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Social Support Modifies the Relationship between Personality and Depressive Symptoms in Older Adults

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Abstract

Objective—To explore the relationship between personality, social support, and depression in older adults, identify the personality trait and social support dimension most closely associated with depression, and determine if the relationship between personality and depression varies by level of social support.

Design—Cross-sectional analysis within longitudinal study.

Participants—Older patients originally diagnosed with major depression (n=108) and never depressed comparison group of older adults (n=103).

Measurements—Patients sufficiently recovered from major depression and comparison participants were administered the NEO Personality Inventory. Social support was measured annually for both groups. Patients were administered the Montgomery-Asberg Depression Rating Scale (MADRS) every three months.

Results—Patients and comparison participants differed on four of the five NEO domains and all four social support dimensions, but personality did not significantly predict depression status (patient/comparison) in controlled analyses. Within the patient group, subjective social support was the only dimension correlated with MADRS score. In separate linear regression analyses among the patients, controlling for age, sex, and subjective social support, the domains of Neuroticism, Openness to Experience, Conscientiousness, and Extraversion were associated with MADRS score. For Neuroticism and Openness, the association varied by level of subjective social support.

Conclusions—Our research confirmed older patients differed from never depressed older adults in dimensions of personality and social support, and the relationship between these variables differed by depression status. The relationship between personality, social support, and depressive symptoms in older adults recovering from depression is also complex, with subjective social support modifying the association between personality and depression.

Introduction

Many studies have either investigated the ties between social support and depression or between personality and depression, but few have examined whether these three factors are linked. There is clear evidence that social support affects the outcome of depression (1–5). Negative correlations have been noted between level of social support and severity of depression (6). One study (7) reported a social causation effect in which social resources

impact depression severity, as opposed to a social selection effect where depression contributes to changes in social support. Therefore, it appears that a decline in social support may itself cause an increase in depression, or in depression severity. However, the directionality of this effect has been debated, with some studies suggesting that depression may have an impact on social support (7). A subjective view of social support, in which patients rate their perceptions of the support they receive, frequently shows the strongest relationship when investigating how social support affects depression outcome (1,5,8). Low satisfaction with social support has been noted as a risk factor for poor depression outcomes (5). It is especially important to investigate social support in the elderly because aging brings many changes in social relationships (9).

In studies examining the connection between personality traits and depression, the five-factor model of personality is commonly used and the Neuroticism trait stands out as one that is frequently associated with major depressive disorder (MDD) (10). The neurotic personality type can be defined as experiencing negative emotions and having a tendency towards emotional sensitivity; especially towards negative stimuli (11–12). Neuroticism has a dramatic effect on the course of depression as well as likelihood of recovery from the disease (11–13). In addition, early reports of high Neuroticism can predict later depressive episodes; therefore Neuroticism is a vulnerability factor for the disease (11,14,15). Perfectionism and neurotic-type behavior can impede social relations which further obstructs recovery from depression (16).

One study (3) noted the possibility of social support mediating the relationship between Neuroticism and the course of depression. Here, a bivariate analysis was completed showing that Neuroticism and social support were associated with each other as well as with the outcome of depression. Furthermore, the relationship between Neuroticism and depression outcome was eliminated after controlling for social support.

The present study aimed to advance these findings in a larger sample and focused on an elderly population. We hypothesized that older patients would differ from never depressed older adults in personality and social support, and that Neuroticism and subjective social support would be the dimensions most significantly correlated with late life depression. We also expected that high Neuroticism and low subjective social support would each negatively affect the outcome of depression, but did not know how they worked together. Therefore, we tested the exploratory hypothesis that high Neuroticism scores in association with low levels of subjective social support would be associated with higher levels of depressive symptoms among older adults recovering from an episode of major depression.

