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Personality Pathology and Increased Use of Medical Resources in Later Adulthood

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Abstract

Objectives—Personality pathology is associated with many negative health outcomes in young adulthood, including overutilization of healthcare resources. It is unclear, however, what the relation between personality pathology and medical resource utilization is as individuals age and develop new physical health problems.

Design—The present study examined whether personality disorder (PD) features were related to greater medical resource utilization in a sample of 1,630 community-dwelling participants, aged 55–64 years. PD features and health status were measured at baseline; medical resource utilization and new physical health problems were measured at four 6-month follow-up assessments. Multilevel modeling analyses tested associations between number of physical health problems and PD features in medical resource use over time.

Results—Greater number of physical health problems significantly predicted higher medical resource utilization. The results also showed that many PD features were related to higher reported medical resource utilization independent of health status and sociodemographic variables. Schizoid and schizotypal PD features were associated with less reported medical resource utilization. When all PDs were included in the model together, dependent, antisocial, histrionic, and narcissistic PD features remained predictive of higher medical resource utilization.

Conclusions—Personality pathology remains a relevant predictor of greater medical resource utilization into later adulthood and should be considered an important risk factor when trying to determine ways to reduce costly overuse of healthcare resources among older adults.

Keywords

Personality disorders; personality pathology; later adulthood; medical resource utilization

Personality disorders (PDs) are associated with many negative physical health outcomes in younger adulthood, including increased risk for chronic physical health problems,¹ overutilization of healthcare services,² and engagement in unhealthy behaviors.³ As individuals age, the risk of developing major physical health problems increases, and the stress that accompanies a physical health problem can make it difficult to function and

manage daily tasks. Determining if PDs act as risk factors for maladjustment to physical health problems may facilitate efforts to reduce healthcare costs and promote healthy aging.

Increased utilization of healthcare resources may be one reflection of the impact of PDs. The Collaborative Longitudinal Personality Disorders Study, a study of treatment-seeking individuals ages 18–45 years,⁴ has shown that PDs are associated with increased utilization of mental health resources.² More specifically, patients with borderline PD were significantly more likely to utilize all types of psychosocial treatments available, and obsessive compulsive PD was related to more individual psychotherapy, when compared with patients with major depression alone. Soeteman et al.⁵ similarly found greater use of inpatient and outpatient mental health resources among patients with PDs compared with patients without PDs across a number of healthcare sites. Other longitudinal research on patients with borderline PD also found increased use of mental health resources, as well as other medical resource use among individuals with borderline PD.³ These studies demonstrate greater mental health resource use among patient populations with PDs, yet little is known about the relationship between PDs and medical resource utilization beyond psychiatric care alone. This is particularly relevant in light of growing evidence that personality pathology is related to worse perceived health and increased likelihood of having chronic physical health problems.¹

Although we have learned a great deal about the negative effects of PDs in younger adulthood, there is inadequate research available on how personality pathology affects health and functioning across the lifespan.⁶ Furthermore, the focus of PD research has generally been on patient populations, and more should be known about what these relationships look like among individuals living in the community. The present study helped to fill these gaps in research and assessed whether the presence of PD features affected physical health-related medical resource utilization in the presence of physical health problems among a community sample of middle- to older-aged adults. Patterns of change in medical resource utilization were examined in relation to PD features (including all 10 *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR PDs⁷)) and the presence of major physical health problems over the course of two years.

METHODS

Participants

A representative, community-based sample of adults aged 55–64 years was recruited to participate in an ongoing longitudinal study of personality, health, and transitions in later life: The St. Louis Personality and Aging Network (SPAN; see Oltmanns et al.⁸ for details of study procedures). The sample consisted of 1,630 participants at the baseline assessment; all 6-month follow-up (FU) data for FU1–FU4 collected by November 1, 2011, were included, resulting in the following sample sizes: FU1 (N = 1,313); FU2 (N = 1,207); FU3 (N = 913); FU4 (N = 738). Not all participants had the opportunity to complete all four FU assessments by the time data were organized and cleaned for the analyses reported in this paper. Therefore these numbers do not reflect attrition; the SPAN project is longitudinal, and

all participants did not begin at the same time. The overall attrition rate for the study at the time of these analyses was 5.6%.

