Personality Characteristics of Depressed and Non-Depressed Patients With Parkinson's Disease

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Depression and a specific personality profile are often outlined as premorbid characteristics of Parkinson's disease (PD). However, few studies have explored possible relations between personality and depression in PD despite research in non-parkinsonian samples identifying specific personality traits as risk factors for depression. The personality profiles of 290 non-depressed and 119 depressed patients with PD were compared. The depressed patients were characterized by elevated neuroticism, reduced extroversion, and reduced conscientiousness and less convincing findings of reduced openness and agreeableness. The largest unique contribution to a regression analysis predicting depression was greater number of motor symptoms, increased neuroticism, and reduced extroversion.

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Depression is common in Parkinson's disease (PD) and affects an estimated 40% of patients.[1] Depression, and an expression of a unique personality profile are, among other symptoms, suggested to prelude the onset of motor symptoms in PD by several years.[2,3] Such premorbid symptoms are often interpreted as expressions of early pathological effects on various neurotransmitter systems affected by the disease.

A recent review[4] estimates that 80 scientific articles have been published on personality profiles of people with PD, since this so-called "parkinsonian personality" was initially described. Of these publications, few have explicitly sought to elucidate the relation between depression and personality profiles in PD.[5–9] Here increased harm avoidance as measured by Cloninger's Tridimensional Personality Questionnaire (TPQ)[10] has been linked to depression in people with PD.[6,8,9] Furthermore, increased neuroticism (tendency to experience negative emotionality) and reduced extroversion on the NEO-Five Factor Inventory (NEO-FFI)[11] have been associated with depression in PD.[7] This is in congruence with findings that increased harm avoidance measured by the TPQ and increased neuroticism measured by the NEO-FFI act as general risk factors for

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the development of psychopathology in otherwise healthy elderly people.[12,13]

Little empirical attention has been paid to the possible contribution of specific personality traits to the etiology of depression in PD or vice versa to the possible effects of concomitant depression on the manifestation of personality features in PD. Though personality traits are largely believed to be stable emotional, attitudinal, and behavioral ways of responding, they are to a small extent temporarily amendable to the effects of acute depression inasmuch as specific traits may be amplified during the depressive episode and return to premorbid levels upon remission.[14–16] This intertwined nature between depression and personality is also evident in findings that personality traits may contribute to treatment outcome inasmuch as higher scores on neuroticism predicts better response to psychopharmacological treatment than psychotherapy[17]. However, lower scores on neuroticism in people suffering from major depression are generally linked to better treatment outcomes.[18,19] Such findings point to the clinical relevance of examining the relationship between depression and personality in PD.

The few studies linking depression and particular personality traits in populations of patients with PD mainly utilize TPQ, which assesses four temperaments and three character dimensions: novelty seeking, reward dependence, and harm avoidance. Novelty seeking is theorized to be an indirect measure of dopamine while harm avoidance reflects serotonin and reward dependence is purportedly based on the noradrenergic system.[10] However, as recently pointed out by Poletti and Bonucelli,[4] studies have been unable to empirically substantiate the seven-factor structure of TPQ and the supposed link to underlying neurotransmitters. This led the authors to suggest that personality measures based on the Five Factor Model, such as NEO-FFI may be more suitable.[4] The purpose of the current study is to describe the personality profiles, as assessed with NEO-FFI, of depressed and non-depressed patients with PD.

METHODS

Patients

All community dwelling outpatients with PD residing in the mid- and northern part of Jutland in Denmark identified through the Danish National Patient Registry were invited to participate in the study. The Danish National Patient registry contain diagnosis obtained during hospital admissions and also encompass all outpatient visits including dates of admission/discharge, primary diagnosis and up to 19 additional diagnoses linked to each individual by a personal ID number. The majority of patients with PD receive their diagnosis by a specialist in neurology. In line with this, a recent study indicates that 84% of patients with a primary diagnosis of PD were diagnosed at a neurology department.[20] Inclusion criteria were a registered diagnosis of PD (primary diagnosis only). exclusion criteria were as follows: 1) a registered diagnosis of dementia; 2) a diagnosis of other neurological or neurodegenerative diseases than idiopathic PD; and 3) personality disorder or severe psychiatric disorder besides depression or anxiety.

