model in the confirmatory subsample;  $\omega$ =reliability coefficient in the confirmatory subsample.

Next, we tested the obtained two-factorial (unconstrained) baseline model in the confirmatory subsample, which yielded good model fit:  $\chi^2(19) = 47.314$ ,  $p < .001$ , CFI = .986, TLI = .980, RMSEA (90% CI) = .036 (.024; .050), SRMR = .049. The inter-correlation between latent factors was high:  $r = .680$ ,  $p < .001$ . When we compared the measurement and structural models for the two subsamples, it became evident that there were no meaningful differences between the two groups. The results of this analysis are reported in Table 4. This is evidence for the stability of the NPI-8s psychometric properties. Next, we tested for invariance between groups of age and sex. Here we found clear evidence for strict invariance with only non-significant deviations in  $\chi^2$  and no substantial decreases in fit in terms of CFI and RMSEA.

### 3.1 Validity

We report correlations with related measures in Table 5. As hypothesized, we found small to moderate negative associations between narcissistic personality traits and depression and psychological distress in general. In addition, we found a small positive relationship with depersonalization. The evaluation of external criteria revealed that participants who spent more time and money on improving their appearance scored higher on both NPI subscales. A similar effect was also observable between individuals who had (versus had not) engaged in different specific behaviors of self-beautification (see Table 6). More precisely respondents who reported using or having used exercise, aesthetic plastic surgery, hair-growth, virility, and/or muscle building supplements had substantially higher means in one or both of the scales, as indicated by  $d \geq .30$ . Generally, we observed larger effect sizes for the Leadership/Authority subscale (compared to the Grandiose Exhibitionism subscale). Cell sizes for some of the groups were rather small, specifically for the group of respondents who had aesthetic plastic surgery done on them. Thus, effect size estimates are not very reliable for these particular groups.

### 3.2 Differences based on sociodemographic variables

We explored the differences in narcissistic personality traits between sociodemographic groups, finding several instances of significant differences (see Table 1). However, because of the large sample size at play and the multiple instances of testing, these significant  $p$ -values should not be over-interpreted and instead effect size estimates should be consulted. With regard to those participants with higher education, they exhibited higher levels of narcissism on the L/A subscale –but to a lesser extent also the GE subscale– compared to those with lower education. In addition, those with full employment (vs. part-time employment and especially those without employment) and with higher income exhibited higher levels of narcissism. All other comparisons re-

vealed only small effects ( $\eta_p^2 < .020$ ).

### 3.3 Comparison of NPI-15 and -8

To further demonstrate the validity of the shortform NPI-8, we compared it to the 15-item version of the scale from which it was constructed. First, we calculated the overlap between the short and long versions of the subscales. Here we found that most variance of the NPI-15 was explained by the NPI-8,  $R_{L/A}^2 = .787$ ,  $R_{GE}^2 = .923$ . When removing the items which were retained in NPI-8 from the original scale and comparing the resulting scores to those of the NPI-8, the resulting overlap is attenuated:  $R_{L/A}^2 = .458$ ,  $R_{GE}^2 = .182$ . This is not surprising, as –in the case of the Grandiose Exhibitionism subscale– only a single item remained. For the Leadership/Authority subscale, still around half of the variance of the corrected NPI-15 was explained.

We then compared the pattern of related measures between the two NPI versions. As becomes evident in Table 4, there were no meaningful difference for either the Leadership/Authority subscale,  $z \leq .781$ ,  $p \geq .217$ , or the Grandiose Exhibitionism subscale,  $z \leq .443$ ,  $p \geq .329$ , for any of the correlation coefficient pairs. Given the large sample size, this should be considered evidence that the external validity of the NPI has been retained in the 8-item version.

Finally, we compared the NPI-8 and -15 with regard to differential effects between the sociodemographic groups analyzed in Table 1. Naturally, the sum score will be larger for the NPI-15, and so the following analyses are based on the mean score for each of the subscales. With regard to the Grandiose Exhibitionism subscale, we observed only one significant interaction effect for respondent sex:  $F(1, 2289) = 6.45$ ,  $p = .011$ ,  $\eta_p^2 = .003$ . All other ANOVAs returned insignificant results. And even the one significant effect was very small, even compared to the originally small effect of sex on the NPI GE score. With regard to the Leadership/Authority subscale, there were no significant effects. Once again we observed an interaction effect with sex:  $F(1, 2289) = 10.86$ ,  $p = .001$ ,  $\eta_p^2 = .005$ . In addition, age interacted with the questionnaire version, which is  $F(5, 2285) = 2.40$ ,  $p = .035$ ,  $\eta_p^2 = .005$ . Measured against the observed effect sizes reported in Table 1, these effects are again negligible at less than a third of the original effect.

