Comorbidity and Quality of Life in *DSM-5* Social Anxiety Disorder Among a Nationally Representative Sample

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Abstract

Objective: Social anxiety disorder (SAD) is a prevalent and debilitating psychiatric disorder that is associated with impairments in functioning and detrimental outcomes such as suicide, poor physical quality of life (QOL), and overall mental health. The goal of the present study was to examine the past-year comorbidities of *DSM-5* SAD among a large nationally representative sample of US adults (N = 36,309) and to examine correlates of physical QOL and overall mental health among individuals with past-year SAD (N = 980).

Methods: The study utilized data from the National Epidemiologic Survey on Alcohol and Related Conditions-III to examine diagnostic correlates of SAD as well as how symptoms and features of SAD are related to QOL using survey-weighted regression analyses.

Results: We found that comorbid depression, anxiety disorders, posttraumatic stress disorder, and borderline personality disorder were positively associated with SAD. Further, presence of these disorders was also associated with poorer mental health among those with SAD. We also found that specific feared situations (eg, eating and drinking in public) and social anxiety symptoms (panic attack and avoidance) were linked to both forms of QOL (all *ps* < 0.01).

Conclusion: The present findings highlight that SAD is comorbid with other impairing disorders and that these comorbidities, specific feared situations, and SAD symptoms are related to worse QOL in individuals with SAD.

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Social anxiety disorder (SAD) is characterized by excessive fear or anxiety related to social situations where individuals may be scrutinized by others.[1] SAD is among the most prevalent psychiatric disorders (5.0%–12.1%)[2–4] with the average age of onset being relatively young (ie, 10.6–15.1 years) compared to other psychiatric disorders.[5,6] Women are more likely to be diagnosed with SAD and present with greater symptom severity.[7,8] Further, SAD is highly comorbid with other psychiatric disorders such as depression and substance use disorders.[9–11] SAD is also associated with suicidal thoughts and behaviors[12,13] as well as impairments in quality of life (QOL).[14,15] While effective treatments for SAD exist, many individuals (eg, 61.6%) with the disorder never seek treatment.[16]

Although SAD is among the most frequently studied anxiety disorders, little is known about its correlates and comorbidities in general population samples. Notably, several studies have examined SAD in national representative samples, but these studies only focused on a sole secondary disorder such as antisocial personality disorder (PD),[17] depression,[18] or posttraumatic stress disorder (PTSD)[19] to examine key correlates and risk factors. Outside of the United States, a study from Germany found that SAD was associated with mood disorders and other anxiety disorders in the general population; however, the study did not control for comorbid disorders simultaneously.[20] The lack of comprehensive and detailed information of *DSM-5* SAD and its comorbidities in the United States represents a gap in knowledge that would be essential in future research on prevention, development, and treatment of SAD.

Given that SAD is associated with impairments in multiple life domains (ie, social, occupational, and relational),[1] it is also vital to better understand how psychiatric comorbidities uniquely account for deficits in QOL. Health-related QOL is a broad construct that is often measured as mental and physical functioning or disability.[21] Notably, SAD has been found to be significantly associated with poorer physical and mental QOL.[14] Prior research has begun to examine what factors

Clinical Points

- Comorbidities of social anxiety disorder using *DSM-5* criteria and how social anxiety disorder is related to physical and mental quality of life have yet to be examined.
- If patients present with social anxiety disorder, it is important to consider that they often meet criteria for another psychiatric disorder.
- For these patients, it is also important to consider how their symptoms such as panic attacks, persistent anxiety, and avoidance may impact the quality of their life.

may be associated with these domains to improve treatment efforts finding that fear of negative evaluation was uniquely related to QOL above and beyond depression.[15,22] However, research has yet to examine whether specific feared situations or SAD symptoms are related to physical and mental QOL. Further, research has yet to examine how comorbidities among individuals with SAD are associated with physical and mental QOL, respectively.

