

Perceived Health, Psychological Distress, and Subjective Well-Being Among Older Adults With Parkinson's Disease: A Cross-Lagged Analyses

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Research article

Keywords: Parkinson's disease, quality of life, subjective well-being, psychological distress, cross-lagged study

Posted Date: July 22nd, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-673726/v1>

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Version of Record: A version of this preprint was published at International Journal of Environmental Research and Public Health on November 29th, 2021. See the published version at <https://doi.org/10.3390/ijerph182312566>.

Abstract

Background

Growing number of ageing population adds to the increase in the number of the patients with Parkinson's disease (PD). This study examines how perceived health, psychological distress, and subjective well-being evolve in older adults with PD.

Methods

A cross-lagged study design was employed using data from Waves 4 and 6 of the Survey of Health, Ageing and Retirement in Europe (SHARE). In total, 421 older adults diagnosed with PD at the baseline (46% female; mean age 74.98 ± 9.05 years) were followed-up with a 4-year lag. Auto-regressive effects and cross-lagged associations between the measured variables were examined in reciprocal models.

Results

Individual differences in perceived health, psychological distress, and subjective well-being were relatively stable over the 4-year lag. A final reciprocal model with significant cross-lagged effects well-explained the underlying structure of the sample data.

Discussion

Early behavioral and psychological intervention at disease onset will play a pivotal role in maintaining a sense of well-being among older adults with PD.

Background

The current study aimed to examine longitudinal relationships between perceived health, psychological distress, and subjective well-being among older adults with Parkinson's disease (PD) in terms of reciprocal causality. Due to its idiopathic and progressive symptoms, patients with PD are more likely to experience deteriorated motor functioning that increases difficulty to perform basic activities for daily living (e.g., dressing or walking). Furthermore, among patients with PD, secondary impacts are often observed, such as digestion problems, poor quality of sleep, and subtle cognitive deficits (Buczak-Stec et al., 2018; Forsaa et al., 2008; Harsanyiova et al., 2020; Martinez-Martin et al., 2011). Therefore, as the stage of illness and disability progress, PD impedes the patients' sense of well-being including perceived health, self-efficacy, life satisfaction, and quality of life (Behari et al., 2005; Buczak-Stec et al., 2018; Jonasson et al., 2020; Pirogovsky et al., 2014; Wagner et al., 2020; Welsh, 2004).

The literature shows that a high rate of psychiatric comorbidity is significantly correlated with PD, including depression, (social) anxiety disorder, and stigma (Behari et al., 2005; Bolluk et al., 2010; Kano et al., 2011; Lawrence et al., 2014; Pachana et al., 2013; Quelhas & Costa, 2009; Rascol et al., 2003; Sagna et al., 2014; Smit et al., 2016). A lack of control in motor functions and abnormal behavioral manifestation (e.g., freezing, tremors) may lead to anxiety and embarrassed feelings in social situations. This further develops maladjustment to one's social environments and social withdrawal which increases social isolation among older adults with PD (Moguel-Cobos et al., 2020; Smit et al., 2016; Vann-Ward et al., 2017). Some studies reported that patients with PD experience a lack of social communication and positive support (e.g., Forsaa et al., 2008; Uitti, 2012; Vescovelli et al., 2018). Frequent experiences of psychological distress might further influence cognitive deterioration such as memory loss, confusion, and visual hallucinations. Moreover, it may contribute to drug abuse or suicidal ideation (Kummer et al., 2009; Mursaleen & Stamford, 2016; Rahman et al., 2008). Mild to intense psychiatric responses and psychological instability significantly diminish the quality of life and subjective well-being of patients with PD and often exacerbates PD symptoms (Hanna & Cronin-Golomb, 2012; Jonasson et al., 2020; Lawrence et al., 2014; Quelhas & Costa, 2009; Sagna et al., 2014).

