Linguistic Markers of Narcissism:
An Exploratory LIWC Analysis of 15 Samples

Nicholas S. Holtzman¹, Allison M. Tackman², Angela L. Carey², Melanie S. Brucks³, Albrecht
C. P. Küfner⁴, Fenne große Deters⁵, Mitja D. Back⁴, M. Brent Donnellan⁶, James W.
Pennebaker⁷, Ryne A. Sherman⁸, Matthias R. Mehl²

¹Georgia Southern University

²University of Arizona

³Stanford University

⁴University of Münster

⁵University of Potsdam

⁶Michigan State University

⁷University of Texas at Austin

⁸Hogan Assessment Systems

Address correspondence to:

Nicholas S. Holtzman
Department of Psychology, P.O. Box 8041
Georgia Southern University
Statesboro, GA 30460-8041
Email: nick.holtzman@gmail.com

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Abstract

Narcissism is virtually unrelated to using first-person singular pronouns (Carey et al., [2015] *Journal of Personality and Social Psychology*, 109). The degree to which narcissism is linked to other aspects of language use, however, remains unclear. We conducted a multi-site, multi-measure, and dual-language project to identify potential linguistic markers of narcissism. We applied the Linguistic Inquiry and Word Count (LIWC) program to a large number of written and spoken texts across 15 samples (total $N = 4,941$). The strongest positive correlates of narcissism were: using words related to sports, second-person pronouns, and swear words. The strongest negative correlates of narcissism were: using anxiety/fear words, tentative words, and words related to sensory/perceptual processes. All effects were small (each $|r| < .10$).

Keywords: language, LIWC, narcissism, personality, text analysis

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Our words often betray who we are. Personality psychology has recently identified various links between the Big Five personality traits—openness, conscientiousness, extraversion, agreeableness, and neuroticism—and word use (Fast & Funder, 2008; Ireland & Mehl, 2014; Kern et al., 2014; Schwartz et al., 2013; Yarkoni, 2010). Relatively little is known, however, about the degree to which narcissism reveals itself through word use. With a few choice exceptions (Bogolyubova, Panicheva, Tikhonov, Ivanov, & Ledovaya, 2018; Preotiuc-Pietro, Carpenter, Giorgi, & Ungar, 2016; Sumner, Byers, Boochever, & Park, 2012), the prominent studies on narcissism and language have been conducted on small samples (Fast & Funder, 2010; Hancock, Woodworth, & Porter, 2013; Holtzman, Vazire, & Mehl, 2010). Indeed, even some of the larger samples might still be considered underpowered (Preotiuc-Pietro, et al., 2016), given the typically modest effect sizes for psychological language markers (with most maximum correlations at .10 to .15; e.g., Kern, et al., 2014). Accordingly, the overarching goal of this paper was to use a large collection of datasets (multi-lab, multi-measure, and dual-language), which we used in a previous collaboration (Carey et al., 2015), to provide a more clear answer as to whether there are any word (category) patterns that can help identify narcissistic individuals. Additionally, motivated by findings that men and women may differ in their linguistic correlates in this domain (Fast & Funder, 2008), we also explore gender differences in the associations between narcissism and word (category) use.

We use the Linguistic Inquiry and Word Count (LIWC) program for our analyses, as it is currently one of the most commonly used and best validated approaches to studying word use in social/personality psychology. This program was developed by James Pennebaker and

colleagues (Pennebaker, Francis, & Booth, 2001) and offers an efficient way to code text files on a number of dimensions. We chose to use the LIWC 2001 dictionary (rather than a more recently developed dictionary) because, for this dictionary, a translated German version (a language used in several of our samples) is available that has been validated for psychometric equivalence (Wolf et al., 2008). LIWC 2001 counts how many times words from 87 categories have appeared in a text file; in the end, each text file is assigned a set of 87 scores, each of which indicate the percent of occurrence relative to the total number of words in the file. Using this technology, we aim to answer two research questions.

Research Question 1: Are there robust LIWC Correlates of Narcissism?

The first question is whether we can identify a robust set of LIWC correlates of grandiose narcissism. This is a controversial question, as a recent study of Twitter data (final $N = 491$) suggests that there is not a robust set of LIWC correlates of narcissism (Preotiuc-Pietro, et al., 2016); the prediction equation led to a multiple R of .15 in their study (using the set of LIWC variables as predictors). The study provided a first glimpse at the LIWC profile of narcissism. It is important to note that the study was limited in several ways: (a) the number of users was substantial but ultimately not large enough to detect small effects and (b) the generalizability is questionable, given that it is based solely on Twitter—an inherently public, one-to-many computer-mediated communication that limits the number of characters one may use in any given communication (i.e., in any given tweet). Thus, the Preotiuc-Pietro et al. (2016) study provides a solid starting point for answering this research question, while it has some limitations that our study seeks to address.