The present study sought to build on prior work that has examined SAD among the general US population by using the National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III), a recent large and nationally representative community sample of US adults. Specifically, we sought to determine what specific demographic characteristics and psychiatric comorbidities are associated with past-year SAD in the general NESARC-III sample. Further, we sought to examine what demographic factors, psychiatric comorbidities, feared social situations, and SAD symptoms are associated with both physical QOL and overall mental health among individuals with past-year SAD. The NESARC-III is ideal to examine these aims given its large, nationally representative design, comprehensive diagnostic interviews, and measurement of QOL.[23,24]

Given prior research on comorbidities,[9–11] we hypothesized that comorbid major depressive disorder (MDD), agoraphobia, specific phobia, panic disorder, and generalized anxiety disorder (GAD) would be associated with SAD in the past year. Further, we hypothesized that these disorders would be associated with poorer physical and mental QOL. Lastly, given that prior research has not investigated whether certain feared social situations and SAD symptoms are related to QOL, we considered these analyses exploratory and did not posit any a priori hypotheses for this aim.

METHODS

Participants and Procedures

Participants included 36,309 individuals who participated in the NESARC-III. The NESARC-III was a cross-sectional nationally representative survey conducted by the National Institute on Alcohol Abuse and Alcoholism.[2,25] Individuals from the United States participated in the study between 2012 and 2013. All data were collected via in-home interviews conducted by a trained research professional. The overall response rate for the survey was 60.1%, and multistage probability sampling was used to choose eligible participants. The primary sampling units included the individuals or groups of counties, the secondary units were the groups of census-defined blocks, and the tertiary units contained individual adults from the identified census blocks in the secondary sampling. Individuals of color, specifically black, Asian, and non-white Hispanic individuals, were oversampled. The data were adjusted for the oversampling and variable probabilities of selection and nonresponse. Participant characteristics are presented in Table 1. The present study analyzed both the total sample as well as the subsample of individuals who met criteria for past-year SAD (n = 980).

Measures

Demographics. Age, sex, race, marital status, income, and education were all collected during the survey. Race was coded into 5 distinct categories (ie, white, black, Native American/Alaskan Native, Asian/Hawaiian/Pacific Islander, and Hispanic any race). Marital status in the present study was operationalized as either married/living with someone as if married or single (ie, widowed, divorced, separated, and never married). Income was assessed using an 18-option question with categories ranging from "no personal income" (0) to "$100,000 or more" (17). Education was measured on a scale from 1 ("no formal schooling") to 14 ("completed Master's degree or equivalent or higher graduate degree"). Finally, the age of onset of SAD was measured along with the diagnostic assessment for SAD.

Medical conditions. Chronic physical comorbidities were assessed by asking about the presence of 17 chronic medical conditions (eg, diabetes, fibromyalgia, and cancer) followed by questions asking whether these were confirmed by a medical professional. In the present study, a count variable was calculated representing the total number of chronic conditions an individual has.

Diagnostic assessment. To assess for past-year *DSM-5* psychiatric disorders, the Alcohol Use Disorder and Associated Disabilities Interview Schedule *DSM-5* version (AUDADIS-5) was used. The AUDADIS-5 is a structured diagnostic interview that is designed to assess psychiatric disorders (eg, alcohol use disorders (AUDs), substance use disorders, PTSD, PDs, mood disorders, and anxiety disorders) using *DSM-5* criteria.[1] The presence or absence of a past-year disorder was measured by dichotomous diagnostic variables (0 = does not meet criteria; 1 = meets criteria). The AUDADIS-5 has demonstrated fair to moderate test-retest reliability across various disorders

Table 1.

Summary of Demographics, Comorbid Disorders, and Multivariate Analyses Predicting SAD (N = 36,309)

