CLINICAL REVIEW

The Effectiveness of Problem-Solving Therapy for Primary Care Patients' Depressive and/or Anxiety Disorders: A Systematic Review and Meta-Analysis

Anao Zhang, MSW, LCSW, Sunyoung Park, MA, John E. Sullivan, MSW, and Shijie Jing, PhD

Background: **There is increasing demand for managing depressive and/or anxiety disorders among primary care patients. Problem-solving therapy (PST) is a brief evidence- and strength-based psychotherapy that has received increasing support for its effectiveness in managing depression and anxiety among primary care patients.**

Methods: **We conducted a systematic review and meta-analysis of clinical trials examining PST for patients with depression and/or anxiety in primary care as identified by searches for published literature across 6 databases and manual searching. A weighted average of treatment effect size estimates per study was used for meta-analysis and moderator analysis.**

Results: **From an initial pool of 153 primary studies, 11 studies (with 2072 participants) met inclusion criteria for synthesis. PST reported an overall significant treatment effect for primary care depression and/or anxiety ($d = 0.673$; $P < .001$). Participants' age and sex moderated treatment effects. Physician-involved PST in primary care, despite a significantly smaller treatment effect size than mental health provider only PST, reported an overall statistically significant effect ($d = 0.35$; $P = .029$).**

Conclusions: **Results from the study supported PST's effectiveness for primary care depression and/or anxiety. Our preliminary results also indicated that physician-involved PST offers meaningful improvements for primary care patients' depression and/or anxiety. (J Am Board Fam Med 2018;31: 139–150.)**

Keywords: **Anxiety Disorders, Depressive Disorder, Mental Health, Primary Health Care, Problem Solving, Psychotherapy**

Depressive and anxiety disorders are the 2 leading global causes of all nonfatal burden of disease[1] and the most prevalent mental disorders in the US primary care system.[2–4] The proportion of primary care patients with a probable depressive and/or anxiety disorder ranges from 33% to 80%[2,5,6]; primary care patients also have alarmingly high levels of co-/multi-morbidity of depressive, anxiety, and physical disorders.[7] Depression and anxiety among primary care patients contribute to: poor compliance with medical advice and treatment[8]; deficits in patient–provider communication[9]; reduced patient engagement in healthy behaviors[10]; and decreased physical wellbeing.[11,12] Given the high prevalence of primary care depression and anxiety, and their detrimental effects on the qualities of primary care treatments and patients' wellbeing, it is important to identify effective interventions suitable to address primary care depression and anxiety.

Primary care patients with depression and/or anxiety are often referred out to specialty mental health care.[13,14] However, outcomes from these

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From the Steve Hicks School of Social Work, University of Texas at Austin, Austin, TX (AZ, JES); Quantitative Methods Program, College of Education, The University of Texas at Austin, Austin, TX (SP); School of Social Development, East China University of Political Science and Law, Shanghai, China (SJ).
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Ethics Review: This is a systematic review and meta-analysis based on de-identified aggregate study data. No human participants or animals were involved in this study. No ethics review was required.
Corresponding author: Anao Zhang, MSW, LCSW, The University of Texas at Austin, 1925 San Jacinto Blvd., Austin, TX, 78712 (E-mail: zhanganao@utexas.edu).

referrals are usually poor due to patients' poor adherence and their resistance to mental health treatment[15,16]. Therefore, it is critical to identify effective mental health interventions that can be delivered in primary care for patients' depression and/or anxiety.[17,18] During the past decade, a plethora of clinical trials have investigated different mental health interventions for depression and anxiety delivered in primary care. One of the most promising interventions that has received increasing support for managing depression and anxiety in primary care is Problem-Solving Therapy (PST).

PST

Holding that difficulties with problem solving make people more susceptible to depression, PST is a nonpharmacological, competence-based intervention that involves a step-by-step approach to constructive problem solving.[19,20] Developed from cognitive-behavioral-therapy, PST is a short-term psychotherapy approach delivered individually or in group settings. The generic PST manual[19] contains 14 training modules that guides PST providers working with patients from establishing a therapeutic relationship to identifying and understanding patient-prioritized problems; from building problem-solving skills to eventually solving the problems. Focused on patient problems in the here-and-now, a typical PST treatment course ranges from 7 to 14 sessions and can be delivered by various health care professionals such as physicians, clinical social workers or nurse practitioners. Because the generic PST manual outlines the treatment formula in detail, providers may deliver PST after receiving 1 month of training. For example, 1 feasibility study on training residents in PST found that residents can provide fidelious PST after 7 weeks' training and reach moderate to high competence after 3 years of practicing PST.[21] PST also has a self-help manual available to clients when needed.

