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The Impact of Self-Management Abilities, Sleep Quality, and Anxiety on the Well-Being of Patients With Benign Prostatic Hyperplasia: A Cross-Sectional Analysis

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Abstract

Current benign prostatic hyperplasia (BPH) management prioritizes urological symptoms while neglecting psychological impacts on subjective well-being (SWB). Although chronic disease-SWB associations are established, limited evidence exists regarding interactive effects of psychosocial factors (sleep, anxiety, self-management) in BPH populations. This multicenter cross-sectional study enrolled 412 BPH patients from 6 tertiary hospitals in Northwest China. Validated instruments assessed key variables: Pittsburgh Sleep Quality Index for sleep quality, Self-Rating Anxiety Scale for psychological distress, Memorial University of Newfoundland Happiness Scale for SWB, and Chinese Self-Management Ability Scale for behavioral competencies. Structural equation modeling elucidated pathway relationships. Of the patients, 72.5% experienced sleep disorders, and 79.0% reported anxiety. Regression analysis indicated that income ($\beta = 1.378$, $P < .01$) and self-management abilities ($\beta = 0.074$, $P < .01$) positively impacted SWB, while anxiety ($\beta = -0.155$, $P < .01$) and sleep disorders ($\beta = -0.581$, $P < .01$) negatively affected it. The structural equation model revealed a direct effect of self-management abilities on SWB of 0.20 and an indirect effect of 0.16. This study contributes to the field by proposing a comprehensive, patient-centered model of care that can improve both the quality of life and long-term outcomes for BPH patients.

Keywords

benign prostatic hyperplasia, self-management, subjective well-being, anxiety, sleep quality

Introduction

Lower urinary tract symptoms (LUTS) secondary to benign prostatic hyperplasia (BPH) transcend mere urological complaints to profoundly impair subjective well-being (SWB) through interconnected physiological and psychosocial pathways.[1] While 60% to 80% of aging males develop histologically confirmed BPH,[2] contemporary management remains disproportionately focused on symptom scores,[3] overlooking 3 critical determinants of SWB revealed through emerging evidence: sleep architecture disruption,[4-7] anxiety-mediated detrusor dysfunction,[8-10] and self-management ability (SMA) for successful aging.[11-13] This disconnect persists despite projections that men over 60 will constitute 27% of the global population by 2100,[14,15] necessitating urgent paradigm shifts in BPH care.

The bidirectional sleep–LUTS relationship establishes a self-perpetuating cycle: nocturia fragments sleep (Pittsburgh Sleep Quality Index [PSQI] ≥ 5 in 68% patients),[4] while sleep deprivation exacerbates LUTS severity through hypothalamic–pituitary–adrenal axis dysregulation.[7] Araujo's prospective cohort[5] quantified this vicious circle, demonstrating 1.8-fold increased LUTS risk in poor sleepers. Crucially, Scovell's comparative analysis[6] revealed that sleep-impaired patients report 40% higher IPSS scores than controls, with SWB metrics correlating more strongly with sleep quality than urinary flow parameters. These findings expose a

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critical gap: current guidelines omit sleep optimization as a therapeutic target.

Anxiety emerges as both consequence and catalyst of LUTS progression. Longitudinal data[8,9] indicate that urinary urgency induces state anxiety, which physiologically manifests as pelvic floor hypertonicity and bladder neck obstruction.[10] This neuro-urological cascade explains why anxious patients demonstrate 2.3-fold higher LUTS recurrence post-treatment.[10] Yet, fewer than 15% of urology clinics implement routine anxiety screening,[8] reflecting systemic underappreciation of psychosomatic interactions.

Self-management ability presents untapped potential for breaking this biopsychosocial cycle. Self-management ability refers to the key behaviors, cognitions, and the capacity for successful aging that maintain well-being in older adults.[11] The theory of self-management posits that successful aging is the ability of individuals to utilize both external and internal resources to acquire and maintain well-being. External resources directly contribute to various aspects of well-being, such as food, housing, health (physical well-being), and friends (social well-being). However, external resources tend to diminish with age. This necessitates SMA (internal resources to manage external resources) to maintain or restore physical and social well-being when these resources are lost.[11] Studies[12] have shown that self-management interventions, such as bibliotherapy, can improve health behaviors in older patients and enhance their well-being. Self-management related to health or disease in BPH patients (eg, fluid management, physical exercise, lifestyle changes) has been developed and effectively translated into interventions.[13] In addition to disease-related self-management, interventions aimed at managing the overall health and well-being of BPH patients may be necessary to actively foster and sustain their well-being. Therefore, it is essential to explore the impact of SMA on the SWB of BPH patients and the underlying mechanisms.

