Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eMethods 1. Information on Coaches for Mindful Mood Balance

During the intervention phase, participants were supported by a coach who provided motivational and technical support in order to enhance engagement with MMB. The intention here was to offer 'minimal support' to patients and strike a balance between MMB being fully self-guided (no support) versus structured contact following every MMB session (session by session support). Contact with the coach was 'front loaded' with a 45 minute orientation call and 10 minute check in for the first two weeks, fading to weekly motivational emails/messages for the remaining weeks. The average patient to coach ratio of 16:1 and, on average, participants received 2.34 hours of coaching over 12 weeks. Coaches were instructed to steer away from discussing/advising on therapeutic content and, instead to encourage participants to continue with the online exercises and home practices as their main sources of learning. All coaches were clinical psychology graduate students, with prior experience in mental health, who atteneded a 5 day MBCT workshop and who were trained according the MMB Coach Manual developed by SD and ZS. Coaches received weekly supervision from SD and ZS during which a log of patient queries was reviewed and patient session progress was monitored. For those interested in The MMB Coach Manual it is available on request by writing to Dr. Sona Dimidjian at sona.dimidjian@colorado.edu.

eMethods 2. Description of Usual Depression Care at KPCO

Usual Depression Care (UDC) followed the Kaiser Permanente Adult Depression National Guidelines that incorporates risk stratification for treatment recommendations in either primary care or specialty behavioral health based on severity of symptoms and patient preferences for treatment. Primary care providers receive education in the guidelines and are expected to use the PHQ-9 routinely for screening and follow-up monitoring of patients. They also receive periodic reminders and orientation to use the PHQ-9 from a quality assurance group (Depression Governance Committee) within KPCO, and their performance on HEDIS depression quality measures are monitored and fed back on a semi-annual basis. There are also semi-annual internal continuing medical education sessions on mental health topics for primary care. In addition, primary care providers are supported by licensed behavioral health clinicians called behavioral medicine specialists (BMS-primarily psychologists and social workers) embedded in all primary care clinics. The BMS clinicians also used the PHQ-9 and provide assessment and brief follow-up, including referral to specialty behavioral health services if needed. The PHQ-9 is used at every visit to specialty behavioral health clinics to assess baseline depression symptom severity and response to treatment. Approximately half of patients in this trial were treated in specialty behavioral health with at least two sessions of individual or group psychotherapy in the year prior to trial enrollment, and three quarters received antidepressant treatment from either primary care or psychiatry. Patients newly initiated on antidepressant treatment in primary care were supported by a nurse-run telephonic depression care management program adapted from STAR*D protocols[1,2].

eMethods 3. Description of Mindful Mood Balance

MMB was developed to provide the core components of the in person MBCT program in a web-based, 8-session self-administered platform. It teaches patients how to disengage from habitual, *automatic*, dysfunctional cognitive patterns (i.e., depression-related ruminative thought patterns), as a way to reduce RDS and vulnerability to relapse. Each of the eight MMB sessions incorporates a sequential tripartite learning cycle [3,4] (Experiential Practice, Video-Based Vicarious Learning, and Didactic Information) that is core to the in-person MBCT program and that is designed to integrate learning and application of mindfulness and CBT exercises. Patients, thus, have access to the threefold presentation of content through unique and overlapping receptive learning modes (Dirkx, 2008; Eastmond, 1998). For example, one of the core MBCT practices is a Body Scan meditation practice in which participants are asked to direct their attention systematically to regions of their body. In MMB, patients are asked to: (1) perform the Body Scan by listening to guided instructions provided on the website and a downloadable audio file, (2) watch a video interaction between instructors and participants in an MBCT class as they explore their experience of the Body Scan, and (3) answer questions in an interactive learning module that inquires about a participant's own experience with the Body Scan and relevance to managing RDS and relapse risk. A similar structure is used for the delivery of cognitive behavioral components, including didactic delivery of content from the instructors, direct experience via interactive modules, and personal reflections on relevance to managing RDS and relapse risk. Patients practice mindfulness during each MMB session and are then provided with downloadable audiofiles of these exercises for home practice between sessions. At the start of each MMB sessions, patients are asked to indicate the frequency of home practice completion. Formal practices in the program included; 30 minute sitting meditation, 30 body scan, 30 minute mindful walking while informal practices included 3 minute breathing space, mindful eating, noticing pleasant and unpleasant events. Accompanying materials are provided online in each session, including handouts and audio guides.

