Impact of Spiritual Symptoms and Their Interactions on Health Services and Life Satisfaction

David A. Katerndahl, MD, MA

Department of Family & Community Medicine, University of Texas Health Science Center at San Antonio, Texas

ABSTRACT

PURPOSE Recent work suggests that the biopsychosocial model should be expanded to include the spiritual dimension as well. The purpose of this study was to assess the independent effects of spiritual symptoms and their interactions with biopsychosocial symptoms on health care utilization, extreme use of services, and life satisfaction among primary care patients.

METHODS Three hundred fifty-three adult waiting room patients at 2 primary care clinics completed the Biopsychosociospiritual Inventory (BioPSSI) as well as measures of life satisfaction and health care use. Hierarchical logistic regression analysis was performed with each outcome to determine whether adding spiritual symptoms and their interaction terms better accounted for outcomes than demographics, functional status, and chronic medical problems alone.

RESULTS Spiritual symptoms (alone or in interaction) were associated with 7 of the 10 outcomes and were particularly important to extreme use of health care services and life satisfaction. Among best-fit models, spiritual symptoms alone were significantly associated with any mental health use ($\beta = 0.694$, $P \le .05$), fair-poor health status ($\beta = 0.837$, $P \le .05$), and life lacking meaning ($\beta = 1.214$, $P \le .001$).

CONCLUSIONS This study has shown the relevance of spiritual symptoms and their interactions to understanding health outcomes. Extreme utilization outcomes were related to the number of chronic problems, as well as to the social-spiritual interaction. Satisfaction outcomes were associated with physical and spiritual symptoms. These findings may have important implications for providing comprehensive, outcome-based care, as well as for modeling of research findings.

CORRESPONDING AUTHOR

David Katerndahl, MD
Department of Family &
Community Medicine
University of Texas Health
Science Center at San Antonio
7703 Floyd Curl Dr
San Antonio, TX 78229-3900
Katerndahl@uthscsa.edu

INTRODUCTION

Since Engel[1] described the biopsychosocial model and its clinical applications,[2] this model has become a foundation of primary care.[3,4] New models of care continue to emphasize the psychological and social aspects of illness in addition to the biomedical disorder.[5-7] Biomedical, psychological, and social issues are important to everything from chronic pain[8] and cerebral palsy[9] to angina pectoris[10] and inflammatory bowel syndrome,[11] panic disorder,[12] and depression.[8,13,14] Yet, the biioopsychosocial model may be relevant to understanding a variety of clinical outcomes across disorders among primary care patients.[15]

Based on the consistent importance of religion and spirituality to health,[16-19] Onarecker and Sterling[16] proposed that the biopsychosocial model be revised to include spirituality. This model is consistent with the definition of holism that "deals with health problems in their physical, psychological, social, cultural, and existential dimensions."[20] In addition to a direct association between spirituality and clinical parameters, associations between biopsychosocial symptoms and spiritual factors[21-25] suggest that

spiritual symptoms may act synergistically with these other symptom dimensions to affect health. Even so, studies that have included spiritual assessments along with those of physical, psychological, and social symptoms have not sought such synergistic effects.

Does knowledge of spiritual symptoms contribute to our understanding of clinical outcomes above that which is explained by biopsychosocial symptoms? Does knowledge of interaction effects between spiritual symptoms and biopsychosocial symptoms add additional explanatory power? The purpose of this study was to assess the independent effects of spiritual symptoms and their interactions with biopsychosocial symptoms on health care utilization, extreme use of services, and life satisfaction among primary care patients.

METHODS

Sample

This study was conducted in 2 primary care clinics in San Antonio, Texas. The study was reviewed and approved by the Institutional Review Board for the University of Texas Health Science Center at San Antonio. English- and Spanish-speaking adult (aged 18 years and older) patients seeking nonacute care were approached in the waiting rooms and asked to participate. Those agreeing underwent informed consent and completed the questionnaire in a private setting.

