



## Investigating personality in stuttering: Results of a case control study using the NEO-FFI

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### ABSTRACT

A recent study by Iverach et al. (*Journal of Communication Disorders*, 2010) compared persons who stutter with two normative samples in the context of the five-factor model of personality measured by the NEO Five-Factor Inventory (NEO-FFI). Persons who stutter were characterized by higher *Neuroticism*, lower *Conscientiousness* and lower *Agreeableness* scores in contrast to the normative data from an Australian and a United States sample. Moreover, the authors report that the scores on all five personality dimensions in the stuttering group were within those of the normative samples. A shortcoming of the Iverach et al. study is the lack of a matched control group. In the present study we compared persons who stutter with a control group matched to age and gender. Furthermore, none of the controls had a history of personal and family stuttering. The findings with respect to *Neuroticism* could be replicated in our sample. But in contrast to Iverach et al. we found higher *Conscientiousness* and *Agreeableness* scores in persons who stutter compared to the control group.

**Learning outcomes:** The reader of the present study will learn that elevated *Neuroticism* scores can be observed in persons who stutter across cultures such as Germany or Australia. With respect to other personality dimensions such as *Conscientiousness* or *Agreeableness* the picture is much more difficult.

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## 1. Introduction

Persistent developmental stuttering is a speech disorder with a prevalence of about 1% among adults (Bloodstein & Bernstein Ratner, 2008) that can severely hinder communication and quality of life (Yaruss, 2001). Several studies investigated and discussed stuttering in the context of personality and temperament (Alm & Risberg, 2007; Anderson, Pellowski, Conture, & Kelly, 2003; Prins, 1972; Schwenk, Conture, & Walden, 2007; Seery, Watkins, Mangelsdorf, & Shigeto, 2007; Van Riper, 1982). Convincing arguments for the hypothesis that stable traits are causal factors in the development of stuttering do not exist so far (Bloodstein & Bernstein Ratner, 2008). Furthermore it is still unclear if the speech disorder has a significant impact on the personality of the afflicted persons. The empirical findings in this area are mixed and sometimes controversial (for a very good overview, see again Bloodstein & Bernstein Ratner, 2008). In consideration of the various methodological approaches used in the diverse studies, inconsistencies in the findings are not surprising. One of the reasons

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for contradictory results in the field is a lack of use of standardized questionnaires measuring personality. This has been pointed out explicitly very early by Goodstein (1958). Another reason for the heterogeneous findings could be that the studies used different kinds of control groups. For instance, Walnut (1954) compared the Minnesota Multiphasic Personality Inventory (MMPI) scores of a stuttering population with the norms of the MMPI (Hathaway & McKinley, 1943), Sermas and Cox (1982) compared the MMPI scores of persons who stutter with MMPI scores of psychiatric patients, and Treon, Dempster, and Blaesing (2006) with MMPI scores of a carefully matched control sample. The three studies led to ambiguous results. Bloodstein and Bernstein Ratner (2008) mentioned in this context that it is risky to compare collected personality data from a stuttering population with published test norms and emphasize the importance of selected case-control groups. In order to prevent ambiguity regarding the link between stuttering and personality, it is furthermore essential to use the same inventories when doing replication studies. When such studies were conducted in different cultures, it is of additional importance to consider potential cross-cultural personality differences (Terracciano & McCrae, 2006).

Recently, Iverach et al. (2010) published an interesting study in the field of personality and stuttering. The authors searched for an association between the prominent five-factor model of personality and stuttering. The so-called Big Five include the personality dimensions *Extraversion*, *Neuroticism*, *Openness to Experience*, *Conscientiousness*, and *Agreeableness* as measured by the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992). Susca (2006) suggested before to administer this valid and reliable inventory when comparing personality traits of people who stutter and people who do not stutter.

Iverach et al. reported that 93 adult participants seeking speech treatment for stuttering in Australia and New Zealand were associated with significantly higher *Neuroticism*, lower *Conscientiousness* and lower *Agreeableness* scores compared to normative data from an Australian and an United States sample. The personality self-report scores of the stuttering group were within the average range for all five personality dimensions. Convincingly, the authors expected that besides higher *Neuroticism* scores, persons who stutter would also be associated with lower *Extraversion* scores. This hypothesis could not be confirmed. As mentioned by Iverach et al. in their discussion, a problem of their study design is a lack of a matched control group. This might bias their findings, because the male gender is more prevalent in persons who stutter (about two to four times more men than women stutter; Craig & Tran, 2005; Yairi & Ambrose, 2005), whereas both sexes are equally distributed in the normal population. As pronounced differences between males and females exist with respect to personality dimensions linked to negative emotionality (such as neuroticism) (Chapman, Duberstein, Sørensen, & Lyness, 2007; Costa, Terracciano, & McCrae, 2001), it is also of particular importance to take into account the gender distribution by using once again a case-control design. Furthermore, Iverach et al. cannot control for the fact that there are also persons who stutter in their used normative samples.

