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The Relationship between Parkinson's Disease Symptoms and Caregiver Quality of Life

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Abstract

Objective—Caregivers for individuals with Parkinson's disease (PD) can experience high burden, which underlies the importance of examining the needs of caregivers to be able to support them in the caregiving role. The current study aims to assess the relationships among PD symptoms and four measures of caregiver quality of life (QOL; i.e., personal and social activities, anxiety and depression, self-care, and strain).

Method—Data from 181 caregiver/care recipient dyads (N = 362) were collected at a multidisciplinary PD clinic in a public, academic medical center in the southeastern United States at the time of the care recipient's first neuropsychological evaluation.

Results—All PD symptoms were positively correlated with each other, as were all forms of caregiver QOL, and all PD symptoms were associated with each measure of caregiver QOL. A series of regressions suggested that demographics and PD symptoms predicted all four types of caregiver quality of life, explaining 33% of the variance in caregiver personal and social activities, 24% in anxiety and depression, 28% in self-care, and 36% in strain. Female caregivers and those who provided care to male care recipients generally had worse QOL. Greater symptoms including difficulties with mobility, decreased emotional well-being, and greater non-motor functioning impairment were unique predictors of reduced caregiver QOL.

Conclusions—PD symptoms are robustly related to caregiver QOL, with mobility and non-motor symptoms as the primary drivers of this relationship. Interventions for PD caregivers should include strategies for managing mobility and non-motor symptoms, as well as their QOL effects on caregivers.

Keywords

Caregivers; quality of life; Parkinson's disease; symptoms

Parkinson's disease (PD), a progressive, debilitating neurodegenerative disorder, ranks second only to Alzheimer's disease in prevalence (Ascherio & Schwarzschild, 2016; Elbaz, Carcaillon, Kab, & Moisan, 2016). PD affects an estimated 1–2 per 1,000 individuals, and 1% of people over the age of 60 (Tysnes & Storstein, 2017). Other estimates suggest approximately 1 million Americans are affected each year (Edwards & Scheetz, 2002). PD

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is characterized by its motor symptoms: bradykinesia, tremor, rigidity, gait disturbances, and postural instability (Alves, Forsaa, Pedersen, Dreetz Gjerstad, & Larsen, 2008; Lang & Lozano, 1998). However, non-motor symptoms (e.g., loss of taste and smell, autonomic and gastrointestinal problems, sleep dysfunction, cognitive changes, and neuropsychiatric symptoms including depression, anxiety, and hallucinations) have become incorporated into the diagnostic criteria, due to the dominant clinical presentation in many patients (Postuma et al., 2015). There is currently no treatment or cure that will prevent progression of the disease; however, there are some treatments aimed at reducing the symptoms (Sveinbjornsdottir, 2016). As the disease progresses, the individual with PD will usually experience greater need for assistance with everyday tasks and activities (A'Campo, Wekking, Spliethoff-Kamminga, Le Cessie, & Roos, 2010; American Parkinson Disease Association, 2018; Parkinson's Foundation, 2019). Informal caregivers (e.g., spouses/significant others, children, parents, and friends) will often provide this daily support (Lökk, 2008; Martínez-Martín et al., 2005; National Family Caregivers Association, 2017; The National Alliance for Caregiving & AARP Public Policy Institute, 2015).

PD caregivers often experience high burden (Martínez-Martín et al., 2005; Schrag, Hovris, Morley, Quinn, & Jahanshahi, 2006), which underlies the need to examine the needs of informal caregivers in order to be able to support them in this role (Aarsland, Larsen, Karlsen, Lim, & Tandberg, 1999; Schrag et al., 2006). Caregiving burden has been conceptualized as feeling stress or strain, increased physical and mental health problems, decreased feelings of well-being, financial burden, and task burden (Caap-Ahlgren & Dehlin, 2002). Caregivers report elevated rates of tiredness, sadness, decreased satisfaction with life (Aarsland et al., 1999), worse physical health, increased depression, decreased social life (Schrag et al., 2006), sleep difficulty, anxiety, and loneliness (Secker & Brown, 2005). To better assist caregivers, some attention in the research literature has been given to what drives caregiver burden.

