

Supplemental Results

Supplemental Table 1. Group Characteristics

	Self-Selected Therapists	Matched Therapists
Distinct		
Patients	13,305 [1,664 used both]	12,662 [1,664 used both]
Providers	5,130	2,111
Patient-Provider Pairs	16,225	12,885
Accessing Medication Management	21.4%	18.7%
Baseline PHQ9 (given positive screen)		
Mean (SD)	15.5 (4.38)	15.3 (4.24)
Median [Min, Max]	15.0 [10.0, 27.0]	15.0 [10.0, 27.0]
Missing	20.4%	20.2%
PHQ9 baseline acuity		
high	40.8%	39.9%
medium	38.9%	40.0%
medium_low	16.7%	16.7%
low	3.6%	3.5%
Baseline GAD7 (given positive screen)		
Mean (SD)	14.6 (3.34)	14.5 (3.30)
Median [Min, Max]	14.0 [10.0, 21.0]	14.0 [10.0, 21.0]
Missing (i.e. no anxiety diagnosis)	23.0%	23.9%
GAD7 baseline acuity		
high	36.2%	35.3%
medium	40.8%	40.8%
medium_low	17.6%	18.4%
low	5.4%	5.5%
Baseline GAD7 (given positive and PTSD screen)		
Mean (SD)	15.2 (3.40)	15.1 (3.36)

Median [Min, Max]	15.0 [10.0, 21.0]	15.0 [10.0, 21.0]
Missing (i.e. no PTSD diagnosis)	56.2%	55.5%

Supplemental Table 2. Components of Patient-Provider Fit

<i>Predictors</i>	<i>Odds Ratios</i>	Reliable Change	
		<i>CI</i>	<i>p</i>
(Intercept)	0.912	0.888 – 0.937	<0.001
selection method	1.074	1.017 – 1.134	0.010
continuity of care	1.043	1.018 – 1.069	0.001
historical performance	1.051	1.027 – 1.075	<0.001
alignment	1.003	0.985 – 1.023	0.727
continuity of care x selection method	1.015	0.969 – 1.063	0.518
historical performance x selection method	0.980	0.937 – 1.024	0.364
alignment x selection method	0.977	0.939 – 1.017	0.254
Random Effects			
σ^2	3.29		
τ_{00} member id	0.19		
τ_{00} provider id	0.04		
ICC	0.07		
N _{member id}	18265		
N _{provider id}	2898		
Observations	55971		
Marginal R ² / Conditional R ²	0.003 / 0.068		

Availability for Matched and Self-Selected Providers

To be included in recommendations, providers needed to have available appointments within 15 days. In contrast, non-recommended therapists were displayed to participants by next-available appointment, thus introducing a bias in availability between matched and self-selected providers, wherein patients using matched providers may have needed to wait longer until their first care appointment.

On average, self-selected provider availability was 1.9 calendar days vs. 6.6 calendar days for matched providers (although in either group, patients may not have always selected the next-available appointment). To see whether this difference in availability undermined the advantage for matched vs. self-selected therapists in rates of improvement, next-availability was included as a covariate in the symptom improvement regression (i.e., Table 1). Across all depression, anxiety, and PTSD, we found that next-availability was not a significant predictor ($ps > 0.552$) and the interaction between time in treatment and selection method (i.e., patients with matched providers improving faster) remained significant ($ps < 0.010$). This indicates that differences in provider availability between the two groups did not impact the rate of their patients' improvement.

Treatment response

We used treatment response (50% reduction in symptomatology) at two months rather than average treatment duration to facilitate comparison to recent meta-analysis (e.g., Cuijpers, et al. (2021), which found that average treatment response rate in psychotherapies at 2 (± 1) months after baseline was 41% (95% CI: 38~43). With this approach, we found that treatment response rate was 46.3% among patients using a self-selected therapist and 54.9% among those using matched therapists—an absolute difference of 8.5% between these two conditions. Although the response rate in our study was slightly higher, the large apparent difference in reliable change and recovery rates was reduced when the methodologies are aligned, yet the advantage of matching was even more pronounced.

