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Perceived Social Support Mediates Anxiety and Depressive Symptom Changes Following Primary Care Intervention

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Abstract

Background—The current study tested whether perceived social support serves as a mediator of anxiety and depressive symptom change following evidence-based anxiety treatment in the primary care setting. Gender, age, and race were tested as moderators.

Methods—Data were obtained from 1004 adult patients (age $M=43$, $SD=13$; 71% female; 56% White, 20% Hispanic, 12% Black) who participated in a randomized effectiveness trial (CALM Study) comparing evidence-based intervention (cognitive-behavioral therapy and/or psychopharmacology) to usual care in the primary care setting. Patients were assessed with a battery of questionnaires at baseline, as well as at 6-, 12-, and 18-months following baseline. Measures utilized in the mediation analyses included the Abbreviated Medical Outcomes (MOS) Social Support Survey, the Brief Symptom Index (BSI) – Somatic and Anxiety subscales, and the Patient Health Questionnaire (PHQ-9).

Results—There was a mediating effect over time of perceived social support on symptom change following treatment, with stronger effects for 18-month depression than anxiety. None of the mediating pathways were moderated by gender, age, or race.

Conclusions—Perceived social support may be central to anxiety and depressive symptom changes over time with evidence-based intervention in the primary care setting. These findings possibly have important implications for development of anxiety interventions.

Keywords

anxiety; depression; social support; primary care; intervention studies

Cognitive and behavioral therapies and pharmacotherapies are well established as efficacious anxiety treatments. However, many patients remain symptomatic and do not achieve full remission. There is a need to move beyond analysis of outcome toward examination of *how* certain treatments (i.e., mechanisms) lead to change and *for whom* these changes occur (i.e., moderators).¹ A better understanding of these factors can inform which therapy components are catalysts for symptom change, facilitating shedding of unnecessary therapeutic strategies and enhancement of essential elements. To date, most evaluation of treatment mediation of cognitive behavioral therapy (CBT) has focused on the extent to which cognitions and beliefs around anxiety and depression mediate symptom change.² The current study takes a novel approach by examining perceived social support as a mediator of symptom change following evidence-based intervention for anxiety disorders.

Social support can be emotional (i.e., a resource who listens and validates), instrumental (i.e., practical support), informational (i.e., advice), companionate (i.e., people with whom to socialize), and feedback (i.e., feedback on the community's behavioral expectations).³ It is measured as perceived support, received support (i.e., how often supportive behaviors are received), and social integration (i.e., diversity/number of relationships). Perceived social support is the most commonly measured index of social support,⁴ given its ease of measurement and evidence that it is a better predictor of mental health and support utilization than other measures.^{5,6} The risk^{7–10} and protective effects^{11–15} of perceived social support on depression have been widely studied. Fewer studies have demonstrated these relations with anxiety as well, but the observed effects parallel the findings with depression.^{16–20}

Perceived social support changes following treatment, and it has been studied as a moderator of treatment.^{21–23} Poor social support at baseline reduces the effect of treatment for depression,^{24,25} and treatment responders for depression are more likely to have better social support at baseline than nonresponders.^{26,27} Finally, there is some evidence for bidirectional relationships between perceived social support and symptoms of anxiety and depression. Specifically, there is evidence that social support predicts depression and depression predicts social support.^{9,10,28,29} Less is known about the directionality of perceived social support and anxiety. Given that perceived social support is a malleable construct, it is conceivable that enhanced perceptions of social support during an intervention may result in larger symptom change. If treatments for anxiety disorders are mediated by changes in perceived social support (or vice versa), then identification of treatment strategies targeting social support may facilitate treatment efficacy.