Among the many posited explanations for increased caregiver burden is greater PD symptom severity. Severity of PD symptoms has been linked to increased caregiver burden and decreased quality of life (QOL) for PD (Santos-García & Fuente-Fernández, 2015; Schrag et al., 2006), dementia, and Alzheimer's caregivers (Glozman, 2004). Specifically, increased and more severe mobility symptoms (Dunn, 2010), cognitive symptoms (Leroi, McDonald, Pantula, & Harbishettar, 2012), mental health symptoms, and falls (Schrag et al., 2006) have been linked to increased burden for caregivers. This suggests that investigating disease stage, progression, and presentation via the presenting symptoms may be important to best identify PD caregivers in need of assistance and support.

Increased caregiver burden has been negatively associated with caregiver QOL (Duggleby et al., 2016; Goldsworthy & Knowles, 2008; Hughes, Giobbie-Hurder, Weaver, Kubal, & Henderson, 1999) and while some studies have focused on caregiver burden (D'Amelio et al., 2009; Oguh, Kwasny, Carter, Stell, & Simuni, 2013), less attention has been given to overall caregiver well-being and QOL. Caregiver QOL is the extension of the impact and consequences of a disease from the patient to the caregiver (Martinez-Martin, Rodriguez-Blazquez, & Forjaz, 2012). Caregiver QOL includes aspects related to caregiver spiritual, social, emotional, physical, and financial functioning and well-being (Weitzner, Jacobsen, Wagner, Friedland, & Cox, 1999).

While some extant literature has connected increased symptoms with decreased caregiver QOL, these studies have often focused on specific problems (e.g., falls; (Schrag et al., 2006) or in populations other than PD (Glozman, 2004). The current study aimed to assess the relationship among a range of PD symptoms and four measures of caregiver QOL (i.e., personal and social activities, anxiety and depression, self-care, and strain). Based on previous research (Chappell & Reid, 2002; Goldsworthy & Knowles, 2008; Yates, Tennstedt, & Chang, 1999), the study hypothesized that increased symptoms will be related to decreased personal and social activities, increased anxiety and depression, decreased self-care, and increased strain.

Method

Participants

Data from 181 caregiver/care recipient dyads (N = 362) were collected at a multidisciplinary PD clinic in a public, academic medical center in the southern United States. For patients, eligibility for the study included (a) having a physician diagnosis of PD, (b) having baseline (first appointment) data, (c) being enrolled in the clinic's research registry, (d) being over the age of 18, (e) and being able to read and respond in English. Eligibility for caregivers included (a) being the primary caregiver of an individual with a diagnosis of PD seen in the clinic, (b) being at least 18 years of age, and (c) being able to read and respond in English. Dyads were included if at least 50% of items—a cutoff established for missing data imputation (Dong & Peng, 2013)—in every care recipient and caregiver measure were completed. Only one participant was excluded for completing less than 50% of items on a scale. Originally, 536 first evaluations coded as PD were pulled from the registry. Of these, 354 participants had not completed one or more of the study measures and had to be excluded. There are many reasons for this exclusion number, including that not all physicians contributing to the research registry followed the same protocol, which resulted in missing scale data. Participant demographic information for the final 181 patients and their caregivers appears in Table 1.

Procedure

All information is from the care recipients' (i.e., individual with PD) first neuropsychological evaluation, which was accessed for research purposes if consent had been given to include the neuropsychological evaluation data in the clinic's research registry for ongoing and future research. Ethical approval of the clinic's research registry was obtained from the university's institutional review board. As part of the clinical neuropsychological evaluation, both caregivers and care recipients completed the paper and pencil measures examined in this current study in private clinic rooms. Caregiver QOL was assessed through the Parkinson's Disease Questionnaire for Caregivers (PDQ-Carer), and care recipient symptoms were assessed using the Parkinson's Disease Questionnaires (PDQ-39) and Non-Motor Symptoms Questionnaire (PD-NMS). A variety of demographic information was also obtained for care recipients (i.e., age, sex, race, and years of education) and caregivers (i.e., age, sex, relationship to care recipient, how often they see the care recipient, and how many hours per week they spend with the care recipient).

