Supplement to "Measuring Measurement: a survey of behavioral health providers on use and barriers to use of measurement-based care"

Supplementary Table 1. Theoretical barriers to use of MBC and the associated survey questions. *Answers to these questions were re-coded to coincide in meaning with the other questions in the barrier construct - e.g., if a respondent stated they agree with the statement "MBC is useful for tracking symptoms", they were coded as disagreeing with the statement "MBC is *not* useful for tracking symptoms". ^removed from this construct in sensitivity analysis.

Barrier Construct	Survey Question
Low perceived clinical utility	I don't think standardized measures are useful Research supports use of measurement-based care in practice* I don't have measures that suit my patients' needs and complexity MBC is useful for tracking symptoms* MBC is useful to shared decision-making* MBC is useful for making treatment decisions*
Lack of knowledge and self-efficacy	I don't know what measurement-based care is I don't know how to use measurement-based care in my practice I have trouble interpreting the results
Administrative burden	MBC is too time consuming I am not compensated to perform MBC I have trouble integrating measures into my workflow I don't have an electronic health record or platform to collect results^ I am concerned that patients will not complete the measures
Concern with how the data will be used	I am concerned about how the data will be used to judge my clinical skillfulness I am concerned about the how the data will be tied to bonuses

Supplementary Table 2. Average values of each barrier index. Values closer to 1 and 5 indicate lesser and greater endorsement of the barrier, respectively. The alternate administrative burden construct does not contain the question on EHR, which was less correlated with the other construct items.

Barrier construct	Mean Index Value	95% Confidence Interval
Low perceived clinical utility	2.62	2.56 – 2.67
Lack of knowledge and self-efficacy	2.02	1.97 – 2.07
Administrative burden	3.09	3.04 – 3.15
Administrative burden (alternate)	3.21	3.16 – 3.27
Concerns with how the data will be used	3.24	3.16 – 3.32

Supplementary Table 3. Reliability (Cronbach's alpha) and correlation coefficients between barrier indices. Cronbach's alpha for each index is on the diagonal and correlation coefficients are below the diagonal. These values were calculated using the non-imputed data and listwise deletion. The number of observations is given for each alpha calculation in parentheses. The number of observations used to calculate the correlation matrix was *N* = 889. The alternate administrative burden construct does not contain the question on EHR (see Methods in the main text).

	Low perceived utility	Lack of knowledge	Administrative burden	Administrative burden (alt.)	Data use concerns
Low perceived utility	0.874 (*N* = 798)				
Lack of knowledge	0.386	0.756 (*N* = 853)			
Administrative burden	0.546	0.455	0.693 (*N* = 773)		
Administrative burden (alt.)	0.567	0.417	0.941	0.741 (*N* = 793)	
Data use concerns	0.458	0.286	0.486	0.514	0.763 (*N* = 791)

Supplementary Table 4. Average marginal effects (in percentage points) of each barrier index on the probability of using MBC with a given percentage of one's caseload (main analysis). Some respondents did not answer one or more of the questions regarding their opinions of MBC – answers to these questions were imputed using multivariate normal multiple imputation, as described in the main text. Estimates are reported for both unadjusted and adjusted models. The unadjusted models were ordered logit models with the outcome as percentage of caseload with which MBC and each individual barrier index as the predictor. In the fully adjusted models, predictors were sex, Urban Influence Code of primary practice location, race/ethnicity, practice type, license, specialty training, treatment modalities provided, weekly clinical care hours, if the respondent has had training on MBC, the number of years in the mental health field, if the provider bills insurance for insured patients, and the estimated insurance distribution of the provider's caseload. See the main text and Supplemental Table 1 for the full definition of each predictor. All *p* values were less than 0.001. *alternate administrative burden construct without EHR question (sensitivity analysis). *N* = 922.

Barrier	Unadjusted Model		Adjusted Model	
	Estimate	95% CI	Estimate	95% CI
Low perceived clinical utility				
0%	18.7	17.1 to 20.4	16.7	14.9 to 18.5
1-49%	6.7	5.5 to 8.0	5.3	4.2 to 6.5
50%	-2.5	-3.3 to -1.7	-2.5	-3.2 to -1.8
51-99%	-9.9	-11.4 to -8.5	-8.4	-9.7 to -7.0
100%	-13.0	-15.0 to -11.1	-11.2	-12.9 to -9.4
Lack of knowledge and self-efficacy				
0%	12.4	10.4 to 14.4	9.0	6.9 to 11.1
1-49%	4.4	3.2 to 5.5	2.7	1.8 to 3.6
50%	-2.0	-2.6 to -1.4	-1.5	-1.9 to -1.0
51-99%	-6.8	-8.1 to -5.5	-4.6	-5.8 to -3.4
100%	-8.0	-9.7 to -6.2	-5.7	-7.2 to -4.1
Administrative burden				
0%	15.5	13.5 to 17.5	11.8	9.8 to 13.8
1-49%	4.8	3.7 to 5.9	3.3	2.4 to 4.2
50%	-2.4	-3.0 to -1.7	-1.9	-2.5 to -1.4
51-99%	-8.1	-9.3 to -6.8	-5.9	-7.0 to -4.7
100%	-9.9	-11.6 to -8.1	-7.3	-8.8 to -5.8
Administrative burden (alternate)*				
0%	15.3	13.3 to 17.3	12.3	10.3 to 14.2
1-49%	4.6	3.5 to 5.7	3.3	2.4 to 4.2
50%	-2.3	-3.0 to -1.7	-2.0	-2.6 to -1.5
51-99%	-7.9	-9.1 to -6.7	-6.0	-7.1 to -4.9
100%	-9.7	-11.4 to -8.0	-7.5	-9.0 to -6.1
Data use concerns				
0%	10.6	8.4 to 12.7	7.9	5.8 to 10.0
1-49%	3.4	2.5 to 4.3	2.2	1.5 to 2.9
50%	-1.8	-2.3 to -1.2	-1.3	-1.8 to -0.9
51-99%	-5.7	-6.9 to -4.5	-3.9	-5.0 to -2.9
100%	-6.5	-8.1 to -5.0	-4.8	-6.2 to -3.4