The current study sought to assess these multidimensional changes over time in relation to treatment for anxiety. Using path analysis, we examined mediational effects of perceived social support on anxiety and depressive symptom changes in 1004 patients with anxiety disorders in primary care settings who were randomized to an evidence-based treatment of CBT and/or pharmacotherapy (CALM) or usual care for the treatment of anxiety disorders.³⁰ Primary outcome publications^{2,31} already reported that the evidence-based CALM intervention had greater effects on 12- and 18-month outcomes than did usual care. The current study seeks to add to this knowledge base by examining whether changes in perceived social support explain some of the change in anxiety and depressive symptoms

following evidence-based interventions compared to change that would normally occur in usual care. We hypothesized that the evidence-based intervention (compared to usual care) would have indirect effects on anxious and depressive outcomes via changes in social support over an 18-month period.

Gender, race, and age have been examined as moderators of the relationship between perceived social support and emotional symptoms.^{7,32–37} Minority status and perceived social support interact to predict depressive symptoms.^{36,38} Similarly, gender and perceived social support interact to predict depression, such that only among females does perceived social support predict the disorder.^{32,34} Findings regarding the interaction effect of age and perceived social support on depression and anxiety have been mixed.^{7,39} Given the importance of peers, it is expected that younger age groups would demonstrate the greatest effect of social support on depression and anxiety. On account of these findings, it was hypothesized that our mediating effects would be strongest among females, minorities, and younger age groups.

In sum, the primary goal of this study was to evaluate the degree to which perceived social support mediates anxious and depressive symptom changes following primary care intervention. We further explored moderators of the mediating pathways in order to establish for whom the mediating effects of perceived social support were strongest.

Methods

Participants

Participants were 1004 adults with diagnoses of panic, generalized anxiety, social anxiety, and/or posttraumatic stress disorder.^{31,40} They were referred by primary care physicians (PCPs) from 17 recruited clinics across four sites: Little Rock, San Diego, Seattle and Los Angeles County. Eligibility criteria were between the ages of 18–75, met diagnostic criteria for at least one of the aforementioned anxiety disorders, and scored at least an 8 on the Overall Anxiety Severity and Impairment Scale (OASIS).⁴¹ Ineligibility included ongoing CBT or psychiatric medication, limited fluency in English or Spanish, unstable medical conditions, marked cognitive impairment, active suicidal ideation, psychosis, bipolar I disorder, or substance abuse/dependence other than alcohol or marijuana abuse, all of which likely would limit the benefits patients would receive from the treatments. See Roy-Byrne et al.³¹ for a complete description.

1620 individuals consented to be screened for eligibility, of whom 1062 met criteria and 1036 signed treatment consent. Due to communication difficulties and dropout, 1004 participants were randomized. A remaining 804 participants completed all baseline, 6-month, 12-month, and 18-month questionnaires.³¹

Participants were 71% female and diverse (56% White, 20% Hispanic, 12% Black) with an average age of 43 (SD=13). The majority had received at least 12 years of education and had private insurance. Most patients were above the United States poverty line (91%) with a mean income of \$64,236 (SD=\$94,585). Approximately half had at least two chronic medical conditions. In terms of specific disorders, 75% met criteria for generalized anxiety

disorder, 65% for major depressive disorder, 47% for panic disorder, 40% for social phobia, and 18% for post-traumatic stress. The evidence-based CALM intervention and usual care groups did not differ in age, gender, race, education, number of medical conditions, level of insurance, or diagnosis.³¹

Design

Data were collected from a randomized clinical trial comparing two treatments in the primary care setting: Coordinated Anxiety Learning and Management (CALM) and usual care. The study was in compliance with all participating Institutional Review Boards, which required that all participants provide written informed consent prior to intervention and assessment onset. Referred participants were screened for eligibility by specially trained clinicians, Anxiety Clinical Specialists (ACS) and then randomized either to CALM or usual care. Randomization was conducted using an automated computer program at RAND and stratified by clinic and by presentation of major depressive disorder comorbidity.³¹ Participants were assessed four times at 6-month intervals (baseline, 6-, 12-, 18-month).