Measures

Parkinson's Disease Questionnaires-39 (PDQ-39)—Care recipient PD symptoms were assessed using the PDQ-39 (Peto, Jenkinson, & Fitzpatrick, 1998). The PDQ-39 is a 39-item measure that assesses symptom domains of individuals' lives impacted by PD. Of the eight domains of the PDQ-39 (mobility, activities of daily living, emotional well-being, stigma, social support, cognitive, communication, and bodily discomfort) only mobility, activities of daily living, emotional well-being, cognitive, and bodily discomfort were retained in the current study, as these were thought to reflect the symptom domains of PD. For each subscale, scores range from 0 (i.e., no problem at all) to 100 (i.e., maximum possible problem). Scores are calculated by totaling the raw score, dividing by the number of items in the subscale, and then multiplying by 100 with higher scores reflecting greater symptoms. For example, a score of 80 in mobility or cognitions would indicate significant movement issues or cognitive deficits. The same score of 80 for emotional well-being would suggest an absence or negative well-being. In the current study, the Mobility (α = .95), Activities of Daily Living (ADLs; α = .90), and Emotional Well-Being (α = .91) subscales had excellent reliability, while Cognitions (α= .75) and Bodily Discomfort (α = .75) were acceptable.

Non-Motor Symptoms Questionnaire (NMS)—Non-motor symptoms of PD for the care recipient were also assessed using the 30-item NMS (Martinez-Martin et al., 2007). Individuals answer "yes" or "no" to whether they have experienced a range of problems in the previous month. Example items include, "loss or change in your ability to taste or smell," "difficulty concentrating or staying focused," and "swelling of your legs." A total score is calculated with one point for each "yes" answer, and higher scores represent more severe non-motor symptoms. In the current study, the scale had good internal reliability (α = .83).

Parkinson's Disease Questionnaire for Caregivers (PDQ-Carer)—Caregiver QOL was assessed using the PDQ-Carer (Jenkinson et al., 2012). The PDQ-Carer is a 29-item measure that assesses four domains of caregiver QOL (i.e., personal and social activities, anxiety and depression, self-care, and strain). For each subscale, scores range from 0 (i.e., no problem at all) to 100 (i.e., maximum possible problem). Scores are calculated by totaling the raw score, dividing by the number of items in the subscale, and then multiplying by 100 with higher scores reflect more negative outcomes. In the current study, internal reliability for each subscale was found to be excellent for Personal and Social Activities (α = .95) and Anxiety and Depression (α = .91), and good for Self-Care (α = .86) and Strain (α = .83).

Results

Normality Assumptions

Normality assumptions were checked prior to running analyses. For all PD symptoms and caregiver QOL variables, normality assumptions were met except for caregiver self-care.

Self-care was kurtotic at 2.40. As data transformation only minimally corrected this slight violation, it was determined the subscale would be retained in its original form to aid with interpretability. Univariate outliers were also checked. Emotional well-being had three, cognitions had one, bodily discomfort had two, non-motor symptoms had one, personal and social activities had two, anxiety and depression had two, self-care had three, and strain had one. All other PD symptoms contained no outliers. Per Cohen and colleagues (2003), as these outliers represented less than 2% of the data they were retained. Using Mahalanobis distance, three multivariate outliers were detected. As the outliers were not extreme and represented only a small (1.6%) percentage of the data, they were retained.

Correlation Matrices

A correlation matrix was generated to examine the bivariate relationships in the current study among the symptoms of PD and caregiver QOL variables (Table 2). All PD symptoms were positively correlated with each other, and all forms of caregiver QOL were positively associated with each other. Finally, all PD symptoms were positively associated with each measure of caregiver QOL.