The average age of participants at baseline was 59.4 years (SD: 2.7). Sixty-four percent of participants were Caucasian and 55% were female. Roughly half of participants were currently married (48%). Fifty-four percent of participants had a bachelor degree or higher, and median household income was between \$40,000 and \$59,000.

Procedure

Baseline levels of physical health problems were determined by structured interview (see the Measures section). The onset of new physical health problems was assessed at each FU, and a count of physical health problems at each time point was determined. Through self-report questionnaire, participants were asked to identify whether the onset of a new physical health problem occurred over the previous 6 months and to describe the condition. A trained research assistant, who remained blind to all knowledge of study goals, categorized self-report descriptions of health problems and assessed for inclusion criteria.

Inclusion criteria for the occurrence of a physical health problem were as follows: 1) for major health conditions (e.g., diabetes), participants also had to report at least one doctor visit; and 2) for surgery or other medical emergencies (e.g., stroke, knee replacement), participants also had to report an outpatient procedure or overnight stay in the hospital. Physical health problems were excluded if they did not meet inclusion criteria, if there were missing descriptions of the condition, if the condition represented a psychological disorder (e.g., bipolar disorder), if a surgery was for cosmetic reasons (e.g., eyebrow lift), if a routine testing or surgery was described (e.g., mole removal), or if the condition reflected an acute infection (e.g., bladder infection). Approximately 4% of conditions were excluded at each follow-up: missing descriptions (1.1%–2.4%), not meeting inclusion criteria (0.6%–1.7%), infections (0.6%–0.9%), routine or cosmetic surgery (0.2%–0.8%), and psychopathology (0.1%–0.2%). These exclusions were made with the goal of including only new physical health problems that were of significance above and beyond routine procedures and would affect the participants for longer than a few days. The number of physical health problems at each time point reflects the new health problems at that FU.

Data obtained over two years (baseline interview and four 6-month FU assessments) were used in subsequent analyses.

Measures

The Structured Interview for DSM-IV Personality⁹ is a semi-structured diagnostic interview that consists of 101 questions corresponding to the criteria for the 10 DSM-IV-TR PDs.⁷ Each criterion was rated from 0 (not present) to 3 (strongly present) by trained research assistants (undergraduate and graduate); interviews were conducted in our research laboratory. Each participant's scaled score for each PD was calculated by adding together the ratings for the relevant criteria and computing the average. The possible range for scaled scores was 0–3. All interviews were video-recorded, and 265 interviews were randomly chosen to be re-rated by independent observers, showing adequate reliability (intraclass

correlation coefficient: 0.67 for overall scale). See Table 1 for scaled means, SDs, and reliability values.

The health portion of the computerized screening version of the Diagnostic Interview Schedule¹⁰ was used for the present study. Physical health problems were assessed through participants report (yes or no) of being under a doctor's care for: heart disease, cancer, stroke, arthritis, diabetes, hypertension, asthma, hepatitis, tuberculosis, bleeding ulcer, and epilepsy. We calculated the number of chronic conditions each participant reported at the time of the baseline assessment (range: 0–5, mean: 0.76, SD: 0.93).

Medical resource utilization (measured at FU1–FU4) was collected four times. Participants were asked to report how often in the past 6 months they had: visited a physician's office, gone to the emergency room, stayed overnight in the hospital, or had an outpatient procedure (on a scale of 0 [0], 1–2 [1], 3–5 [2], or >6 [3]). These were summed to create an overall medical resource utilization score (mean ranged from 1.64–1.69, SD ranged from 1.41–1.49 across FUs).

Statistical Analyses

To examine the potential moderating effects of personality on medical resource utilization in the presence of physical health problems (baseline and new health problems at each follow-up), multilevel analyses were conducted with hierarchical linear modeling using an ordinal proportional odds model.¹¹ Multilevel modeling techniques are best suited to examine inter- and intra-individual change over time while accounting for dependency due to repeated measures, as well as managing missing data and time variation between observations.¹² The ordinal proportional odds model is specified in terms of cumulative comparisons of an ordinal outcome.¹³ Cumulative logits become link functions:

$$\eta_m = \ln(\phi_m / 1 - \phi_m) = \ln[Prob(R \leq m) / Prob(R > m)]$$

These can then be used in terms of a simple logistic regression model:

$$\eta_m = \theta_m + \beta X_i$$

with a threshold for each category, m , and a common slope. Inherent in the proportional odds model is the proportional odds assumption, which states that the cumulative odds ratio for any two values of the covariate is constant across response categories,¹¹ such that

$$Odds_{m1} / Odds_{m2} = \exp[\beta'(x_1 - x_2)]$$

X affects the odds ratio in the same way for each category, with a common intercept for the $M-1$ categories, a common slope for the Level 1 predictor(s), and a threshold (δ) that specifies how the probability changes from one ordinal response category to the next. The intercept and slope may also vary across Level 2 units. Negative coefficients reflect greater use of medical resources.