Instruments

In addition to demographics, chronic medical problems, and medications, participants reported their levels of biopsychosociospiritual symptoms and functioning using the BIOPsychoSocioSpiritual Inventory (BioPSSI).[26] Each symptom and activity item is rated from "0" (none of the time) to "5" (all of the time). This instrument consists of 5 scales (physical symptoms, psychological symptoms, social symptoms, spiritual symptoms, and impaired biopsychosociospiritual functioning) in which high scores indicate negative (or lack of positive) symptoms or limitations. All 5 scales have good concurrent validity (correlating with the number of scale-specific diagnoses, medications, and health care utilization, as well as scale-related satisfaction) and excellent internal consistency ($\alpha = .862-.967$). The 10-item physical symptoms scale includes items concerning generalized nonspecific symptoms (ie, pain, weakness, dyspnea), whereas the 4-item psychological symptoms scale includes items concerning anxiety and depression. The 8-item social symptoms scale focuses on opportunities for social interaction and support, and the 7-item spiritual symptom scale includes items concerning peace, harmony, and purpose (Table 1).

Although the 12-item impaired functional status scale assessed function in all 4 symptom dimensions, orthogonal (equamax) factor analysis showed that it was independent of the other scales. This scale, however, was still significantly correlated with the 4 symptom scales (Pearson $r = 0.38-0.69$). The Spanish translation of the BioPSSI also showed excellent internal consistency for all 5 scales ($\alpha = .800-.965$). In addition, Hispanic participants completing the English and Spanish versions did not differ significantly ($P > .3$) when adjusted for age, sex, socioeconomic status, income, marital status, employment, and number of chronic medical problems.

Health care utilization was assessed using the Health Care Utilization Questionnaire.[27] This instrument asked participants to report the number of visits during the previous 2 months to emergency settings, primary care and medical specialty settings, and mental health settings. Participants also reported the number of times during the previous year that they were admitted to a hospital. This instrument has good internal consistency.

Life satisfaction was assessed in 3 ways. Perceived health status was rated from "poor" to "excellent" on a 5-point scale.[28] Sense of meaning was assessed using a question from the FACIT-sp[29] asking participants to rate how often during the previous month they felt that their life lacked meaning and purpose from "0" (none of the time) to "5" (all of the time). Finally, quality of life was assessed using a modified version of the Quality of Life Inventory (QOLI).[30] For each area (ie, health, friends), participants were asked to rate the importance of the area to their happiness from "0" (not important) to "2" (extremely important) and to rate their satisfaction from "–3" (very dissatisfied) to "+3" (very satisfied). The QOLI was modified by additionally rating the importance of and satisfaction with their faith and spirituality using the same rating scales. The total quality-of-life score is computed by summing the importance-satisfaction products for each quality of life area; the total score can range from –102 to +102. The QOLI has good internal consistency and test-retest reliability, as well as concurrent and construct validity.

Table 1. Items In The Spiritual Symptom Scale

Item

1. Peaceful
2. A reason for living
3. Your life has been productive
4. Peace of mind
5. Sense of purpose
6. Able to reach down deep into yourself for comfort
7. Sense of harmony within yourself

Analysis

Because the outcomes were not normally distributed, outcomes were dichotomized before analysis. Cut points were based on meaningfulness, published reports (definitions of extreme behavior), and rarity of the event. Any use of emergency settings, medical specialist and mental health settings, and hospitalization represent "any utilization" outcomes. Frequent use of primary care and ambulatory settings and polypharmacy represent "extreme utilization" outcomes. "Extreme utilization" was defined as that exhibited by the top 10% of participants; previous studies have traditionally used the top 5% as a cut point.[31,32] "Frequent primary care use" was defined as more than 4 visits to a primary care physician in the previous 2 months. Other definitions have ranged from 15 visits in 3 years[33] to 10 visits per year.[34] "Frequent ambulatory use" (including medical specialists and mental health clinicians) was defined as more than 8 visits to any ambulatory health care worker in the previous 2 months. "Polypharmacy" was defined as more than 5 chronic medications.[35] Finally, poor-fair health status, positive quality of life, and never lacking a sense of purpose represent "life satisfaction" outcomes.