A second correlation matrix was generated to examine the bivariate relationships among caregiver QOL and demographic variables of caregivers and care recipients (Table 3). Caregiver sex was positively associated with two indices of caregiver QOL (i.e., strain and self-care), suggesting a larger relationship for female caregivers. Care recipient sex was positively associated with two indices of caregiver QOL (i.e., strain and anxiety and depression), suggesting a larger relationship for male care recipients. No other demographic variables were significantly associated with caregiver QOL. Caregiver sex (with self-care and strain) and care recipient sex (with anxiety and depression and strain) were the only significantly correlated demographic variables, and as such were retained as covariates (entered in the first step) for the regressions. As personal and social activities did not correlate with any of the demographic variables, a simultaneous multiple regression was used, while hierarchical multiple regressions were used for all other QOL measures.

Regression: Personal and Social Activities

In the simultaneous multiple regression (Table 4), the six PD symptoms were regressed onto caregiver personal and social activities. No demographic variables were controlled for, as none had been significantly correlated with caregiver personal and social activities. The model was significant, $F(8, 172) = 12.63$, $p < .001$, $R^2 = .33$. Mobility ($\beta = .38$ $p < .001$) was a unique predictor of caregiver personal and social activities (all other ps $\geq .116$).

Regression: Anxiety and Depression

The first hierarchical multiple regression (Table 4) tested the association between the six PD symptoms and caregiver anxiety and depression. In the first step, care recipient sex was entered, which was significant $F(1, 179) = 5.68$, $p = .018$, suggesting care recipient sex was related to caregiver anxiety and depression. Specifically, caregivers who provided care for male care recipients had higher anxiety and depression. The six PD symptoms were entered into the second step, which was significant, $F(7, 173) = 7.58$, $p < .001$, $R^2 = .24$. Care recipient sex ($\beta = .25$ $p = .001$), emotional well-being ($\beta = .20$ $p = .044$), and non-motor symptoms ($\beta = .27$ $p = .008$) were all unique predictors (all other ps $\geq .355$).

Regression: Self-Care

The second hierarchical multiple regression (Table 4) tested the association between the six PD symptoms and caregiver self-care. In the first step, caregiver sex was entered, which was significant $F(1, 179) = 5.37$, $p = .022$, suggesting caregiver sex was related to self-care. Specifically, female caregivers had higher scores (less self-care). The six PD symptoms were entered into the second step, which was significant, $F(7, 173) = 8.86$, $p < .001$, $R^2 = .26$. Caregiver sex ($\beta = .15$ $p = .027$), mobility ($\beta = .24$ $p = .019$), and non-motor symptoms ($\beta = .23$ $p = .020$) were unique predictors (all other ps $\geq .586$).

Regression: Strain

The final hierarchical multiple regression (Table 4) tested the association between the six PD symptoms and caregiver strain. In the first step, caregiver and care recipient sex were entered, which was significant $F(2, 178) = 8.14$, $p < .001$, suggesting both caregiver and care recipient sex were related to strain. Specifically, female caregivers and those with male care recipients had higher scores (greater strain). The six PD symptoms were entered into the second step, which was also significant, $F(8, 172) = 11.98$, $p < .001$, $R^2 = .36$. Care recipient sex ($\beta = .39$ $p < .001$), mobility ($\beta = .25$ $p = .010$), and non-motor symptoms ($\beta = .20$ $p = .032$) were all unique predictors of caregiver strain (all other ps $\geq .076$).

Discussion

The purpose of this study was to examine the relationship between PD symptoms and caregiver QOL. All PD symptoms were positively correlated with each other, as were all forms of caregiver QOL, and all PD symptoms were associated with each measure of caregiver QOL. A series of regressions suggested that demographics and PD symptoms predicted all four types of caregiver quality of life, explaining 33% of the variance in caregiver personal and social activities, 24% in anxiety and depression, 28% in self-care, and 36% in strain. Female caregivers and those who provided care to male care recipients generally had worse QOL. Total hours of care was not, however, significantly related to decreased QOL. It is possible that the provision of a higher level of care may provide meaning or purpose or a sense of connection for the caregiver. As a result, being a caregiver may be associated with more negative outcomes (Roland & Chappell, 2019; Roth, Brown, Rhodes, & Haley, 2018), but for people who are caregivers, providing a greater number of hours of care per week may not be. Greater difficulties with mobility, emotional well-being, and non-motor symptoms were unique predictors of reduced caregiver QOL.