Model-building was as follows: The model was first fit using an unconditional model, and then built upon using time, number of illnesses, demographic covariates, and each PD. The final model included linear time, number of illnesses, demographic covariates, and all ten PDs. (Throughout model building, variance components and residuals were continually assessed to ensure all model assumptions were adequately met. Although only final model information is fully detailed here, additional numbers from each model are available upon request.) *Time* reflects the number of days past baseline that the FU assessment was completed by a participant. (Time was centered around FU2. FU1 = mean: 194 days [SD: 26]; FU2 = mean: 384 [SD: 34]; FU3 = mean: 572 days [SD: 42]; FU4 = mean: 763 [SD: 49]). Including time in the models ensured that we could see relationships among our variables while holding time constant to avoid any potential confound effects.

The demographic covariates included in the models were age, sex, race, and education, because of past evidence that these factors have independent associations with health outcomes.^{14,15} Due to small samples in several categories, race of participants was recoded into White/Caucasian and Black/African/Other for analyses and was then effect coded (−0.5 and 0.5, respectively, for ease of interpretation of coefficients). Sex was also effect coded (−0.5 for men, 0.5 for women). For education, participants were asked their highest education degree; the nine categorical response options were then transformed to a continuous variable with a possible range of 6.5–20 years of education completed. Age and education were centered for analyses. All demographic variables were measured at baseline and remained constant throughout analyses.

RESULTS

Descriptive Information on Sample

The number of physical health problems that participants reported at baseline ranged from 0–5, with a mean of 0.76 (SD: 0.93). The new physical health problems reported at each FU were as follows: for FU1, the number of new physical health problems emerging in the 6-month time period ranged from 0–3 (mean: 0.20, SD: 0.47); for FU2, the range was 0–10 (mean: 0.23, SD: 0.60) (one participant reported five new illnesses, one reported seven new illnesses, and one reported ten new illnesses; the final model was run with the exclusion of these participants and results did not significant change, so they were included in all reported analyses); for FU3, the range was 0–3 (mean: 0.21, SD: 0.50); for FU4, the range was 0–3 (mean: 0.23, SD: 0.53). The types of physical health problems that were experienced in FU1–FU4 varied widely, with chronic pain conditions (approximately 20%) and rheumatic diseases (approximately 10%) consistently showing the highest rates. Approximately 40% of all participants who faced a new medical condition also had surgery during that 6-month time period. The average utilization of medical resources remained consistent across FUs (for FU1, mean: 1.64, SD: 1.49; for FU2, mean: 1.64, SD: 1.42; for FU3, mean: 1.63, SD: 1.43; and for FU4, mean: 1.69, SD: 1.41).

Effects of PD Features and Physical Health Problems on Medical Resource Use

Models demonstrated that significant associations were present among physical health problems, PD features, and medical resource utilization. As shown in Table 2, when PD

features were included in models by individual PD, many PDs were significantly predictive of medical resource utilization. In particular, antisocial and narcissistic PD features predicted greater medical resource utilization, whereas schizoid and schizotypal PD features predicted less medical resource utilization independent of number of physical health problems and any effects of time. Additionally, dependent, histrionic, and borderline (marginal significance) PD features predicted greater medical resource utilization among those with a greater number of physical health problems. The final statistical model that included all PD features together showed that, when shared variance between PD features is accounted for, antisocial and narcissistic PD features remained predictive of greater medical resource utilization independent of physical health problems (see Table 3). Dependent and histrionic PD features also remained predictive of greater medical resource utilization among those with more physical health problems. Dependent PD features reported less use over time when holding physical health problems constant, however.