Characteristics	n (%) or mean (SD)		OR[a] [95% CI]	AOR[b] [95% CI]
	Past-year SAD (n = 980)	No past-year SAD (n = 35,329)		
Demographics				
Sex				
Male	345 (35.2%)	15,517 (43.9%)	Referent	Referent
Female	635 (64.8%)	19,812 (56.1%)	1.52 [1.29 to 1.78]**	1.06 [0.9 to 1.25]
Race				
White	648 (66.1%)	18,546 (52.5%)	Referent	Referent
Black	124 (12.7%)	7642 (21.6%)	0.61 [0.49 to 0.76]**	0.59 [0.45 to 0.77]**
Native American/Alaskan Native	28 (2.9%)	483 (1.4%)	1.61 [1.00 to 2.59]	0.82 [0.40 to 1.67]
Asian/Hawaiian/Pacific Islander	14 (1.4%)	1787 (5.1%)	0.19 [0.10 to 0.35]**	0.28 [0.15 to 0.53]**
Hispanic any race	166 (16.9%)	6871 (19.4%)	0.68 [0.54 to 0.86]*	0.67 [0.51 to 0.88]*
Married	389 (39.7%)	16405 (46.4%)	0.69 [0.60 to 0.79]**	0.89 [0.77 to 1.04]
Income	6.03 (4.09)	7.24 (4.57)	0.93 [0.92 to 0.95]**	0.99 [0.97 to 1.00]
Education	9.4 (2.15)	9.73 (2.41)	0.91 [0.89 to 0.94]**	0.95 [0.90 to 0.99]
Age	43.14 (16.65)	45.70 (17.55%)	0.99 [0.99 to 0.99]**	1.00 [0.99 to 1.00]
Past-year comorbid disorders				
Major depressive disorder	342 (34.9%)	3621 (10.2%)	4.83 [4.11 to 5.68]**	1.84 [1.46 to 2.31]**
Bipolar I disorder	93 (9.5%)	473 (1.3%)	8.06 [5.86 to 11.08]**	1.40 [0.91 to 2.16]
Alcohol use disorder	205 (20.9%)	4928 (13.9%)	1.60 [1.34 to 1.91]**	0.78 [0.60 to 1.03]
Cannabis use disorder	56 (5.7%)	916 (2.6%)	2.71 [1.94 to 3.78]**	0.91 [0.61 to 1.35]
Specific phobia	334 (34.1%)	1701 (4.8%)	10.07 [8.77 to 11.56]**	4.24 [3.49 to 5.17]**
Panic disorder	216 (22.0%)	888 (2.5%)	11.19 [9.15 to 13.68]**	1.62 [1.16 to 2.27]*
Agoraphobia	202 (20.6%)	347 (1.0%)	28.22 [23.08 to 34.51]**	5.43 [4.03 to 7.32]**
Generalized anxiety disorder	333 (34.0%)	1575 (4.5%)	10.48 [8.81 to 12.47]**	2.37 [1.89 to 2.97]**
Posttraumatic stress disorder	256 (26.1%)	1523 (4.3%)	8.08 [6.70 to 9.74]**	1.30 [0.99 to 1.70]
Schizotypal personality disorder	286 (29.2%)	1412 (4.0%)	11.06 [9.31 to 13.13]**	2.03 [1.49 to 2.77]**
Borderline personality disorder	495 (50.5%)	3305 (9.4%)	10.34 [8.95 to 11.94]**	2.73 [2.01 to 3.71]**
Antisocial personality disorder	134 (13.7%)	1466 (4.1%)	3.66 [2.86 to 4.68]**	1.00 [0.75 to 1.34]

[a]OR represents bivariate associations between characteristics and social anxiety disorder.
[b]AOR represents multivariate associations between past-year comorbid disorders and social anxiety disorder adjusted for demographics listed above.
*$P < .01$, **$P < .001$.
Abbreviations: AOR = adjusted odds ratio, OR = odds ratio, SAD = social anxiety disorder.

($\kappa = 0.35–0.51$). The test-retest reliability was moderate for SAD in this sample ($\kappa = 0.46$).[26]

Feared situations and SAD symptoms. Feared social situations were measured by asking participants whether they experienced anxiety related to 16 different situations (eg, dating, eating in public, and conversation with unfamiliar person). Participants who endorsed anxiety related to at least one feared social situation were asked about whether they had experienced specific symptoms in the context of that fear situations (eg, "Did you have a STRONG FEAR, anxiety or avoidance of any social situation because you were afraid of being rejected by other people because of what you might say or do?"). Further, individuals were assessed for experiencing a "panic attack" in these social situations. Given that some symptoms are required for a *DSM-5* diagnosis of SAD (eg, "Almost always anxious/frightened by these social situations), we only examined specific SAD symptoms that might not be present for all individuals with SAD (eg, embarrassment of what you might say, becoming speechless, and being rejected by others). Additionally, as part of this interview, age of onset of SAD was assessed.