To answer this question, we take an explicitly exploratory approach based on a large amount of text data derived from various communication contexts. We correlate narcissism with

each of the LIWC 2001 categories, excluding the “I” category, which we studied in our previous publication on narcissism (Carey, et al., 2015), and excluding the punctuation categories because punctuations can be arbitrary in verbatim transcripts of spoken language; we also excluded emoticons because they do not appear in (transcribed) spoken language. Thus, after the exclusions had been accounted for, we ran correlations with 72 LIWC categories. Our exploratory approach allows us to identify potential effects in a transparent fashion. This is conceptually similar to what has been done in other exploratory research in personality, especially in using Q-sort methods (Block, 1961; Fast & Funder, 2010; Funder, Furr, & Colvin, 2000; Sherman, Nave, & Funder, 2010). The logic is that, given enough data, reliable correlates will emerge. Last but not least, this exploratory approach has the additional advantage of minimizing HARKing—hypothesizing after the results are known (Kerr, 1998), which can distort the literature by portraying exploratory research as confirmatory.

One reason to expect that narcissism has detectable LIWC correlates is that there is evidence that theoretically and empirically related traits such as extraversion and disagreeableness have robust LIWC correlates (Schwartz, et al., 2013; Yarkoni, 2010). However, one might expect these correlations to be modest in magnitude for at least two reasons—one statistical and the other substantive. The statistical reason one might not expect large correlations is because effect sizes tend to be modest in studies that are adequately powered, including large-scale collaborative efforts to estimate the reproducibility of psychological science (Aarts et al., 2015; Ioannidis, 2005; Sterne, Gavaghan, & Egger, 2000); such effects by the Center for Open Science are presumably less influenced by publication bias than small studies—studies that often produce larger effects, likely due to publication bias. The substantive reason one might not expect large correlations is because narcissistic people can be versatile and amorphous (i.e.,

quick to change) in their social presentation (Emmons, 1984), much like people high in Machiavellianism (Jonason & Webster, 2012), and this might manifest in a relatively unstable language profile, even within a particular language context. Finally, small effects are to be expected in any multiply-determined outcome (like language), so no single variable is likely to have a large effect (Strube, 1991).

Given that we are not expecting large effects by conventional standards (Gignac & Szodorai, 2016; Hemphill, 2003), it is important to provide a benchmark for what constitutes a sizable effect in this type of analysis. Large scale studies ($N > 1,000$) linking personality to language markers in fact rarely find individual LIWC effects for which $|r| > .15$ (Kern, et al., 2014; Schwartz, et al., 2013; Yarkoni, 2010). Indeed, extraversion, which is a close positive correlate of narcissism (Paulhus, 2001), and which is arguably one of the most prominent and important personality variables, had only 2 out of 87 LIWC effects for which $|r| > .10$ (Schwartz, et al., 2013). The study by Kern and colleagues (2014) produced even smaller effects. Thus, in our study, we do not expect to find many correlations for which $|r| > .10$.

Research Question 2: Are there Gender Differences in the LIWC Correlates of Narcissism?

The second research question we intend to answer is whether there are consistencies across men and women in the profiles of correlations. Prior research in this area has shown that there are gender differences in the language correlates of narcissism (Fast & Funder, 2010); in particular, it has been demonstrated that for men, some facets of narcissism are positively correlated with first-person singular pronoun use, whereas for women this is not the case. Although follow-up research generally did not support this pattern with regard to first-person singular pronouns (Carey, et al., 2015), it is important to consider the possibility that it could be relevant to a broader study of LIWC correlates of narcissism. Thus, we explore gender

differences in the LIWC correlates of narcissism in our study.

Overview of Aims and Scope

In sum, our objective is to test for significant LIWC correlates of narcissism and to determine whether there are any gender differences in the correlations between LIWC and narcissism. We do not explore context-specificity of the correlates (as the study by Carey and colleagues did), as exploring many LIWC variables across many contexts would (in the absence of specific hypotheses, which we do not have due to missing prior research) increase the chances of Type I errors. We also do not explore correlates of potential facets of narcissism as (a) this would also substantially increase the number of tests and (b) the complexity of such analyses exceed what we deemed feasible in our data set given that, in the 15 samples, narcissism was assessed with different measures (both type and language of measure). Moreover, there is some evidence that the Narcissistic Personality Inventory does not allow for the reliable assessment of certain facets of narcissism, especially the exploitativeness/entitlement facet (Grosz et al., in press). This makes the endeavor to conduct facet-level analyses difficult (if not impossible) given the data used here, which we collected over the past decade and which was collected prior to and during the establishment of other arguably more comprehensive and psychometrically sound narcissism measures, such as the NARQ (Back et al., 2013) and the PNI (Pincus et al., 2009). Ultimately, our study was motivated by the goal to find a stable LIWC-based linguistic profile for grandiose narcissism that could then be integrated into, and interpreted on the background of, the existing LIWC research (Ireland & Mehl, 2014; Tausczik & Pennebaker, 2010).

Method

The data are the same as the data used in Carey and colleagues (Carey, et al., 2015). However, there are some notable differences in methodology. First, in the Carey study, the data

were analyzed at the level of the individual. In this study, we analyzed the data at the level of the aggregate sample statistic (i.e., we examined correlations, sample by sample) and then we meta-analytically synthesized the results. Prior research has shown that the two approaches—analysis at the individual level versus at the sample level—tend to produce similar results (Fleeson & Gallagher, 2009; Steinberg et al., 1997). Second, in the Carey study, the data were analyzed with context as a moderator; here, we refrain from doing so to not further exacerbate the multiple comparison problem (our reported analyses are already based on over 200 statistical tests).

Samples and Procedures

Important information about the study samples is summarized in Table 1. We acknowledge that sample sizes for the individual samples were determined by convenience and were based on logistical constraints, and they were not necessarily concerned with statistical power in mind.