The PD caregivers in this study had similar characteristics to informal caregivers in other samples. They were predominantly female, and their relationship to the care recipients was mostly as a spouse/significant other (Lökk, 2008; Martínez-Martín et al., 2005; National Family Caregivers Association, 2017; The National Alliance for Caregiving & AARP Public Policy Institute, 2015). Univariate analyses demonstrated that women had higher scores on QOL indices of strain and self-care, suggesting worse QOL in those domains than male caregivers. This finding of worse mental health and QOL outcomes for female caregivers has been found in previous research on multiple sclerosis caregivers and may reflect traditional gender roles and self-sacrifice in the provision of care (Perrin et al., 2015). It also suggests that sex may play an important role in caregiving relationships, designating it as an important consideration for future work with PD caregivers and care recipients. Given that caregivers are often spouses of care recipients, a related finding in the current study was that caregivers who provided care to men (likely female caregivers) had higher strain and anxiety/depression. It may be that care recipient sex is not a significant predictor of caregiver QOL by itself per se, but rather that it reflects more complex constructs tapping intersections of age, relationship to caregiver, quality of relationship to caregiver, and stressors causing burden for the caregiver (American Psychological Association, 2019; Swinkels, Tilburg, Verbakel, & Broese van Groenou, 2019).

Mobility symptoms were a unique predictor of personal and social activities, self-care, and strain, suggesting that increased mobility symptoms are a major driver of decreased caregiver QOL. This finding is consistent with previous research showing that with greater mobility symptoms, the need for assistance from others increases (Dunn, 2010). The other consistent symptom predictor of caregiver QOL was non-motor symptoms, which uniquely predicted caregiver depression and anxiety, self-care, and strain. Relatedly, emotional well-being of the individual with PD uniquely predicted caregiver anxiety and depression. It has been previously demonstrated that caring for someone with behavioral and emotional problems can negatively impact caregivers' own mental and emotional well-being (Arango Lasprilla, Moreno, Rogers, & Francis, 2009; Schrag et al., 2006). Depression, anxiety, and apathy are common among individuals with PD, which can add to caregiver burden and decreased QOL. Non-motor symptoms encompass a wide variety of heterogeneous symptoms and can become prominent in the advanced stages of PD (Marinus, Zhu, Marras, Aarsland, & van Hilten, 2018). However, in the early stages, friends, family, and caregivers may notice changes, before they become clinically apparent, and that may cause worry, doubt, frustration (Carter, Stewart, Lyons, & Archbold, 2008).

Research and Practice Implications

In conjunction with previous research, the findings from this study have implications for research and practice with PD caregivers. Given the robust associations between PD symptoms and caregiver QOL, investigations into identifying caregivers at risk for poor QOL based on particular symptoms profiles of individuals with PD and providing them with evidence-based support would be extremely important. Such research should explore the role of mobility and non-motor symptoms, as these were the primary predictors of reduced caregiver QOL. When these symptoms are present, clinicians can provide caregivers with referrals to appropriate support groups (Marziali, Donahue, & Crossin, 2005; Mittelman, Roth, Coon, & Haley, 2004) and, if appropriate and accessible, respite care (Berglund & Johansson, 2013; Goy, Carter, & Ganzini, 2008; O'Brien, Whitehead, Jack, & Mitchell, 2012; Petrovic, 2013). It is critical to identify caregivers providing care to individuals with PD with particularly mobility difficulties and greater non-motor symptoms, as caregivers may experience even worse QOL as PD progresses.

One of the biggest barriers to caregiver self-care cited in the extant literature is time (Acton, 2002; Mosher, Given, & Ostroff, 2015; Ostwald, 2009). Caregivers prioritize the care recipients' needs above their own, and in some instances may be concerned about negative judgments or stigma that may occur from seeking mental health services or engaging in other forms of self-care (Mosher et al., 2015). Additionally, caregivers have reported a need for greater wellness strategies included in care at specialty movement disorder clinics (Lageman, Mickens, & Cash, 2015). Providing more holistic, integrated treatment plans—which include the caregivers—may help to promote better care for the care recipient and QOL of caregivers.