This study bridges these gaps through 2 innovations: (1) constructing a structural equation model to quantify SWB determinants in Asian BPH populations; (2) Operationalizing SMA as a dynamic mediator between biological stressors (nocturia/sleep disruption[4-7]), psychological sequelae (anxiety 8-10), and SWB. Our theoretical framework challenges reductionist models by simultaneously evaluating behavioral, neurological, and affective pathways—a synthesis absent from prior fragmented approaches.[3,5,11]

Methods

Study Design

This cross-sectional, descriptive, and correlational study aimed to examine the relationships among anxiety, sleep quality, SWB, and SMA in patients with BPH. This design was chosen for its effectiveness in capturing the current state of these variables within a real-world clinical setting, enabling meaningful correlation analyses. Participants were recruited by convenience sampling from the outpatient urology clinics of 6 tertiary hospitals in Lanzhou, China. Patients with a clinical diagnosis of BPH who volunteered to participate in this study were included. Eligible patients were asked to complete a questionnaire with the help of a nurse. A total of 412 patients completed questionnaires. This study was approved by the Ethics Review Committee of the School of Nursing at the Lanzhou University (LZUHLXY20200017).

Measures

The Zung Self-Rating Anxiety Scale (SAS) is a self-report scale comprised of 20 items covering a variety of anxiety symptoms, both psychological (eg, "I feel afraid for no reason at all" and "I feel like I'm falling apart and going to pieces") and somatic (eg, "My arms and legs shake and tremble" and "I feel my heart beating fast").[16] It allows for a comprehensive assessment of the anxiety levels among BPH patients, whose psychological well-being may be influenced by the disease. The 4-point response scale ranges from 1 (none or a little of the time) to 4 (most or all of the time). The sum of the 20 items gives the total rough score, which is multiplied by 1.25; the integer represents the standard score. Higher scores indicate higher anxiety levels. In a Chinese population, a standard SAS score threshold of 50 points is used; scores of 50 to 59, 60 to 69, and $\geq$70 are classified as mild, moderate, and severe anxiety, respectively.

The Chinese translation of the PSQI was used to evaluate sleep quality. It is a standard 19-item self-report questionnaire designed to capture a person's subjective feelings about sleep habits for more than 1 month.[17] Sleep quality is often disrupted in individuals with chronic conditions such as BPH, and the PSQI provides a robust measure of subjective sleep quality across several dimensions. Each item is divided into 4 levels, with scores ranging from 0 to 3. The PSQI has been used to diagnose sleep disorders in many clinical applications, and its reliability, validity, and sensitivity have been proven.[18,19] It assesses 7 aspects of sleep: subjective sleep quality, sleep latency, sleep duration, habitual sleep frequency, sleep disorders, use of sleeping aids, and daytime dysfunction.[17] The sum constitutes the global sleep quality score (ranging from 0 to 21), with a higher score indicating worse sleep quality. A score $\leq$ 7 points indicates good sleep quality and a score > 7 points indicates poor sleep quality. The PSQI has been shown to have high diagnostic sensitivity and specificity (98.3% and 90.2%, respectively) in the Chinese population.[20]

Overall SWB was measured with the widely used Memorial University of Newfoundland Scale of Happiness (MUNSH).[21] This scale contains 24 items divided into 4 subscales: positive emotions, negative emotions, positive experiences, and negative experiences. Each item has 3 possible answers: yes, 2 points; don't know, 1 point; and no, 0 points. Total score = (positive emotions + positive experiences) – (negative

emotions + negative experiences) + 24. The total possible score is 0 to 48, with a higher score indicating greater SWB. Cronbach α coefficient of this scale was 0.886 in our study, indicating reliability. The MUNSH has been shown to be reliable and valid in evaluating the overall happiness of elderly populations, making it suitable for our target group of older BPH patients.