PST is a well-established, evidence-based intervention for depression in specialty mental health care and is receiving greater recognition for its effectiveness in treating depression and anxiety in primary care. Systematic and meta-analytic reviews of PST for depression consistently reported moderate to large treatment effects, ranging from d = 0.4 to d = 1.15.[22–24] Several clinical trials indicated PST's clinical effectiveness in alleviating anxiety as well.[25,26] Most importantly, PST has been adapted for primary care settings (PST-PC) and can be delivered by a variety of health care providers with fewer number of sessions and shorter session length. These unique features make PST(-PC) an ideal psychotherapy for depressive and/or anxiety disorders in primary care.

Previous reviews of PST focused on its effectiveness for depression care, but with little attention to PST's effect on anxiety or comorbid depression anxiety. In addition, to our knowledge, no previous reviews of PST have focused on managing depressive and/or anxiety disorders in primary care. Although research demonstrates that PST has a strong evidence base for treating depression and/or anxiety in specialty mental health care settings, more research is needed to determine whether PST remains effective for treating depressive and/or anxiety disorders when delivered in primary care. To address this gap, we conducted a systematic review and meta-analysis on the effectiveness of PST for treating depressive and/or anxiety disorders with primary care patients.

Methods

Search Strategies

This review included searches in 6 electronic databases (Academic Search Complete, CINAHL, Medline, PsychINFO, PUBMED, and the Cochrane Library/Database) and 3 professional Web sites (Academy of Cognitive Therapy, IMPACT, Anxiety and Depression Association of America) for primary care depression and anxiety studies published between January 1900 and September 2016. We also E-mailed major authors of PST studies for feedback and input. Search terms of title and/or abstract searches included: ["PST" or "Problem-Solving Therapy" or "Problem Solving Therapy" or "Problem Solving"] AND ["Depression" or "Depressive" or "Anxiety" or "Panic" or "Phobia"] AND ["primarycare" or "primary care" or "PCP" or "Family Medicine" or "Family Doctor"]. We supplemented the procedure described above with a manual search of study references.

Eligibility Criteria

For inclusion in analyses, a study needed to be 1) a randomized-controlled-trial of 2) PST for 3) primary care patients' 4) depressive and/or anxiety disorders. For studies that examined face-to-face, in-person PST, the intervention must be delivered

in primary care for inclusion. If studies examined tele-PST (eg, telephone delivery, video conferencing, computer-based), the intervention must be connected to patients' primary care services for a study to be included. For example, when a primary care physician prescribed computer-based PST at home for their patients, the study met inclusion criteria (as it was still considered managing depression "in primary care" in the present review). However, studies would be excluded if a primary care physician referred patients to an external mental health intervention. Finally, studies must document and report sufficient statistical information for calculating effect size for inclusion in the final analysis.

Data Abstraction and Coding

Two authors (AZ and JES) reviewed an initial pool of 153 studies and agreed to remove 65 studies based on title and 68 studies based on abstract, resulting in 20 studies for full-text review. To develop the final list, we excluded 6 studies after closer review of full-text and consultation with a third reviewer who is an established PST researcher. Lastly, we excluded 2 studies due to 1) a study with a design that blurred the effect of PST with other treatments and 2) unsuccessful contact with a study author to request data needed for calculating effect size. We used a final sample of 11 studies for meta-analysis. The PRISMA chart is presented in Figure 1.

Statistical Analysis

This study conducted meta-analysis with the following procedures: 1) calculated a weighted average of effect size estimates per study for depression and anxiety separately (to ensure independence)[27]; 2) synthesized an overall treatment effect estimate using fixed- or random-effects model based on a heterogeneity statistic (Q-statistic)[28]; and 3) per-

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) chart of literature search for Problem-solving therapy (PST) studies for treating primary care patients' depression and/or anxiety.