Providing caregivers with interventions that are specifically tailored to their needs, especially if they occur across the duration of the caregiving relationship and actively involve both the caregiver and care recipient, is important (Brodaty, Green, & Koschera, 2003; Selwood, Johnston, Katona, Lyketsos, & Livingston, 2007). Several PD caregiver interventions have been shown to reduce caregiver burden; for example, both face-to-face and telehealth psychosocial support groups have demonstrated an increase in PD caregivers' ability to cope with caregiving stress (Marziali et al., 2005). Decreased caregiver strain and burden in PD caregivers was also found in a preliminary randomized controlled trial of cognitive behavioral therapy (CBT) (Secker & Brown, 2005). Benefits from the CBT intervention were still present at a three-month follow-up. The current study findings suggest targeted interventions for PD caregiver QOL are needed, which if shown in future research, could enhance the quality of care provided.

Limitations and Future Directions

Although the current study has provided support for the relationship between PD symptoms and caregiver QOL, and accordingly potential directions for future research and practice, it has several limitations. First, the design was cross-sectional, which does not allow for temporal or causal inferences between PD symptoms and caregiver QOL. Utilization of longitudinal designs in future studies will allow for inference of causal relationships and time-order relations. Second, the sample was entirely recruited via an academic PD specialty clinic. Due to the targeted recruitment, as a clinical sample, these individuals may not be representative of those with limited access to health care or rehabilitation services or more rural caregivers. Generalizability of the sample to the clinic population must also be interpreted with caution, as approximately two-thirds of individuals coded as PD visits during their initial neuropsychological evaluation were excluded because they did not complete the measures included in this study. This was also a secondary data analysis, and as such, some information and measures were not included in the database which may have enhanced the analyses. For example, time since the PD diagnosis, how long the caregiver has been a caregiver, and history of invasive treatments such as deep brain stimulation would have been important additional variables. The data set from the research registry did not contain any cognitive measures outside of the Cognitive PDQ-39 subscale. Only individuals able to complete the questionnaires independently were allowed to be included in the research registry, which may have screened out anyone with significant cognitive impairments. Additionally, as all measures were self-report, social desirability may have influenced some patients and caregivers to underreport some symptoms, or others with particularly high burden or depression to exaggerate their negative responses. Next the NMS ought to be interpreted with caution. The response options of yes/no only allow the assessment of the presence of a symptom, not its severity. Future studies should also include examinations of symptom severity. Furthermore, there were no clinical data of patient symptoms and especially the motor symptoms, such as the Unified Parkinson's Disease Rating Scale or the Hoehn and Yahr scale, which would be very important to include in future studies. This underscores to the importance of assessing these variables longitudinally and of using more objective measures in conjunction with self-report measures.

Conclusion

The current study aimed to explore the relationship between PD symptoms and caregiver QOL. A series of multiple regressions suggested that PD symptoms were robustly related to caregivers' QOL, with mobility and non-motor symptoms being unique predictors of three of the four QOL measures. These results suggest a tentative rubric for identifying caregivers who may need additional support. They also underscore the need for integrated behavioral health services for caregivers and individuals with PD to assist with management of PD symptoms and their effects on caregiver quality of life.

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Impact

- Research on the relationship between Parkinson’s disease (PD) symptoms and caregiver quality of life (QOL) has been sparse.
- In this study, greater difficulties for individuals with PD with mobility, decreased emotional well-being, and worse non-motor functioning were unique predictors of reduced caregiver QOL.
- These results suggest a tentative rubric for identifying caregivers who may need additional support. They also underscore the need for integrated behavioral health services for caregivers and individuals with PD to assist with management of PD symptoms and their effects on caregiver quality of life.