Quality of life. QOL was measured using the Short-Form-12 (SF-12), a valid and reliable measure of mental and physical functioning.[21] The SF-12 consists of 8 subscales that address different dimensions of QOL. Notably, the subscales create 2 composite scores that represent the overall physical component summary (PCS) and mental component summary (MCS), respectively. Each subscale is norm-based to the general population and is continuous variable with a mean of 50 and SD of 10. Higher scores on the scales indicate greater overall functioning in that domain.

Statistical Analyses

Data were analyzed using *R* version 4.2.2.[27] The *survey* package[28] was utilized to conduct survey-weighted analyses to account for the complex survey design of the NESARC-III. First, we conducted unadjusted models examining bivariate associations between demographic and clinical diagnoses with SAD in the total sample. We then conducted a multivariable analysis with all demographic and past-year diagnoses included as independent variables predicting past-year SAD. Second, among individuals with past-year SAD, we examined the

association between demographic variables with PCS and MCS using survey-weighted 1-way analysis of variance (ANOVA) or Pearson correlations. Third, we conducted survey-weighted linear regression analyses to examine associations of comorbid past-year psychiatric disorders with both PCS and MCS, respectively, among individuals with past-year SAD. In these models, all psychiatric disorders were adjusted for in the same model along with demographic characteristics, and total number of chronic physical conditions was included in physical QOL models. Fourth, we conducted survey-weighted linear regression analyses to examine the associations of individual SAD symptoms with PCS and MCS while covarying for demographics among individuals diagnosed with past-year SAD. For all linear regression analyses, we included standardized coefficients, confidence intervals, and *P* values. Given the number of analyses conducted, we utilized a more conservative threshold of statistical significance of $P = .01$.

RESULTS

Demographic Characteristics and Psychiatric Comorbidities

A total of 980 (2.7%; weighted population N = 6,721,422) of the total sample met criteria for SAD in the past year. Notably, all comorbid psychiatric disorders examined in the study were significantly associated with SAD at the bivariate level; for example, SAD was found to be associated with PTSD (Table 1). In the multivariate model ($\chi^2_{18} = 2368.87$, $P < .001$, Nagelkerke pseudo $R^2 = .28$), past-year MDD [adjusted odds ratio (AOR) = 1.84, $P < .001$], specific phobia (AOR = 4.24, $P < .001$), panic disorder (AOR = 1.62, $P = .005$), agoraphobia (AOR = 5.43, $P < .001$), GAD (AOR = 2.37, $P < .001$), schizotypal personality disorder (SPD; AOR = 2.03, $P < .001$), and borderline personality disorder (BPD; AOR = 2.73, $P < .001$) were positively associated with SAD. Conversely, identifying as black (AOR = 0.59, $P < .001$), Asian (AOR = 0.28, $P < .001$), or Hispanic any race (AOR = 0.67, $P = .004$) was associated with decreased odds of meeting criteria for SAD.

Demographics and Quality of Life

Data were first screened for issues of nonnormality. Skewness and kurtosis for both PCS and MCS fell within the range of −0.25 to −0.65, indicating that the data were normally distributed among the past-year SAD sample. The mean score of PCS in the sample was 46.36 ($SD = 12.31$), and the mean score of MCS in the sample was 40.94 (SD = 12.69).