As clinical and psychiatric comorbidity is highly prevalent with PD, patients with PD are more likely to experience emotional, social, behavioral, and cognitive changes compared to other types of chronic illnesses. Even though the pharmacological treatments help restore motor functioning such as dexterity and speed of movement, it is evident that patients with PD barely maintain their sense of well-being and autonomy, perceived health, social competence, meaningful social engagement, and purpose in life (Leroi et al., 2012; Smit et al., 2016; Shulman et al., 2001). Building on this, the current study examined how perceived health and quality of life measures evolved in older adults with PD using a two-wave panel design with a 4-year lag. We hypothesized that perceived health, psychological distress, and subjective well-being, among patients with PD, are related to reciprocal causation over time. i.e., perceived health at Time 1 would not only predict perceived health, but also psychological distress and subjective well-being at Time 2. Our study will provide empirical evidence for a reciprocal influence between the health and well-being constructs, suggesting the need to incorporate long-term behavioral and psychosocial interventions, while caring for older adults with PD, to optimize their subjective well-being and quality of life.

Methods

Study design and data collection

A two-wave longitudinal study was employed using data drawn from the Survey of Health Ageing and Retirement in Europe (SHARE). SHARE biannually collects data from European populations, aged 50 years and above, by employing an interviewer-administered data collection technique; the collected data includes a wide range of information about respondents, including health and well-being, socio-economic living, life trajectories, and activity engagement. This current study used data sampled from Waves 4 (data collected in 2011; Time 1) and 6 (data collected in 2015; Time 2), which indicated a 4-year gap. The respondents who reported that they were diagnosed with PD in the past or present at Time 1 ($N = 421$), were followed-up at Time 2 ($N = 357$). A detailed description of the main survey design, data collection procedure, and obtained informed consent can be found elsewhere (see Börsch-Supan et al., 2013; Malter & Börsch-Supan, 2013, 2016).

Measures

Perceived health, mental health, and subjective well-being were assessed using a multiple-item questionnaire. Respondents were asked to indicate their general health condition using a 5-point Likert scale, ranging from 1 (*poor*) to 5 (*excellent*) (Ware & Gandek, 1998). Respondents were also asked to indicate how many chronic illnesses they coped with.

Two forms of activities of daily living were measured: activities of daily living (ADLs; Katz et al., 1963) and instrumental activities of daily living (IADLs; Lawton & Brody, 1969). ADLs refer to the skills needed to manage one's basic needs such as personal hygiene, dressing, transferring/walking, and eating. Respondents were asked to report any difficulty in completing the listed activities. IADLs included more complex activities associated with the ability that allows an individual to live independently in their community such as cleaning and maintaining the house, preparing meals, shopping for groceries, and using the telephone or other form of communication. The resulting ADL scores ranged from 0 to 6, and IADL scores ranged from 0 to 9—higher scores indicated more limitations in (instrumental) activities of daily living.

Mental health included two measures: depression and loneliness. Depression was assessed using the EURO-D scale (Prince et al., 1999). The EURO-D scale comprises a total of 12 items that reflect late-life depressive symptoms including depression ("being sad or depressed in the last month"), pessimism ("no hopes mentioned"), suicidality ("any mention of suicidal feelings or wishing to be dead in the last month"), and sleep or appetite problems. The resulting score of the EURO-D scale ranged from 12 to 48—higher scores indicated higher levels of depressive symptoms. Loneliness was measured using the short version of the UCLA-Loneliness scale (Hughes et al., 2004) that consists of four indicators of survey questionnaire items (e.g., "feeling lonely and isolated") using a 3-point Likert scale, 1 (*hardly or never*) to 3 (*often*), where higher scores signify higher levels of loneliness.