Nine hundred and fourteen patients were offered to participate in the survey. Fifteen patients were excluded because of death (N=5) or recent diagnosis of dementia (N=10) since the sample was drawn from the registry. In total, 504 patients returned the questionnaires, 249 patients did not wish to participate, and 145 patients were non-respondents. The overall response rate was 56.1% of the eligible patients. Of the 504 returned questionnaires a further 84 patients were excluded because of poor data quality with over 20% missing items on either the depression questionnaire, the personality questionnaire, or both, leaving 409 (62% men) patients in the final sample (mean age=70.6 years, SD=9.6 years).

The average age at disease onset in the sample was 62 years (SD=11.2 years), and the average disease length was 8.3 years (SD=6.4). Four hundred and four patients received medical treatment for PD; thereof 246 patients were treated with levodopa alone or in combination with dopamine agonist or monoamine oxidase B inhibitors (mean total levodopa equivalent daily dose (LEDD)=564 mg, SD=377.6 mg). A total of 213 patients received dopamine agonists. Seventy-six patients were treated with antidepressants, receiving selective serotonin reuptake inhibitors (SSRI, N=35), tricyclic antidepressants (N=16), noradrenergic and specific serotonergic antidepressants (NaSSAs, N=14), agomelantine (N=5), or serotonin-norepinephrine reuptake inhibitors (SNRI, N=3).

Procedure

The survey was reported to the Danish Data Protection Agency and carried out in accordance to the Declaration of Helsinki. All participants received a letter explaining the purpose of the study, a consent form, the questionnaires, and a prepaid envelope by post. Non-respondents received one reminder after 10 days.

Demographics and Health

Details on age at disease onset, disease duration, physical and mental health and medication, motor symptoms, motor fluctuations, medication for PD, current and previous smoking, drug abuse, and family history of PD and drug abuse were obtained from the participants via a questionnaire.

The Short Geriatric Depression Scale

Symptoms of depression were assessed with the short Geriatric Depression Scale (GDS–15).[21,22] GDS–15 is a self-administered 15-item questionnaire suitable for assessing depression in PD, as it contains no somatic items. A cut-off score of 5 indicates clinically relevant depressive symptomatology.[23]

The NEO-Five Factor

The NEO-Five Factor Inventory (NEO-FFI), was used to assess five personality dimensions as derived from the five-factor model of personality (NEO-PI-R).[11] The questionnaire consists of 60 statements that the respondents rate on a five-point Likert scale from "strongly disagree" to "strongly agree." The five personality dimensions assessed are openness (openness to internal and external stimuli including imagination), conscientiousness (self-discipline and competency), extroversion (tendency to be sociable, novelty seeking, and adventurous), agreeableness (trustfulness, altruism, modesty), and neuroticism (tendency toward experiencing psychological distress or negative affect). The questionnaire assesses stable characteristics of personality (traits) as opposed to temporary psychological states and mood states (states).

Statistical Measures

Data were analyzed using SPSS 21. Independent, two-tailed *t*-test was applied on demographic variables while comparisons on categorical variables were done by χ^2. A one-way between-groups multivariate analysis of covariance (MANCOVA) was utilized to compare personality profiles of depressed and non-depressed patients with PD while covarying for age. To assess possible predictors of depression in PD a multiple regression analysis was performed.

RESULTS

Using the GDS cut-off of five, patients were subdivided into two groups based on the severity of symptoms of depression: a non-depressed group of patients (PDnd; N=290) and a depressed group (PDd; N=119). For comparisons on demographics and disease variables see Table 1.

TABLE 1. Group Characteristics and Independent t-test Comparisons of the PDnd and PDd Groups

	PDnd (N=290)	PDd (N=119)	*t*-test or χ^2	
	Mean (SD)	Mean (SD)	t(407)	p
Age	69.6 (9.6)	72.8 (9.2)	–3.065	0.002
Disease length	7.4 (5.6)	10.5 (7.5)	–3.875	0.000
Total LEDD	559.4 (363.9)	575.4 (410.7)	–0.388	0.698
Motor symptoms[a]	4.4 (2.2)	6.3 (2)	–7.382	0.000
Sex (% males)	(65.2)	(55.5)	2.988	0.084
Antidepressant (%)	(15.2)	(26.9)	6.904	0.009

LEDD: levodopa equivalent daily dose; PDnd: non-depressed patients; PDd: depressed patients.
[a]Number of self-reported motor symptoms (range: 0–10).