Sample 1. As part of a larger study, 101 introductory psychology students completed a series of questionnaires and gave a videotaped self-description that was later transcribed. For more details on the sample and procedures, see Krause, Back, Egloff, and Schmukle (2011).

Sample 2. As part of a larger study, 68 introductory psychology students completed a series of questionnaires and participated in a videotaped group session (including 2 males and 2 females) wherein their task was to describe themselves to the other three group members (Küfner, Nestler, & Back, 2013).

Sample 3. As part of a larger study, 340 college students completed a series of questionnaires online and participated in a videotaped group session (4–6 individuals). As part of the group session, they introduced themselves briefly to the other group members based on the prompt “Tell something about yourself, what you study, what your hobbies are, and so forth” (Küfner & Back, unpublished data, 2010).

Sample 4. Seventy-three introductory psychology students participated in a study on the first day of class. Participants were randomly assigned to a seat as they entered the room. They were then (one after the other) asked to step forward to a marked spot on the floor and briefly introduce themselves. Immediately afterward, they were rated by the other class members for first impressions. In addition, they engaged in several brief writing tasks as part of another class session. One task asked them to write down specific attributes they have and the other task asked them to write down their goals. For more details see Back and colleagues (2010).

Sample 5. As part of a larger study, 133 introductory psychology students completed a series of questionnaires a few days before participating in a behavioral study. For the behavioral study, they were seated in front of a camera and asked to introduce themselves in response to the prompt “Please tell us about yourself, your hobbies, what you are interested in, and so on.” Fifty three participants also participated in the study described in sample 4. For more details see Back, Schmukle, and Egloff (2009).

Sample 6. Fifty-four online social network users were recruited through Germany-wide advertisements for an online study of personality. They completed a series of personality measures and provided researchers with the “about me” descriptions on their profile pages (Küfner & Back, unpublished data, 2010).

Sample 7. Two hundred forty two introductory psychology students were asked to write for five minutes about any topic that they wanted to, provided that they wrote for the entire time without stopping (Holtzman & Donnellan, unpublished data, 2012).

Sample 8. Three hundred twelve psychology students wrote short essays in response to four different prompts adapted from McAdams’s (2008) Life Story Interview. Participants were asked to (a) describe a personal memory they considered “self-defining,” (b) describe a scene,

episode, or memory in their life that stands out as an especially positive experience or high point in their life story, (c) identify a scene that stands out as a low point in their life story, and (d) describe themselves, either by discussing their life or their characteristics, or both (Donnellan & Holtzman, unpublished data, 2012).

Sample 9. Four hundred fifty three psychology students wrote short essays in response to six different prompts modeled after the Life Story Interview. These prompts asked them to (a) describe an important scene, episode, or moment in life that stands out as either especially positive or especially negative (i.e., high point or low point in their life story), (b) describe an episode or moment that stands out as a significant event in their romantic life, love life, or sexual life, (c) write about the person they care most about in life and describe the person, (d) describe a recent problem or trouble that they had to face and tell how they overcame it, (e) write what they like most about themselves, and (f) write about what they like least about themselves (Donnellan & Holtzman, unpublished data, 2013).

Sample 10. Seventy four Facebook users were recruited via mailing lists of student organizations from German universities. They completed a series of questionnaires and provided researchers with access to their Facebook status updates (Deters, Mehl, & Eid, 2014).

Sample 11. As part of a larger study, 132 Facebook users were recruited from introductory psychology classes. They completed a series of questionnaires and provided researchers with their Facebook status updates (Deters & Mehl, 2013).

Sample 12. As part of a class assignment, 751 introductory psychology students completed a series of questionnaires and participated in a stream of consciousness writing task (similar to the task described in Holleran & Mehl, 2008) as well as a task that required them to write short essays in response to a picture from the Thematic Apperception Test (Murray, 1943).

Sample 13. As part of a class assignment, 921 introductory psychology students completed a series of questionnaires as well as a stream of consciousness writing task. (The task was identical to that used for Sample 12.)

Sample 14. As part of a class assignment, 1,210 introductory psychology students completed a series of questionnaires as well as a stream of consciousness task (identical to Samples 12 and 13), a Thematic Apperception Test (identical to Sample 12), and an essay in response to the prompt “Write about who you are.”

Sample 15. As part of a larger study, 77 Facebook users recruited from introductory psychology courses completed a series of questionnaires and provided researchers with their Facebook status updates.

Measures

Important information about the study measures is summarized in Table 1.

Table 1. Sample descriptions and narcissism POMP scores.