Table 1

Participant Demographics

Variables	Percentage
<u>Caregiver</u>	
Age *M* (SD)	64.04 (10.50)
Sex	
Female	77.9
Male	22.1
Race/Ethnicity	
Caucasian	86.7
African American/Black	7.7
Asian	2.2
Missing	3.3
Relationship to patient	
Spouse or Significant other	79
Child (including in-law)	14.4
Other Family	3.9
Friend	0.6
Other	2.2
Frequency of caregiver visits	
Daily	86.7
4–6 days per week	3.9
2–3 days per week	6.1
Once per week	1.7
Once every two weeks	1.1
Less than once per month	0.6
Hours per week *M* (SD)	113.90 (55.74)
Years known *M* (SD)	43.19 (13.19)
<u>Care recipient</u>	
Age *M* (SD)	69.28 (8.55)
Sex	
Female	33.1
Male	66.9
Race/Ethnicity	
Caucasian	85.1
African American/Black	8.8
Asian	2.2
Missing	3.9
Years of Education *M* (SD)	14.81 (3.06)

Table 2

Symptom and Caregiver QOL Correlations

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1 CG Strain									
2 CG Self-Care	.76								
3 CG Anxiety & Depression	.78	.77							
4 CG Caregiver Activities	.80	.78	.71						
5 CR Mobility	.40	.42	.27	.53					
6 CR ADLs	.39	.37	.25	.43	.71				
7 CR Emotional	.38	.34	.36	.42	.56	.43			
8 CR Cognition	.36	.34	.29	.40	.44	.46	.56		
9 CR Bodily Discomfort	.25	.30	.27	.27	.50	.44	.54	.45	
10 CR Non-motor	.42	.43	.40	.40	.53	.54	.61	.64	.53

Note. CG = caregiver; CR = care recipient. All correlation coefficients were statistically significant at $p < .01$ or lower.

Table 3

Caregiver QOL and Demographic Correlations

	1	2	3	4	5	6	7	8	9	10	11
1 CG Strain											
2 CG Self-Care	.76**										
3 CG Anxiety & Depression	.78**	.77**									
4 CG Activities	.80**	.78**	.71**								
5 Frequency of CG Visits	−.06	−.01	−.02	−.14							
6 Hours of Care per Week	.09	.02	.02	.10	−.50**						
7 Years Known	−.06	−.04	−.08	.07	.17*	−.03					
8 CG Sex	.21**	.17*	.15	.08	.05	−.04	−.13				
9 CG Age	−.04	−.10	−.08	.08	−.36**	.39**	.42**	−.18*			
10 CR Age	−.02	−.01	−.12	.11	.19*	−.03	.54**	.07	.37**		
11 CR Sex	.29**	.12	.18*	.13	−.20**	.17*	−.24**	.64**	.06	−.02	
12 CR Education	−.001	−.10	−.01	−.09	.02	.10	−.08	.02	.10	.10	.01

Note. CG = caregiver; CR = care recipient.

$^{*}p < .05$

$^{**}p < .01$.

Table 4

Hierarchical Multiple Regression Analyses: Associations between PD Symptoms and Caregiver QOL

	Personal & Social Activities		**Anxiety & Depression**		**Self-Care**		**Strain**	
Independent Variable	**ΔR^2**	**β**	**ΔR^2**	**β**	**ΔR^2**	**β**	**ΔR^2**	**β**
Step 1	-		.03		.03		.08***	
Caregiver Sex						.17*		.03
Care recipient Sex				.18*				.27**
Step 2	.33***		.20***		.25***		.27***	
Caregiver Sex						.15*		−.06
Care Recipient Sex				.25**				.39***
Mobility		.38***		.10		.24*		.25**
ADLs		.05		−.08		.01		.01
Emotional Well-being		.12		.20*		.05		.16
Cognitive		.16		.−.03		.03		.03
Bodily Discomfort		−.11		.06		.02		−.03
Non-motor		.07		.27**		.23*		.20*
Total R^2	.33***		.24***		.28***		.36***	

Note.

*= $p < .05$

**= $p < .01$

***= $p < .001$, two-tailed.