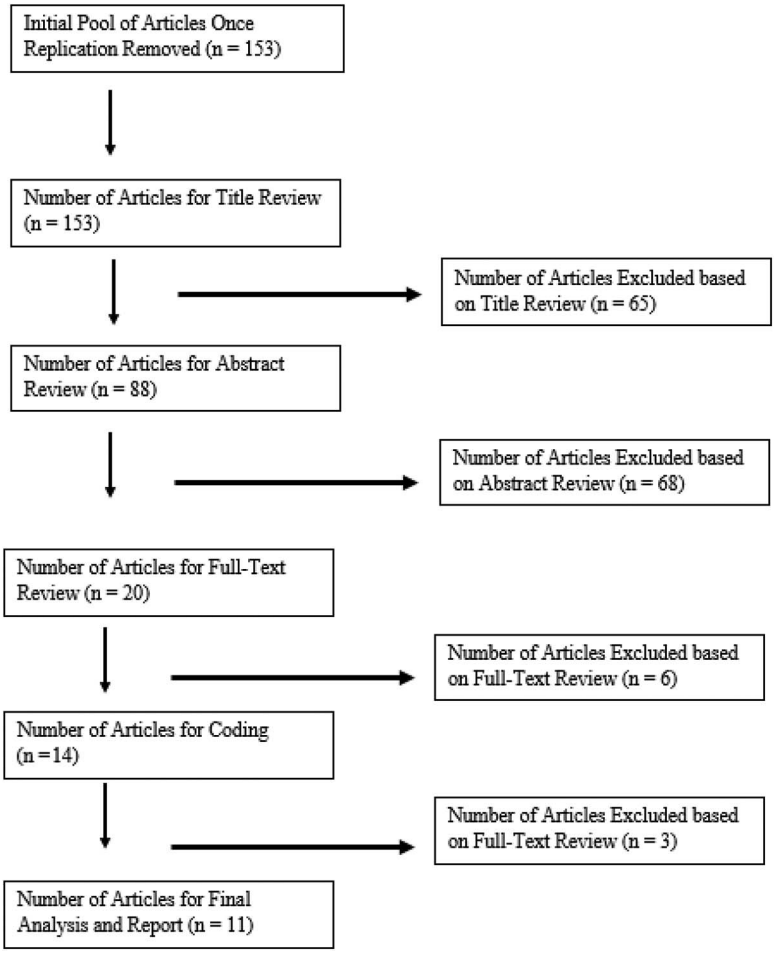


Table 1. Study Characteristics for Problem-Solving Therapy as Intervention for Treating Depression and/or Anxiety Among Primary Care Patients (n = 11)

Author	Sample*	Demographics†	Control‡	Provider and PCP's role in PST (if applicable)	PST/PST-PC Dosage	Diagnostic or Symptom Severity Criteria	Depression and/or Outcome Measures
Barrett et al. (2001)	T = 80 C1 = 80 C2 = 81§	44.1 year old (SD NR), 36.1% male, 90% white.	MED Placebo	Ph.D-level psychologists. PCP no involvement	6 PST-PC sessions, lasting about 1 hour for the first visit and 30 minutes for subsequent visits.	DSM-III-R, HDRS, PRIME-MD	HSCL-D-20 HDRS
Chibanda et al. (2014)	T = 30 C = 28	24.5 years old (SD = 4.9) % male NR Race NR	MED	Trained Peer Counselor. PCP no involvement	12 sessions (60 mins per session) group PST session which were modeled after a 7-step management plan for depression published earlier (Abbas et al., 1994)	DSM-IV	EPDS
Katon et al. (2004)	T = 164 C = 165	58.3 years old (SD = 12), 35% male, 75.4% white.	TAU	Registered nurses in collaboration with the PCP	Medication OR PST-PC, there is a stepped-care algorithm¶	PHQ-9 Did not require diagnostic criteria	SCL-90 depression
Lam et al. (2009)	T = 149 C = 150	71.8 years old (SD = 7.0) 43.14% male, Race NR	AC‖	Primary care physicians	3 sessions of modified PST-PC (Mynors-Wallis et al., 2000), first session 30 to 45 minutes. session 2 & 3 20 to 30 minutes.	HADS score	HADS (AS), HADS (DS) SF-36 mental
Lynch et al. (2004)	T = 9 C1 = 9 C2 = 13	38.5 years old (SD = 13.7), 17% male Race NR	AC** TAU	Registered nurses. PCP referral, no other involvement	6 sessions of telephone-based PST (adopted Nezu, Nezu, & Perri, 1989)	PRIME-MD HRSD	PRIME-MD, HRSD BDI, DHP-D-A
McCusker et al. (2008).	T = 36 C = 32	73.3 years old (SD = 8.6), 33.8% male Race NR	TAU	Depression care practitioner supervised by (and in collaboration with) PCP	4 sessions PST intervention (60-minute first session, 30 mins for the rest) developed based on IMPACT	PHQ-2	SCL-20, SF-12 SCID
Mynors-Wallis et al. (2000)	T1 = 80 T2 = 35 C = 36	35 years old (SD = NR), 23% male, 95% white	MED	General practitioner Nurse and General Practitioner (PCP)	6 sessions PST-PC, with first session 1 hr, others 30 minutes	RDC HDRS score	HDRS BDI-I
Oxman et al. (2008)	T = 72 C = 69	55.2 years old (SD = 16), 41.8% male, 96.5% white	TAU	Masters level counselor. PCP referral, no other involvement	6 sessions PST-PC, with first session 1 hr, others 30 minutes	DSM-IV, HAM-D, PRIME-MD	HAM-D, MADRS HSCL-D-20
Reynolds et al. (2014)	T = 125 C = 122	36.5 years old (SD = 10.9) 28.7% male 62.3% white	TAU	Social workers and mental health nurses PCP referral, no other involvement	6 to 8 sessions PST-PC, with first session 1 hr, the rest 30 minutes	CES-D, DSM-IV; MMSS	SCID/DSM-IV; BDI, SF-12 CIRSG, BSI - Anxiety
Schmaling et al. (2002)	T = 31†† C1 = 31 C2 = 30	42.8 years old (SD = 10.7) 39.1% male 88.0% white	MED Placebo	Trained therapists with no further specification PCP referral, no other involvement	6 sessions PST-PC, with first session 1 hr, others 30 minutes	DSM-III-TR PRIME-MD, HRSC	HAM-D (17-item) HSCL-D (20-item)