Sample	Task	Lang.	Measure	α	Total Sample			Females			Males		
					<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
1	1.1 Video-taped self-descriptions	G	NPI 15	.75	101	25.48	19.33	78	25.30	19.29	23	26.09	19.88
2	2.1 Describe yourself to group members	G	NPI 40	.78	68	35.96	14.70	34	32.35	11.84	34	39.56	16.50
3	3.1 Introduce yourself to group members	G	NPI 40	.82	340	36.42	15.76	233	35.06	15.09	107	39.37	16.83
4	4.1 Write down specific attributes you have 4.2 Write down goals 4.3 Video-taped self-descriptions	G	NPI 40	.84	73	39.90	17.03	52	38.22	16.93	21	44.05	16.98
5	5.1 Introduce yourself into camera	G	NPI 40	.82	133	36.20	16.09	77	34.94	15.64	53	38.63	16.87
6	6.1 "About me" on German social media profile	G	NPI 15	.84	54	35.75	19.20	44	35.69	19.05	10	36.00	20.89
7	7.1 Direct replication of Raskin & Shaw (1988)	E	NPI 40	.83	242	40.65	16.63	199	40.17	16.52	43	42.88	17.19
8	8.1 Self-defining memory essay 8.2 High point in life essay 8.3 Low point in life essay 8.4 Describe yourself essay	E	NPI 40	.82	312	40.89	16.23	208	40.02	15.44	103	42.88	17.54
9	9.1 Important memory or life episode essay 9.2 Important moment in romantic life essay 9.3 Person you care most about essay 9.4 Recent problem essay 9.5 Like most about yourself essay 9.6 Like least about yourself essay	E	NPI 40	.84	453	42.59	17.12	326	41.79	16.89	124	44.74	17.71
10	10.1 Facebook status updates	G	NPI 15	.70	74	32.61	19.18	57	30.39	17.97	17	40.06	21.71
11	11.1 Facebook status updates	E	NPI 40	.83	132	45.94	17.53	84	42.00	15.39	48	52.83	19.01
12	12.1 Stream of consciousness task 12.2 Thematic apperception test	E	NPI 16	.70	751	34.55	19.45	472	31.97	18.22	279	38.91	20.68
13	13.1 Stream of consciousness task	E	NPI 16	.65	921	31.20	17.96	562	28.89	17.40	359	34.81	18.24
14	14.1 Stream of consciousness task 14.2 Thematic apperception test 14.3 "Who am I?" writing task	E	Dirty 12	.74	1,210	67.54	14.62	751	66.08	14.95		70.20	13.54
15	15.1 Facebook status updates	E	NPI 40	.77	77	39.22	14.4	60	37.54	14.28	17	45.15	13.59

Note: Lang. = Language; G = German; E = English; NPI = Narcissistic Personality Inventory; Dirty 12 = Dirty Dozen; α = Cronbach's alpha. Narcissism Scores are in POMP units, reflecting percentage values relative to the maximum possible score (Cohen, Cohen, Aiken, & West, 1999); this facilitates comparisons across samples.

Narcissism. The 40-item Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988) was administered in the original English version in Sample 7, Sample 8, Sample 9, Sample 11, and Sample 15. The 16-item NPI (Ames, Rose, & Anderson, 2006) was administered in Sample 12 and Sample 13 and it uses select items from the NPI-40. In prior research, the 16-item version correlated .90 with the NPI-40 (Ames, et al., 2006). The German version of the 40-item NPI (Schütz, Marcus, & Sellin, 2004) was administered in Sample 2, Sample 3, Sample 4, and

Sample 5. The German 15-item NPI version (Schütz, et al., 2004) was administered in Sample 1, Sample 6, and Sample 10. In prior research, the German 15-item NPI version correlated .67 with the German 40-item NPI version (Schütz, et al., 2004). Finally, the Dirty Dozen (Jonason & Webster, 2010), a newer but already widely-used 12-item measure of the dark triad, was administered in Sample 14. The four narcissism items from the Dirty Dozen are: I tend to “want others to admire me,” “want others to pay attention to me,” “seek prestige or status,” and “expect special favors from others.” In the validation study, Dirty-Dozen-measured and NPI-measured Narcissism were correlated $r = .46$ (Jonason & Webster, 2010).

LIWC. We chose to use LIWC 2001 to analyze the data for all 15 data sets because this version of the LIWC dictionary is currently the only one that can be used to score English and German responses in the same metric. All videotaped introductions and interactions were transcribed and saved as text documents. All written documents were saved as text documents and, where sample size permitted, were manually cleaned and spell checked. The resulting text documents from English samples were submitted to the English version of Linguistic Inquiry and Word Count 2001 (Pennebaker, et al., 2001). The resulting text documents from the German samples were submitted to the psychometrically validated German LIWC 2001 dictionary (Wolf, et al., 2008). For the purpose of this study, we focused on how narcissism is related to 72 LIWC categories. All LIWC measures are in a percentage-based metric—that is, expressed relative to all words in a participants’ (written or spoken) text sample.

Data Analytic Strategy

First, we aimed to arrive at one LIWC category score (in raw form) per participant. Thus, in the datasets in which there were multiple language tasks, we ran LIWC on each task, and then we averaged the LIWC scores across the tasks. Next, we correlated the LIWC scores with

narcissism using weighted Pearson's correlations (Bills & Li, 2005); we weighted each participant by the number of words provided. A weighting method was selected because some participants provided much more linguistic information (i.e., more words) than others. The advantage of this method is that it differentially weights participants who have provided more information (in some cases, hundreds more words), and thus it appropriately down-weights cases that are based on less text data.

Next, we aimed to aggregate the correlations across the 15 data sets. To do so, we used the `metafor` package for meta-analysis in R (Viechtbauer, 2010); we used the fixed effects model because we aimed to determine the effect sizes for this (fixed) set of 15 studies, rather than make inferences about broader sets of studies in the population (Viechtbauer, 2010). We ran this process three times: for the total sample, for females, and for males. Given the large number of effects that we report, we focus on the effect sizes, rather than modeling the variability among the effects. Following recommendations to decrease reliance on significance testing, we computed 95% confidence intervals for each point estimate (Cumming, 2013). To enhance readability (i.e., to avoid displaying the numerous LIWC effects), we focus on the top 15 (most positive) and bottom 15 (most negative) LIWC correlates of narcissism for the total sample, for females, and for males.