Methods

Design and sample

The study was conducted through the National Institute of Mental Health (NIMH)-supported Conte Neuroscience Center for the Study of Depression in Late Life. Participants consisted of 108 depressed patients gathered through doctor referrals to the inpatient and outpatient psychiatry service and general medicine clinic at Duke University Medical Center. Patients were initially screened for depression using the Center for Epidemiologic Studies-Depression Scale (CES-D), a frequently used self-report depression measure (17). Patients with a score of 16 or above on the CES-D were interviewed by a geriatric psychiatrist and included in the study as part of the depressed patient group if they met DSM-IV criteria for major depression. All participants were 60 years of age and older and could read and write in English. Exclusion criteria included having another major psychiatric illness such as bipolar disorder, schizophrenia, or schizoaffective disorder or having a major neurologic illness such as dementia, stroke, Parkinson's disease, seizure disorder, or multiple sclerosis.

The comparison group consisted of 103 non-depressed older adults who were recruited from the Center for Aging Subject Registry at Duke University, which included more than 1,900 community-dwelling elders in the Durham, Chapel Hill, and Raleigh (North Carolina) area who expressed a willingness to participate in the Duke Center for Aging Research. This is the same geographic area that gave rise to the depressed patient group. Eligible comparison participants had a non-focal neurological examination at Duke University, no self-report of neurologic or depressive illness, and no evidence of a lifetime depression diagnosis based on the Diagnostic Interview Schedule portion of the Duke Depression Evaluation Schedule (DDES) (1,18). These measures and this setting serve as a referral base for depressed patients who were eligible for inclusion in the depressed sample.

After giving a complete description of the study to the participants, researchers obtained written informed consent. The overall study is longitudinal, and is reviewed and approved by the Duke Institutional Review Board annually.

This analysis followed a cross sectional design within the longitudinal cohort study of depressed patients and never depressed older adults using data on depression (clinical rating), social support, and personality. Within the patient group, personality was measured once patients had adequately recovered from the index episode of depression (as determined by the study psychiatrist), because an extensive questionnaire requiring much thought and concentration was used. Depression severity was measured at baseline and at quarterly follow-up visits, while social support was measured at baseline and at annual visits. In this analysis, the social support and depression severity scores used were those taken closest in time to when personality was assessed. Generally, this occurred when depressed patients were in remission and the score would not likely reflect the most severe depression experienced during the current episode. Therefore, although the larger cohort study involved a longitudinal design, a cross section of data was sampled for the participants used in this analysis. Baseline measures of personality and social support were used for the comparison group.

Dependent measure

In the first analyses, depression status (patient vs. comparison group) was used as the dependent variable to compare the groups. For the analyses within the patient group alone, the Montgomery-Asberg Depression Rating Scale (MADRS) was the dependent variable. The MADRS was designed to assess the severity of depression (19) and consists of ten items that are scored during a clinical interview. The scores range from 0–60; scores of 20–34 indicate moderate depression, while scores above 34 signify severe depression (20). The MADRS has high inter-rater reliability ranging from 0.89 to 0.97 (21). In addition, this measure correlates highly (e.g., $r=0.71$) with similar clinical assessments such as Hamilton Depression Rating Scale (22). MADRS score was used as a continuous variable in these analyses.

Independent measures

Social support was measured using the four social support subscales of the Duke Social Support Index (DSSI) (1,23). The subscales were: social network size (four items: number of family members, coworkers, and friends, household size; possible range 0 to 10); social interaction (four items: family proximity, in-person and telephone contact with family and friends, group affiliations; possible range 0 to 28); availability of instrumental aid (13 items: help with sick care, errands, chores, transportation, finances etc.; possible range 0 to 12); and subjective social support (10 items: feeling useful, listened to, satisfied with relationships, etc.; possible range 0 to 30) (24–25). Each of the social support dimensions were used as continuous variables in the analyses.