Associations between demographic variables and both QOL scales were first examined. Using ANOVA, sex, race, and marital status were not found to be significantly associated with physical QOL. Conversely, income ($r = 0.17$, $P < .001$) and education ($r = 0.24$, $P < .001$) were positively associated with physical QOL, and age ($r = −0.31$, $P < .001$), age of onset of SAD ($r = −0.14$, $P < .001$), and chronic physical conditions ($r = −0.57$, $P < .001$) were negatively associated with physical QOL. Sex was associated with the MCS ($F_{1,978} = 10.99$, $P < .001$) such that women (mean = 39.96, SD = 12.25) had lower mental health than men (mean = 42.76, SD = 12.42). Marital status was found to be associated with the MCS ($F_{1,978} = 20.53$, $P < .001$) such that married individuals (mean = 43.19, SD = 11.90) reported greater mental health compared to single individuals (mean = 39.47, SD = 12.58). Further, income ($r = 0.16$, $P < .001$) and education ($r = 0.15$, $P < .001$) were positively correlated with the MCS, and age of SAD onset ($r = −0.14$, $P < .001$) was negatively correlated with the MCS.

Psychiatric Diagnoses and Quality of Life

Survey-weighted linear regression analyses of past-year comorbid disorder predicting both of the quality-of-life scales (Table 2) revealed that GAD ($\beta = −0.07$, $P = .010$) was significantly related to lower physical QOL, but comorbid AUD ($\beta = 0.10$, $P = .005$) was significantly associated with increased physical QOL while covarying for demographics and chronic illness. In examining mental health, we found that past-year MDD ($\beta = −0.28$, $P < .001$), panic disorder ($\beta = −0.14$, $P < .001$), GAD ($\beta = −0.10$, $P = .003$), PTSD ($\beta = −0.14$, $P < .001$), and BPD ($\beta = −0.14$, $P < .001$) were significantly associated with lower mental health among individuals with past-year SAD.

Feared Situations and Quality of Life

Findings from multivariate linear regression analyses examining the association of type of feared situation and both QOL scales are presented in Table 3. Notably, we found that fear of eating or drinking in public ($\beta = −0.09$, $P = .009$) was associated with decreased physical QOL while covarying for demographics and chronic illness. We also found that fear of eating or drinking in public ($\beta = −0.09$, $P = .008$) and small groups ($\beta = −0.14$, $P < .001$) were all significantly related to decreased mental health.

Social Anxiety Symptoms and Quality of Life

Findings from multivariate linear regression analyses examining the association of specific social anxiety symptoms and both QOL scales are presented in Table 4. We found that being anxious or frightened in a social situation during the entire time ($\beta = −0.09$, $P = .002$) and panic attacks due to social anxiety ($\beta = −0.08$, $P = .010$) were associated with decreased physical QOL. Further, experiencing panic attacks due to social anxiety ($\beta = −0.15$, $P < .001$) was associated with poorer mental health. We also found that fear or avoidance of social situations causing relationship interference ($\beta = −0.16$,

Table 2.

Summary of Multivariable Linear Regression Analyses of Comorbid Diagnoses Predicting QOL

Past-year comorbid diagnoses	Physical component score[a]		Mental component score[a]	
	Mean (SD)	β [95% CI]	Mean (SD)	β [95% CI]
Major depressive disorder		−0.03 [−0.10 to 0.04]		−0.28 [−0.33 to −0.22]**
Yes	45.33 (12.62)		34.89 (11.23)	
No	46.92 (12.11)		44.19 (12.24)	
Bipolar I disorder		−0.006 [−0.07 to 0.07]		−0.03 [−0.11 to 0.04]
Yes	42.97 (13.94)		34.29 (14.53)	
No	46.72 (12.08)		41.64 (12.28)	
Alcohol use disorder		0.10 [0.03 to 0.16]*		−0.06 [−0.13 to 0.00]
Yes	48.77 (12.51)		37.44 (13.27)	
No	45.63 (11.25)		41.87 (13.38)	
Cannabis use disorder		0.02 [−0.04 to 0.09]		0.04 [−0.02 to 0.09]
Yes	49.59 (10.68)		38.95 (14.17)	
No	46.17 (12.38)		41.07 (12.59)	
Specific phobia		−0.003 [−0.06 to 0.05]		0.02 [−0.05 to 0.08]
Yes	44.95 (12.17)		39.01 (12.94)	
No	47.09 (12.32)		41.95 (12.45)	
Panic disorder		−0.02 [−0.08 to 0.05]		−0.14 [−0.20 to −0.08]**
Yes	43.64 (13.17)		33.55 (12.30)	
No	47.13 (11.95)		43.04 (12.00)	
Agoraphobia		−0.06 [−0.13 to 0.01]		−0.08 [−0.14 to −0.01]
Yes	42.66 (12.84)		34.68 (12.60)	
No	47.33 (11.99)		42.57 (12.20)	
Generalized anxiety disorder		−0.07 [−0.13 to −0.01]*		−0.10 [−0.17 to −0.04]*
Yes	44.32 (13.03)		35.35 (11.59)	
No	47.41 (11.79)		43.82 (12.27)	
Posttraumatic stress disorder		−0.05 [−0.13 to 0.02]		−0.14 [−0.21 to −0.06]**
Yes	42.33 (13.00)		33.86 (12.30)	
No	47.79 (11.73)		43.45 (11.56)	
Schizotypal personality disorder		−0.01 [−0.07 to 0.05]		−0.06 [−0.13 to 0.01]
Yes	44.06 (13.06)		35.68 (12.84)	
No	47.31 (11.87)		43.11 (11.98)	
Borderline personality disorder		0.02 [−0.04 to 0.09]		−0.14 [−0.21 to −0.07]**
Yes	45.27 (13.05)		36.56 (12.21)	
No	47.48 (11.40)		45.42 (11.57)	
Antisocial personality disorder		−0.003 [−0.06 to 0.05]		−0.03 [−0.08 to 0.03]
Yes	44.47 (12.61)		36.64 (12.59)	
No	46.66 (12.24)		41.63 (12.58)	