As expected, physical health problems also significantly predicted greater medical resource utilization independent of other predictors and covariates (see Table 3). Although individuals with a greater number of physical health problems used significantly more medical resources, over time individuals reported less medical resource use whether or not they had a high number of physical health problems. In terms of control variables, increasing age and minority status were predictive of greater use of medical resources. See Table 3 for coefficient values.

DISCUSSION

This study examined the relationship between personality pathology, physical health conditions, and medical resource utilization in later adulthood. We found that narcissistic and antisocial PD features were related to greater use of medical resources over a period of two years. This result is consistent with past research showing a link between personality pathology and medical resource use.³ Most previous studies have focused on the use of mental health services; our findings demonstrate that this effect carries over into the physical health domain, and it persists into later adulthood. This link between PD features and medical resource utilization remained robust independent of the number of physical health problems reported by participants. Thus, individuals with symptoms of certain PDs are at risk for overuse of resources even if they do not develop new health conditions. Interestingly, among those with greater physical health problems, histrionic and dependent PD features were also related to greater medical resource utilization, suggesting that important interactions between personality pathology and health conditions may also occur in older age and impact resource use.

Antisocial, narcissistic, dependent, and histrionic PD features were related to greater medical resource use even after controlling for variance shared with other PD features. The risk associated with these features has not been reported in previous studies, but research on most PDs in relation to health behaviors remains limited. The association of dependent PD features with resource use does make intuitive sense. Individuals with dependent PD tend to be needy and have trouble managing everyday decisions and problems on their own. These problems could easily carry over into health concerns in later life, leading these individuals

to seek excessive treatment for physical ailments. The role of narcissistic and antisocial features in higher levels of medical resource utilization likely follows a different pattern. Individuals with these personality features may feel “entitled” to use healthcare resources on a more regular basis, regardless of whether or not they are sick or in need of medical help.¹⁶ For histrionic PD, the relation with greater medical resource use was observed among those with more physical health problems. Histrionic PD is associated with a need for attention as well as exaggeration of behavior and emotions. These personality characteristics may manifest in increased use of resources when the stresses of real health problems emerge in later life.

We did not find a significant relationship between borderline PD features and greater medical resource utilization when all forms of personality pathology were included in the final model. Previous research from our lab has shown that borderline PD features are associated with risk for greater medication use and medical resource utilization, as well as worse reported physical functioning and health 6 months after baseline, even when controlling for baseline health status.¹⁷ The current study expands this research to demonstrate that the burden of multiple health problems may exacerbate the pathology associated with these PD features and result in overuse of costly resources. In the current analyses, however, we found only a marginal effect with borderline PD features. When comorbid PD features were considered simultaneously, that relationship for borderline PD was not significant, suggesting that borderline PD is only part of the story in understanding how personality pathology affects medical resource utilization in later adulthood.

Our findings regarding sociodemographic variables are also of interest. It seems reasonable that increasing age would be associated with greater medical resource utilization, given the burden of health problems in later life. The relationship between minority status and greater medical resource utilization is also consistent with previous research findings. African Americans and other minorities experience profound health disparities (e.g., Mensah et al.¹⁸ and Miller et al.¹⁹). Therefore, it is not surprising to see the link with greater resource utilization in our sample.

Limitations

A number of limitations should be kept in mind when interpreting these results. First is our reliance on self-report to measure physical health problems. The scope of the present study did not allow for thorough medical testing. Although it would have been ideal to have had access to participants’ medical records, researchers have found little discrepancy between self-reports of physical illnesses and documented medical histories.²⁰ We used the phrase “Have you ever been diagnosed by a doctor as having.” when asking about physical health problems in an effort to reduce participants’ self-reported ailments and prompt them to consider their doctor’s judgment rather than their own concerns. In addition, we created inclusion criteria for physical health problems reported at follow-ups to make the process more conservative.

We also used self-report of medical resource utilization. This is the standard method for measuring these variables, but the validity of this measure must be kept in mind (see Bhandari and Wagner²¹ for more details). One factor that can affect accuracy in this domain

is the length of time individuals are asked to recall. We used a relatively short (6-month) time frame, which should be associated with enhanced accuracy.