Personality was assessed using the NEO PI-R (26). The NEO PI-R examines five personality domains: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Within each domain, six personality attributes are assessed. The Neuroticism domain includes attributes such as anxiety and hostility and the Extraversion domain includes attributes such as assertiveness and activity. Further examples of attributes within the domains include fantasy and actions for Openness to Experience, compliance and trust for Agreeableness, and dutifulness and self-discipline for Conscientiousness. Scores for each domain are standardized by converting the raw scores to t-scores. The average t-score in the general population is 50 with a SD of 10. T-scores < 45 are considered to be in the low range, t-scores 45–55 in the average range, and t-scores > 55 in the high range (26). While most of our mean values fell in the average range (except Neuroticism and Agreeableness for comparison subjects, and Conscientiousness for recently depressed patients), we were interested in the significant differences between the patient and comparison groups. Each NEO domain score was used as a continuous variable in the analysis.

Analyses

We first conducted descriptive analyses to identify differences between the patient and comparison participants for each of the four dimensions of social support and five domains of the NEO in addition to sociodemographic characteristics. We used chi-square and t-tests to identify significant differences between groups. Logistic regression was used to model the probability of depression status (patient/comparison group) for the sample with the NEO domains as independent variables controlling for social support. We also explored using linear regression whether the relationship between personality and social support differed by group. Within the patient group alone, Pearson correlation coefficients were used to examine the relationship between the social support dimensions, NEO domains, and MADRS score. Also within our sample of patients, multiple regression analyses allowed us to examine the unique association between social support and each domain of personality and level of depressive symptoms. Age (modeled as a continuous variable) and sex were controlled for in all analyses. Significance levels were set at $p < .05$ and all tests were two-tailed. All analyses were conducted using SAS software (SAS, Cary NC), version 9.1.3.

Results

The sample included 108 elderly patients who were recovering from an episode of major depression and 103 participants in the comparison group. The depressed sample was mostly female (61%), Caucasian (94%), and had a mean age of 69.4 years (see Table 1). Most of the depressed patients were married (60%), few were employed (16%), and on average they had completed 13.9 years of schooling. 43% of the depressed patients considered themselves to have fair/poor self-rated health compared with 3% of the non-depressed participants. Additionally, members of the comparison group differed from the recently depressed patients in that they were older and more educated.

The recently depressed participants had a mean depression severity rating of 8.19 (SD=8.05) on the MADRS 60 point scale; evidence that most of the sample had largely recovered from the index episode of major depression. Nineteen percent of the patients had MADRS scores of 16–32 at the assessment closest to the NEO, while 28% had scores of 7–15 and 53% had MADRS scores of 0–6. MADRS scores were not available in the comparison group since they had never experienced a depressive episode.

As shown in Table 1, scores on the NEO Personality Inventory showed that the depressed patients had significantly higher ratings of Neuroticism and lower ratings on Extraversion, Openness to Experience, and Conscientiousness compared with non-depressed participants.

Additionally, the depressed patients rated significantly lower in three of the four social support domains: instrumental social support, non-family social interaction, and subjective social support. In the social network domain, depressed patients had higher mean scores than the comparison group.

We then ran five logistic regression models with depression/comparison group status as the dependent variables and each of the NEO domains as an independent variable, controlling for subjective social support as a continuous variable (our key domain of interest), age, sex, and an interaction term of the NEO domain-by-subjective social support. None of the NEO domains were associated with depression status (patient/comparison group) and none of the interaction terms was significant (analyses not shown). Using linear regression and models for each of the NEO domains predicting subjective social support, we found that the interaction of NEO characteristics and group was significant. That is, the relationship between personality and social support differed by depression status (patient/comparison group). We focused the remainder of our analyses on the patient group alone to explore the effect of personality and social support on MADRS score among the recently depressed.

For depressed patients there were significant associations between three of the five NEO subscales and total MADRS score. The correlation between Neuroticism and total MADRS score was 0.34 ($p=0.0002$), while negative correlations were shown for the relationships between Extraversion and MADRS score (-0.38 , $p<0.0001$) and Conscientiousness and MADRS score (-0.28 , $p=0.003$). In addition, there was a significant negative correlation between subjective social support and MADRS score (-0.35 , $p=0.0002$). The other three dimensions of social support were not significantly associated with MADRS score. We continued our analyses only focusing on subjective social support.