Continued

Table 1. Continued

Author	Sample*	Demographics†	Control‡	Provider and PCP's role in PST (if applicable)	PST/PST-PC Dosage	Diagnostic or Symptom Severity Criteria	Depression and/or Outcome Measures
Williams et al. (2000)	T = 138 C1 = 137 C2 = 140	71 years old (SD = 7.0), 58.5% male, 78.2% white	MED Placebo	PhD Psychologists, Social workers, and Psychology Counselors PCP no involvement	6 sessions PST-PC, with first session 1 hr, others 30 minutes	DSM-III-R, HDRS DSM-IV, PRIME-MD	HSCL-D-20 HDRS

*Sample size: T, treatment; T_2, treatment 2 if applicable; C, control.
†Demographic: NR, not reported.
‡Control: TAU, treatment as usual, W/NT, waitlist or no treatment; MED, medication; Placebo, placebo medication.
§C1, medication paroxetine; C2, Placebo.
¶Participants in the treatment group (68.7%) received PST. Therefore, the authors believed the effect of intervention can be attributed to PST. Because sensitivity analysis that excluded this study did not alter the overall treatment effect, we included and presented this study in final analysis.
‖AC, active control (health education video).
**Active control (stress management).
††Specific breakdown of the numbers was not reported in article, thus assigned arbitrarily.
BSI, Brief Symptoms Inventory; CES-D, Center for Epidemiology Scale–Depression; DCS = depression care specialist; DFD; depression-free days; DHP-D-A, Duke Health Profile-Depression–Anxiety; EPDS, 10-item Edinburgh Postnatal Depression Scale; HAM-D, Hamilton Rating Scale for Depression; HADS, Hospital Anxiety and Depression Scale; HDRS, Hamilton Depression Rating Scale; HRSD, Hamilton Rating Scale for Depression; HSCL-D-20, Hopkins Depression self-report scale; MADRS, Montgomery-Åsberg Depression Rating Scale; MED, Medication Management; PCP, Primary Care Physician; PHQ-2, Patient Health Questionnaire, 2-item; PHQ-9, Patient Health Questionnaire, 9-item; PRIME-MD, Primary Care Evaluation of Mental Disorders; RDC, Research Diagnostic Criteria; SCL-20, Hopkins depression symptom checklist; SCL-90 depression, Hopkins Symptom Checklist—90 depression questions; SCID/DSM-IV, Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II); SF-12, SF-36 Health Survey 12-item version; TAU, Treatment as Usual; CIRSG, Cumulative Illness Rating Scale for Geriatrics.
Abbas M, Broadhead JC, Mbape P, Khumalo-Sakatukwa G. Defeating depression in the developing word: A Zimbabwean model. *Br J Psychiatry* 164(3):293–296.
Mynors-Wallis LM, Gath DH, Day A, Baker F. Randomised controlled trial of problem solving treatment, antidepressant medication, and combined treatment for major depression in primary care. *BMJ* 320:26–30.
Nezu A, Nezu C, Perri M. *Problem-solving therapy for depression*. New York: Wiley; 1989.

formed univariate meta-regression with a mixed-effects model for moderator analysis.[29] Although other more advanced statistical approaches allow inclusion of multiple treatment effect size estimates per study for data synthesis, like the Generalized Least Squares method[30] or the Robust Variance Estimation method[31], this study employed a typical approach because of the relatively small sample and absence of study information required to conduct more advanced methods. Following procedures outlined by Cooper and colleagues[32], we conducted all analyses with R software.[33] We chose to conduct analyses in R, rather than software specific to meta-analysis (eg, RevMan), because R allowed for more flexibility in statistical modeling (eg, small sample size correction).[34] Sensitivity analysis using Robust Variance Estimation did not significantly alter results estimated with the typical approach. And so this study presents results from only the typical approach for purposes of parsimony and clarity.