Because we studied adults living in the community rather than exclusively clinical patients, our sample does not include a large number of individuals with extreme levels of personality pathology. However, roughly 10% of our sample met DSM-IV-TR criteria for at least one PD, as expected based on previous epidemiological studies (9.1%).²² Almost half of the people in our sample (>40%) had received some kind of mental health treatment, demonstrating that individuals with varying levels of psychopathology were represented in this study.²³ Furthermore, we measured PDs on a dimensional scale rather than following the categorical approach to diagnosis included in DSM-IV-TR. Measuring PDs according to the presence of symptoms allowed us to capture the full range of variability in personality pathology evident in this sample.

Finally, the generalizability of these findings to other age groups should be considered carefully. The focus of this study was on the relation between PD symptoms and use of medical resources in the face of health-related stressors. The range of physical health problems in our sample allowed for greater variability than would be found among younger participants. Older adults may represent a population in which the impact of personality pathology on physical health is stronger than might be found with younger participants. It would be beneficial to extend this line of research in other samples to determine whether our findings translate across different age groups. Our sample also included a slightly higher-than-expected proportion of participants with at least college-level education. This may be a product of the fact that people who could not read were excluded from the sample. Nevertheless, our sample is quite diverse in terms of socioeconomic status and education, and it is generally representative of adults living in the St. Louis metropolitan area.⁸

Conclusions and Future Directions

The results of the present study support a growing body of evidence which suggests that personality pathology can lead to greater utilization of medical resources, whether in the presence of serious physical health problems or not. Healthcare utilization is costly, and this study helps to explain the health burden and healthcare costs that are associated with personality pathology across the lifespan. Recent research has shown that when PDs are treated, there are significant reductions in mental healthcare utilization for up to three years following completion of treatment.²⁴ This is particularly relevant because PDs interfere with psychological treatment effectiveness and make it harder to handle daily living tasks in later life.²⁵ Identifying specific personality features or behaviors that can be targeted in the context of, or in combination with, physical healthcare may be the next step in reducing this healthcare burden and promoting successful aging. Treating personality pathology in this context could carry over into many aspects of individuals' health and wellbeing beyond medical use, to areas like perceived health status and health behaviors, which are also important aspects of successful aging.²⁶

Much remains to be learned about risks associated with personality pathology and how they may shift across the lifespan. Because symptoms of personality pathology can change with age, the consequences of those features will affect different outcomes. Emerging evidence

regarding the importance of social connections in later adulthood (especially in the face of physical health problems; e.g., see Hawkley and Cacioppo²⁷) suggests that interpersonal difficulties associated with most PDs may come to affect individuals in new ways. It is likely that current measurement techniques do not fully capture the changing role of personality pathology.^{28,29} This study provides initial evidence of the consequences of personality pathology in later adulthood, but efforts in improving the assessment of PDs and understanding their unique role in functioning as individuals age must continue.

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TABLE 1

Descriptive Statistics For Scaled Predictor Variables

	Mean	SD	Min	Max	ICC
Paranoid	0.17	0.26	0.00	1.86	0.53
Schizotypal	0.08	0.15	0.00	2.00	0.68
Schizoid	0.14	0.25	0.00	2.14	0.75
Antisocial	0.05	0.16	0.00	2.14	0.69
Borderline	0.13	0.21	0.00	1.78	0.77
Histrionic	0.14	0.22	0.00	1.75	0.54
Narcissistic	0.18	0.28	0.00	2.33	0.75
Avoidant	0.16	0.34	0.00	2.86	0.86
Dependent	0.08	0.17	0.00	1.63	0.73
Obsessive Compulsive	0.37	0.34	0.00	2.00	0.62

Notes: Reliability intraclass correlation coefficient (ICC) values were calculated based on 265 randomly chosen videos of personality disorder interviews that were re-rated by independent observers.