Results from five linear regression models where MADRS total score was the dependent variable and the independent variables included an interaction between the NEO domain and subjective social support are shown in Table 2. As noted in these models, Neuroticism and Openness each were associated with depression score, but the effect varied by level of subjective social support. For the models exploring Conscientiousness, Extraversion, and Agreeableness, the interaction term was not significant and was dropped from the final model. Agreeableness was not associated with MADRS score in controlled analyses. Increased Extraversion was associated with a decrease in MADRS score (slope= -0.29), while increased Conscientiousness was associated with an increased MADRS score (slope= 0.14). There was no evidence of measureable collinearity in the final models (VIF close to 1 for all parameters). Therefore, social support and personality appear not to be highly correlated as predictors in the models.

Because the patients had essentially recovered from the index episode of major depression, the MADRS scores were somewhat skewed toward zero. We reran our linear regression models using a square root transformation of MADRS score to normalize the distribution and associated error. The results did not appreciably differ from those presented in Table 2. For ease of interpretation, we used the MADRS score in its original scale.

We took a closer look at the association between MADRS score, social support, and two measures of personality; Neuroticism and Openness. When Neuroticism is low and subjective social support is high, depression levels decrease to remission. When Neuroticism is high and subjective social support is low, the MADRS scores decrease, but not to remission. If patients have low social support and low Neuroticism or high Neuroticism and high social support, the MADRS score is increasing such that the patient is depressed. We also found that as subjective social support decreases and Openness decreases, MADRS scores increase. At lower Openness scores, as subjective social support increases, MADRS

scores decrease. At higher levels of Openness, as subjective social support decreases MADRS scores decrease and as Openness increases and subjective social support increases the MADRS scores decrease to remission levels.

Conclusions

While there has been significant research documenting the relationship between different personality traits and depression as well as social support and depression, few studies have examined how both personality and social support together are related to depressive symptoms in older adults and are related to recovery from major depression.

We began by comparing characteristics of the depressed patient group to those of the non-depressed comparison group. In agreement with previous studies on the topic, we observed significant differences between depressed patients and non-depressed controls for personality and social support variables. The patients reported having higher Neuroticism and lower Extraversion, Openness, and Conscientiousness than non-depressed subjects. Patients also had more impairment in instrumental social support, social interaction and subjective social support but did report a larger social network compared to those in the comparison group. We also noted the relationship between personality and social support differed by group.

Our investigation was then focused on the depressed group alone and the findings provide new evidence documenting the complexity of the relationship between personality, social support and depression in older adults. As expected, we found higher Neuroticism scores and lower scores for Extraversion, Openness, and Conscientiousness among depressed patients compared to older adults without a history of depression. In addition, among recently depressed older adults, Neuroticism was a key predictor of higher levels of depressive symptoms. Subjective social support was also significantly associated with depression severity, and was, in fact, the only aspect of social support associated with depression score, consistent with prior studies (1,8). Novel findings from this study show that subjective social support may modify the association between personality and depressive symptoms in a patient group receiving treatment for depression. One previous study has shown that subjects with low subjective social support and high Neuroticism would have higher levels of depression (6). A second study reported that social support may mediate the relationship between Neuroticism and the course of depression (3). We found that low subjective social support had a profound effect on depression which may trump the effect of Neuroticism

These results have clinical implications for those managing older depressed patients. The focused research presented here took place in the context of a larger longitudinal study in which patients received ongoing pharmacotherapy, as indicated, using an algorithm-based treatment guideline approach. Yet, despite ongoing pharmacological treatment, a significant number of patients continued to experience ongoing subsyndromal or syndromal depressive symptoms. In such cases, it may be prudent to examine social and personality factors. For individuals with poor social support, for example, examining ways to improve the social milieu and hopefully, one's perceptions of that environment through cognitive behavioral therapy may be useful. For such individuals, finding ways to cope in a flexible way could potentially help with residual depression symptoms. Problem solving therapy may be particularly helpful in this regard (27). However, if perceptions of social support are positive, personality factors such as high Neuroticism and low Conscientiousness may contribute to chronic depressive symptoms and could be targets in psychotherapy. Personality attributes may also potentially affect treatment plans as well as the provider patient relationship (28) which can lead to incomplete recovery from an index episode.