[a]Both models include demographic characteristics as covariates. Further, the physical component model also covaried for chronic illness.
*$P < .01$, **$P < .001$.
Abbreviations: β = standardized regression coefficient, QOL = quality of life.

$P < .001$), restriction in usual activities (β = −0.12, $P = .006$), and restriction in things an individual wants to do (β = −0.15, $P < .001$) were associated with decreased mental health.

DISCUSSION

Using a large, representative sample, this study sought to assess the co-occurrence of demographic characteristics and psychiatric comorbidities with past-year SAD and evaluate how mental and physical QOL are associated with demographic factors, specific feared situations, SAD symptoms, and comorbidities for those with past-year SAD. Consistent with past findings,[2,29] some ethnic and racial groups displayed relatively lower likelihood of past-year SAD. For example, compared to the white individuals, identifying as black, Asian, and/or Hispanic was associated with decreased likelihood of past-year SAD. When evaluated separately, all past-year

Table 3.

Summary of Multivariate Linear Regression Analyses Predicting Physical Component Score and Mental Component Score of the SF-12

	β [95% CI][a]	
Feared situation	Physical component	Mental component
Talking in front of others	−0.03 [−0.10 to 0.03]	0.05 [−0.02 to 0.13]
Conversations with strangers	0.04 [−0.03 to 0.11]	−0.02 [−0.10 to 0.07]
Going to parties/social gatherings	0.04 [−0.04 to 0.12]	−0.06 [−0.15 to 0.03]
Eating/drinking in public	−0.09 [−0.17 to −0.01]*	−0.09 [−0.16 to −0.03]*
Writing while others watch	0.03 [−0.05 to 0.11]	0.02 [−0.05 to 0.10]
Dating	−0.03 [−0.10 to 0.04]	−0.09 [−0.17 to −0.01]
Small groups	−0.008 [−0.09 to 0.07]	−0.14 [−0.22 to −0.06]**
Speaking in class	−0.01 [−0.07 to 0.05]	0.09 [0.00 to 0.17]
Being interviewed	−0.05 [−0.13 to 0.03]	−0.01 [0.09 to 0.06]
Speaking in meeting	0.03 [−0.05 to 0.11]	−0.02 [−0.09 to 0.05]
Performing in front of others	0.02 [−0.06 to 0.10]	0.01 [−0.06 to 0.08]
Taking an important exam	−0.04 [−0.11 to 0.02]	−0.03 [−0.10 to 0.05]
Speaking to authority figures (boss, teacher, etc)	−0.04 [−0.12 to 0.04]	0.01 [−0.07 to 0.10]
Meeting new people	0.06 [−0.03 to 0.14]	−0.05 [−0.15 to 0.05]
Talking at social gatherings	−0.03 [−0.09 to 0.04]	−0.10 [−0.18 to −0.01]
Other	−0.001[−0.05 to 0.05]	−0.06 [−0.12 to −0.01]

[a]Both of these models included demographic covariates presented in Table 1. Further, the physical component model also covaried for chronic illness.
*P < .01, **P < .001.
Abbreviation: SF-12 = Short-Form-12.