TABLE 2
PD Coefficients from Individual Ordinal Proportional Odds Model Predicting Medical Resource Utilization by Physical Health Problems and Personality Pathology

Fixed Effects	B	SE	t ratio	OR (95% CI)	p value
For Intercept, π_1					
Paranoid PD features	0.05	0.06	0.86	1.05 (0.94, 1.18)	0.393
Schizotypal PD features	0.27	0.11	2.51	1.31 (1.06, 1.63)	0.012
Schizoid PD features	0.18	0.06	2.87	1.20 (1.06, 1.35)	0.004
Antisocial PD features	-0.32	0.10	-3.16	0.72 (0.59, 0.89)	0.002
Borderline PD features	-0.12	0.08	-1.60	0.88 (0.76, 1.03)	0.110
Histrionic PD features	-0.11	-0.07	-1.63	0.89 (0.77, 1.02)	0.103
Narcissistic PD features	-0.17	0.06	-2.96	0.84 (0.76, 0.95)	0.003
Avoidant PD features	0.05	0.04	1.16	1.05 (0.96, 1.15)	0.247
Dependent PD features	-0.19	0.10	-2.05	0.82 (0.68, 0.99)	0.041
Obsessive Compulsive PD features	0.04	0.04	1.04	1.05 (0.96, 1.14)	0.298
For Physical Health Problems slope, π_1					
Paranoid PD features	-0.08	0.11	-0.67	0.92 (0.73, 1.16)	0.504
Schizotypal PD features	0.14	0.21	0.67	1.15 (0.76, 1.75)	0.512
Schizoid PD features	0.08	0.12	0.64	1.09 (0.84, 1.40)	0.520
Antisocial PD features	-0.01	0.13	-0.05	0.99 (0.77, 1.27)	0.962
Borderline PD features	-0.23	0.12	-1.86	0.79 (0.62, 1.01)	0.064
Histrionic PD features	-0.45	0.14	-3.02	0.64 (0.48, 0.85)	0.003
Narcissistic PD features	-0.17	0.11	-1.54	0.85 (0.69, 1.06)	0.125
Avoidant PD features	-0.01	0.09	-0.04	0.99 (0.84, 1.18)	0.971
Dependent PD features	-0.56	0.18	-3.15	0.57 (0.40, 0.81)	0.002
Obsessive Compulsive PD features	0.04	0.09	0.47	1.04 (0.87, 1.24)	0.636
For Time, π_2					
Paranoid PD features	-0.01	0.03	-0.19	0.99 (0.94, 1.05)	0.850
Schizotypal PD features	0.01	0.05	0.20	1.01 (0.91, 1.12)	0.844
Schizoid PD features	0.01	0.03	0.36	1.01 (0.95, 1.07)	0.721
Antisocial PD features	0.01	0.05	0.26	1.01 (0.92, 1.11)	0.796

Fixed Effects	B	SE	t ratio	OR (95% CI)	p value
Borderline PD features	0.04	0.04	1.22	1.04 (0.97, 1.14)	0.220
Histrionic PD features	0.06	0.03	1.64	1.06 (0.99, 1.13)	0.102
Narcissistic PD features	0.03	0.03	1.22	1.03 (0.98, 1.09)	0.220
Avoidant PD features	-0.03	0.03	-1.49	0.97 (0.92, 1.01)	0.141
Dependent PD features	0.10	0.05	2.00	1.11 (1.00, 1.22)	0.046
Obsessive Compulsive PD features	-0.01	0.02	-0.23	0.99 (0.96, 1.04)	0.740

Notes: All models included age, sex, race, education level, physical health problems, and time. See Table 3 for coefficients as these did not change significantly across the individual PD models.
Boldface represents p 0.05; df = 1,391.

TABLE 3

Final Ordinal Proportional Odds Model Predicting Medical Resource Utilization by Physical Health Problems and Personality Pathology