Bivariate relationships between dichotomous outcome variables and scales were assessed using Student's t tests. To correct for multiple bivariate tests, Bonferroni's method was used. Thus, of the 50 bivariate analyses performed, only those with individual P values of ≤.001 are significant at the experiment-wise $P ≤ .05$ level when corrected for multiple comparisons. Hierarchical logistic regressions were performed to assess whether BioPSSI scales predict outcomes independent of their relation to demographic variables and the number of chronic medical problems. Adjusting for age, sex, socioeconomic status based on education and occupation,[36] full-time employment, married status, and black race, each outcome was assessed with a series of 4 logistic regressions; income was not entered because of the high rate of missing data. In model 1 the number of chronic medical problems was added, whereas in model 2 the BioPSSI impaired functional status score was further added. In model 3 the 4 BioPSSI symptom scales were added to model 2. Finally, in model 4, the 3 BioPSSI symptom scale interaction terms involving spiritual symptoms (physical × spiritual, psychological × spiritual, social × spiritual) were added. P values ≤.05 were deemed significant, and .05 < P values ≤.10 were deemed as trending toward significance. Adjusted R^2 was estimated using the Nagelkerke method,[37] and goodness-of-fit was assessed using Hosmer-Lemeshow (HL) statistics.[38] The model that showed an improvement in variance and a nonsignificant HL statistic was deemed the best fit. With an α level of .05 and seeking a moderate effect size, this regression analysis has a statistical power of 80%.

RESULTS

This predominantly low-income, English-speaking, minority sample consisted of 237 women and 142 married individuals. Medically, 267 (74%) reported at least 1 chronic medical problem and 211 (61%) reported at least 1 chronic medication. The sample description is displayed in Table 2.

Any Utilization

Overall, 76 (26%) participants reported at least 1 use of emergency services. Similarly, 77 (25%) participants reported at least 1 visit to a specialist. Although 87 (26%) reported at least 1 hospitalization, 49 (16%) reported use of mental health services. Only mental health use showed significant differences for all 5 BioPSSI scales (Table 3). For emergency department use, model 2 with its association with impaired functional status was the optimal model (Table 4). Although better-fitting model 3 (HL P = .358) suggested that specialist use was related to physical

Table 2. Sample Demographics (n = 353)

Demographic	Number Missing	n (%)
Sex, female	2	237 (67)
Race/ethnicity	3	
non-Hispanic white		108 (31)
Hispanic		207 (59)
Black		22 (6)
Other		13 (4)
Marital status	3	
Married		142 (40)
Single		95 (27)
Other		113 (32)
Employment (full-time)	5	88 (25)
Income	59	
<$5,000		57 (16)
$5,000-$19,999		118 (33)
$20,000-$49,999		95 (27)
≥$50,000		24 (7)
Social class	27	
II		2 (1)
III		61 (17)
IV		72 (20)
V		191 (54)
Age, mean years ± SD	20	42.6 ± 13.5
Chronic medical problems, mean No. ± SD	0	2.1 ± 2.0
Chronic medications, mean No. ± SD	9	2.1 ± 2.5

Table 3. Bivariate Biopsychosociospiritual Inventory Differences In Outcomes (Mean Scores)