References

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2. Trivedi MH, Rush AJ, Wisniewski SR, et al. Evaluation of outcomes with citalopram for depression using measurement-based care in STAR*D: implications for clinical practice. *Am J Psychiatry*. 2006;163:28–40.

3. Dirkx, J. The meaning and role of emotions in adult learning. *New Directions for Adult and Continuing Education*, 2008, 120, 7-18.

4. Eastmond D. Adult learners and internet based Distance Education New *Directions for Adult and Continuing Education,* 1998, 78, 33 – 41.

eTable 1. SOAR Clinical Deterioration Descriptive Data

To examine this point, we now report symptom deterioration across both groups based on total suicide ideation alerts (PHQ-9 Item 9) or high PHQ-9 score alerts (PHQ-9 >13). Drawing from ReDCap data on the number of referrals to behavioral health for PHQ-9 scores > 13 and Crisis calls for PHQ-9 item 9 suicide ideation endorsement, our data indicate that clinical deterioration was more prevalent in the usual care group. Although, a Chi Square test indicated no significant difference in proportions betweent the groups groups (Chi Square = .49, ns), on an absolute basis, the UDC group had more than twice as many alerts as MMB.

	MMB	UDC	TOTAL
PATIENTS			
Patient suicidal ideation - PHQ-9 item 9	18	38	56
Patient total score > 13	33	89	122
Totals	51	127	178

eTable 2. Demographic and Clinical History Variables for Participants Completing < 4 vs. ≥ 4 Sessions of MMB

	MMB Completed < 4 sessions n = 86	MMB Completed ≥ 4 sessions n = 144	Test Statistics N = 230
PHQ-9 intake, mean (SD)	7.19 (1.41)	7.20 (1.41)	$t(228) = -0.08$, $p = 0.94$
GAD-7 intake, mean (SD)	6.58 (3.33)	6.47 (3.05)	$t(228) = 0.26$, $p = 0.80$
SF-12 PCS intake, mean (SD)	50.21 (11.21)	51.049 (9.05)	$t(218) = -0.92$, $p = 0.36$
SF-12 MCS intake, mean (SD)	34.10 (8.59)	34.37 (7.55)	$t(218) = -0.24$, $p = 0.81$
Age, mean (SD)	48.67 (15.29)	48.15 (15.05)	$t(227) = 0.25$, $p = 0.80$
Gender, n (%)			$\chi^2(1, n = 229) = 1.98$, $p = 0.16$
Male	26 (30.59)	32 (22.22)	
Female	59 (69.41)	112 (77.78)	
Marital status, n (%)			$\chi^2(3, n = 229) = 3.17$, $p = 0.37$
Never Married	16 (18.82)	39 (27.08)	
Married, Civil Union, or Common-Law Marriage	39 (45.88)	66 (45.83)	
Divorced, Separated	27 (31.76)	33 (22.92)	
Widowed	3 (3.53)	6 (4.17)	
Race, n (%)			$\chi^2(1, n = 228) = 0.35$, $p = 0.55$
American Indian or Alaskan Native	1 (1.18)	0 (0.00)	
Asian	2 (2.38)	1 (0.69)	
Black or African American	1 (1.19)	3 (2.08)	
White	77 (91.67)	135 (93.75)	
Other	3 (3.57)	5 (3.47)	
Hispanic or Latino, n (%)	8 (9.52)	13 (9.29)	$\chi^2(1, n = 224) = 0.004$, $p = 0.95$
Education, n (%)			$\chi^2(2, p = 227) = 12.78$, $p = 0.002$
Did not complete High School	2 (2.35)	1 (0.70)	
Completed High School	21 (24.71)	12 (8.45)	
College or University, Graduate School or Professional School	62 (72.94)	129 (89.58)	
Employment, n (%)			$\chi^2(3, n = 230) = 3.23$, $p = 0.36$