CALM—In the CALM intervention, participants chose between medication management, CBT or both. Thirty four percent of patients received CBT only, 9% received medication management, and 57% received both CBT and medication management.³¹ ACSs regularly had contact with PCPs.

CBT consisted of 8 modules (self-monitoring, psychoeducation, fear hierarchy, breathing retraining, relapse prevention, cognitive restructuring, exposure), some of which were tailored to the specific anxiety disorder that was the most distressing and disabling. The ACSs guided participants through CBT with the aid of the computer program, and when necessary, the ACSs would implement motivational interviewing for engagement or additional cognitive restructuring and behavioral activation for depressed mood.⁴²

PCPs prescribed medication. Initial use of SSRIs or SNRIs was emphasized, and if the patient presented with minimal or no improvement, for most cases another antidepressant was prescribed in addition or in place of the originally prescribed medication. ACSs provided medication adherence monitoring and counseling in caffeine/alcohol avoidance, sleep hygiene, and behavioral activities by phone and/or in person.

Usual care—PCPs provided the usual care that would be given to patients with anxiety disorders, such as no intervention, medication, counseling or referral to a mental health specialist.

Measures

A battery of measures was administered at 6-month intervals. Three measures that were used in the current data analysis are listed below.

Brief Symptom Index – Somatic and Anxiety subscales (BSI-18)⁴³—The BSI-18 is a self-report 18-item measure assessing anxiety and depressive symptoms. Items are rated on a 5-point Likert scale. Only the somatic and anxiety subscales were administered and

analyzed in the current analyses. This measure has demonstrated good psychometric properties⁴⁴ with excellent inter-item reliability in the current sample ($\alpha = .87$).

Patient Health Questionnaire – Depression subscale (PHQ-9)⁴⁵—The PHQ-9 is a 9-item self-report scale assessing depressive symptoms on a 4-point Likert scale based on DSM-IV diagnostic criteria. It demonstrated high levels of validity in the primary care setting⁴⁵ with excellent test-retest reliability.⁴⁶ The current study examined total scores of only the first 8 items, excluding a suicidality question. Items demonstrated excellent inter-item reliability in this sample ($\alpha = .85$).

The Medical Outcomes (MOS) Social Support Survey – Abbreviated⁴⁷—The abbreviated MOS Social Support survey is a 4-item measure assessing perceived social support. Items are rated on a 5-point Likert scale. Participants are asked how often each kind of support is available if needed. The four kinds of support are “someone to get together with for relaxation” (companionate support), “someone to help with daily chores if you were sick” (instrumental support), “someone to turn to for suggestions about how to deal with a personal problem” (informational support), and “someone to love and make you feel wanted” (emotional support). The original version was developed for patients in the MOS to be easily administered to medical care patients. The abbreviated version demonstrates good fit with the original version and good psychometric properties.⁴⁸ Of note, the current abbreviated MOS social support survey differs by one item from the abbreviated version utilized by Gjesfjeld et al.⁴⁸ While the current version assessed companionate support using the item “someone to get together with for relaxation”, Gjesfjeld et al.⁴⁸ instead included the following item: “someone to do something enjoyable with”. Both items are measures of companionate support. Items of the current measure demonstrated high inter-item reliability ($\alpha = .80$).

Data Analysis

Primary interest of the current study was to test significance of four indirect paths as part of a single mediation model: effect of evidence-based intervention on 18-month perceived social support via (1) anxiety and (2) depression, and effect of evidence-based intervention on 18-month anxiety (3) and depression (4) via perceived social support. If combined indirect effects were significant, follow-up specific indirect effects were estimated by calculating the product of direct path estimates (Table 1 and Figure 1).