Subjective well-being involved two domains, the quality of life (CASP-12 scale) and life satisfaction. The SHARE questionnaire uses the CASP-12 scale to measure quality of life that is composed of four underlying domains, Control (e.g., "My age prevents me from doing the things I would like to"), Autonomy (e.g., "I can do things that I want to do"), Self-realization (e.g., "I feel that life is full of opportunities"), and Pleasure (e.g., "I feel that my life has meaning"). The resulting score of the CASP ranged from 12 to 48—higher scores indicated higher levels of quality of life (Hyde et al., 2003). Life satisfaction was measured using a single questionnaire item with a 10-point rating scale, ranging from 1 (*least satisfied*) to 10 (*most satisfied*; Cheung & Lucas, 2014).

Analysis

Pearson's correlations were performed to determine associations between the study variables. A paired *t*-test was performed to see if perceived health and quality of life in older adults with PD would change at a follow-up point. By employing structural equation modeling (SEM), the stability and cross-lagged effects between the latent factors were examined. A baseline model included auto-regressive paths with no cross-lagged effects by hypothesizing that the measure at Time 1 would only predict the same measure at Time 2. We then tested a number of normal causation models and reversed causation models by adding cross-lagged effects from measures at Time 1 to measures at Time 2. A reciprocal model including all auto-regressive and cross-lagged paths was also examined to determine longitudinal predictability of the health perception, mental health, and subjective well-being among older adults with PD. Several goodness-of-fit indices were used to examine if each structural model fit the sample data: chi-square statistics, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Normed Fit Index (NFI), and Akaike Information Criterion (AIC) (Hu & Bentler, 1999). A final reciprocal causation model was identified with the significant standardized path coefficients between the latent factors. Statistical analyses were conducted using the software IBM SPSS Statistics 20.0 and AMOS version 18.0.

Results

Sample frame

Participants were aged between 52 and 103 years (Mean = 74.50 years, SD = 9.05) and 46% were female at the Time 1 point; followed-up sample were aged between 56 and 94 years (Mean = 76.23 years, SD = 8.10) and 58% were female. Although the age of PD onset varied, nearly 90% of sample reported a diagnosis of PD after their 50 years old (Mean age of PD onset = 63.82 years, SD = 15.85).

Correlations

Table 1 presents the correlations between the latent factors. There was a significant correlation between IADLs ($r = .569$), chronic illness ($r = .408$), self-rated health ($r = .343$), depression ($r = .427$), loneliness ($r = .420$), CASP-quality of life ($r = .547$, $p < .01$, respectively), and life satisfaction ($r = .156$, $p < .05$) at Times 1 and 2. However, there was no significant correlation between ADLs at Times 1 and 2. Furthermore, significant correlations were also reported between the latent factors; Pearson's correlations ranged between $-.109$ (ADLs at Time 1 and life satisfaction at Time 1) and $-.614$ (depression at Time 1 and CASP-quality of life at Time 1). Cross-sectional correlations between the latent factors tended to be stronger than the longitudinal correlations on all measures.

Test of time effect using *t*-test

Results indicated that older adults with PD reported an increased number of limitations of IADLs at follow-up point. There was a significant difference in the scores for limitations of IADLs at Time 1 ($M = 1.51$, $SD = 1.92$) and Time 2 ($M = 3.64$, $SD = 2.54$), $t(194) = -11.04$, $p < .001$.

Measures of subjective well-being significantly decreased at the follow-up point in older adults with PD. There was a significant difference in CASP-quality of life scale at Time 1 ($M = 34.08$, $SD = 6.46$) and Time 2 ($M = 32.83$, $SD = 6.03$), $t(140) = 2.49$, $p < .05$. Likewise, there was a significant difference in life satisfaction at Time 1 ($M = 7.06$, $SD = 2.12$) and Time 2 ($M = 6.68$, $SD = 2.11$), $t(158) = 2.06$, $p < .05$.

However, no significant change was found in the measures of ADLs, number of chronic diseases, self-rated health, depression, and loneliness 4 years later. Table 2 shows the mean difference in perceived health, mental health, and subjective well-being between Time 1 and Time 2.