Full-time employed	50 (58.14)	81 (56.25)	
Part-time employed	6 (6.98)	19 (13.19)	
Student	1 (1.16)	4 (2.78)	
Other	29 (33.72)	40 (27.78)	
Income, n (%)			$\chi^2(3, n = 227) = 1.65, p = 0.65$
$0 - $29,999	9 (10.47)	16 (11.35)	
$30,000 - $69,999	37 (43.02)	54 (38.30)	
$70,000 - $99,999	16 (18.60)	36 (25.53)	
$100,000 and up	24 (27.91)	35 (24.82)	
Age of onset of first episode of depression, mean (SD)	23.60 (13.81)	22.86 (13.02)	$t(221) = 0.40, p = 0.69$
Weeks since last episode, mean (SD)	65.32 (138.94)	63.22 (158.01)	$t(200) = 0.10, p = 0.92$
Number of past episodes of depression, mean (SD)	7.20 (3.23)	7.59 (3.10)	$t(223) = -0.90, p = 0.37$
Previous hospitalization for depression, n (%)	17 (19.77)	19 (13.38)	$\chi^2(1, n = 228) = 1.64, p = 0.20$
Past suicide attempt, n (%)	20 (23.53)	19 (13.38)	$\chi^2(1, n = 227) = 3.85, p = 0.05$
Antidepressant at intake, n (%)	73 (84.88)	105 (72.92)	$\chi^2(1, n = 230) = 4.41, p = 0.04$
Current psychotherapy, n (%)	40 (51.28)	70 (50.36)	$\chi^2(1, n = 217) = 0.02, p = 0.90$
Current psychotherapy and antidepressant, n (%)	35 (40.69)	49 (34.03)	$\chi^2(1, n = 217) = 1.95, p = 0.16$

eTable 3. Model Fit Parameters for HLM

Mathematical Form	PHQ-9	GAD-7	SF-12 Mental	SF-12 Physical
Linear	34327.9	11545.8	8112.0	7688.2
Quadratic	34215.2	11526.9	8021.4	7678.8
Cubic	34210.3	11518.3		
Logarithmic	34221.8	11490.7	8041.7	7674.7
Square-root of time	34244.2	11498.3	8053.2	7677.0
Exponential	34603.3	11665.7	8199.7	7719.0
Piecewise	34201.1	11474.5	8010.6	7673.4

Note: Smaller values of the -2log-likelihood function represent a better fit. For the SF-12, there are not enough repeated measures to fit the cubic shape.

As we observe above, for the PHQ-9, GAD-7, and SF-12 Mental composite, there is significant improvement of fit for the piecewise model compared to all other mathematical forms. Specifically, comparison of piecwise model with linear form yielded significant differences for all four outcomes ($\chi^2(2)$=126.8, p<.0001 for PHQ-9, $\chi^2(2)$=71.3, p<.0001 for GAD-7, $\chi^2(2)$= 101.4, p<.0001 for SF-12 Mental, and $\chi^2(2)$=14.8, p=.0006 for SF-12 Physical). In comaprisons to the remaining standard mathematical forms, piecewise form had significantly better fit (p<.004) for PHQ-9, GAD-7, and SF-12 Mental. For the SF-12 Physical composite, we do not see significant change over time; therefore, all mathematical forms are fitting nearly the same reflective of the lack of treatment related change in outcomes.

References

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eTable 4. Sensitivity Analyses for Missing Data

Measure	Observed	MI	Pattern-Mixture Model (Hedeker and Gibbons, 1997)	Pattern-Mixture Model (Guo, Ratcliffe, and Ten Have, 2004)
PHQ-9				
Total	0.95* (0.39)	0.64* (0.31)	1.23* (0.51)	0.87* (0.36)
Intervention phase	1.89*** (0.32)	1.54*** (0.28)	1.83** (0.48)	1.63*** (0.36)
Follow-up phase	-0.95** (0.35)	-0.90* (0.42)	-0.60(0.48)	-0.76* (0.31)
GAD-7				
Total	1.21** (0.42)	1.10** (0.39)	1.50*(0.60)	1.20* (0.49)
Intervention phase	1.60*** (0.37)	1.37*** (0.34)	1.73*** (0.50)	1.56*** (0.44)
Follow-up phase	-0.39 (0.40)	-0.27 (0.38)	-0.22(0.52)	-0.36 (0.42)
SF-12 (PCS)				
Total	-0.53 (0.93)	-2.27 (1.29)	-0.25 (1.30)	-0.25 (1.30)
Intervention phase	-0.74 (0.78)	-0.44 (1.28)	-0.52 (1.15)	-0.51 (1.48)
Follow-up phase	0.22 (0.94)	1.83 (1.29)	0.27 (0.93)	0.26 (0.93)
SF-12 (MCS)				
Total	-5.10** (1.37)	-2.39* (1.21)	-6.49** (2.08)	-6.49** (2.06)
Intervention phase	-5.67*** (1.11)	-4.62*** (1.07)	-6.86*** (1.79)	-6.81*** (1.78)
Follow-up phase	0.57 (1.33)	2.22 (1.17)	0.37 (1.58)	0.32 (1.59)

Notes: # $p<0.10$, *$p<0.05$, **$p<0.01$, ***$p<0.0001$