Publication Bias, Risk of Bias and Quality of Studies

To detect publication bias, we used a funnel plot of effect size estimates graphed against their standard errors for visual investigation. To evaluate risk of bias, we used the Cochrane Collaboration's tool for assessing risk of bias in randomized trials[35] and the Quality Assessment of Controlled Intervention Studies to evaluate study quality.[36]

Results

Primary Studies

Eleven PST studies for primary care depression and/or anxiety reported a total sample size of 2072 participants. Participants' age averaged 50.1 and ranged from 24.5 to 71.8 years old. Ten studies reported participants' sex with an average of 35.6% male participants across all studies. Seven studies (63.6%) reported participants' racial background with

most identified as non-Hispanic white (83.6%). Other racial/ethnic groups were poorly reported for meaningful summary. Five studies used active medication as a comparison, including 3 studies that used both active medication and placebo medication. The rest compared PST with treatment-as-usual while 2 studies used active control group (eg, video education material). Four studies involved physicians in some component of intervention delivery. PCPs provided PST in 2 studies; supervised and collaborated with depression care manager in 1 study, and collaborated with a primary care nurse in another. Ten studies reported an average of 6 PST sessions ($M = 6.1$) ranging from 3 to 12 sessions. All but 1 study (n = 10) used individual PST and 2 studies used tele-health modalities to provide PST. All studies used standardized measures of depression and anxiety. Examples of the most common measures included: PHQ-9, CES-D, HAM-D, and BDI-II. Table 1 presents a detailed description of study characteristics.

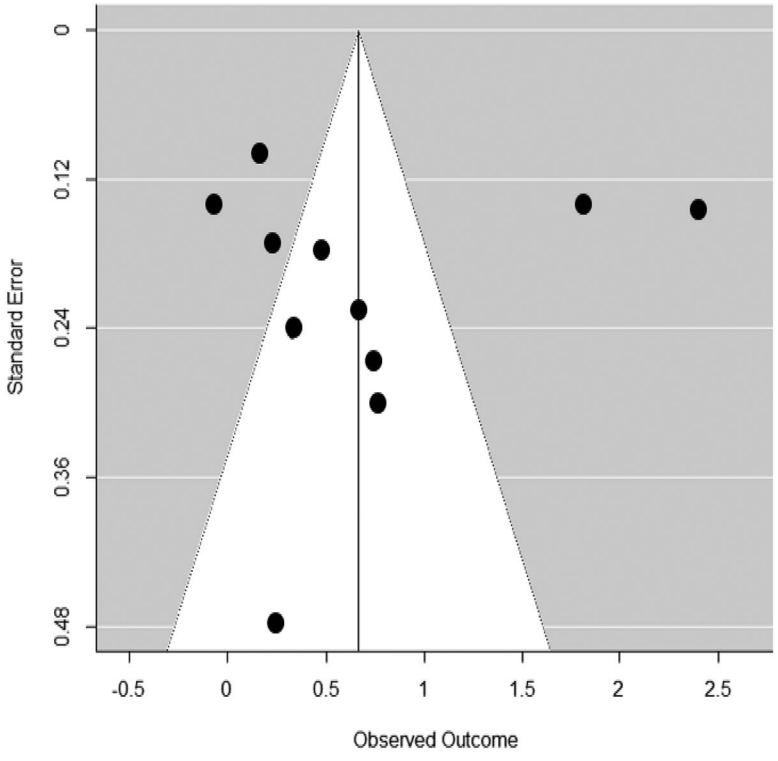
Publication Bias, Risk of Bias, and Quality of Studies

The funnel plot (Figure 2) did not indicate any clear sign of publication bias. Risk of bias (Table 4) indicated an overall acceptable risk across studies included for review with blinding of participants and personnel, blinding of outcome assessment and incomplete outcome data most vulnerable to risk of bias. Quality of study assessment (Table 5) indicated an overall satisfactory study quality with over half of studies (n = 6) achieving ratings of "Good" study quality.