Self-management abilities were assessed using the validated Chinese Self-Management Ability Scale,[22] a 26-item instrument grounded in the successful aging paradigm that emphasizes sustained physical–social wellness through behavioral–cognitive competencies. This framework aligns with our holistic approach to BPH care, extending beyond symptom alleviation to encompass psychosocial well-being. This revised version has 26 items divided into 5 subscales: taking initiative (investing), variety, multifunctionality, self-efficacy, and a positive frame of mind, assessing a broad range of self-management abilities. Examples include investing in resources that create long-term benefits, and ensuring the multifunctionality of resources (gaining and maintaining resources or activities that serve multiple gains). The average SMA score ranges from 5 to 30 with higher scores indicating better self-management abilities. The reliability and validity of the scale were tested by Liu et al.[22] The Cronbach α coefficient was 0.920, and the internal consistency coefficient of each subscale was 0.718 to 0.909, indicating that the scale had good reliability and validity and was suitable for the ordinary elderly population in China. In this study, the Cronbach α coefficient of this scale was 0.886, which had good reliability, indicating that it was suitable for the elderly BPH population in China.

We also asked respondents to provide their demographic characteristics, including age, place of residence, education level, employment status, monthly income level, and disease-related factors.

Statistical Analysis

First, the characteristics of the sample were examined using descriptive statistics. Differences in SWB between subgroups were tested using independent sample *t* tests and analyses of variance. Second, we investigated the bivariate relationships among SWB, sleep quality, anxiety, and self-management abilities using correlation analyses. Third, the relationships among sleep quality, anxiety, self-management abilities, and SWB were investigated using correlation and multiple stepwise regression analyses. Finally, a structural equation model was constructed to explore the influence of self-management abilities on SWB.

Results

Clinical Burden of BPH-Related Distress

The mean SAS score for patients with BPH was 60.74 ± 11.62, with 25.5% (105/412) reporting mild anxiety, 28.6% (118/412) moderate anxiety, and 25.2% (104/412) severe anxiety. The mean PSQI score was 10.49 ± 4.50, indicating that 27.5% (113/412) of patients had good sleep quality, while 72.5% (229/412) had poor sleep quality. These results underscore the high prevalence of anxiety and sleep disturbances among BPH patients, highlighting significant areas for clinical intervention.

Correlations Among Sleep Quality, Anxiety, Self-Management, and Well-Being

We explored the relationships between sleep quality, anxiety, self-management abilities, and SWB. The results revealed that SWB was significantly negatively correlated with both PSQI scores ($r = -0.553$, $P < .01$) and anxiety levels ($r = -0.536$, $P < .01$), suggesting that worse sleep quality and higher anxiety are associated with lower SWB. Conversely, SWB was positively correlated with self-management abilities ($r = 0.380$, $P < .01$), indicating that better self-management is associated with higher SWB. This suggests that improving self-management could be a pathway to enhancing overall well-being in BPH patients.

Influence of Patient Characteristics

As shown in Table 1, SWB (MUNSH score) was significantly influenced by a range of factors, including age, place of residence, education, employment status, sexual activity, monthly income, disease duration, and the number of chronic diseases ($P < .01$). This suggests that factors such as socioeconomic status and health conditions have a substantial impact on the well-being of BPH patients, pointing to the need for a comprehensive, individualized approach to BPH management.

Predictors of Well-Being

Table 2 presents the results of the multiple stepwise regression analysis, where anxiety and poor sleep quality were found to be significant negative predictors of SWB ($P < .05$), while self-management abilities and monthly income were positive predictors ($P < .05$). This highlights the importance of addressing anxiety and sleep issues in clinical practice, while also emphasizing the role of self-management strategies and financial stability in improving the quality of life for BPH patients.