Auto-regressive effect and cross-lagged associations

The baseline model including auto-regressive paths was examined. All auto-regressive effects were significant ($p < .001$), except for the measure of ADLs; the measure of ADLs was thus removed from the initial baseline model. Significant coefficients for IADLs, number of chronic diseases, self-rated health, depression, loneliness, CASP-quality of life scale, and life satisfaction indicated that individual differences in perceived health, mental health, and subjective well-being among older adults with PD were relatively stable over the 4-year lag between measurements. The baseline model (ADLs excluded) indicated an acceptable fit to the sample data, $\chi^2(54) = 142.207$, $p < .001$, CFI = .921, NFI = .905, RMSEA = .060, and AIC = 272.207.

Based on the baseline model, a number of normal causation models and reversed causation models were tested by adding a cross-lagged effect from measures, one at a time, to the measurements from Time 1 and Time 2. Each model was compared with the baseline model. Due to numerous latent factors in the analysis, the results of the chi-square difference test between the baseline model and causation/reversed causation models were obscured.

A reciprocal model was examined including all auto-regressive effects and cross-lagged associations. All auto-regressive effects were statistically significant in the expected direction ($p < .001$). A number of significant standardized cross-lagged effects were also identified in the reciprocal model. Specifically, CASP-quality of life at Time 1 had a cross-lagged effect on IADLs at Time 2. IADLs at Time 1 had a cross-lagged effect on chronic diseases at Time 2. It was also found that IADLs, chronic disease, loneliness, and CASP-quality of life at Time 1 had cross-lagged effects on depression at Time 2. Chronic diseases, self-rated health, and loneliness at Time 1 had cross-lagged effects on CASP-quality of life at Time 2. In addition, self-rated health at Time 1 had cross-lagged effects on life satisfaction at Time 2. Although depression and life satisfaction at Time 1 had auto-regressive effects on the same measures at Time 2, they did not have any cross-lagged effect on different measures at Time 2. Table 3 provides a summary of the significant path coefficients between the latent factors.

Figure 1 visualizes the final reciprocal model including significant path coefficients. The goodness-of-fit indices of the final reciprocal model indicated that the model including reciprocal relationships between the measures well-explained the underlying structure of the sample data, $\chi^2(49) = 101.876$, $p < .001$, CFI = .953, NFI = .935, RMSEA = .050, and AIC = 241.876. Furthermore, the chi-square difference test shows that the final reciprocal model provided a better fit to the data than the baseline model, and the normal causation and reversed causation models; the final reciprocal model also indicated significantly better fit indices compared to the other models.

Discussion

This study examined if perceived health, mental health, and subjective well-being changed over time in older adults with PD, and analyzed whether the measures had a reciprocal and causal effect on each other. Results indicated that older adults with PD tended to experience significantly increased difficulties in the IADLs. Older adults with PD also reported a significant decline in perceived well-being including life satisfaction and overall quality of life. The findings were consistent with the literature which showed that slowness of movement and subtle cognitive deficits associated with PD hinder patients wanting to complete activities necessary for one's active and independent living in a society (Kano et al., 2011; Quelhas & Costa, 2009; Vescovelli et al., 2018). Although our study sample did not provide specific information about PD onset and disability stage, increased difficulties in IADLs and a significant cross-lagged effect of IADLs on chronic disease may imply that symptoms and disabilities progressed over time among older adults with PD. Limitations of IADLs, however, can be mitigated by providing various services and infrastructure such as mobility assistance services in a community or home care products that can relieve the difficulties associated with performing activities of daily living among older adults with PD. Furthermore, to help improve and maintain motor abilities and functioning, accessible and affordable rehabilitation interventions should be provided for older patients with PD, in particular, those who live with limited material resources.