Descriptive Statistics

The means and standard deviations for the LIWC variables for the narcissism measures are shown in Table 1, and the means and standard deviations for the 72 LIWC word categories, by sample, are listed in the Supplemental Material – LIWC Descriptives. Note that some of the cells are empty because of differences between the English and German dictionaries.

Results

Testing the Overall Effect

To estimate the degree to which narcissism is associated with relative word frequencies in the LIWC dictionary in general, we conducted a randomization test following the method prescribed by Sherman and Funder (2009). First, we calculated the weighted correlations between narcissism and 72 LIWC categories, weighted by word count, for each of the 15 datasets. (The word count category was not weighted by word count as it did not make sense to weight the variable by itself.) Second, we meta-analytically combined the weighted correlations across the studies, weighting by sample size, to get 72 correlations between narcissism and LIWC. Third, the average absolute correlation was taken as the observed average absolute association between narcissism and LIWC ($|\bar{r}| = .0194$). This value serves as a gauge for the overall association between narcissism and LIWC.

To determine if this value is larger than one would expect under a random model of no association between narcissism and LIWC, we did the following 100,000 times: (1) within each data set we randomly re-assigned narcissism scores to participants (i.e., shuffled the narcissism scores); (2) we repeated the steps just previously described to calculate an average absolute association between narcissism and LIWC. We saved the values of each of these 100,000 randomizations as a sampling distribution for our observed value. For only 3 of the 100,000 randomizations did the randomizations yield a value greater than or equal to the observed absolute effect size value. Thus, the probability of the observed relationship between narcissism and LIWC word frequencies is estimated to be 3 in 100,000 ($p = .00003$). This is strong evidence that overall, narcissism has real (i.e., beyond chance) relationships to word frequencies (i.e., across all tested LIWC variables).

LIWC Profile of Narcissism

Next, a meta-analysis of the 15 studies was conducted on the weighted correlations. (See the Supplemental Material – Weighted Correlations by Sample.) The top 15 (most positive) and bottom 15 (most negative) LIWC correlates of narcissism are displayed in Figure 1; we display the effects for the total sample as well as for females only and males only. The full sets of correlations for all LIWC variables for the total sample, for females only, and for males only, are available in the Supplemental Material – Figure of Overall Narcissism Effects. In the total sample (i.e., ignoring gender), 17 of the 72 effects were statistically significant at the $p < .05$ level; seven were statistically significant at the more stringent $p < .01$ level; five were significant at the even more stringent $p < .005$ level (Benjamin et al., 2018). Narcissism was most positively correlated with using sports-related words ($r = .042$, $p = .003$, 95% CI [.014; .070]), second person pronouns such as “you” ($r = .035$, $p = .02$, 95% CI [.007; .063]), and swear words ($r = .032$, $p = .025$, 95% CI [.004; .060]). Narcissism was most negatively related to using “anxiety or fear” words ($r = -.065$, $p < .001$, 95% CI [-.093; -.036]), tentative words ($r = -.045$, $p = .002$, 95% CI [-.073; -.017]), and senses words ($r = -.044$, $p = .005$, 95% CI [-.075; -.014]).

When applying a full Bonferroni correction for the entire study, $(.05/[3*72]) = .0002$, the only statistically significant finding that emerged was the negative relationship between narcissism and the LIWC category “anxiety or fear” ($p < .0001$); none of the other effects, including the gender-specific effects—to which we turn next—were significant at this maximally stringent level, although this stringent level is quite likely too conservative (e.g., García, 2004).

Figure 1. Correlation coefficients with 95% confidence intervals for the top 15 (most positive) and bottom 15 (most negative) LIWC correlates of narcissism. Parenthetical r s are for Total r s.

Correlations by Gender and a Test for Between-Correlation Gender Differences

Among females, narcissism was most positively correlated with the “humans” category ($r = .046, p = .01, 95\% \text{ CI } [.011; .080]$), and it was most negatively correlated with “anxiety or fear” words ($r = -.061, p < .001, 95\% \text{ CI } [-.097; -.026]$). Among males, narcissism was most positively correlated with certainty ($r = .050, p = .048, 95\% \text{ CI } [.0004; .0992]$), and it was most negatively correlated with tentative words ($r = -.051, p = .04, 95\% \text{ CI } [-.100; -.002]$).

Next, we examined gender differences for each specific LIWC category; the full results are available in the Supplemental Material – Gender Differences. Using the equation 2.8.5 from Cohen and Cohen (1983), which compares the magnitudes of correlations from independent samples, we found two gender differences that were significant ($ps < .05$). The two were as follows: The correlation between narcissism and word count was greater for women than men ($Z = 2.204, p = .028$); and the correlation between narcissism and percent of words captured as LIWC dictionary words was greater for men than women ($Z = 2.030, p = .042$). Overall, the number of gender differences we found is fewer than what can be expected by chance alone, given that we ran 72 statistical tests (at chance, 3.6 out of 72 would be significant at $p < .05$), and thus these two highlighted differences probably do not reflect real differences.