Meta-analysis and moderator analysis

Figure 3 presents a forest plot of treatment effects per study, including depression and anxiety measures. Table 3 presents subgroup analysis of overall treatment effect by moderator and Table 2 presents the results of meta-analysis and moderator analysis. Meta-analysis revealed an overall significant treatment effect of PST for primary care depression and/or anxiety ($d = 0.67$; $P < .001$). Further investigation revealed no significant difference between the mean treatment effect of PST for depression versus anxiety in primary care ($d(diff.) = -0.25$; $P = .317$) while subgroup analysis revealed the overall treatment effect for anxiety was not significant ($d = 0.35$; $P = .226$). Age was found to be a significant moderator ($\beta_1 = 0.02$; $P = .012$) for

Figure 2. Funnel Plot for Publication Bias in Problem-solving therapy (PST) Studies for Treating Primary Care Patients' Depression an/or Anxiety.



treatment outcomes, indicating that for each unit increase in participants' age, the overall treatment effect for primary are depression and/or anxiety are expected to increase by 0.02 (standard deviations). Neither participants' ethnic or racial backgrounds nor marital status significantly moderated the overall treatment outcome.

The overall treatment effect was not moderated by any treatment characteristics including: treatment modality (individual vs group PST), delivery methods (face-to-face vs tele-health PST), number of PST sessions and length of individual PST sessions. Subgroup analysis indicated an overall significant treatment effect of in-person PST ($d = 0.72$; $P < .001$) but not of tele-PST ($d = 0.53$; $P = .097$). However, the difference between the 2 was not statistically significant.

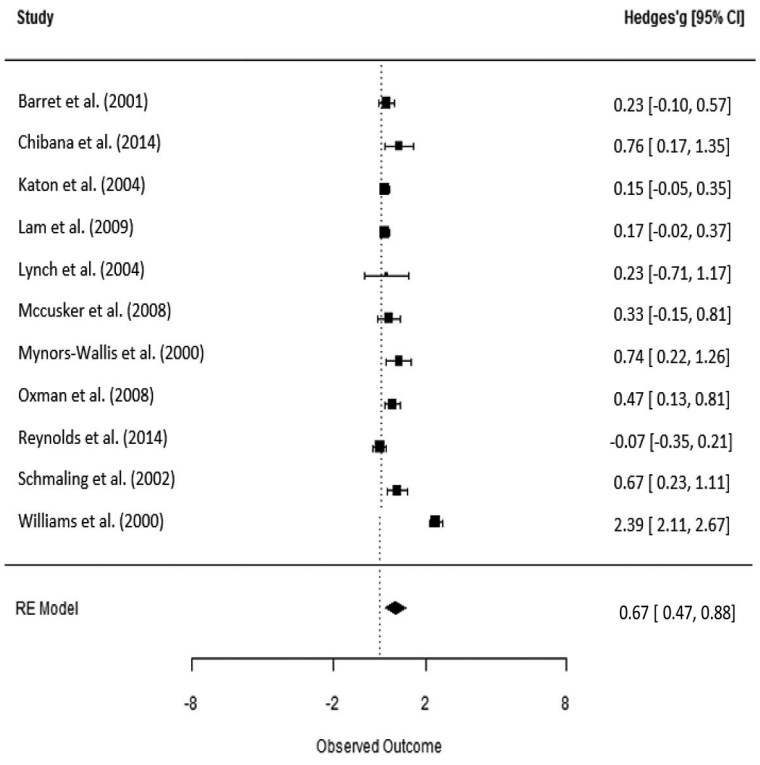
PST providers background and primary care physician's involvement significantly moderated the overall treatment effect size. Master's-level providers reported an overall treatment effect ($d = 1.57$; $P < .001$) significantly higher than doctoral-level providers ($d = -1.33$; $P = .007$). Both physician-involved and nonphysician involved PST reported significant overall treatment effect of PST for depression and/or anxiety in primary care ($d = 1.06$; $P < .001$ and $d = 0.35$; $P = .029$, respectively). Moderator analysis further revealed that PST without physician involvement reported significantly greater treatment effects compared with physician-involved PST in primary care ($d = -0.71$; $P = .005$). Results of subgroup and moderator analyses indicated that while the difference (in treatment effect) between physician and nonphysi-

Table 2. PST for Treating Primary Care Patients' Depression and/or Anxiety; Results of Univariate Meta-regression