### 3.4 Norm values

In Table 7, we present normative percentile values for comparisons with the German general population. We derived these values from the full sample and split the table by age and sex to allow for a more precise classification.

Table 3

Tests of Measurement Invariance of the Narcissistic Personality Inventory-8 (NPI-8)

Model	$\chi^2(df)$	$\Delta\chi^2$	$\Delta df$	$p$	CFI	$\Delta CFI$	RMSEA	$\Delta RMSEA$
Data sets								
Configural invariance	79.32(34)				.989		.034	
Explorative sample ( $n = 1,165$ )	38.31(19)				.990		.030	
Confirmatory sample ( $n = 1,126$ )	47.31(19)				.986		.036	
Measurement invariance	91.62(50)	12.30	12	.422	.990	.001	.027	.007
Measurement+structural invariance	92.78(55)	1.16	5	.949	.991	.001	.024	.003
Sex								
Configural invariance	59.34 (34)				.987		.036	
Female ( $n = 644$ )	41.24(19)				.978		.043	
Male ( $n = 482$ )	34.75(19)				.982		.042	
Weak invariance	67.32(42)	7.98	8	.435	.987	.000	.033	.003
Strict invariance	71.48(50)	4.16	8	.842	.989	.002	.028	.005
Age (years)								
Configural invariance	138.68(94)				.989		.035	
18–29 ( $n = 336$ )	18.85(19)				1		0	
30–39 ( $n = 358$ )	17.47(19)				1		0	
40–49 ( $n = 446$ )	24.34(19)				.992		.025	
50–59 ( $n = 392$ )	21.278(19)				.996		.018	
60–69 ( $n = 375$ )	36.68(19)				.968		.050	
$\leq 70$ ( $n = 384$ )	43.206(19)				.967		.058	
Weak invariance	179.75(134)	41.07	40	.423	.988	.001	.030	.005
Strict invariance	220.67(174)	40.92	40	.430	.988	.000	.027	.003

Table 4

Observed Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11
1–NPI GE	–	.408*	.960	.517	.058 <sup>+</sup>	.010	.036	-.022	.118*	.029	.087*
2–NPI L/A		–	.450	.887	-.049 <sup>#</sup>	-.171*	-.123*	-.093*	-.018	.078*	.134*
3–NPI GE <sup>15</sup>			–	.567	.058 <sup>+</sup>	.014	.039	-.024	.127*	.026	.074*
4–NPI L/A <sup>15</sup>				–	-.054 <sup>#</sup>	-.160*	-.120*	-.100*	-.001	.055 <sup>+</sup>	.133*
5–HADS Anx					–	.676*	.908*	.647*	.514*	.063 <sup>+</sup>	-.007
6–HADS Dep						–	.923*	.548*	.515*	-.083*	-.114*
7–HADS Total							–	.650*	.562*	-.014	-.069 <sup>+</sup>
8–CBI								–	.422*	.072 <sup>+</sup>	-.010
9–CDS									–	-.023	-.053 <sup>#</sup>
10–Time/day										–	.414*
11–Money/month											–

Note. NPI=Narcissistic Personality Inventory; GE=Grandiose Exhibitionism; L/A=Leadership/Authority; 15=Subscales of the 15-item NPI; HADS=Hospital Anxiety Depression Scale; Anx=Anxiety; Dep=Depression; CBI=Copenhagen Burnout Inventory; CDS=Cambridge Depersonalization Scale; \*=significant at  $p < .001$ ; +=significant at  $p < .01$ ; #= significant at  $p < .05$ .

#### 4. Discussion

The present study was conducted with the aim of constructing a short form of the NPI to enable a more economic assessment of narcissistic personality traits than previously similar efforts. Based on previous work by Spangenberg et al. (2013), we used an exploratory sample to construct all possible subsets of items in a two-scale solution and tested the optimal configuration in

CFA. Our findings confirm the NPI as a two-factorial measure with the dimensions Grandiose Exhibitionism and Leadership/Authority (Corry et al., 2008; Spangenberg et al., 2013). Given the fact that it only consists of four items per scale, reliability should be considered good for the former and acceptable for the latter of the two subscales. It should be mentioned that –as per theory– the NPI does not offer a total score and researchers should consider only the subscales on their own.