Pathway Decoding Through Structural Equation Model

The structural equation model (Table 3 and Figure 1) showed that self-management abilities, anxiety, and sleep quality significantly influence SWB in BPH patients. The model fit indices indicated a strong model fit (comparative fit index = 0.998, goodness of fit index = 0.997, Tucker-Lewis index = 0.986), suggesting that the relationships in the model

Table 1. Influence of Patient Characteristics and Disease-Related Factors on Subjective Well-Being.

Characteristic	Number	MUNSH score	*t/F*	*P*
Age (years)				
<50	119 (29%)	23.28 ± 7.71	7.87	<.01
50-59	115 (28%)	21.48 ± 8.14		
60-69	100 (24%)	21.74 ± 8.41		
70-79	57 (14%)	16.79 ± 8.13		
≥80	21 (5%)	16.81 ± 8.47		
Place of residence				
Village	180 (44%)	23.85 ± 8.35	12.168	<.01
Town	116 (28%)	21.67 ± 7.16		
City	116 (28%)	23.85 ± 7.87		
Educational level				
College or above	119 (29%)	23.35 ± 7.87	19.006	<.01
Middle school	126 (31%)	23.02 ± 6.90		
Primary or below	167 (41%)	18.23 ± 8.87		
Employment status				
Employed	117 (28%)	24.03 ± 7.82	19.972[a]	<.01
Retired	295 (72%)	20.04 ± 8.32		
Marital status				
Married	274 (67%)	21.53 ± 7.99	0.741	.477
Widowed	99 (24%)	20.41 ± 9.08		
Divorced/single	39 (9%)	20.62 ± 9.10		
Sexual frequency (per month)				
0	263 (64%)	19.76 ± 9.10	8.857	<.01
1	46 (11%)	24.67 ± 7.21		
2	46 (11%)	21.56 ± 5.11		
≥3	57 (14%)	24.60 ± 5.66		
Monthly income (RMB)				
<1000	138 (33%)	17.83 ± 8.23	21.466	<.01
1000-3000	172 (42%)	21.92 ± 7.82		
≥3000	102 (25%)	24.44 ± 7.90		
Duration of disease (years)				
<3	104 (25%)	23.05 ± 9.54	6.888	<.01
3-4	119 (29%)	21.75 ± 8.13		
5-10	133 (32%)	20.95 ± 7.16		
>10	56 (14%)	17.00 ± 7.90		
Number of chronic diseases				
0	201 (49%)	22.85 ± 7.82	7.524	<.01
1	149 (36%)	20.42 ± 7.98		
2	50 (12%)	17.96 ± 10.12		
≥3	12 (3%)	15.83 ± 7.30		

Abbreviation: MUNSH, Memorial University of Newfoundland Scale of Happiness.

[a]*T* values, with the remaining values being *F* values; $P < .01$ indicates statistically significant differences in the subjective well-being of patients with benign prostate hyperplasia among the different groups.

accurately reflect the data. Two significant pathways were identified:

Self-management abilities → anxiety → subjective well-being

Self-management abilities → anxiety → sleep quality → subjective well-being

These pathways indicate that self-management not only directly affects anxiety and well-being but also indirectly impacts sleep quality, further influencing overall well-being. The indirect effect of self-management through anxiety and sleep quality highlights the complex interplay of psychological and physical factors in managing BPH. This suggests that improving self-management skills may reduce anxiety and improve sleep quality, ultimately enhancing the overall quality of life for BPH patients.

Discussion

This study revealed that 72.5% of the 412 patients with BPH experienced sleep disorders and 79.0% reported anxiety symptoms, emphasizing the high prevalence of these comorbidities in this patient population. It is important to note that comorbidities (eg, cardiovascular diseases) and medications (eg, alpha-blockers) were not systematically controlled in this study, which may confound the observed relationships between BPH symptoms and psychological outcomes. Furthermore, significant relationships were identified between sleep quality, anxiety, SMA, and SWB. More importantly, we found that SMA not only directly influenced the SWB of patients with BPH but also had an indirect impact through effects on anxiety and sleep quality. These findings underscore the importance of a multidimensional approach in BPH care, highlighting the need to consider not just physical symptoms but also psychological and behavioral factors when assessing patient well-being.