Significant auto-regressive associations between the study variables with a 4-year lag suggested that perceived health, mental health, and subjective well-being of older adults with PD were relatively stable at least between the two different measurement points. Moreover, significant cross-lagged effects between the measures confirmed the predictability of perceived health, mental health, and subjective well-being on future health and quality of life among patients with PD. This reciprocity and causality between a wide range of health and well-being indices suggested that they have the potential to influence each other over time. Health care professionals, in supporting patients with PD, should consider various life aspects of older patients with PD that facilitate positive psychosocial and behavioral adjustment or adaptation to chronic illness, for example, an optimistic mindset and social support (Stutts et al., 2020). In other words, to improve a sense of well-being and quality of life among patients with PD, a multilayer intervention should be coupled with the medical and pharmacological treatments.

The results showed that depression itself neither significantly changed/increased, nor predicted other aspects of health or quality of life at a four-year follow-up. This was an unexpected finding because existing literature has highlighted depression as the most evident psychiatric response and determinant of quality of life among patients with PD. Therefore, this raised two points of limitations. First, our study specifically examined the relationship between depression at Time 1 and other domains of health and well-being at Time 2. We argue that the cross-sectional association between depression and health and well-being among patients with PD assessed at the same time might be robust. However, with the 4-year interval, it is unclear how depression affects health conditions and well-being of patients with PD. Second, we examined the relationships between the latent factors en bloc using structural equation modeling; thus, the latent factors may have affected one another. The effect of depression at Time 1 on other domains of health and well-being at Time 2 could be mitigated by stronger relationships between the other latent factors. Interestingly, depression at the follow-up point was significantly associated with several baseline measures including IADLs, presence of chronic diseases, loneliness, and quality of life. This might indicate the pivotal role of early behavioral and

psychological interventions in maintaining psychological health by developing more positive resources, resilience, and coping strategies that diminish emotional distress (Gison et al., 2014; Stutts et al., 2020; Lundervold et al., 2013).

Our sample data showed that chronic disease, self-rated health, and loneliness at Time 1 significantly predicted CASP-quality of life at Time 2; self-rated health at Time 1 was also significantly related to life satisfaction at Time 2. Thus, perceived health conditions and social environment may have a long-term effect on subjective well-being among older adults with PD. Furthermore, a significant auto-regressive effect of loneliness suggested that older adults with PD might lack positive social exchanges and social support over time. Additionally, a cross-lagged effect of loneliness on depression and quality of life was consistent with other studies where loneliness was the significant determinant of depressive symptoms and declined quality of life among patients with PD (e.g., Vann-Ward et al., 2017). Increased social stress, anxiety, and imposed or voluntary social isolation and withdrawal were observed in patients with PD (e.g., Stutts et al., 2020; Vann-Ward et al., 2017). Additionally, older patients with PD, who had limited social networks and social support (e.g., widowed or childless), may have experienced severe loneliness and isolation owing to motor malfunctioning. Physical activity intervention in a group can facilitate the physical improvement of older patients with PD and provide opportunities to interact with peers that contribute to patients' social well-being and life engagement (Sheehy et al., 2017; Vescovelli et al., 2018). Educational training for communication skills and technology can help older adults with PD stay better connected and informed.

Conclusions

As the global population ages, PD prevalence will increase. This causes economic, physical, and mental burdens in both patients and caregivers. Study findings provided a better understanding of the relationship between perceived health, mental health, and subjective well-being in older adults with PD. Older adults with PD were at a greater risk for decline in daily functional status, quality of life, and life satisfaction. Additional attention should be paid to help older patients with PD overcome functional limitations and improve their quality of life and well-being. A companion study, already in development, is needed to provide more specific and practical interventions for older adults with PD. It will investigate the potential correlates of coping strategies that might mitigate the negative aspects of PD.

Abbreviations

PD: Parkinson's disease

Declarations

Ethics approval and consent to participate

The current study employed publicly available *secondary* data. The Ethic Committee of the Faculty of Physical Culture, Palacký University Olomouc waived the need for approval.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

SL was funded by The Czech Science Foundation (19-11418Y GAČR). None of the funding bodies had any role in study design, data collection, data analysis, data interpretation, or writing of the report.