To determine whether the profile for females was similar to the profile for males, we ran a column-vector correlation (Funder & Sneed, 1993). This approach takes the column of correlations for females, the column of correlations for males, and then correlates them (after using the appropriate r -to- z transformation); it indexes the degree of similarity between the profiles. In this case, the correlation was small for a profile correlation ($r = .321$), indicating only modest similarity between the females and the males with regard to LIWC correlates of narcissism. It is worth mentioning that because the 72 correlations hovered around zero, this

pattern may have stifled our ability to detect a large profile correlation, and thus it is possible that the profile correlation reported here is underestimated.

Discussion

Our exploratory, multi-site, multi-measure, and dual language analysis into linguistic markers of narcissism revealed several statistically significant correlations based on the full set of LIWC categories, and our randomization test revealed strong evidence that overall LIWC categories are related to narcissism. These effects tended to be small in magnitude. Moreover, there was little evidence of a gender-differentiated profile so we do not consider gender differences further. The majority of our Discussion focuses on four significant correlations in the total sample that could be viewed as particularly theoretically and empirically interesting: the positive association between narcissism and sexual word use, the positive association between narcissism and swear word use, the negative association between narcissism and tentative word use, and the negative association between narcissism and anxiety-related and fear-related words. After discussing these findings one by one and then integrating them, we turn our attention to a key question of general importance: If it is the case that narcissism has consistently only small associations with dictionary-based categories (i.e., LIWC categories), then why is this the case?

Candidate Linguistic Markers of Narcissism: More Sexual Words, More Swear Words, Fewer Tentative Words, and Fewer Anxiety-Related and Fear-Related Words

First, consistent with empirical research (e.g., Holtzman, et al., 2010; Sumner, et al., 2012) and theory (Buss & Shackelford, 1997; Foster, Shrira, & Campbell, 2006; Holtzman & Donnellan, 2015; Jonason, Li, Webster, & Schmitt, 2009), narcissism was associated with using more sexual words. The idea is that narcissistic people will use sexual language to create a sexualized environment (McNulty & Widman, 2014), perhaps as a means to signaling their own

sexual availability or to prime sexual concepts in the minds of sexually-available others. In short, this linguistic result makes sense theoretically (Holtzman, in press), it contributes to a blossoming literature on narcissism and sexual behavior (Dufner, Rauthmann, Czarna, & Denissen, 2013), and it seems like a fruitful area for further study.

Second, narcissism was associated with using more swear words (cf. Feldman, Lian, Kosinski, & Stillwell, 2017). One explanation of this effect is that narcissistic people tend to be disagreeable (Paulhus, 1998, 2001; Paulhus & Williams, 2002), and one linguistic marker of disagreeableness is swearing (Kern, et al., 2014, Figure 1; Mehl, Gosling, & Pennebaker, 2006). An alternative way to think about this is that it may be part of the general tendency for narcissistic people to seek attention (Morf & Rhodewalt, 2001). At times, it seems as if narcissistic people wish to have attention even for socially unacceptable behavior. In line with this idea, Oscar Wilde (1890/1998) once wrote that “there is only one thing in the world worse than being talked about and that is not being talked about.” Narcissistic people tend to do what it takes to be talked about, including swearing.

Third, narcissism was associated with using fewer tentative words. Narcissistic people tend to be dominant (Bradlee & Emmons, 1992; Cheng, Tracy, & Henrich, 2010) and exploitative (Raskin & Terry, 1988); in general, they are self-assured and confident (Campbell, Goodie, & Foster, 2004). It is a rare narcissistic individual who is submissive and tentative about things. So, perhaps it is unsurprising that narcissistic people are less tentative in their language (i.e., rarely using words like “maybe”, “perhaps”, and “guess”). This is consistent with previous work on narcissism and tentative words (Sumner, et al., 2012).

Fourth, we also found that narcissism is negatively related to using words related to anxiety and fear (e.g., afraid, distraught, horror). This was the most robust effect in the analysis.

The negative association between narcissism on the one hand, and expressing fear or anxiety on the other, has been substantiated (Foster & Trimm, 2008): Narcissistic people tend to be disinhibited, and this manifests in low scores on the Behavioral Inhibition Scale (Foster & Trimm, 2008). This is what others have referred to as a “shortage of restraints” (Vazire & Funder, 2006). Thus, one interpretation is that narcissistic people—at least grandiose narcissistic people (Miller et al., 2011; Wink, 1991)—actually experience little fear and anxiety, and this is betrayed by their word use. Another possible way to interpret this finding is that narcissistic people may have some anxiety and fear, but these emotions may not register consciously and thus do not get expressed in language; this latter interpretation is consistent with the perspective that grandiose narcissism masks underlying vulnerabilities (Cheng, Tracy, & Miller, 2013). While our data cannot resolve this ongoing debate in the literature about whether narcissistic people really are vulnerable “deep down” (Campbell, Bosson, Goheen, Lakey, & Kernis, 2007), our data does point to this interesting notion: Narcissistic people appear not to verbalize indicators of vulnerability—namely, anxiety and fear.