Outcomes, n	Physical Symptoms	Psychological Symptoms	Social Symptoms	Spiritual Symptoms	Impaired Functional Status
Any utilization					
Any emergency use					
No, n = 221	1.02 (0.93)[a,b]	1.58 (1.30)[c]	1.61 (1.34)	1.48 (1.35)[c]	1.48 (1.44)[a,b]
Yes, n = 76	1.53 (1.03)	2.05 (1.39)	1.85 (1.49)	1.90 (1.49)	2.18 (1.56)
Any specialist use					
No, n = 227	0.99 (0.90)[a,b]	1.56 (1.27)[d]	1.71 (1.36)	1.51 (1.37)[c]	1.46 (1.42)[a,b]
Yes, n = 77	1.74 (1.14)	2.18 (1.49)	1.69 (1.51)	1.94 (1.52)	2.40 (1.65)
Any mental health use					
No, n = 265	1.06 (0.93)[a,b]	1.51 (1.25)[a,b]	1.56 (1.35)[a,b]	1.39 (1.29)[a,b]	1.46 (1.38)[a,b]
Yes, n = 49	1.79 (1.18)	3.07 (1.18)	2.49 (1.37)	3.03 (1.31)	3.10 (1.60)
Any hospitalization					
No, n = 241	1.08 (0.99)[c]	1.69 (1.32)	1.68 (1.37)	1.59 (1.41)	1.57 (1.50)[d]
Yes, n = 87	1.40 (1.03)	1.79 (1.38)	1.80 (1.44)	1.83 (1.42)	2.20 (1.56)
Extreme utilization					
Frequent primary care use					
≤4 Visits, n = 260	1.01 (0.91)[a,b]	1.63 (1.29)[a,b]	1.66 (1.36)	1.55 (1.40)[e]	1.51 (1.43)[a,b]
>4 Visits, n = 28	2.10 (1.07)	2.58 (1.65)	2.03 (1.51)	2.29 (1.41)	3.04 (1.53)
Frequent ambulatory use					
≤8 Visits, n = 252	1.02 (0.91)[a,b]	1.58 (1.29)[a,b]	1.64 (1.37)	1.50 (1.36)[d]	1.45 (1.36)[a,b]
>8 Visits, n = 27	1.86 (1.05)	2.70 (1.46)	2.00 (1.51)	2.32 (1.54)	3.35 (1.67)
Polypharmacy					
≤5 Medications, n = 307	1.08 (0.96)[a,b]	1.67 (1.32)[a,b]	1.67 (1.38)[e]	1.61 (1.43)[e]	1.56 (1.47)[a,b]
>5 Medications, n = 37	2.17 (1.12)	2.75 (1.31)	2.31 (1.24)	2.29 (1.41)	3.09 (1.46)
Satisfaction					
Fair-poor health status					
No, n = 180	0.74 (0.72)[a,b]	1.16 (1.08)[a,b]	1.29 (1.24)[a,b]	1.05 (1.11)[a,b]	1.04 (1.21)[a,b]
Yes, n = 159	1.80 (1.08)	2.43 (1.30)	2.23 (1.39)	2.39 (1.41)	2.61 (1.47)
Positive quality-of-life					
No, n = 54	1.92 (1.06)[a,b]	3.03 (1.22)[a,b]	2.55 (1.38)[a,b]	3.10 (1.22)[a,b]	3.21 (1.45)[a,b]
Yes, n = 228	1.01 (0.89)	1.40 (1.18)	1.52 (1.29)	1.29 (1.23)	1.38 (1.34)
Life lacking meaning					
Never, n = 149	0.90 (0.93)[a,b]	1.25 (1.24)[a,b]	1.35 (1.28)[a,b]	1.02 (1.25)[a,b]	1.16 (1.32)[a,b]
At least sometimes, n = 183	1.39 (1.02)	2.17 (1.28)	2.04 (1.40)	2.24 (1.34)	2.22 (1.55)

Note: analyses determined by *t* tests.

[a] $P \leq .001$.
[b] $P \leq .05$ by Bonferroni correction.
[c] $P \leq .05$.
[d] $P \leq .005$.
[e] $P \leq .01$.

symptoms and lack of social symptoms, model 4 found associations with 2 interaction terms. For mental health use, although model 4 noted an association with psychological symptoms and was a better fit (HL $P = .610$), it did not account for additional variance over model 3, which found associations with the number of chronic problems and spiritual (but not psychological) symptoms ($\alpha = 0.694$; $P \leq .05$). The lack of association between impaired functional status and any utilization in models 3 and 4 may reflect its correlation with symptom scores. Similarly, model 4 was not a significant improvement over model 3 for hospitalization and

found that hospitalization was associated with both the number of chronic problems and impaired functional status as well as a lack of psychological symptoms.

Extreme Utilization

Although participants reported, on average, 1.65 primary care and 3.26 ambulatory visits, they also reported using 1.94 chronic medications. All bivariate comparisons were significant for impaired functional status as well as physical and psychological symptoms. Model 4 was an improvement over model 3 for all 3 extreme utilization outcomes (Table 5). Frequent

primary care use was associated with the number of chronic problems, physical symptoms, and social-spiritual interaction. Similarly, frequent ambulatory use was related to the number of chronic problems and impaired functional status, as well as spiritual symptoms. Finally, polypharmacy was linked to the number of chronic problems and social symptoms, as well as social-spiritual interaction.