The mediation model was developed as follows. All analyses included intervention (CALM=1, Usual Care=0) as the independent variable, social support as the mediating variable, and anxiety (BSI-12) and depression (PHQ-9) as the dependent variables. The proposed mediation model was tested via path analysis, which included analysis of 30 direct pathways and 12 covarying pathways entered into a single model. Each subsequent time point was regressed on the previous time point within each measure to assess stability or improvement of symptoms over time. For example, 12-month depression was regressed on 6-month depression, which was regressed on baseline depression. Remaining direct pathways included: (1) from intervention to all variables at subsequent time points, (2) from the mediator to outcomes at subsequent time points, and (3) from outcomes to the mediator

at subsequent time points (see Figure 1 for tested model). Pathways between mediator and outcomes, as well as pathways between outcomes, were covaried within time points. Baseline levels of perceived social support and depressive and anxious symptoms were included in the model as predictors and covariates. Fit indices were not of interest, because the current study sought to test indirect effects rather than overall fit of model.

Three moderation tests of each indirect pathway also were tested by comparing the indirect pathway of one group to another group: (1) males to females, (2) non-Latino Whites to all minority groups, and (3) lower age group (less than 50 years of age) to older age group (50 years of age or greater)¹. Direct pathways within variables and across time points were constrained (i.e., set as equal) between groups, given that we did not expect groups to differ on changes in depression, anxiety, and social support across time. Thus, only two of the remaining pathways within each indirect pathway were allowed to vary between groups in this analysis. Although stringent, this test is consistent with our hypothesized model.

Models were estimated using MPlus Version 6.12 with full information maximum likelihood (FIML) to address missing data (approximately 0% at baseline, 13% at 6-months, 19% at 12-months, and 20% at 18-months). FIML yields unbiased estimates both when the data are missing completely at random and missing at random.⁴⁹ To test the assumption that data were missing at random, we predicted when participants dropped out of the study using baseline variables theorized to be related to dropout (e.g., symptom severity levels, demographic variables). Because the distribution of indirect effects is known to be non-normal, significance tests of indirect effects were based on 95% bias-corrected bootstrap confidence intervals from 10,000 bootstrapped samples, which yields more accurate coverage and Type I error rates.³⁵ Effects are considered statistically significant if the confidence interval does not contain zero. Note, consistent with statistical methods of primary outcome publications,^{31,40} multi-level modeling was not conducted to account for potential clustering effects within site and clinic, given that estimates would not be stable with our small numbers of sites and clinics.

Results

Direct Effects

Significant direct effects are represented by bolded lines in Figure 1. All direct pathways within each variable across time points were significant, meaning that the depression, anxiety, and perceived social support were related to depression, anxiety, and perceived social support at previous and subsequent time points respectively.

The intervention had significant direct effects on 6- and 12-month anxiety and depression and 6-month social support. That is, the intervention (versus usual care) did not have significant direct effects on outcomes at the later time point of 18 months over and above 12-month scores on the outcomes.

¹A cut-off of 50 years of age was chosen to ensure that at least a quarter of the sample represented the older age group and given that prior studies have examined age ranges 50 and older to represent older adults (Strausbaugh, 2001)

Effects of social support on 6- and 12-month anxiety were significant, but none of the direct pathways from anxiety to subsequent perceived social support were statistically different from zero. All pathways between depression and perceived social support were significant. That is, relations between perceived social support and depression were bidirectional, whereas they were unidirectional between perceived social support and anxiety.

Indirect Effects

Three out of four combined indirect pathways were statistically significant from zero (Table 1). Only the indirect effect of intervention on 18-month perceived social support via anxiety was non-significant. These findings suggest that, relative to usual care, the evidence-based intervention led to changes in perceived social support, that in turn lead to subsequent changes in depression and anxiety. Similarly, the intervention led to changes in depression that in turn led to changes in perceived social support.

Ratio effects—Options for indirect effect sizes in this model are limited because (1) more than three variables are estimated in each pathway and (2) effects are conditionally estimated due to missing data. Ratios of indirect effects over the total effect (summation of eight possible pathways from the intervention to 18-month outcome) were calculated (Table 1). These ratios provide an estimate of the percentage of total effect accounted for by indirect effects of interest.² Indirect effects with depression accounted for the greatest percentages of the total effect.