Following this argumentation line, we would like to add to the findings of Iverach et al. our present NEO-FFI scores of a stuttering sample that was compared to a sex- and age-matched control group of persons who had no personal or family history of stuttering.

## 2. Materials and methods

### 2.1. Participants

The experimental group consisted of 87 persons who stutter, including 63 men (72.4%) and 24 women (27.6%), and a sex- and age-matched control group of 87 persons who had no personal or family history of stuttering. Mean age of the stuttering group ( $M = 34.93$  years,  $SD = 12.82$ ) and of the control group ( $M = 32.20$  years,  $SD = 12.04$ ) did not differ significantly as shown by an ANOVA model ( $F(1, 172) = 2.11$ ,  $p = .15$ ). Moreover, the gender subgroups did not differ significantly in age, either. When comparing our stuttering group to that of Iverach et al. no significant differences in age ( $t(179) = 1.16$ ,  $p = .25$ ) and gender distribution ( $\chi^2 = .42$ ,  $df = 1$ ,  $p = .52$ ) were observed.

### 2.2. Recruitment of participants

Persons who stutter were recruited at an annual meeting of the German Stuttering Association (German abbreviation: BVSS), at local meetings of self-help groups for people who stutter, and in the context of group therapies for stuttering. Persons who stutter were required to meet the following eligibility criteria before being accepted to the study: (1) age 16 years and over; (2) developmental stuttering present before 12 years of age; (3) presence of stuttering already confirmed by a speech and language pathologist.

The control group was recruited at the University of Bonn, Germany, and met the following inclusion criteria: (1) age 16 years and over; (2) no personal or family history of stuttering. All eligibility criteria in this study were determined by self-reports.

In terms of stuttering history, 58.6% of the persons who stutter reported a family history of stuttering ( $n = 51$ ), 96.6% reported receiving previous treatment for stuttering ( $n = 84$ ), and 64.4% reported being a member of a self-help group ( $n = 56$ ). The self-reported age of onset of stuttering ranged from 2 to 11 years ( $M = 4.44$ ,  $SD = 1.82$ ).

The study was approved by the ethics committee of the University of Bonn. All subjects gave informed consent before participating in the study.

### 2.3. Material and procedure

All participants completed a paper and pencil version of the German NEO Five-Factor Inventory (NEO-FFI) (Borkenau & Ostendorf, 1993; Costa & McCrae, 1992). This well established questionnaire consists of 60 items with a 5-Likert scale

**Table 1**

Means and standard deviations (SD) of the NEO-FFI in the stuttering and the control group. The last column includes the results of the *t*-tests contrasting persons who stutter vs. controls with respect to each personality dimension.

Domain	Sample	Mean	SD	<i>t</i> -test
Extraversion	Stuttering	26.54	6.32	$t(172) = -2.10, p = .04$
	Control	28.59	6.53	
Neuroticism	Stuttering	23.39	8.16	$t(172) = 3.46, p = .001$
	Control	19.16	7.95	
Openness	Stuttering	30.09	6.31	$t(172) = -1.48, p = .14$
	Control	31.52	6.38	
Agreeableness	Stuttering	32.40	5.28	$t(172) = 3.17, p = .002$
	Control	29.93	4.99	
Conscientiousness	Stuttering	32.94	6.38	$t(172) = 2.88, p = .005$
	Control	29.89	7.59	

**Table 2**

Means and standard deviations (SD) of the NEO-FFI in the persons who stutter in Germany ( $n = 87$ ) vs. Australia (AUS) respectively New Zealand (NZ) ( $n = 93$ ). The last column includes the results of the *t*-tests contrasting persons who stutter in Germany vs. AUS and NZ with respect to each personality dimension.

Domain	Sample	Mean	SD	<i>t</i> -test
Extraversion	Germany	26.54	6.32	$t(178) = -1.25, p = .21$
	Australia, NZ	27.70	6.10	
Neuroticism	Germany	23.39	8.16	$t(178) = 0.97, p = .33$
	Australia, NZ	22.20	8.30	
Openness	Germany	30.09	6.31	$t(178) = 3.71, p < .001$
	Australia, NZ	26.80	5.60	
Agreeableness	Germany	32.40	5.28	$t(178) = 2.01, p = .046$
	Australia, NZ	30.70	6.00	
Conscientiousness	Germany	32.94	6.38	$t(178) = 0.93, p = .36$
	Australia, NZ	32.00	7.20	

response format (0–4 points). As already mentioned the NEO-FFI measures the personality dimensions *Extraversion*, *Neuroticism*, *Openness to Experience*, *Conscientiousness*, and *Agreeableness*.

#### 2.4. Statistical procedures

Five two sided independent *t*-tests were calculated to test for significant differences in personality between the persons who stutter and the matched controls. In order to control for multiple testing, we adjusted the  $\alpha = .05$  to  $\alpha = .01$  (Bonferonni correction,  $\alpha = .05$  divided per number of tests calculated). As participants were matched 1:1 with respect to the gender distribution, but not with respect to age (here we only made sure that the samples do not differ significantly in their age), we calculated independent *t*-tests instead of dependent *t*-tests.