Authors' contributions

SL designed the study, analyzed the data and interpreted results, and wrote and revised the manuscript.

Acknowledgements

Not applicable

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Tables

Table 1 Pearson's correlations of the study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. ADLs (t1)	-															
2. ADLs (t2)	.115	-														
3. IADLs (t1)	.217**	.117	-													
4. IADLs (t2)	.192**	.233**	.569**	-												
5. CI (t1)	.028	.090	.138**	.059	-											
6. CI (t2)	.155*	.134	.285**	.231**	.408**	-										
7. SRH (t1)	-.323**	-.223**	-.385**	-.238**	-.174**	-.175*	-									
8. SRH (t2)	-.190**	-.360**	-.209**	-.359**	-.022	-.098	.343**	-								
9. DP (t1)	.165**	.046	.498**	.289**	.137**	.107	-.361**	-.078	-							
10. DP (t2)	.085	.094	.375**	.433**	.053	.176*	-.259**	-.419**	.427**	-						
11. LN (t1)	.105	.203*	.270**	.198*	.111	.116	-.193**	-.106	.382**	.273**	-					
12. LN (t2)	.027	.145	.289**	.311**	.089	.122	-.102	-.152	.310**	.428**	.420**	-				
13. CASP (t1)	-.202**	-.146	-.550**	-.427**	-.131*	-.234**	.475**	.255**	-.614**	-.430**	-.416**	-.311**	-			
14. CASP (t2)	-.195*	-.143	-.301**	-.494**	.038	-.159	.389**	.377**	-.359**	-.574**	-.305**	-.436**	.547**	-		
15. LS (t1)	-.109*	-.009	-.314**	-.220**	-.119*	-.205**	.330**	.149*	-.415**	-.308**	-.405**	-.297**	.566**	.368**	-	
16. LS (t2)	-.033	-.074	-.232**	-.288**	-.107	-.091	.265**	.332**	-.268**	-.413**	-.252**	-.356**	.355**	.552**	.156*	-

Note. ADLs: Activities of daily living; IADLs: Instrumental activities of daily living; CI: Chronic illness; SRH: Self-rated health; DP: Depression; LN: Loneliness; CASP: CASP quality of life scale; LS: Life satisfaction. ** $p < .01$, * $p < .05$.

Table 2 Mean difference in perceived health, mental health, and subjective well-being between time 1 and time 2

	Time 1	Time 2	t-value	p-value
Measures	Mean (SD)	Mean (SD)		
ADLs	0.92 (0.26)	0.91 (0.28)	0.391	.231
IADLs	1.51 (1.92)	3.64 (2.54)	-11.040	.000
Chronic diseases	3.43 (1.87)	3.28 (2.01)	0.946	.345
Self-rated health	1.72 (0.76)	1.62 (0.68)	1.505	.134
Depression	3.79 (2.55)	3.92 (2.55)	-0.612	.541
Loneliness	1.40 (0.68)	1.50 (0.62)	1.392	.134
CASP - quality of life scale	34.08 (6.46)	32.83 (6.03)	2.487	.014
Life satisfaction	7.06 (2.12)	6.68 (2.11)	2.060	.031

ADLs: Activities of daily living; IADLs: Instrumental activities of daily living

Table 3 Auto-regressive effects and cross-lagged associations in final reciprocal model

Path		β	S.E.	t-value	R2
Time 1	Time 2				
IADLs	IADLs	.550 ***	.072	8.544	.49
CASP - Quality of life		-.217 ***	.071	-3.318	
Chronic diseases	Chronic diseases	.365 ***	.064	5.748	.23
IADLs		.265 ***	.064	4.164	
Self-rated health	Self-rated health	.328 ***	.067	4.828	.09
Depression	Depression	.185 *	.088	2.234	.31
Loneliness		.161 *	.080	2.157	
CASP - Quality of life		-.244 **	.093	-2.747	
Chronic diseases		.184 **	.065	3.072	
IADLs		.249 **	.083	3.256	
Loneliness	Loneliness	.539 ***	.073	7.355	.25
CASP - quality of life	CASP - quality of life	.445 ***	.078	5.832	.38
Chronic diseases		-.208 ***	.065	-3.388	
Self-rated health		.196 **	.073	2.831	
Loneliness		-.228 **	.077	-3.069	
Life satisfaction	Life satisfaction	.401 ***	.075	5.418	.20
Self-rated health		.151 *	.075	2.050	