**Table 5**

*Comparisons of the Narcissistic Personality Inventory-8 (NPI-8) subscales between groups of self-beautifying behavior*

	No, M(SD)	Yes, M(SD)	Comparison
Grandiose Exhibitionism			
Diet	4.58(.99), n = 1472	4.54(.93), n = 819	$t(1768.61) = 1.07, p = .284, d = .04$
Exercise	4.45(.85), n = 1262	4.72(1.08), n = 1029	$t(1930.32) = 6.56, p < .001, d = .28^*$
Weight-loss-inducing supplements	4.57(.97), n = 2209	4.50(.82), n = 82	$t(89.67) = .76, p = .448, d = .08$
Aesthetic plastic surgery	4.57(.97), n = 2287	5.25(1.89), n = 4	$t(3.00) = .72, p = .523, d = .45$
Hair growth supplements	4.57(.97), n = 2270	4.90(1.18), n = 21	$t(20.25) = 1.32, p = .203, d = .31$
Virility-inducing supplements	4.57(.97), n = 2277	4.64(.93), n = 14	$t(13.17) = .30, p = .768, d = .07$
Mood-raising supplements	4.57(.97), n = 2272	4.74(1.10), n = 19	$t(18.23) = .67, p = .510, d = .16$
Supplements to enhance cognitive function	4.57(.97), n = 2252	4.74(.94), n = 39	$t(39.41) = 1.18, p = .247, d = .18$
Supplements to increase hypertrophy	4.56(.97), n = 2262	4.86(1.06), n = 29	$t(28.60) = 1.50, p = .144, d = .30$
Leadership/Authority			
Diet	5.43(1.30), n = 1472	5.50(1.28), n = 819	$t(1714.17) = 1.33, p = .185, d = .05$
Exercise	5.21(1.23), n = 1262	5.75(1.31), n = 1029	$t(2134.29) = 9.98, p < .001, d = .42^*$
Weight-loss-inducing supplements	5.45(1.30), n = 2209	5.46(1.23), n = 82	$t(87.83) = .07, p = .944, d = .01$
Aesthetic plastic surgery	5.45(1.29), n = 2287	6.72(.96), n = 4	$t(3.02) = 2.71, p = .073, d = 1.12$
Hair growth supplements	5.45(1.29), n = 2270	6.00(1.34), n = 21	$t(20.35) = 1.87, p = .075, d = .42$
Virility-inducing supplements	5.45(1.29), n = 2277	6.21(1.53), n = 14	$t(13.11) = 1.87, p = .084, d = .54$
Mood-raising supplements	5.46(1.29), n = 2272	5.32(1.34), n = 19	$t(18.28) = .45, p = .656, d = .11$
Supplements to enhance cognitive function	5.45(1.29), n = 2252	5.59(1.35), n = 39	$t(39.21) = .63, p = .530, d = .11$
Supplements to increase hypertrophy	5.44(1.29), n = 2262	6.38(1.47), n = 29	$t(28.55) = 3.41, p = .002, d = .68^*$

*Note.* \* = significant at  $p < .05$ . We used Welch's robust  $t$ -test with adjusted  $df$ , wherever samples or variances were unequal; we judged sample sizes as unequal when one was at least 50% larger than the other.

**Table 6**

*Comparisons of the Narcissistic Personality Inventory-8 (NPI-8) subscales between groups of self-beautifying behavior*

Female (n = 1,278)												
Age group	18–29 years (n = 187)		30–39 years (n = 207)		40–49 years (n = 247)		50–59 years (n = 211)		60–69 years (n = 199)		≥ 70 years (n = 227)	
4	28	60	30	69	25	67	31	74	41	73	42	81
5	57	81	59	89	58	84	58	87	68	88	71	92
6	73	94	81	94	77	94	80	94	67	98	87	97
7	92	96	93	98	93	98	95	100	96	100	97	100
8	100	100	100	100	100	100	100	100	100	100	100	100
Male (n = 1,278)												
Age group	18–29 years (n = 149)		30–39 years (n = 151)		40–49 years (n = 199)		50–59 years (n = 181)		60–69 years (n = 176)		≥ 70 years (n = 157)	
Scale	L/A	GE	L/A	GE	L/A	GE	L/A	GE	L/A	GE	L/A	GE
4	26	60	27	53	21	52	34	66	22	70	33	80
5	49	81	48	72	42	78	59	81	52	85	59	90
6	65	88	63	91	63	89	77	92	73	91	77	94
7	85	97	85	96	87	99	90	97	91	98	90	99
8	100	100	100	100	100	100	100	100	100	100	100	100