Our findings are cross-sectional and therefore somewhat limited in that we cannot establish temporality to determine if personality affects social support or if social support is predictive of personality or perhaps personality changes. While we have assumed personality attributes are generally stable in late life, we have only one assessment of personality in this sample and cannot determine if self-reported personality assessment changes over time as depressive symptoms change. In addition, it was difficult to determine whether personality and social support predisposed the patients to increased depressive symptoms or the other way around. However, previous studies suggest that certain personality factors affect the probability of major depression (15) and that social support is also a provoking agent on the path to major depression (2). Our personality measures were administered when the patients had sufficiently recovered from their index episode of major depression and we used the MADRS score closest in time to when the NEO was administered. It is not known whether these relationships would be observed in a sample of patients who were currently depressed.

This work is primarily hypothesis generating as we sought to identify which aspects of personality and social support were most significantly associated with depression, but we cannot rule out the possibility of a Type I error. Additionally, our samples were not random and the two groups (depressed/non-depressed) were recruited using different techniques, although all came from the same geographic area and were examined at Duke Medical Center prior to inclusion in the study. The patients were generally healthy and well-educated and may not be representative of all older adults diagnosed and recovering from major depression. The comparison group also had a higher mean age than the patients, but age was controlled in our regression models. Finally, the sample was not examined at the same time during the course of participation in the study, so variable length of treatment and improvement of symptoms may have affected our results.

Our study, however, had numerous strengths. Our access to a large cohort of older adults being treated for major depression allowed us to sample a large number of patients. In addition, our patients were part of a naturalistic treatment study and were selected from inpatient and outpatient clinics and therefore were representative of older depressed patients typically seen in clinical practice. We studied the association between personality attributes, social support, and depression by looking at each trait individually, but we recognize these traits may also be associated with depression in combination (28). Future work could examine how these personality domains work in combination with social support in their relationship with depression. The findings from our study have implications for working with elderly patients who are recovering from a depressive episode. The data suggests that high Neuroticism and low subjective social support are risk factors for an incomplete recovery from depression. Thus, physicians should consider patient personality and social support resources when addressing these cases. Our study is a first step in understanding the role of personality and social support in patients sufficiently recovered from major depression. Future work will examine the impact of personality and social support on the trajectories of depression recovery.