Supplementary Table 5. Average marginal effects (in percentage points) of each barrier index on the probability of using MBC with a given percentage of one's caseload (sensitivity analysis). Instead of using multiple imputation, the 30 respondents who did not answer any questions for one or more barrier indices were dropped (listwise deletion). Estimates are reported for both unadjusted and adjusted models. The unadjusted models were ordered logit models with the outcome as percentage of caseload with which MBC and each individual barrier index as the predictor. In the fully adjusted models, predictors were sex, Urban Influence Code of primary practice location, race/ethnicity, practice type, license, specialty training, treatment modalities provided, weekly clinical care hours, if the respondent has had training on MBC, the number of years in the mental health field, if the provider bills insurance for insured patients, and the estimated insurance distribution of the provider's caseload. See the main text and Supplemental Table 1 for the full definition of each predictor. All *p* values were less than 0.001. *N* = 892.

Barrier	Unadjusted Model		Adjusted Model	
	Estimate	95% CI	Estimate	95% CI
Low perceived clinical utility				
0%	18.6	16.9 to 20.3	16.7	14.9 to 18.4
1-49%	7.0	5.7 to 8.2	5.6	4.4 to 6.8
50%	-2.5	-3.3 to -1.7	-2.5	-3.2 to -1.8
51-99%	-10.0	-11.5 to -8.6	-8.5	-9.8 to -7.1
100%	-13.0	-15.0 to -11.0	-11.3	-13.0 to -9.5
Lack of knowledge and self-efficacy				
0%	12.1	10.0 to 14.1	8.8	6.7 to 10.9
1-49%	4.4	3.2 to 5.5	2.7	1.8 to 3.5
50%	-2.0	-2.6 to -1.4	-1.5	-2.0 to -1.0
51-99%	-6.7	-8.0 to -5.4	-4.4	-5.7 to -3.3
100%	-7.7	-9.5 to -6.0	-5.5	-7.0 to -4.0
Administrative burden				
0%	15.3	13.4 to 17.3	11.7	9.7 to 13.7
1-49%	4.9	3.8 to 6.0	3.3	2.4 to 4.3
50%	-2.4	-3.1 to -1.7	-2.0	-2.5 to -1.4
51-99%	-8.1	-9.3 to -6.8	-5.9	-7.0 to -4.7
100%	-9.8	-11.5 to -8.0	-7.2	-8.7 to -5.7
Data use concerns				
0%	10.7	8.7 to 12.8	8.1	6.1 to 10.1
1-49%	3.5	2.6 to 4.5	2.3	1.5 to 3.0
50%	-1.8	-2.4 to -1.3	-1.4	-1.9 to -1.0
51-99%	-5.8	-7.0 to -4.7	-4.1	-5.1 to -3.0
100%	-6.6	-8.2 to -5.1	-4.9	-6.2 to -3.6

Supplementary Table 6. Average marginal effects (AMEs) in percentage points of provider and practice characteristics on the probability of using MBC with a given percentage of one's caseload, after adjusting for barrier indices.