Table 4. Results of Regression Analyses (β) for Health Services: Any Utilization

Model	Any Emergency Use	Any Specialist Use	Any Mental Health Use	Any Hospitalization
Model 1				
Number of problems	0.283[a]	0.271[a]	0.563[b]	0.277[c]
R^2 (P)	.100 (.136)	.158 (.009)	.268 (.000)	.122 (.029)
HL P	.445	.424	.540	.882
Model 2				
Number of problems	0.175	0.174	0.444[c]	0.218[d]
Impaired functional status	0.372[d]	0.327[d]	0.520[a]	0.175
R^2 (P)	.148 (.035)	.196 (.003)	.336 (.000)	.134 (.029)
HL P	.526	.442	.786	.275
Model 3				
Number of problems	0.172	0.126	0.498[c]	0.246[d]
Impaired functional status	0.255	0.226	0.379	0.413[d]
Symptoms				
Physical	0.364	0.511[e]	−0.333	0.302
Psychological	−0.146	−0.045	0.259	−0.804[c]
Social	0.034	−0.364[e]	−0.112	−0.167
Spiritual	0.102	0.032	0.694[d]	0.210
R^2 (P)	.164 (.101)	.249 (.002)	.429 (.000)	.232 (.002)
HL P	.918	.358	.510	.428
Model 4				
Number of problems	0.198	0.116	0.508[c]	0.249[d]
Impaired functional status	0.269	0.124	0.329	0.455[d]
Symptoms				
Physical	0.412	0.319	0.131	0.598
Psychological	−0.106	0.882[d]	1.310[e]	−1.051[a]
Social	0.332	−1.082[a]	−0.328	0.033
Spiritual	0.586	0.269	0.744	0.359
Symptom Interactions				
Physical-spiritual	0.000	0.004	0.002	−0.002
Psychological-spiritual	−0.002	−0.018[d]	−0.006	0.005
Social-spiritual	−0.003	0.005[e]	0.001	−0.002
R^2 (P)	.183 (.141)	.314 (.000)	.434 (.000)	.252 (.004)
HL P	.350	.004	.610	.536

Note: Adjusted for age, sex, socioeconomic status, race/ethnicity (black), employment (full-time), married.

HL P = Hosmer-Lemeshow P value.

[a] $P \leq .01$.
[b] $P \leq .001$.
[c] $P \leq .005$.
[d] $P \leq .05$.
[e] $P \leq .1$.

Life Satisfaction

Although 159 (47%) subjects rated their health status as fair or poor, and 228 (81%) rated their quality-of-life as positive, 149 (45%) reported that their life always has meaning. All 5 BioPSSI scales showed significant bivariate differences for all 3 satisfaction outcomes. Model 3 showed that health status was related to physical and spiritual symptoms (Table 6). Model 4 also accounted for the most variance in a positive quality of life and found it was associated with fewer chronic problems, psychological but not physical symptoms, and the psychological-spiritual interaction (HL P = .690). The lack of association between impaired functional status and satisfaction in models 3 and 4 may reflect its correlation with symptom scores. Finally, model 4 was the best fit for lack of meaning (HL P = .642) and found that it was related to impaired functional status, spiritual symptoms, and the social-spiritual interaction.

DISCUSSION

Any Utilization

Emergency department use was unrelated to any biopsychosociospiritual symptoms, unlike previous studies that found emergency use was associated with psychological symptoms, stress, substance use,[39-41] and parental religiosity,[42] but also a lack of social support.[32,39] Similarly, specialist use was possibly related to physical symptoms and a lack of social symptoms, but was only related to spiritual symptoms in model 4, in which goodness of fit was poor.

Table 5. Results of Regression Analyses (β) for Health Services: Extreme Utilization

Model	Frequent Primary Care Use	Frequent Ambulatory Use	Poly-pharmacy
Model 1			
Number of problems	0.492[a]	0.647[b]	0.810[b]
R^2 (P)	.199 (.109)	.299 (.002)	.472 (.000)
HL P	.272	.494	.690
Model 2			
Number of problems	0.436[c]	0.561[b]	0.769[b]
Impaired functional status	0.342	0.694[d]	0.394
R^2 (P)	.227 (.098)	.394 (.000)	.496 (.000)
HL P	.912	.853	.982
Model 3			
Number of problems	0.456[c]	0.580[a]	0.833[b]
Impaired functional status	0.083	0.709[c]	0.083
Symptoms			
Physical	1.370[c]	0.323	0.135
Psychological	−0.237	−0.503	0.363
Social	−0.021	−0.277	0.389
Spiritual	−0.477	0.378	0.003
R^2 (P)	.327 (.072)	.419 (.001)	.546 (.000)
HL P	.784	.717	.994
Model 4			
Number of problems	0.457[c]	0.691[a]	1.047[b]
Impaired functional status	0.286	0.815[c]	−0.007
Symptoms			
Physical	2.135[e]	−0.113	−0.338
Psychological	0.038	0.227	0.323
Social	0.917	0.611	1.773[c]
Spiritual	1.780	1.861[e]	0.860
Symptom interactions			
Physical-spiritual	−0.006	0.002	0.003
Psychological-spiritual	−0.008	−0.016	−0.001
Social-spiritual	−0.010[e]	−0.007	−0.009[c]
R^2 (P)	.413 (.045)	.475 (.001)	.594 (.000)
HL P	.951	.954	.817