Table 4.

Summary of Multivariate Linear Regression Analyses Predicting Physical Component Score and Mental Component Score of the SF-12

	β [95% CI][a]	
Social anxiety symptom	Physical component	Mental component
Embarrassment of what you might say.	−0.04 [−0.10, 0.02]	−0.006 [−0.08, 0.07]
Becoming speechless, having nothing to say, or showing how anxious you were.	0.02 [−0.04, 0.08]	0.02 [−0.06, 0.09]
Becoming rejected by others because of what you might say/do.	0.03 [−0.03, 0.09]	−0.04 [−0.11, 0.03]
Fear of social situation due to fear of offending people.	−0.03 [−0.08, 0.02]	0.05 [−0.02,0.12]
Very anxious/frightened the whole time when had to be in social situations.	−0.09 [−0.15, −0.03]**	−0.07 [−0.13, 0.00]
In social situation that made you anxious, ever had panic attack.	−0.08 [−0.15, −0.01]*	−0.15 [−0.21, −0.09]**
Fear/avoidance of social situations made you very upset.	0.04 [−0.02, 0.10]	−0.07 [−0.15, 0.00]
Fear/avoidance interfered with relationships with others.	0.04 [−0.03, 0.11]	−0.16 [−0.24, −0.08]**
Fear/avoidance interfered with work, schoolwork, taking care of family/home.	−0.04 [−0.10, 0.02]	0.03 [−0.04, 0.10]
Fear/avoidance of social situations ever restricted usual activities.	−0.04 [−0.11, 0.03]	−0.12 [−0.20, −0.04]*
Fear/avoidance of social situations kept you from doing something you wanted to do.	−0.005 [−0.07, 0.06]	−0.15 [−0.23, −0.07]**

[a]Both of these models included demographic covariates presented in Table 1. Further, the physical component model also covaried for chronic illness.
*P < .01, **P < .001.
Abbreviation: SF-12 = Short-Form-12.

comorbidities assessed in our sample were associated with increased odds of an SAD diagnosis, in line with past work suggesting that the comorbidity of SAD with other disorders is high.[30] However, when including all comorbid diagnoses as predictors of past-year SAD, a more detailed picture emerged—comorbid MDD, specific phobia, panic disorder, agoraphobia, SPD, and BPD were significantly associated with SAD, with comorbid PTSD trending in significance. Thus, some psychiatric disorders may cluster more closely with SAD compared to other diagnoses.

In terms of comorbidity, our findings were consistent with our hypotheses and extend past work suggesting that SAD is highly comorbid with anxiety disorders and MDD.[2] The significantly increased likelihood of SAD comorbidity across anxiety disorders may also support burgeoning work advancing higher-order dimensional models of psychopathology that may better account for

this diagnostic overlap given their common core features of high fear and distress.[31] The strong associations observed between past-year SAD diagnosis and comorbid BPD and SPD extend prior findings on the relationship between PDs and SAD that suggest that BPD is highly prevalent among those with SAD.[32,33] This has important treatment implications considering that comorbid BPD has been demonstrated to negatively affect the outcomes of SAD treatment.[34] In this sample, however, other PDs that have demonstrated strong associations with SAD, such as avoidant PD and dependent PD,[2] were not assessed.