Predictor	AME on Percentage of Caseload with which MBC is used					Overall Odds Ratio
	0%	1-49%	50%	51-99%	100%	
Barrier						
Low perceived clinical utility	14.2**	4.3**	-2.2**	-7.0**	-9.4**	0.32**
Lack of knowledge and self-efficacy	2.2**	0.7**	-0.3**	-1.1**	-1.4**	0.84**
Administrative burden	3.8**	1.1**	-0.6**	-1.9**	-2.5**	0.74**
Data use concerns	-0.2	-0.1	0.0	0.1	0.1	1.01
Provider Demographics						
Sex						
Female (base level)	-	-	-	-	-	-
Male	1.7	0.5	-0.3	-0.8	-1.1	0.87
Nonbinary	3.3	0.9	-0.6	-1.6	-2.0	0.78
Race/Ethnicity						
White	1.8	0.6	-0.3	-0.9	-1.2	0.87
Black	-2.6	-0.9	0.4	1.3	1.8	1.24
Latino/Latina	4.7	1.1	-0.8	-2.2	-2.7	0.70
Other	-2.6	-0.9	0.4	1.3	1.8	1.24
Not specified	-5.8	-2.2	0.7	2.8	4.5	1.64
Urbanity						
Large metro (base level)	-	-	-	-	-	-
Small metro	-0.2	-0.1	0.0	0.1	0.1	1.02
Non-metro	-5.5**	-2.1*	0.7**	2.8**	4.1*	1.59**
Practice Type						
Solo practice	-3.4	-0.9	0.6	1.6	2.2	1.31
Small group (<10 providers)	-7.1	-2.7	0.9**	3.6	5.3	1.81
Large group (>= 10 providers)	-9.0**	-4.0	0.8**	4.6**	7.6	2.21*
Facility-based	-3.0	-1.1	0.4	1.5	2.2	1.28
License						
Masters	-0.2	-0.1	0.0	0.1	0.1	1.02
Advanced Practice	11.9	1.5**	-2.4	-5.3	-5.8**	0.42
PhD/PsyD	7.5	1.7**	-1.4	-3.6	-4.3*	0.57
MD	11.4	1.5**	-2.3	-5.1	-5.6	0.44
Other	1.4	0.4	-0.2	-0.7	-0.9	0.90
Specialty Training						
Generalist[#]	1.9	0.6	-0.3	-0.9	-1.2	0.86
Trauma	1.1	0.3	-0.2	-0.6	-0.8	0.91
Substance use disorder[#]	-2.7	-0.9	0.4	1.4	1.9	1.25
Child/adolescent	-1.3	-0.4	-0.2	0.6	0.9	1.11
Geriatrics	5.4	1.2**	-1.0	-2.6	-3.1*	0.66
Mood disorders[#]	-4.8**	-1.4**	0.8**	2.4**	3.1**	1.46**
Anxiety disorders	0.7	0.2	-0.1	-0.3	-0.4	0.95
Women's mental health	-0.8	-0.2	0.1	0.4	0.5	1.06
Serious mental illness	0.2	0.1	0.0	-0.1	-0.1	0.98
Other	-1.9	-0.6	0.3	1.0	1.3	1.17

Modalities provided						
Medication management	-5.6	-2.2	0.7*	2.8	4.3	1.61
Medication-assisted treatment (OUD)	-4.4	-1.7	0.6	2.2	3.3	1.44
CBT	3.3	1.1	-0.5	-1.6	-2.4	0.76
DBT	0.6	0.2	-0.1	-0.3	-0.4	0.96
Acceptance and commitment therapy	-4.4**	-1.5**	0.6**	2.2**	3.1**	1.43**
Psychodynamic/ psychoanalytic	0.8	0.2	-0.1	-0.4	-0.5	0.94
Other	1.6	0.5	-0.3	-0.8	-1.0	0.88
Care hours^	-2.3**	-0.7**	0.4**	1.1**	1.5**	1.20**
Have had training on MBC	-5.6**	-1.6**	1.0**	2.8**	3.4**	1.54**
Years in field						
Less than 5 (base level)	-	-	-	-	-	-
Between 5 and 10	6.2**	3.4*	-0.4*	-3.3**	-6.0*	0.56**
Between 10 and 20	9.8**	4.6**	-0.9**	-5.0**	-8.4**	0.42**
More than 20	11.4**	5.0**	-1.2**	-5.8**	-9.3**	0.37**
Bill insurance for insured patients?						
Yes, all patients (base level)	-	-	-	-	-	-
No, only certain insurance types	1.7	0.5	-0.3	-0.8	-1.1	0.87
No, I do not bill for any patients	7.9	1.6*	-1.5	-3.7	-4.3	0.55
Insurance distribution of caseload^						
Medicaid	-0.1	0.0	0.0	0.1	0.1	1.01
Medicare	0.0	0.0	0.0	0.0	0.0	1.00
Blue Cross/Blue Shield	0.2	0.1	0.0	-0.1	-0.1	0.98
Other private	-0.7	-0.2	0.1	0.3	0.4	1.05
Out-of-pocket	0.4	0.1	-0.1	-0.2	-0.3	0.97
State Health Plan	0.0	0.0	0.0	0.0	0.0	1.00
Tricare (omitted due to collinearity)	-	-	-	-	-	-

*indicates p value less than 0.10; **indicates p value less than 0.05; ^continuous variable with average marginal effect expressed as percentage-point change in probability per each 10 additional units of the independent variable (e.g., 10 additional weekly clinical care hours or 10 percentage point increase in caseload with specific type of insurance). #Variable for which interpretation is substantially different compared to the unmediated model.

Supplementary Figure 1: Number of respondents reporting using measurement-based care with 0%, 1-49%, 50%, 51-99%, or 100% of their caseload (N = 922)