Parameter*	Estimate	95%CI	t (*df*)	*P* Value
Overall Effect (β_0)	0.673	0.467 to 0.879	$z = 6.41$	**.000**
Depression (β_0)	0.601	0.224 to 0.978	t (11) = 3.12	**.007**
Anxiety (β_1)	−0.249	−1.015 to 0.516	t (11) = −0.64	.317
Age† (β_0)	0.696	0.477 to 0.915	t (10) = 6.23	**.000**
Age (β_1)	0.020	0.007 to 0.033	t (10) = 2.97	**.012**
% Male (β_0)	−1.408	−2.161 to −0.655	t (10) = −3.66	**.004**
% Male (β_1)	0.053	0.035 to 0.071	t (10) = 5.63	**.000**
% White (β_0)	0.741	−0.030 to 1.511	t (7) = 1.88	.075
% White (β_1)	0.001	−0.009 to 0.011	t (7) = 0.14	.381
% Married (β_0)	0.398	0.066 to 0.729	t (5) = 2.35	**.041**
% Married (β_1)	0.007	−0.013 to 0.026	t (5) = 0.66	.296
Individual (β_0)	0.668	0.455 to 0.880	t (11) = 6.16	**.000**
Group (β_1)	0.092	−0.769 to 0.954	t (11) = 0.21	.381
Family (β_2)	—		—	—
In-person (β_0)	0.722	0.494 to 0.950	t (10) = 6.22	**.000**
Tele-health (β_1)	−0.189	−0.846 to 0.469	t (10) = −0.56	.328
Combined (β_2)	—		—	—
Session No. (β_0)	0.465	−0.213 to 1.142	t (11) = 1.34	.157
Session No. (β_1)	0.035	−0.074 to 0.144	t (11) = 0.63	.315
Min per session (β_0)	−0.005	−1.443 to 1.433	t (10) = −0.01	.389
Min per session (β_1)	0.017	−0.018 to 0.052	t (10) = 0.96	.241
Master Level (β_0)	1.569	1.181 to 1.957	t (9) = 7.92	**.000**
Doctoral Level (β_1)	−1.334	−2.112 to −0.557	t (9) = −3.36	**.007**
Multi-Discipline (β_2)	−1.280	−1.757 to −0.802	t (9) = −5.26	**.000**
No Physician (β_0)	1.058	0.755 to 1.362	t (11) = 6.83	**.000**
Yes Physician (β_1)	−0.711	−1.124 to −0.298	t (11) = −3.38	**.005**

*β_0 should be interpreted as an intercept in a regression, that is the overall average (effect size) of the reference group. β_1 should be interpreted as a regression coefficient in a regression, that is the difference (in effect size) between the reference group and the predicting group, noted as *d(diff.)* in the text for categorical variable (moderator). For cells with no numeric value, it was either because of missing data or not enough variation for a statistical estimate to be calculated.
†Participant age was mean-centered.
PST, problem-solving therapy.

Figure 3. Forest Plot of PST Treatment Effect Size Estimates for Treating Primary Care Patients' Depression and/or Anxiety per Study.



cian involved PST in primary care were statistically significant, physician-involved PST was also statistically significant, thus practically meaningful.

Discussion

Results of the study demonstrated a statistically significant overall treatment effect in outcomes of depression and/or anxiety for primary care patients receiving PST compared with patients in control groups. The outcome type—depression versus anxiety—failed to moderate treatment effect; only PST for depression reported a significant overall effect size. This could indicate that many studies primarily targeted depression and included anxiety measures as secondary outcomes. For this reason, we expect to find a greater treatment effect for primary care depression. It was unsurprising that treatment characteristics failed to moderate treatment effect size because most primary studies used PST-PC or its modified version; there was insufficient variation between studies (and moderators), yielding insignificant moderating coefficients.

Although delivery method did not moderate treatment effect reported in studies included in this review, significant effect was only reported by studies using face-to-face in-person PST but not by those with tele-PST modalities (n = 2). Although evidence for the effectiveness of tele-PST is established or increasing in a variety of settings[37–39] most PST studies for primary care patients have used face-to-face, in-person PST. Our study further supported the use of face-to-face in-person PST for treating depression and anxiety among primary care patients. We recognize, however, that current and projected shortages in specialty mental health care provision, felt acutely in subspecialties such as geriatric mental health, necessitate more trials with PST tele-health modalities.[40]

It is salient to note that, while nonphysician-involved PST studies reported significantly greater treatment effect than those involving physicians, PCP-involved studies also reported an overall significant effect size. Closer examination indicated that studies with physician-involved PST were either delivered by physicians or other nonmental health professionals (eg, registered nurses or depression care managers). Lack of sufficient PST training might explain the difference in treatment

Table 3. Results of Subgroup Analysis of Overall Treatment Effect (by Moderator) of PST for Treating Primary Care Patients' Depression and/or Anxiety