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Table 1

Participant Characteristics

	Depressed Patients (N=108)	Nondepressed Comparison Group (N=103)	Total (N= 211)	Statistics
<i>Demographic Characteristics</i>				
Gender (% female)	61%	70%	65%	$\chi^2 = 1.80, 1 \text{ df}, p=0.1796$
Race (% Caucasian)	94%	86%	90%	$\chi^2 = 2.97, 1 \text{ df}, p=0.0846$
Age, mean (SD)	69.4 (6.0)	71.5 (5.6)	70.4 (5.9)	$t = 2.68, 209 \text{ df}, p = 0.0080$
% Married	60%	63%	62%	$\chi^2 = 0.19, 1 \text{ df}, p=0.6627$
% Employed	16%	12%	14%	$\chi^2 = 0.79, 1 \text{ df}, p=0.3736$
Education, mean (SD)	13.9 (2.7)	15.3 (2.0)	14.6 (2.4)	$t = 4.17, 196 \text{ df}, p < 0.0001$
<i>Health Status</i>				
Self-rated health (fair or poor)	43%	3%	24%	$\chi^2 = 44.74, 1 \text{ df}, p < 0.0001$
Depression Severity				
MADRS, mean (SD)	8.2 (8.1)	--	--	--
<i>Personality Traits</i>				
Neuroticism, mean (SD)	54.8 (11.8)	41.6 (9.0)	48.4 (12.4)	$t = -9.09, 199 \text{ df}, p < 0.0001$
Extraversion, mean (SD)	45.2 (9.4)	50.1 (9.6)	47.6 (9.8)	$t = 3.76, 209 \text{ df}, p = 0.0002$
Openness, mean (SD)	46.8 (11.4)	51.5 (9.7)	49.1 (10.9)	$t = 3.25, 209 \text{ df}, p = 0.0014$
Conscientiousness, mean (SD)	44.1 (11.5)	52.0 (10.0)	48.0 (11.5)	$t = 5.34, 209 \text{ df}, p < 0.0001$
Agreeableness, mean (SD)	54.5 (9.2)	55.3 (9.1)	54.9 (9.2)	$t = 0.65, 209 \text{ df}, p = 0.5177$
<i>Social Support</i>				
Social Network, mean (SD)	2.1 (2.2)	1.5 (1.8)	1.8 (2.0)	$t = -2.20, 208 \text{ df}, p = 0.0287$
Instrumental social support, mean (SD)	10.3 (1.2)	10.8 (0.7)	10.5 (1.0)	$t = 3.34, 163 \text{ df}, p = 0.0010$
Non-family social interaction, mean (SD)	6.6 (2.5)	8.0 (2.3)	7.3 (2.5)	$t = 4.28, 208 \text{ df}, p < 0.0001$
Subjective social support, mean (SD)	24.9 (3.6)	27.2 (1.4)	26.0 (3.0)	$t = 6.08, 140 \text{ df}, p < 0.0001$

Table 2
Linear regression models showing personality domains and subjective social support as predictors of MADRS score (n=108)

Parameter	Model 1 NEUROTICISM			Model 2 OPENNESS			Model 3 CONSCIENTIOUSNESS			Model 4 EXTRAVERSION			Model 5 AGREEABLENESS		
	Estimate	Std Err	t, p *	Estimate	Std Err	t, p *	Estimate	Std Err	t, p *	Estimate	Std Err	t, p *	Estimate	Std Err	t, p *
Intercept	67.36	26.32	2.56, 0.0120	67.02	19.41	3.45, 0.0008	20.65	9.70	2.13, 0.0356	22.61	9.39	2.41, 0.0179	16.20	10.39	1.56, 0.1221
Neo Domain	-0.85	0.39	-2.21, 0.0291	-0.93	0.34	-2.75, 0.0071	0.14	0.07	-2.07, 0.0411	-0.29	0.08	-3.47, 0.0008	0.10	0.08	1.16, 0.2479
Subjective Social Support	-3.11	0.98	-3.18, 0.0020	-2.54	0.71	-3.58, 0.0005	-0.65	0.21	-3.08, 0.0027	-0.48	0.22	-2.21, 0.0290	-0.85	0.21	-4.03, 0.0001
NEO* Subjective Social Support	0.04	0.02	2.70, 0.0081	0.03	0.01	2.52, 0.0133	0.35	1.49	0.24, 0.8136	1.32	1.48	0.89, 0.3731	0.20	1.51	0.13, 0.8940
Sex	-1.03	1.47	-0.70, 0.4842	-0.15	1.48	-0.10, 0.9193	0.14	0.12	1.16, 0.2473	0.15	0.12	1.25, 0.2142	0.12	0.12	0.94, 0.3484
Age	0.11	0.12	0.98, 0.3310	0.12	0.12	0.97, 0.3340									

The t-tests for each parameter in Models 1 and 2 have 101 degrees of freedom; t-tests for each parameter in Models 3, 4 and 5 have 102 degrees of freedom;