Self-management theory is concerned with how people achieve and maintain happiness when resources are reduced.[11] Studies have shown that interventions based on this theory, such as reading therapy and family intervention training, enable older adults to better cope with the declining function and chronic diseases associated with aging.[23,24] However, the cultural acceptability of these interventions may vary significantly across regions. For instance, family-based interventions may be more effective in collectivistic cultures (eg, East Asian societies) compared to individualistic Western cultures.[25] A study by Cramm et al[12] showed that patients with higher SMA felt more in control of their lives and could effectively mitigate the impact of depressive symptoms on happiness. Thus, patients with BPH may benefit from culturally adapted interventions that improve SMA, which may complement disease-related interventions.

This study also found that higher income levels were associated with greater SWB. Higher incomes can ensure that basic needs (such as housing, food, and medical expenses) and psychological needs (such as autonomy) are met, which can reduce negative emotions and increase happiness.[26,27] This relationship may be particularly pronounced in low- and middle-income countries where social safety nets are less comprehensive.[26] Therefore, income levels may require consideration when designing interventions to improve SMA and therefore SWB, with special attention to socioeconomic disparities in different healthcare systems.

Table 2. Multiple Stepwise Regression Analysis of the Subjective Well-Being of Study Participants.[a]

	Unstandardized coefficient B	Standard error	Standardization coefficient β	*t*	*P*
Constant	27.691	2.869		9.652	<.001
Sleep quality	−0.581	0.104	−0.312	−5.571	<.001
Self-management abilities	0.074	0.017	0.181	4.318	<.001
Anxiety	−0.155	0.041	−0.216	−3.786	<.001
Monthly income	1.378	0.449	0.125	3.068	.002

[a]Monthly income (RMB): <1000 = 1; 1000-3000 = 2; ≥3000 = 3. The regression equation of factors influencing subjective well-being in patients with benign prostate hyperplasia is as follows: Y = 27.691−0.581X1 + 0.074X2−0.155X3 + 1.378X4 (where X1 = Pittsburgh Sleep Quality Index, X2 = Self-Management Ability, X3 = anxiety, and X4 = monthly income); $R^2 = 0.395$, $\Delta R^2 = 0.389$; $F = 66.472$, $P < .01$ indicating that the regression equation is statistically significant.

Table 3. Path Analysis of Factors Influencing Subjective Well-Being in Patients With Benign Prostate Hyperplasia.[a]

Variable	Direct effect	95% CI	Indirect effect	95% CI	Total effect	95% CI
Anxiety	−0.23	−0.33 to −0.13	−0.24	−0.32 to −0.15	−0.47	−0.53 to −0.40
Self-management ability	0.21	0.13 to 0.28	0.16	0.11 to 0.22	0.37	0.28 to 0.44
Sleep quality	−0.33	−0.44 to −0.21	–	–	−0.33	−0.44 to −0.21

Abbreviation: CI, confidence interval.
[a]The bootstrap method was used to test the significance of the multiple intermediary effects. The 95% CI did not contain 0, indicating that the intermediary effect was significant.