Parameter	Estimate	95% CI	t (*df*)	*P* Value
Depression	0.601	0.224 to 0.978	t (11) = 3.12	**.007**
Anxiety	0.352	−0.314 to 1.018	t (16) = 1.04	.226
Individual	0.668	0.455 to 0.880	t (11) = 6.16	**.000**
Group	0.760	−0.075 to 1.595	t (12) = 1.78	.085
Family	—	—	—	—
In-person	0.722	0.494 to 0.950	t (10) = 6.22	**.000**
Tele-health	0.533	−0.083 to 1.150	t (11) = 1.70	.097
Combined	—	—	—	—
Master level	1.569	1.181 to 1.957	t (9) = 7.92	**.000**
Doctoral level	0.235	−0.439 to 0.909	t (11) = 0.68	.304
Multi-discipline	0.290	−0.012 to 0.567	t (11) = 2.04	.056
Physician not involved	1.058	0.755 to 1.362	t (11) = 6.83	**.000**
Physician involved	0.347	0.068 to 0.627	t (12) = 2.43	**.029**

For cells with no numeric value, it was either because of missing data or not enough variation for a statistical estimate to be calculated.
CI, confidential interval; PST, problem-solving therapy.

effect sizes being statistically significant. Yet, the fact that physician-involved PST studies reported an overall statistically significant effect size for primary care depression and/or anxiety suggested a meaningful treatment effect for clinical practice. When faced with a shortage of mental health professionals (eg, psychologists, clinical social workers, licensed professional counselors), our findings suggest physician-led or -supervised PST interventions could still improve primary care patients' depression and/or anxiety. Researchers are encouraged to further examine the treatment effect of PST delivered by mental

Table 4. PST for Treating Primary Care Patients' Depression and/or Anxiety; Results of the Cochrane Collaboration's Tool for Assessing Risk of Bias*

Study/Year	Random Sequence Generation	Allocation Concealment	Blinding of Participants and Personnel	Blinding of Outcome Assessment	Incomplete Outcome Data	Selective Reporting	Other Source of Bias
Barrett et al. (2001)	+	+	?	?	?	+	+
Chibanda et al. (2014)	+	?	?	?	?	+	?
Katon et al. (2004)	+	+	−	+	?	+	−
Lam et al. (2009)	+	+	+	?	?	+	+
Lynch et al. (2004)	?	?	?	?	?	?	?
McCusker et al. (2008)	+	+	?	?	?	+	+
Mynors-Wallis et al. (2000)	−	+	+	?	?	?	?
Oxman et al. (2008)	+	?	−	?	?	+	?
Reynolds et al. (2014)	+	+	+	+	+	+	+
Schmaling et al. (2002)	+	?	−	−	?	?	+
Williams et al. (2000)	+	+	?	?	?	?	+
Number of "+"*s*	9	7	3	2	1	7	6

*"+" = criteria were met in primary studies, thus no bias present; "?" = unclear whether or not criteria met from reading of primary studies; and "−" = criteria were not met in primary studies, thus bias present.

Table 5. Quality Assessment of Controlled PST Intervention Studies for Primary Care Patients' Depression and/or Anxiety ($n=11$)

Study/Year	Good	Fair	Poor
Barrett et al. (2001)[41]	✓		
Chibanda et al. (2014)[42]		✓	
Katon et al. (2004)[43]	✓		
Lam et al. (2009)[44]	✓		
Lynch et al. (2004)[45]		✓	
Mccusker et al. (2008)[46]	✓		
Mynors-Wallis et al. (2000)[47]		✓	
Oxman et al. (2008)[48]		✓	
Reynolds et al. (2014)[49]	✓		
Schmaling et al. (2002)[50]		✓	
Williams et al. (2000)[51]	✓		

health professionals in collaboration with primary care physicians.

Limitation

This study has several weaknesses that are inherent to meta-analyses. There is no way to assure we included all studies despite adopting a comprehensive search and coding strategy (ie, file drawer problem). Second, while all studies in this meta-analysis seemed to have satisfactory methodological rigor, it is possible that internal biases within some studies may influence results. This study takes a quantitative meta-analysis approach which inherently neglects other study designs and methodologies that also provide valuable information about the effectiveness, feasibility, and acceptability of PST for treating primary care patients with depression. To ensure independence of data, this study used a weighted average of effect size estimates per study in synthesizing an overall treatment effect and conducting moderator analysis. While sensitivity analysis did not reveal significant differences from the reported results, we will not know for sure how our choice of statistical method might affect the results.

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