Cost Savings for Matching Providers

Cost of care was the cost per-patient per-outcome at the average number of visits during treatment. For example, patients in the matched group attended 6.60 sessions and patients in the self-selected group attended 7.14 sessions. If the session rate was \$195, the *total* cost of care for matched patients vs. self-selected patients would be \$1287 vs \$1392. However, these values do not reflect differences in outcomes, e.g. achieving reliable change or recovery, which differed between groups. When modeled by appointment, 89.0% of patients using matched therapists achieved reliable change by the average number of sessions (i.e., 6.6 sessions), compared to 83.8% in 7.1 sessions using self-selected therapists (provider selection method x appointment interaction: OR=1.10, 95% CI: 1.08 – 1.12, $p<0.001$; Supplemental Table 3). To obtain cost-per-outcome, total cost is divided by these rates (e.g. session rate * average number of sessions / rate of reliable change). At this example session rate, this corresponds to \$1446 per-reliable change for matched therapists and \$1661 per-reliable change for self-selected therapists—or, because the session rate is constant between the two groups, this simplifies to 7.4 sessions per reliable change for matched therapists versus 8.5 sessions per reliable change for self-selected. Computing the relative difference between these values (e.g. $(7.4 - 8.5)/8.5$) gives an overall cost savings of 12.9% per reliable change, indicating that provider matching reduced the total cost of the care per patient who reliably improved.

The same approach was taken for recovery. 89.7% of patients using matched therapists achieved recovery in 6.6 sessions, compared to 86.5% in 7.1 sessions, using self-selected

therapists (provider selection method x appointment interaction: OR=1.06, 95% CI: 1.04 – 1.07, $p<0.001$; Supplemental Table 4). This corresponds to 7.4 sessions per recovery for patients using matched therapists versus 8.3 sessions per recovery for those using self-selected, and gives an overall cost savings of 10.8% per recovery.

Supplemental Table 3. Reliable change and recovery by appointment and selection method

<i>Predictors</i>	Reliable Change (Depression, Anxiety, or PTSD)			Recovery (Depression, Anxiety, or PTSD)		
	<i>Odds Ratios</i>	<i>CI</i>	<i>p</i>	<i>Odds Ratios</i>	<i>CI</i>	<i>p</i>
(Intercept)	0.29	0.28 – 0.29	<0.001	1.27	1.31 – 1.31	<0.001
appointment number	1.58	1.56 – 1.59	<0.001	1.29	1.26 – 1.30	<0.001
selection method	1.02	0.97 – 1.08	0.404	1.08	1.01 – 1.15	0.030
appointment number x selection method	1.10	1.08 – 1.12	<0.001	1.06	1.04 – 1.07	<0.001
Random Effects						
σ^2	3.29			3.29		
τ_{00}	0.79 _{member id}			2.50 _{member id}		
	0.04 _{provider id}			0.05 _{provider id}		
ICC	0.20			0.44		
N	24190 _{member id}			24189 _{member id}		
	5101 _{provider id}			5102 _{provider id}		
Observations	76640			76664		
Marginal R ² / Conditional R ²	0.398 / 0.520			0.131 / 0.511		

Sensitivity Analysis

The type of missing data most likely to bias the results was missing data due to assessment drop-out (See Missing Data). The impact of this missingness was assessed by reweighting the data according to the treatment dosage distribution of those without follow-up assessments. In particular, the cost saving was most likely to be affected by different treatment dosage distribution, as it was derived from an appointment model (vs. a time in care model). When the alternative treatment dosage distribution was included, provider matching still reduced the total cost of the care per patient who reliably improved, with 8.5% lower cost per reliable change and 10.9% lower cost per recovery for those using matched providers compared to those using self-selected providers.