Moderation

Moderation of each indirect pathway was tested with gender (male versus female), race (non-Latino White versus all minority groups), and age (younger versus older groups) as moderators using Wald tests. All but two tests were not significant, but these results also were nonsignificant after adjusting for multiple comparisons. Thus, gender, race, nor age moderated the mediating effects.

Discussion

This study examined the mediating effect of perceived social support on changes in depressive and anxiety symptoms following intervention for anxiety. Results suggest that changes in perceived social support mediate changes in subsequent depressive and anxious symptomatology 12- to 18-months following baseline of an evidence-based treatment for anxiety. These meditational changes were not the result of time alone or following any treatment given that these effects were stronger in the evidence-based intervention compared to usual care.

The current findings are consistent with prior studies that found direct predictive relations among variables.^{11,22} However, this is the first study to demonstrate that perceived social

²Because the total effects are the sum of all possible indirect and direct effects, if effects are of different signs, positive and negative effects can balance each other such that a specific indirect effect may exceed the size of the total effect. It is also possible to have negative values, if the specific indirect effect has a different sign than the total effect. In our case for each total effect, one specific indirect effect had an opposite sign, however, the effect was extremely small (all $ps > .40$) and made no substantive impact on the overall total effect. Therefore, we calculated the total effect as usual and proceeded with a standard interpretation.

support functions as a mediator of symptom improvement following evidence-based intervention for anxiety disorders. Most prior studies have examined social support as a moderator or outcome of treatment.^{22,25} Although informative in its own right, moderation and outcome analyses fail to capture the role of perceived social support as a potential change agent in treatments. Such knowledge can provide insight into whether additional treatment strategies that target perceived social support may enhance current evidence-based interventions.

Although these results highlight perceived social support as an agent of change, they do not suggest that social support is a treatment mechanism. We only can speculate potential mechanisms that account for change in our model. For example, given that the CALM intervention demonstrated larger symptom change compared to usual care,^{31,40} sizeable changes following the intervention may have led to greater self-efficacy that in turn led to stronger beliefs in ability to find support. Likewise, such sizeable changes may have led to a reduction in excessive reassurance seeking or decreased withdrawal, which may have led to increased perceived social support.

While perceived social support accounted for some treatment change, it did not account for all change nor was this expected. The current model is not meant to be comprehensive but rather informative about the role of social support in symptom change following intervention. Nevertheless, 11% of total change in 18-month depressive symptoms was due to changes in perceived social support, as was 9% of total change in 18-month anxious symptoms (reported as ratios in Table 1). These results are the first to suggest that perceived availability of global social support is associated with change in depression and anxiety over time following evidence-based intervention. Increases in support perception may arise from changes in resources or cognitions. Thus, strategies to change perception may include increasing recognition of already available resources, problem-solving around support generation, or developing more social skills that may lead to improvements in depressive and anxious symptomatology.

Prior studies suggest bidirectional relations between social support and depression but not anxiety.^{9,29} Similarly, depression but not anxiety was associated bidirectionally with social support in the current study. Perhaps increased perceptions of social support lead to increased self-efficacy and decreased avoidance, which in turn leads to decreased anxiety; however, such changes in anxiety may not generate perceptions of having more support.

The current study tested whether gender, race, and age moderated indirect pathways of our model. None of our moderation tests were significant. One possible explanation is insufficient power due to limited sample size. Indirect effects are difficult enough to detect in that they are the product of three pathways – all of which must at least be greater than zero; thus, moderation tests of this size are even more difficult to detect. In other words, tests of moderated mediation possibly warrant much larger samples than the current sample of 1004. Another possibility is that perception of perceived social support explains symptom change following evidence-based intervention irrespective of age, gender, and ethnicity.