All in all, grandiose narcissism manifests in a linguistic profile that appears certain, confident, and perhaps low in vulnerability. Relatedly, previous research has highlighted the link between narcissism and invulnerability (Aalsma, Lapsley, & Flannery, 2006; Barry, Pickard, & Ansel, 2009). A cocky, tough, and sure-minded language profile seems to integrate many of these findings. Moreover, narcissistic people present as sexually explicit and prone to using profanity (Adams, Fiorell, Burton, & Hart, 2014); conversely, they tend not to use words reflecting uncertainty, anxiety, or fear. Collectively, this set of linguistic manifestations points to an attention-getting personality that is (at least on the surface) confident and certain.

Why is Narcissism Somewhat Difficult to Detect via Language Analysis?

On the basis of our fairly modest effect sizes, one might inquire: Why is narcissism somewhat difficult to detect via language analysis? One possibility is that the way in which narcissistic people talk—and, by extension, how narcissism is revealed—changes as a function of acquaintance (i.e. how long a person has known the target). Given that narcissistic people tend to present themselves as more agreeable earlier on in acquaintance, and then become less agreeable later (Paulhus, 1998), this leaves the possibility of “diagnostic” language profiles changing as a function of acquaintance. Importantly and unfortunately, almost all of our text samples were derived from zero-acquaintance scenarios (e.g., short interactions, writing in response to certain instructions), and thus we cannot directly test this hypothesis here. This feature of our data prevents us from using this dataset to more fully understand narcissistic people in their everyday behavioral modes within their everyday social networks. Prior work using ecological language sampling (Holtzman, et al., 2010) suggests that when narcissistic individuals’ word use is assessed directly within their existing everyday real-life social networks, they tend to exhibit more disagreeable verbal behavior (e.g., swearing). Because of the small sample size, however, that effect had a large confidence interval (Holtzman, et al., 2010)—much larger than in the multi-sample study reported in this paper. So, here we suggest that this emerging pattern is worth exploring further: Narcissistic language changes from agreeable (no swearing, little anger) to disagreeable (more swearing, more anger) over acquaintanceship. This is a testable hypothesis: The popularity of narcissistic people over time tends to decline, in part, because of their increase in disagreeable language over time; or perhaps, more generally, narcissistic people tend to care less about making a positive impression over time and thus they do less to manage their positive social impressions; this hypothesis fits well with a significant section of the literature (Küfner, et al., 2013; Leckelt, Kufner, Nestler, & Back, 2015; Paulhus,

1998). Additionally, this hypothesis calls for more real-life linguistic data on narcissistic people, and suggests that zero-acquaintance paradigms for narcissism may be yielding data that are not tapping into the core of the social problems of narcissistic personality.

A different explanation for the relatively small effect sizes obtained here is that narcissistic people can be protean and socially amorphous (Campbell & Campbell, 2009; Driver & Humphries, 1988; Jonason & Webster, 2012). Narcissistic people mold themselves to the social occasion just like high self-monitors (Ames, et al., 2006; Emmons, 1984; Snyder, 1987). Thus, one explanation is that narcissistic people are constantly changing to fit their immediate social goals or to fit the environment, and this may manifest in a relatively unstable linguistic profile. If this is the case, then research analyzing the language of narcissism will confront a high hurdle—no matter which language software is used to analyze the data.

Are We Using a Suboptimal Language Analysis Method?

Developing a LIWC profile for narcissism has proven challenging (Preotiuc-Pietro, et al., 2016); Preotiuc-Pietro and colleagues looked at narcissism using the Dirty Dozen and found that the measure was virtually unrelated to language use on Twitter in a sample of 491 users. Indeed, they found that the multiple R , which included 64 LIWC categories, was .15. Our larger dataset appears to solidify the idea that LIWC may not be the most optimal approach for capturing narcissism. Thus, it is important to consider alternative ways for revealing how narcissism is betrayed linguistically. Specifically, below we review (a) the single word approach, (b) n-grams, (c) LSA-based approaches, and (d) topic models. Many of these are thoroughly described in Iliev, Dehghani, and Sagi (2015).

First, a single word approach may be effective (Preotiuc-Pietro, et al., 2016). In other work (Park et al., 2015; Schwartz, et al., 2013; Yarkoni, 2010), this has been the case with

respect to the Big 5 personality traits, such as neuroticism. The idea is that the broad, top-down dictionary categories created by LIWC may actually restrict their predictive power—power that would otherwise be unleashed in the study of single words (Schwartz, et al., 2013; Yarkoni, 2010). Indeed, this has been found with regard to neuroticism (Yarkoni, 2010). The use of the specific word “awful” was the best predictor of trait neuroticism ($r = .26, p < .001$). This magnitude was larger than every association between each LIWC category and neuroticism, including the broad negative emotions category (Yarkoni, 2010, Table 1). Thus, the notion is that single words may be better predictors of narcissism than LIWC categories; this could happen, if, for example, using a word like “energetic” is correlated .20 with narcissism, and using a word like “positive” is correlated only .05 with narcissism. Collectively, the correlation with the overarching broad word category in the dictionary, call it “positive energy”, may be lower than .20; thus, the single word “energetic” would serve as a better predictor of the construct than the overarching category. Second, an n-gram approach could be effective as well. N-grams are sets of words in sequence such as the 4-gram “you can be sure.” Such a phrase might be common among narcissistic people, and the n-gram approach could elucidate such effects. This approach has been successful in assessing the Big 5 personality traits (Kern, et al., 2014; Schwartz, et al., 2013). A third possible approach would be to use Latent Semantic Analysis (LSA; Deerwester, Dumais, Furnas, Landauer, & Harshman, 1990; Landauer, Foltz, & Laham, 1998). LSA is a method that examines co-occurrence data (e.g., within documents) to map similar documents onto one another. Using this approach, it would be possible to create a prototypic narcissistic text, and then map other texts onto the prototype, yielding scores that indicate the degree to which a participant’s text matches the prototype. Indeed, personality researchers have found LSA useful (Garcia & Sikstrom, 2014). Derivatives of LSA such as CASS (Holtzman, Kwong, &