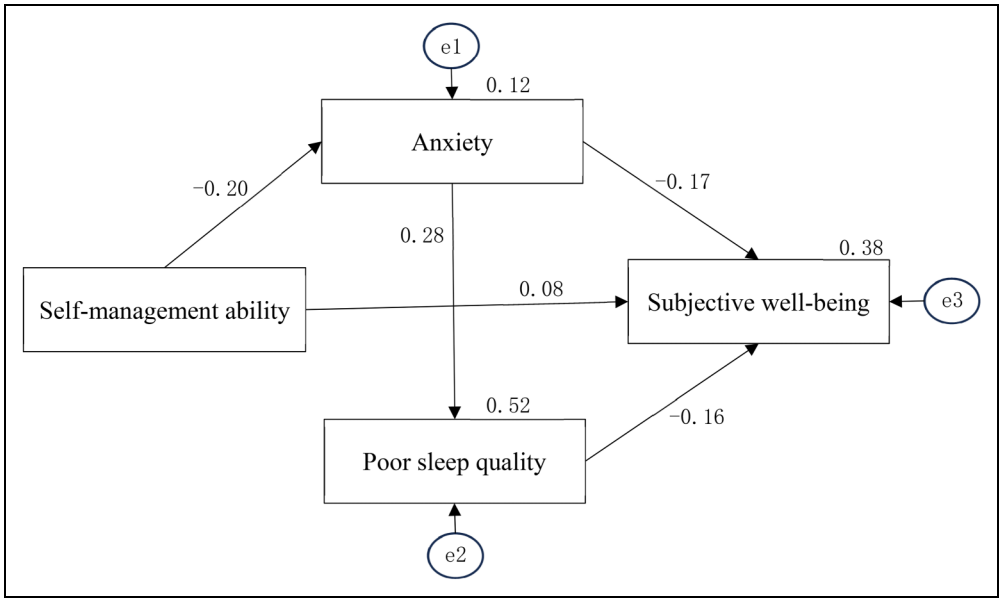

Figure 1. Structural equation model of factors influencing subjective well-being in patients with benign prostate hyperplasia.

To address these findings, we suggest several practical intervention strategies to improve both SWB and overall quality of life for BPH patients. Given the significant role of SMA, healthcare providers should consider implementing self-management education programs that focus on symptom monitoring, coping strategies for anxiety, and techniques to improve sleep hygiene. Cognitive behavioral therapy (CBT) for insomnia, for example, has been shown to reduce sleep disturbances in chronic conditions such as BPH, ultimately improving quality of life.[28] When implementing CBT cross-culturally, adaptations should be made to address region-specific sleep habits and health beliefs. Furthermore, digital health tools offer a promising opportunity to enhance self-management and reduce anxiety. Mobile apps and online platforms that provide symptom tracking, mindfulness exercises, and virtual support groups could help patients better manage both physical symptoms and psychological distress.[29] These platforms have demonstrated effectiveness in the management of other chronic diseases, such as diabetes and hypertension, and

could be adapted for BPH care. However, digital literacy and technology access disparities between urban and rural populations must be considered for global implementation.[30]

This study contributes novel insights into BPH management by proposing a patient-centered framework that incorporates SWB. This framework emphasizes the importance of mental and emotional health alongside traditional clinical indicators such as prostate volume and urinary frequency. Additionally, the study highlights the crucial role of socioeconomic status in determining patient well-being, advocating for holistic care strategies that address both biological and socioeconomic factors in BPH treatment. The framework's applicability across different healthcare contexts should be further validated through multinational studies.

However, some limitations of this study should be considered when interpreting its findings. First, the study included only outpatients with BPH, excluding inpatients and community patients, which limits the representativeness of the sample. Second, the cross-sectional design of the survey did not allow us to track changes in happiness levels over time. Lastly, although our study demonstrates the importance of SMA in enhancing SWB in BPH patients, we did not investigate whether interventions aimed at improving these abilities could result in actual improvements in SWB. Future longitudinal studies with a more representative study population are needed to address these gaps. Additionally, further research is needed to develop targeted interventions that improve the SMA of BPH patients and assess their impact on anxiety, sleep disorders, and SWB. Combining SWB assessments with objective physiological indicators, such as prostate volume and prostate-specific antigen, could also be a promising direction for future research.

Conclusions

This study highlights the key roles of anxiety, sleep quality, and SMA in the SWB of BPH patients. Self-management enhances well-being both directly and indirectly by reducing anxiety and improving sleep quality. To translate these findings into practice, clinicians should integrate 3 evidence-based components into care protocols: digital symptom monitoring, CBT for stress management, and personalized sleep interventions. Additionally, interventions such as bibliotherapy and family-based training should be implemented to enhance SMA.

Authors' Note

Ethical Approval: All methods of this study have been performed in accordance with the Declaration of Helsinki. This study was approved by the Ethics Review Committee of the School of Nursing at the Lanzhou University (LZUHLXY20200017). *Statement of Informed Consent:* All participants volunteered to take part in this study. Since this was an observational study and no intervention was needed, no formal ethical approval or written consent was required, which was approved by the Ethics Committee of School of Nursing at the Lanzhou University. *Statement of Human and Animal Rights:* All procedures involving human subjects in this study were conducted in accordance with the Ethics Review Committee of the School of Nursing at Lanzhou University.

Declaration of Conflicting Interests

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