### 3. Results

The comparison between persons who stutter and controls yielded significant differences for all dimensions of the NEO-FFI with the exception of *Openness to Experience*. The differences in *Extraversion* could not hold for multiple testing. The descriptive results as well the *t*-tests are presented in Table 1.

Persons who stutter in comparison to controls show significantly higher scores in *Neuroticism*, *Agreeableness* and *Conscientiousness*, significantly lower scores in *Extraversion* (the latter effect does not hold correcting for multiple testing) and a tendency for lower scores in the *Openness to Experience* scale.

In order to clarify if the differences between the results by Iverach et al. and ours are confounded by cultural influences, we contrast Iverach et al. NEO-FFI scores from their persons who stutter sample in Australia and New Zealand with our NEO-FFI scores from persons who stutter in Germany. Considering issues of multiple testing only the score for *Openness for Experience* differs significantly between both studies (with higher scores for the German participants). For descriptive statistics and *t*-tests see Table 2.

### 4. Discussion

The aim of the present study was to replicate and overcome the shortcomings of a recent study by Iverach et al. that lacked a matched control group. When contrasting persons who stutter with a matched control group, significant differences in all personality dimensions with the exception of *Openness to Experience* appear. After correction for multiple testing especially the significant differences between persons who stutter and controls on the personality dimensions *Neuroticism*, *Agreeableness*, and *Conscientiousness* are striking.

In line with Iverach et al. we also find higher *Neuroticism* scores in the stuttering group compared to controls, which corroborates the fact that differences in *Neuroticism* are an important characteristic in the personality profile of persons who stutter. In contrast to the findings by Iverach et al. we find significantly higher *Conscientiousness* and *Agreeableness* scores in persons who stutter compared to controls. Fittingly, the study by Lencer et al. (2009) demonstrated in a sample of patients with focal dystonia elevated *Conscientiousness* and *Agreeableness* scores. In both the persons who stutter and also among patients with focal dystonia social interactions can become problematic because of the own observed bodily impairment. Outgoing from this data it is very speculative though if personality variables are the cause or the consequence of stuttering. Moreover, it is unclear how this might be of importance in the context of therapy, because this has not been investigated until now. This is an important research avenue for the future.

Although the present findings and those by Lencer et al. overlap, the already mentioned differences between our study and Iverach et al. might be explainable in the light of our carefully selected control group with respect to age, gender, and most important personal and family history of stuttering (as we especially selected only controls without a personal and family history of stuttering). The initial hypothesis by Iverach et al. that people who stutter might be characterized by lower *Extraversion* scores could be observed in our sample, but did not hold correction for multiple testing. Nevertheless, a trend towards this effect was visible.

Another reason for differences of the results in the study by Iverach et al. and our study may be explained in different recruiting strategies of participants. While Iverach et al. recruited their participants via stutter therapy waiting lists for afflicted persons, we chose a slightly different way via self-help groups and stutter therapists.

A last point to be discussed in the direct comparison of Iverach et al. and our study is the consideration of different cultural settings. This point is not of interest here, because the samples in Germany and Australia/New Zealand under investigation do not differ significantly with the exception of *Openness for Experience*, which is not of importance with respect to here shown pronounced differences between both studies.

## 5. Conclusion

In sum, our study underlines the importance of the construct *Neuroticism* in the context of the investigation of personality in persons who stutter. For the future, longitudinal studies are of high importance in this field, because higher *Neuroticism* scores are likely to be a consequence and not an etiological factor of stuttering. Upcoming studies should also investigate the association between severity of stuttering, applied coping strategies, perceived quality of life, and personality dimensions such as *Neuroticism*.

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## Appendix A. Continuing education

1. How do the studies by Iverach et al. and Bleek et al. differ methodologically (more than one answer can be correct here)?
  - (a) The investigated samples differ in age and gender.
  - (b) The persons who stutter are recruited in different countries.
  - (c) Bleek et al. used in contrast to Iverach et al. a case-control design.
2. The personality dimension *Extraversion* differs significantly between persons who stutter and controls in Bleek et al. study. But does this effect hold for multiple testing?
  - (a) True
  - (b) False
3. Is it possible to answer the question if *Neuroticism* represents a predisposing factor or a consequence of stuttering with the study by Bleek et al.?
  - (a) True
  - (b) False

Explanation: This is a correlational study. If we would like to make inferences about causality, we need to conduct e. g. a longitudinal study.

4. The sample of Bleek et al. consists of more females than males.
  - (a) True
  - (b) False
5. Can the different results in the Bleek et al. and Iverach et al. studies be explained by cultural differences?
  - (a) True
  - (b) False

Explanation: Only differences for the personality dimension “Openness for Experience” turned up when contrasting both samples with respect to persons who stutter. This personality dimension was not of importance when comparing persons who stutter and controls though.

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