Baird, 2015; Holtzman, Schott, Jones, Balota, & Yarkoni, 2011) and BEAGLE (Jones & Mewhort, 2007) may also turn out to be useful in this line of work. Last but not least, a topic modelling approach could be helpful (Blei, 2012; Steyvers & Griffiths, 2007). Topic modeling involves algorithms that extract the main themes from a set of text files (to understand the algorithms, see: Blei, Ng, & Jordan, 2003); in turn, the topic scores can be correlated with narcissism or other individual difference measures. Previously, researchers have found utility in this approach for understanding the Big Five personality traits (Schwartz, et al., 2013). Thus, in sum, there is still promise in a number of ways of profiling narcissism via language analysis. What we have done here is attempt to use one popular text analytic approach—LIWC—in the assessment of narcissism. We hope that our investigation provides a springboard for future studies like the one by Preotiuc-Pietro and colleagues (2016), as guided by the methods outlined in Iliev and colleagues (2015) and Dehghani and colleagues (2016).

Limitations

One limitation worth mentioning is that we used a somewhat outdated dictionary version of LIWC (i.e. the LIWC 2001 dictionary). It is conceivable that this may have limited our obtained effect sizes relative to the newer 2015 version of LIWC (e.g., the number target words in the affective process dictionary is substantially larger in the 2015 version). We did not use LIWC 2015 because a German version of the LIWC 2015 dictionary has not yet been published and we wanted to combine data sets from different languages in an integrated analysis. Thus, as an alternative approach, we would have had to translate the German texts into English prior to running (e.g., using Google translation). This translation process is susceptible to error, which would attenuate effects. Additionally, it is worth noting that other studies of linguistic markers of personality have found sizable effects using the 2001 LIWC dictionary (Holtzman, et al., 2010;

Mehl, et al., 2006), so there is prior evidence in favor of its validity for this purpose, although, of course, it would have been desirable to test the effects using a translated and psychometrically tested version of the LIWC 2015 dictionary.

A second limitation is that we did not conduct facet-level analyses, which may have been one reason why we could not identify sizable effects. As pointed out by Back (in press), narcissism does indeed have multiple facets (e.g., admiration and rivalry; antagonistic and agentic). Perhaps facet-level analyses would have revealed larger correlations with LIWC variables. It may very well be the case that different facets of narcissism have opposing effects, and so the end result might be that the facet-level effects are canceled in the form of near-zero total effects (i.e., when the narcissism factor scores are correlated with the LIWC scores). Some predictions for future research include that one might find stronger effects for antagonistic facets of narcissism in relation to swear words; one might also find more negative associations between agency facets and fear words. These are just some possibilities to consider for future research. In general, we encourage facet-level analyses in future research.

Finally, consistent with the Constraints On Generality (COG) recommendations by Simons, Shoda and Lindsay (2017), we acknowledge the limitations of our sampling method. We acknowledge that our studies may not be generalizable beyond college-age individuals in the United States and Germany. We have no reason to believe that the results depend on other characteristics of the participants, materials, or context.

Conclusions

In review, we have shown that narcissism has links to selected LIWC word categories, several of which were statistically significant at relatively stringent levels. We believe it is useful to get these results into the literature so that they are not hidden in the file drawer, which can

cause problems for researchers who are trying to grapple with the state of the literature (Rosenthal, 1991); indeed, since the publication of the first finding from this 15-sample data set (Carey, et al., 2015) several researchers have contacted us, asking some variant of the question: If not first-person singular pronouns, then which LIWC variables are related to narcissism? Although the answer based on our large, pooled data set requires the caveat that the effects are small, these effects should be available to other researchers so that others do not spend resources embarking on this task themselves. This paper is also valuable for future studies as it suggested the LIWC correlates of narcissism (and other broad personality attributes) are modest in magnitude, so large sample sizes are needed when planning studies.

One theoretical possibility emerging from our study is that we might have not observed sizeable effects here because we were analyzing mostly zero-acquaintance data, whereas narcissistic people change across levels of acquaintance (Paulhus, 1998); to be sure, some of our data sets in our study involved instructions that made acquaintance level irrelevant (i.e., the psychological language tasks were not social, and the participants were not expecting an audience), so this may not be the most compelling explanation. Another possible reason these effects are small is that narcissistic people are protean in their communication (Jonason & Webster, 2012). A combination of these explanations is also possible and we note that small effects tend to be relatively common in large-data science. Finally, our lack of success at revealing pronounced linguistic patterns using the dictionary-based LIWC approach calls for future research using emerging text analytic methods that are not based on pre-determined—and thereby from a measurement perspective likely suboptimal—word lists (e.g., topic models), as researchers have done in explorations of the Big 5 personality traits (Schwartz, et al., 2013).

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