Fixed Effects	B	SE	t ratio	OR (95% CI)	p value
For Intercept, π_1					
Intercept	-1.51	0.10	-14.49	0.22 (0.18, 0.27)	<0.001
Age	-0.05	0.02	-2.87	0.95 (0.91, 0.98)	0.004
Sex	-0.09	0.11	-0.87	0.91 (0.74, 1.12)	0.384
Race	-0.32	0.11	-2.75	0.72 (0.57, 0.91)	0.006
Education	0.01	0.02	0.22	1.00 (0.96, 1.05)	0.825
Physical Health Problems	-0.76	0.03	-21.82	0.47 (0.44, 0.50)	<0.001
Paranoid PD features	0.06	0.07	0.87	1.06 (0.93, 1.22)	0.387
Schizotypal PD features	0.21	0.13	1.54	1.23 (0.95, 1.60)	0.123
Schizoid PD features	0.11	0.07	1.53	1.12 (0.97, 1.29)	0.126
Antisocial PD features	-0.22	0.11	-1.93	0.80 (0.64, 1.00)	0.054
Borderline PD features	-0.05	0.10	-0.53	0.95 (0.79, 1.14)	0.597
Histrionic PD features	-0.01	0.08	-0.03	1.00 (0.85, 1.17)	0.980
Narcissistic PD features	-0.18	0.06	-2.67	0.83 (0.74, 0.96)	0.008
Avoidant PD features	0.04	0.05	0.77	1.04 (0.94, 1.16)	0.441
Dependent PD features	-0.22	0.11	-2.06	0.80 (0.65, 0.99)	0.040
Obsessive Compulsive PD features	0.04	0.05	0.94	1.05 (0.95, 1.15)	0.349
For Physical Health Problems slope, π_1					
Intercept	-2.33	0.27	-8.72	0.10 (0.06, 0.17)	<0.001
Age	-0.01	0.04	-0.04	0.99 (0.92, 1.08)	0.971
Sex	-0.28	0.25	1.17	1.22 (0.82, 2.17)	0.244
Race	-0.07	0.27	-0.24	0.94 (0.55, 1.59)	0.808
Education	-0.06	0.06	-1.11	0.94 (0.84, 1.05)	0.266
Physical Health Problems	0.26	0.06	4.50	1.29 (1.16, 1.44)	<0.001
Paranoid PD features	-0.07	0.15	-0.49	0.93 (0.69, 1.25)	0.622
Schizotypal PD features	0.14	0.28	0.51	1.16 (0.66, 2.02)	0.610
Schizoid PD features	-0.02	0.16	-0.13	0.97 (0.72, 1.34)	0.898
Antisocial PD features	0.21	0.16	1.30	1.23 (0.90, 1.67)	0.194

Fixed Effects	B	SE	t ratio	OR (95% CI)	p value
Borderline PD features	-0.12	0.16	-0.76	0.88 (0.65, 1.21)	0.450
Histrionic PD features	-0.35	0.17	-2.02	0.71 (0.50, 0.99)	0.043
Narcissistic PD features	-0.11	0.14	-0.80	0.89 (0.68, 1.18)	0.424
Avoidant PD features	0.09	0.11	0.83	1.10 (0.88, 1.36)	0.406
Dependent PD features	-0.65	0.22	-2.97	0.52 (0.34, 0.80)	0.003
Obsessive Compulsive PD features	0.17	0.10	1.60	1.18 (0.96, 1.45)	0.111
For Time, π_2					
Intercept	-0.02	0.05	-0.52	0.98 (0.89, 1.07)	0.601
Age	-0.01	0.01	-0.28	1.00 (0.98, 1.01)	0.780
Sex	-0.03	0.05	-0.63	0.97 (0.88, 1.07)	0.528
Race	-0.02	0.05	-0.33	0.98 (0.88, 1.10)	0.740
Education	0.01	0.01	1.09	1.01 (0.99, 1.04)	0.274
Physical Health Problems	0.09	0.02	5.01	1.09 (1.06, 1.13)	<0.001
Paranoid PD features	-0.02	0.03	-0.53	0.98 (0.92, 1.05)	0.595
Schizotypal PD features	0.01	0.07	0.03	1.00 (0.88, 1.14)	0.975
Schizoid PD features	0.03	0.04	0.78	1.03 (0.96, 1.10)	0.437
Antisocial PD features	-0.04	0.05	-0.69	0.96 (0.86, 1.07)	0.491
Borderline PD features	0.04	0.05	0.90	1.04 (0.95, 1.14)	0.368
Histrionic PD features	0.03	0.04	0.78	1.03 (0.96, 1.11)	0.434
Narcissistic PD features	0.02	0.03	0.63	1.02 (0.96, 1.09)	0.537
Avoidant PD features	-0.05	0.02	-2.12	0.94 (0.90, 0.99)	0.072
Dependent PD features	0.12	0.06	2.31	1.14 (1.02, 1.27)	0.021
Obsessive Compulsive PD features	-0.01	0.02	-0.33	0.99 (0.95, 1.04)	0.740

Notes: For sex category: Male = -0.5; For race category: Caucasian = -0.5.

All models included age, sex, race, education level, physical health problems, and time as covariates.

Boldface represents $p < 0.05$; $df = 1,382$.