The patients with PD and concomitant symptoms of depression were significantly older, displayed more motor symptomatology, and have had PD for a longer period of time compared with the group of patients with PD without concomitant depression. No statistically significant difference in total LEDD was found between the PDnd and the PDd group, but the PDd group received significantly more antidepressants.

A χ^2 test on motor symptoms (see Table 2) showed that the participants in the PDd group reported significantly more motor symptomatology than the PDnd group in terms of action tremor, rigidity, postural instability, bradykinesia, rigidity, dyskinesia, freezing, swallowing, and pain and numbness. There was no statistically significant difference in resting tremor between the two groups.

A one-way between-group multivariate analysis of covariance (MANCOVA) was performed with the PDnd and PDd groups as independent variable and the five personality traits (openness, conscientiousness, extroversion, agreeableness, neuroticism) as dependent variables. As age has an effect on the expression of personality traits, age was introduced as a covariate in the analyses. Preliminary assessments ensured that there were no severe violations to the statistical assumptions for performing a MANCOVA. The results of the analysis are shown in Table 3. The was a statistically significant difference on all five personality traits between the two groups where the PDd group were less open, less conscientious, less extrovert, less agreeable, and scored higher

TABLE 2. χ^2 Comparison of Motor Symptomatology in the PDd and PDnd Groups

	PDnd (N=290)	PDd (N=119)	χ^2	p
Resting tremor	39.9%	47%	1.390	0.238
Action tremor	44.9%	57.5%	4.659	0.031
Off-periods	35.2%	67.3%	32.504	0.000
Postural instability	55.2%	82.8%	25.792	0.000
Bradykinesia	83%	94.8%	8.878	0.003
Rigidity	72.5%	83.5%	4.813	0.028
Dyskinesia	29.9%	47%	10.037	0.002
Freezing	30.7%	62.9%	34.525	0.000
Swallowing	26.2%	44.4%	11.942	0.001
Pain and numbness	29.9%	43.6%	6.303	0.012

PDnd: non-depressed patients; PDd: depressed patients.

on neuroticism than the PDnd group. The effect sizes ranged from negligible (with regards to openness and agreeableness) to medium-large (extroversion, conscientiousness, and neuroticism).

To assess possible predictors of depression in PD a multiple regression analysis was performed on the entire sample with openness, conscientiousness, agreeableness, neuroticism, extroversion, disease length, and the total number of reported symptoms as independent variables and depression as dependent variable. Preliminary analysis to test the assumptions of multicollinearity indicated that there was no relationship between the dependent variable and age at disease onset (r=0.021, p=0.349), and only small correlations with agreeableness (r=–0.96, p=0.036) and openness (r=–0.176, p=0.000). Therefore, these variables were excluded from the final model. Furthermore five cases with outliers were excluded. The results of the regression indicated that the remaining independent variables: neuroticism, extroversion, conscientiousness, disease length, and motor symptoms explained 62% of the variance (R=0.616, F(5,360)=43.337, p=0.000). The total number of self-reported motor symptoms predicted depression (β=0.244, p=0.000) as did neuroticism (β=0.316, p=0.000) and extroversion (β =–0.190, p=0.000).

DISCUSSION

The purpose of the current study was to describe the personality profiles of depressed and non-depressed patients with PD. The main results was that patients with PD and concomitant depression displayed a specific personality profile characterized by significantly increased levels of neuroticism and reduced conscientiousness, extroversion, openness, and agreeableness compared with patients with PD without concomitant depression. However, effect sizes for the differences found concerning agreeableness and openness were negligible. Furthermore, the patients with PD and concomitant depression were significantly older, had longer disease duration, and overall reported having more motor symptoms than the group of patients without concomitant depression. Especially postural instability, freezing of gait, and experiencing periods without optimal effect of medication (so-called off-periods) were frequently reported in the group of patients with concomitant depression. The regression analysis indicated that depression was predicted by neuroticism, extroversion, conscientiousness, disease length, and motor symptoms. Of these variables greater number of motor symptoms, increased neuroticism, and reduced extroversion made the greatest unique contribution to the regression.