Note. *** $p < .001$, ** $p < .01$, * $p < .05$. Goodness of Fit indices: $\chi^2(49) = 101.876$, $p = .000$, CFI = 0.953, NFI = .935, RMSEA = 0.050, AIC = 241.876.

Figures

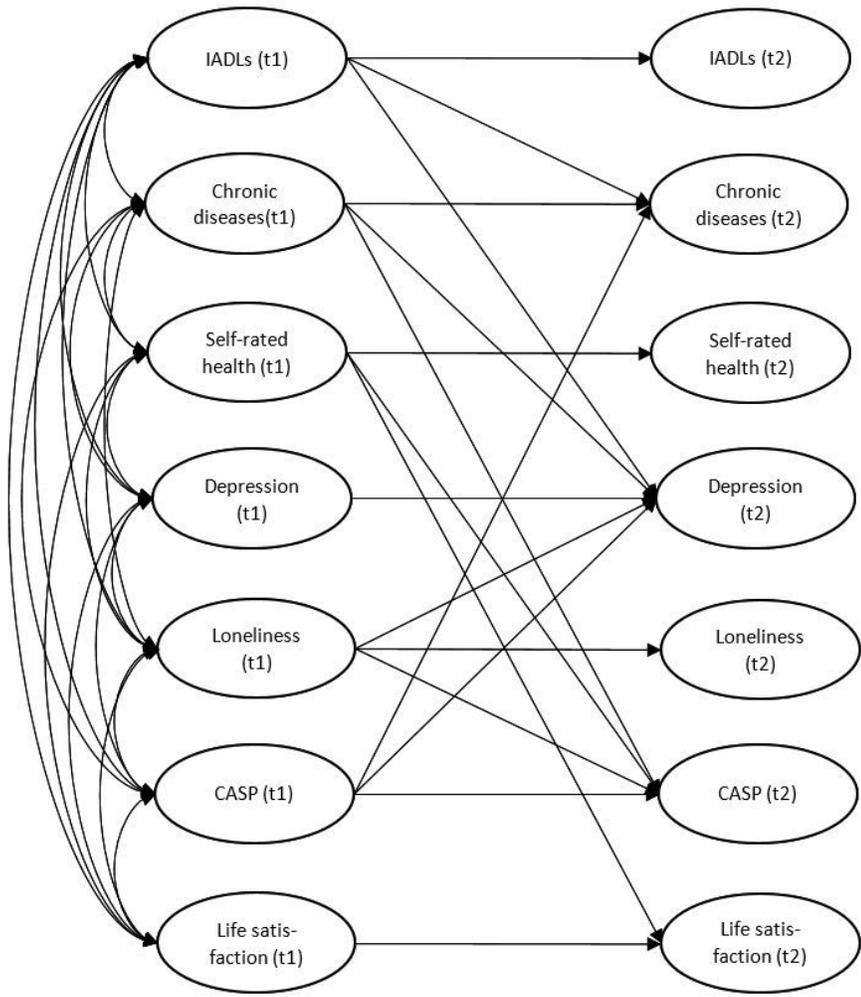


Figure 1

Auto-regressive effect and cross-lagged associations between perceived health, mental health, and subjective well-being (time 1 and time 2) among older adults with Parkinson's disease. Note. Two-headed connections indicate covariance between constructs. One-headed connectors indicate a causal path from measures (T1) to measures (T2); only statistically significant path was indicated. Each measure has an error term, but the error terms are not shown in the figure.