Some limitations of the current study are worthy of note. First, our measure of social support was rudimentary, heterogeneous in content, and subjective, and therefore may not have adequately captured some of the complexity inherent in social support. Second, our comparison group represented a mixture of no treatment, various psychotherapies, or psychopharmacology. A preferred control may have been no treatment. Our evidence-based intervention group also was a mixture of CBT and/or pharmacology, such that conclusions about the mediational effects of each treatment alone on symptom change cannot be made. Third, although the current sample was relatively diverse in ethnicity, age, socioeconomic status, and clinical severity, the sample did not include individuals with current suicidality, bipolar disorder, psychosis, and substance abuse/dependence. Thus, the current results may be limited in the degree to which they can generalize to these types of clinical populations. Further, the current sample included only adults between the ages of 18–75, with the majority of participants below the age of 50. Therefore, the generality of these results to younger or older populations is unknown. However, a strength of the current study is the location of the treatment setting in that the current results likely generalize to most populations who visit their PCP.

The current study found a mediating effect over time of perceived social support on symptom change following evidence-based intervention for anxiety disorders. Thus, treatments for anxiety may benefit from specific efforts to increase perceived social support among other possibilities. Strategies may include family psychoeducation, interpersonal skill training, and environmental changes. None of our pathways were moderated by gender, age, or race, suggesting that perceived social support has an important role in evidence-based interventions for anxiety and depression for most patients.

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Figure 1. Direct effects. Significant tested paths are in full bolded lines and indicated with their b coefficients. Non-significant tested paths are in grey dotted lines. Covariances are indicated by pathways with a double arrow.

TABLE 1

Estimated indirect effects of 16 separate analyses, where b is the overall effect of intervention on outcome via mediating variables and ratios are the percentages of total effect accounted for by indirect effects

Mediating Variables	Dependent Variable	b	CI	Ratios
Combined indirect effects of intervention on outcome via mediating variables				
1. 6- and/or 12-mnth SS →	18-mnth ANX	-.15	(-.30, -.06)*	8.85%
2. 6- and/or 12-mnth SS →	18-mnth DEP	-.16	(-.28, -.08)*	10.51%
3. 6- and/or 12-mnth ANX →	18-mnth SS	.02	(-.07, .11)	2.27%
4. 6- and/or 12-mnth DEP →	18-mnth SS	.13	(.04, .25)*	16.27%
Specific indirect effects of intervention on outcome via mediating variables				
1. 6-mnth SS →	12-mnth SS → 18-mnth ANX	-.06	(-.15, .00)	3.51%
2. 6-mnth SS →	12-mnth ANX → 18-mnth ANX	-.10	(-.19, -.04)*	5.57%
3. 6-mnth ANX →	12-mnth SS → 18-mnth ANX	.00	(-.00, .02)	-.23%
4. 6-mnth SS →	12-mnth ANX → 18-mnth SS	-.00	(-.00, .02)	.5%
5. 6-mnth ANX →	12-mnth ANX → 18-mnth SS	.04	(-.02, .11)	4.67%
6. 6-mnth ANX →	12-mnth SS → 18-mnth SS	-.02	(-.10, .04)	-2.90%
7. 6-mnth SS →	12-mnth SS → 18-mnth DEP	-.09	(.17, -.04)*	5.75%
8. 6-mnth SS →	12-mnth DEP → 18-mnth DEP	-.06	(-.12, -.02)*	3.77%
9. 6-mnth DEP →	12-mnth SS → 18-mnth DEP	-.01	(-.04, -.00)	.99%
10. 6-mnth SS →	12-mnth DEP → 18-mnth SS	.01	(.00, .02)	.76%
11. 6-mnth DEP →	12-mnth DEP → 18-mnth SS	.06	(-.00, .15)	7.44%
12. 6-mnth DEP →	12-mnth SS → 18-mnth SS	.06	(.01, .15)*	8.07%

Note:

* $p < .05$.

CI=confidence interval. Mnth=month. SS=social support. ANX=anxiety. DEP=depression.