Note: Adjusted for age, sex, socioeconomic status, race/ethnicity (black), employment (full-time), married.

HL P = Hosmer-Lemeshow P value.

[a] P ≤.005.
[b] P ≤.001.
[c] P ≤.05.
[d] P ≤.01.
[e] P ≤.1.

Although mental health use was associated with psychological symptoms in model 4, it was not linked to psychological symptoms in model 3. Model 3 found that use was associated with the number of chronic problems and spiritual symptoms instead. This finding agrees with the association between mental health care and infrequent church attendance reported by Schiller and Levin.[42] The association with spiritual symptoms instead of psychological symptoms in this study is

unexpected. The change in correlates as we transition from model 3 to model 4 suggests a strong interdependency between psychological and spiritual symptoms.[43] Only when the spiritual interaction terms were added did a significant relationship with psychological symptoms manifest itself.

Finally, though previous work found an association between religious denomination and both hospitalization and length of hospital stay,[42,44] as well as associations between religious/spiritual variables with acute hospitalizations and long-term care in elders,[45] no relationship between hospitalization and spiritual symptoms or their interactions was found in this study.

Extreme Utilization

For all 3 extreme utilization variables, spiritual symptoms were significant. Frequent primary care use was associated with the number of chronic problems, possibly physical symptoms, and the social-spiritual interaction. Previous research linked frequent primary care office to the number of chronic problems,[46] physical symptoms,[33,40] psychological symptoms,[31,33,40,46] poor social support,[46] and religious denomination.[42] King and Pearson[47] found that patients who attended religious services were more likely to report continuity with a regular health care clinician.

Frequent ambulatory care use was linked to the number of chronic problems and possibly spiritual symptoms but was also related to impaired functional status. Previous research has linked ambulatory utilization with medical burden,[48] impaired function,[48] physical symptoms,[49] psychological symptoms,[49,50] social problems,[49] and religiosity.[42]

Finally, polypharmacy was related to the number of chronic problems and social symptoms, as well as the social-spiritual interaction. Although prior studies linked polypharmacy to general symptomatology,[50] no distinction between types of symptoms was made. The strong relationship between polypharmacy and social symptoms is unexpected, suggesting that a lack of social relationships and support may be an important factor is general symptomatology and use of medications.

Life Satisfaction

The satisfaction outcomes were strongly related to spiritual symptoms. Fair-poor health status was associated

Table 6. Results of Regression Analyses (β) for Health Services: Satisfaction

Model	Fair-Poor Health Status	Positive Quality of Life	Life Lacking Meaning
Model 1			
Number of problems	0.422[a]	−0.676[a]	0.194[b]
R^2 (P)	.214 (0.000)	.479 (0.000)	.103 (0.046)
HL P	0.180	0.712	0.929
Model 2			
Number of problems	0.215[c]	−0.540[a]	−0.017
Impaired functional status	0.610[a]	−0.601[d]	0.618[a]
R^2 (P)	.325 (.000)	.545 (.000)	.231 (.000)
HL P	.360	.933	.982
Model 3			
Number of problems	0.201	−0.717[d]	0.005
Impaired functional status	0.061	0.115	0.445[b]
Symptoms			
Physical	1.149[a]	−1.047[b]	−0.059
Psychological	−0.144	0.140	−0.051
Social	0.079	0.096	0.003
Spiritual	0.654[d]	−1.373[d]	0.567[e]
R^2 (P)	.503 (.000)	.725 (.000)	.306 (.000)
HL P	.722	.734	.263
Model 4			
Number of problems	0.209	−0.766[d]	0.041
Impaired functional status	0.085	−0.012	0.464[b]
Symptoms			
Physical	1.552[a]	−1.849[c]	0.277
Psychological	−0.149	1.902[b]	−0.189
Social	0.075	−1.003	0.407
Spiritual	0.837[b]	−1.090	1.214[a]
Symptom interactions			
Physical-spiritual	−0.003	0.006	−0.003
Psychological-spiritual	0.001	−0.027[b]	0.002
Social-spiritual	0.000	0.006	−0.004[b]
R^2 (P)	.511 (.000)	.759 (.000)	.345 (.000)
HL P	.725	.690	.642