*Note.* L/A=Leadership/Authority, GE=Grandiose Exhibitionism. Percentile ranks denote the percentage of respondents exhibiting an equal or lower score.

We present evidence for strict invariance across respondent sex and age groups. This finding in particular is of relevance, since measurement invariance for these sociodemographic variables has not yet been shown for any German measure of narcissistic personality. The norm values established in the present study allow for comparisons of individual scores with the German population.

In terms of its validity arguments, we found many of the hypothesized correlations between one or both of the NPI-8s subscales and measures of psychological distress.

Specifically, the Leadership/Authority subscale was associated with fewer symptoms of depression and psychological distress overall (Spangenberg et al., 2013). The Grandiose Exhibitionism subscale, on the other hand,

was mainly correlated with depersonalization experiences (Frances et al., 1977; Michal et al., 2006). In terms of predictive validity, we found that both subscales were minor predictors of time and money spent on ones appearance, which is consistent with previous findings with regard to appearance orientation (Davis et al., 2001). In addition, we found mean differences of various magnitudes in both subscales when comparing between groups of individuals who were (vs. were not) taking certain measures of self-beautification. Across the board, all differences of meaningful effect size indicated higher narcissism values for those who engaged in these behaviors. The largest differences were found for the Leadership/Authority subscale and for usage of exercise, aesthetic plastic surgery, hair-growth, virility, and/or muscle building supplements.

In an exploratory analysis, we found moderate differences in narcissism between groups of education and employment, that is, individuals with higher levels of education and those with full (vs. part-time or no employment) had higher scores. This fits well with previous research demonstrating links between narcissism and employment as well as achievement (Back et al., 2013; Elliot & Thrash, 2001; Soyer et al., 1999).

Finally, we compared the NPI-8 to the NPI-15 from which it was constructed. Naturally, the removal of items will lead to the loss of some explained variance compared to the original scale. However, it became evident that the correlational patterns of the NPI-15 with related scales were reproduced by the NPI-8 with only insignificant deviations with regard to the association strengths. Furthermore, the fact that differences between sociodemographic groups are replicated close to perfectly, speaks for the validity of the shortform NPI-8.

## 5. Limitations

It should be noted that we utilized CFA, which is based on structural equation modeling. Item response theory (IRT) provides alternative approaches that generally lead to similar results but may diverge substantially in some cases (Joreskog & Moustaki, 2001; Kamata & Bauer, 2008). For instance, our two-factorial correlated factors model could in principal also be modeled in *mirt* (Chalmers, 2012), complete with tests of differential item functioning –the IRT equivalent of measurement invariance testing. We chose the CFA approach because the scale construction algorithm provided in *stuart* does not have, to our knowledge, an equivalent in IRT, yet. As noted above, results of CFA and IRT should converge in most cases; nonetheless, future research should aim to replicate our findings using IRT.

Furthermore, it bears mentioning that the NPI-8 was constructed from the NPI-15, not the original NPI-40. This means that the pre-selection that took place for the 15-item version is assumed in the present investigation.

One consequence of this could be a smaller number of latent factors. Since Spangenberg et al. (2013) presented convincing evidence of the NPI-15s psychometric qualities, this is only a minor concern. Nonetheless, it should be taken into account when designing a study that the NPI-8 is a screening instrument and that longer versions will likely provide a broader assessment of narcissistic personality.

## 6. Conclusion

In all, the NPI-8 can be recommended as valid and – given its brevity– reliable measure of narcissistic personality traits. It will be particularly useful in large-scale surveys and studies that necessitate an economical form of assessment.

## 7. Acknowledgments

We are grateful to Alina Kähler for technical assistance with the manuscript.

## 8. Author contributions statement

EB designed the study and supervised the data collection. BS did the statistical analyses. All authors participated in writing the article, gave valuable information while working on this publication, and have read and approved the final version of the draft.

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