The findings of the study are in line with a meta-analysis showing relationship between depression and low conscientiousness, alongside high scores on neuroticism in non-parkinsonian samples with major depression.[24] The study design does not allow for causal interference as to whether more pronounced symptoms of depression lead to temporarily altered expressions of personality in subgroups of patients with PD (scar models) or if a common cause underlies both depression and constellation of personality traits (common cause models), or whether pre-existence of specific traits

TABLE 3. MANCOVA Group Comparisons of Personality Traits Between the PDd and PDnd Groups

	PDnd (N=290) Mean (SD)	PDd (N=119) Mean (SD)	F MANCOVA F(1,406)	Partial Eta squared	
				p	η_p^2
Openness	23.65 (5.80)	21.74 (5.91)	5.98	0.015	0.015
Conscientiousness	31.98 (5.34)	27.76 (6.65)	41.50	0.000	0.093
Extroversion	26.91 (6.70)	22.02 (6.92)	40.00	0.000	0.090
Agreeableness	34.24 (5.06)	33.07 (6.22)	4.74	0.030	0.012
Neuroticism	18.41 (6.59)	25.8 (6.77)	98.53	0.000	0.195

MANCOVA: multivariate analysis of covariance; PDnd: non-depressed patients; PDd: depressed patients.

makes development of depression more likely (vulnerability models).[15] However, the latter has gained support in studies where high neuroticism scores predict first episode depression in otherwise healthy populations.[13,25] It is plausible that the same risk factors for development of depression in the general population also predispose development of depression in patients with PD, to an even greater extent than disease specific risk factors.[26] Our findings tentatively support this as increased scores of neuroticism and decreased extroversion predicts depression in PD to a greater extent than disease specific variables (age at disease onset and self-reported motor symptoms). This could render personality traits important for further research on identifying markers for patients at-risk for future depression. Given the cross-sectional design of the study and the lack of an age-matched non-parkinsonian control group with depression it is not possible to conclude whether the constellation of traits found here is indistinguishable from the personality profile of otherwise healthy people with depression. Nor can it be concluded whether the findings of specific "parkinsonian personality" profiles in previous studies, in fact to some extent reflect assessment of a subgroup of patients who possess a personality profile comparable to that of people with depression who do not have PD.

The patients with PD and concomitant depression were significantly older, had longer disease duration, and more severe motor symptomatology. These variables, among others, have previously been identified as disease-specific risk factors for the development of depression in PD.[27,28] Unlike previous studies patients with and without concomitant depression were indistinguishable with regards to the total daily dose of levodopa.[27] Of the aforementioned disease-specific variables, we found that the number of motor symptoms is most related to depression in PD. However, from the design of the study, it is not possible to conclude whether the patients with concomitant symptoms of depression objectively have greater disease severity or if a depressed mindset leads to the perception of greater motor symptomatology. A previous study found that self-assessed ratings of overall disability in a parkinsonian population were unrelated to concurrent depression.[29] However, the concurrence between self-assessed and objectively assessed motor-symptomatology in regards to depression needs to be empirically explored.

There are a number of limitations to the study. The study is solely registry and survey based which precludes any objective verification of data collected from the patients. Second, the lack of a control group and of an otherwise healthy control group with depression is a drawback to the study. Future studies are needed to assess if personality traits associated with depression in PD is comparable to personality traits of depression in non-parkinsonian samples, and if these are distinguishable from a healthy control group. Third, given the study design response bias is an important limitation. It is plausible that patients with severe depression and patients with pronounced motor symptoms choose not to participate in the study. However, the self-reported depression prevalence rate of 41% in the study is comparable to previous studies.[1,30] Finally, it may be that patients with undiagnosed dementia were inadvertently included in the sample. However, given the complexity and length of the questionnaires, it is estimated that it would have posed a considerable challenge to complete the questionnaires if the patient was severely cognitively impaired.

In summary, patients with PD and concomitant depression display a personality profile characterized by increased scores on neuroticism and reduced scores on conscientiousness and extroversion compared with non-depressed patients with PD.

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