Note: Adjusted for age, sex, socioeconomic status, race/ethnicity (black), employment (full-time), married.

HL P = Hosmer-Lemeshow P value.

[a] $P \leq .001$.
[b] $P \leq .05$.
[c] $P \leq ..1$.
[d] $P \leq .005$.
[e] $P \leq .01$.

quality of life to spirituality,[55] not all studies agree.[56] The unexpected pattern seen here may reflect a complex relation between psychological and spiritual symptoms, so that model 3 shows an inverse relationship with spiritual symptoms alone but model 4 shows that psychological symptoms are positively associated with positive quality of life whereas their interaction term is inversely related. More research in this area is needed.

Finally, a lack of meaning was associated with impaired functional status, spiritual symptoms, and a social-spiritual interaction. A sense of purpose in life is associated with better quality of life[57] and perceived health,[57] fewer psychological symptoms,[58] and better abstinence rates.[59] Meaning in life is associated with religiosity[60] and social desirability,[61] consistent with the importance of spirituality and social-spiritual interaction.

Implications

Although prior research has not included spiritual symptoms or their interaction effects in most cases, most of their results agree with those of this study. This study shows the importance of spiritual symptoms and interactions, sometimes more than biopsychosocial symptoms, in understanding health outcomes from a research perspective, confirming a complex relationship.[62] This finding implies that we should expect nonlinear relationships to exist and unpredictability in these outcomes to be the rule rather than the exception. We must consider nonlinear approaches to modeling them and should address the full array of symptoms and potential treatment approaches when providing care.[63]

Clinically, this study has implications. First, it suggests that, when attempting to understand high utilization rates in patients with poor quality of life, clinicians should inquire about spiritual issues. Second, whereas positive interaction coefficients may suggest synergy between symptom dimensions, negative coefficients may suggest complementary effects; in fact, all significant interaction terms in best-fitting model 4 outcomes are indeed negative interaction effects. Thus, positive interactions suggest that symptoms in

with physical and spiritual symptoms. Previous studies found associations between poor health status and disability, and psychological symptoms,[51] infrequent church attendance,[52] and spirituality.[53]

A positive quality of life was related to fewer chronic problems, psychological but lack of physical symptoms, and a psychological-spiritual interaction. Previous research linked quality of life with physical symptoms, psychological symptoms, and social and family symptoms.[54] Although most studies linked

one dimension can be mitigated by promoting health in another dimension. Negative interactions may imply that the adverse effects of symptoms in one dimension complement symptoms in the other dimension. Lack of social interaction, for example, may promote spiritual well-being by facilitating introspection. Third, when patients respond in unexpected ways, clinicians should assess the possible role of spiritual problems.

Limitations

This study has several limitations. The predominance of lower income, Hispanic participants raises questions about its generalizability to other populations. Subpopulations within the Hispanic community may differ even though previous studies have suggested that Hispanic populations within the southwestern United States are similar among themselves.[64] This study was conducted in a clinic population and may not apply to the general population. Selection bias may be present. Some outcomes were based on a single question and are subject to instability. Although the cut points used to define extremes in health services are similar to those of previous studies, there are no agreed-upon definitions for excessive utilization. Current problems and medications as well as 2-month utilization are based on self-report and patient recall. Even so, an earlier study suggests that even depressed patients can accurately recall their utilization for the previous 2 months.[65] Finally, the demographic covariates controlled for in the models may be incomplete. Low income is linked to decreased social support, as well as increased chronic medical problems and psychological symptoms.[66]

In conclusion, that spiritual symptoms (alone or in interaction) were associated with 7 of the 10 outcomes has important implications for providing comprehensive, outcome-based care as well as for modeling of research findings.

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