Among respondents with SAD, those with comorbid GAD had lower physical QOL compared to those without comorbid GAD, suggesting that their co-occurrence may have a uniquely detrimental relationship with physical functioning and disability. Our findings suggest that comorbid AUD is associated with increased physical QOL. One possible explanation for this could be that these individuals use alcohol to temporarily decrease discomfort during socialization and therefore are more likely to engage in social activity.[35] While this increased engagement in social activity may be modestly related to improvements in physical QOL, we do not expect that comorbid AUD is causally linked to long-term improvements in physical health for those with SAD. Contrary to our hypotheses, comorbid agoraphobia, specific phobia, panic disorder, and GAD were not associated with decreased physical QOL. However, as hypothesized, comorbid MDD, GAD, and panic disorder were associated with significantly worse mental functioning and disability, as was comorbid BPD. Given the strong comorbidity with these 4 diagnoses described earlier, this reflects a decrement in mental QOL for a substantial proportion of those with SAD.

We also found that specific feared situations were associated with poorer QOL for individuals with SAD. Specifically, a fear of eating or drinking in public was associated with both significantly lower physical health and mental health; though the mechanisms of this relationship were not examined, it is possible that fears of eating and drinking led to malnourishment, which impaired physical health. Additionally, fear of small groups was significantly related to worse mental health but not physical health. We also demonstrated a differential relationship between specific SAD symptoms and QOL. In particular, our findings suggest that experiencing panic attacks due to social anxiety and feeling very anxious/frightened for the entire duration of social situations were related to decreased physical well-being. These findings align with existing evidence suggesting that extended anxious arousal[36] and panic attacks[37] are associated with reduced physical functioning.

Several SAD symptoms were associated with poorer mental health. Panic attacks due to social anxiety, relationship interference caused by fear or avoidance, restriction in usual activities, or restriction of desired activities were all significantly associated with worse mental health. Given the decreased QOL associated with certain symptoms and feared situations, future work might elucidate whether SAD treatments that target these factors may improve functional outcomes for patients with SAD.

The cross-sectional nature of this study prevents drawing temporal or causal inferences about SAD comorbidity and factors related to QOL. Research employing longitudinal and experimental designs will be necessary to further explain these findings. Assessment methods also limit these findings: Only 3 PDs were assessed in this sample, so we are unable to control for the effects of other personality comorbidity, and the reliability of the AUDADIS-5 ($\kappa = 0.46$) was moderate. Further, the data were collected in 2012–2013, and these rates may have fluctuated since that time. Future epidemiologic studies of SAD should include more reliable assessments of psychiatric conditions including all PDs to evaluate and control for their comorbidity.

The present study has multiple clinical implications. Clinicians should be aware of the high degree of comorbidity of SAD with other disorders such as MDD, other anxiety disorders, and PDs. Further, the present study identified how specific symptoms may be related to physical QOL and mental health overall. Clinicians should be mindful of these associations and consider them as targets to improve overall QOL within these individuals.

Our findings provide detailed insight into how multiple psychiatric comorbidities may be related to SAD in the general US population across a wide range of diagnoses while controlling for other psychiatric comorbidities. This study also suggests that among those with past-year SAD, certain comorbidities (eg, PTSD, MDD, and BPD) may have unique relationships with mental health QOL. For the first time, to our knowledge, we also demonstrated that some specific SAD symptoms and situational fears may contribute significantly to reduced QOL. We hope that this study may inform novel epidemiologic work on psychiatric comorbidity, improve clinical care for those with SAD, and support future investigation of novel treatment targets for SAD.

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Supplementary Material

Article Title: Comorbidity and Quality of Life in *DSM-5* Social Anxiety Disorder Among a Nationally Representative Sample

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LIST OF SUPPLEMENTARY MATERIAL FOR THE ARTICLE

1. **Table 1** Summary of Baseline Associations of Demographic Variables

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Supplementary Table 1

Summary of baseline associations of demographic variables

Characteristics	*F or r*	
	Physical Quality of Life	Mental Health
Sex	0.35	10.99**
Male		
Female		
Race	1.51	1.52
White		
Black		
Native American/Alaskan Native		
Asian/Hawaiian/Pacific Islander		
Hispanic any Race		
Married	0.001	20.53**
Income	0.17**	0.16**
Education	0.24**	0.15**
Age	-0.31**	0.05

Note. F = ANOVA summary statistics. r = Pearson Correlation Coefficient.
*$p < .01$, **$p < .001$