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Valuation of Life as Outcome and Mediator of a Depression Intervention for Older African Americans: The Get Busy Get Better Trial

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Abstract

Objective—Previously, we showed that Get Busy Get Better (GBGB), a 10 session multi-component home-based, behavioral intervention, reduced depressive symptom severity in older African Americans. As appraising the value of life is associated with depressive symptoms, this study examined whether GBGB enhanced positive appraisals of life and if, in turn, this mediated treatment effects on depressive symptoms.

Methods—Data were from a single-blind parallel randomized trial involving 208 African Americans (55 years old) with depressive symptoms (Patient Health Questionnaire, PHQ-9 5). GBGB involved five components: care management, referral/linkage, stress reduction, depression education, and behavioral activation. A 13-item Valuation of Life (VOL) scale with two sub-factors (optimism, engagement) was examined as an outcome and as mediating GBGB effects on PHQ-9 scores at 4-months.

Results—Of 208 enrolled African Americans, 180 completed the 4-month interview (87=GBGB; 93=control). At 4-months, compared to wait-list control group participants, the GBGB group had improved VOL (difference in mean changes from baseline=0.3, 95% CI=0.2, 0.5) and reduced depression severity scores (PHQ-9 difference in mean changes from baseline=2.9, 95% CI=–4.6,

–1.2; $p=0.001$). Structural equation models indicated that enhanced VOL mediated a significant proportion of GBGB's impact on depressive symptoms, explaining 71% of its total effect; and its subfactors (optimism, explaining 67%; engagement, 52%).

Conclusion—VOL appears malleable through an intervention providing resources and activation skills. GBGB's impact on depressive symptoms is attributed in large part to participants' enhanced attachment to life. Attention to VOL as mediator and outcome and the reciprocal relationship between mood and attachment to life is warranted.

Keywords

attachment to life; depression; behavioral treatment; mediation analysis

Introduction

Depressive symptoms, even mild to moderate, are highly prevalent among older adults with estimates as high as 31% for those with chronic health conditions (Kurlowicz *et al.*, 2005; Gitlin *et al.*, 2012; Gitlin *et al.*, 2012). When untreated, symptoms are associated with significant risks including higher health care utilization, functional decline, comorbidities, poor quality of life, more rapid progression from mild cognitive impairment to dementia, and mortality (Ciechanowski *et al.*, 2004; Cuijpers *et al.*, 2012; Glaser *et al.*, 2003; Lenze *et al.*, 2001; Areán, 2006; Glaser *et al.*, 2003; Grabovich *et al.*, 2010; Lee *et al.*, 2012; Lyness *et al.*, 2009; Sacuiu *et al.*, 2016).

Older African Americans, one of the fastest growing groups among the aging population in the United States (Institute of Medicine, 2012), are at high risk for depression due primarily to their high rates of chronic illnesses and exposures to lifelong jeopardies (financial strain, unsafe neighborhoods, discrimination); factors associated with depressive symptoms (Areán *et al.*, 2010; Pickett *et al.*, 2013). With few exceptions, previously evaluated non-drug depression programs for community-living older adults have not specifically addressed ways to improve access to mental health treatments nor targeted or appealed to low income older African Americans (Gitlin, 2014).

One program addressing these issues is the Get Busy Get Better: Helping Older Adults Beat the Blues (GBGB) program, also referred to as the Beat the Blues Trial. GBGB is a home-based, multi-component intervention delivered by senior center licensed social work staff that was tested in a randomized clinical trial with 208 older African Americans (Gitlin *et al.*, 2012a). The trial demonstrated clinically and statistically significant benefits such that participants receiving GBGB compared to a wait-list control group reported reduced depressive symptoms. Furthermore, 43.8% in GBGB compared to 26.9% in the control group ($p=0.020$) entered remission by 4-months. After receiving GBGB, control group participants demonstrated similar benefits (4 to 8-months) while those in the initial GBGB group maintained benefits at 8-months (Gitlin *et al.*, 2013).

Nevertheless, it remains unclear why non-drug approaches and specifically GBGB, are effective or what the active ingredient(s) or mechanism(s) of action are which underlie these interventions (Gitlin *et al.*, 2000). It may be that for behaviorally-oriented treatment

approaches, positive effects are achieved through multiple pathways. If that is the case, it would be important to identify all possible conduits by which a behaviorally-oriented intervention might have a positive effect in order to optimize efficiency in its delivery and strengthen derived benefits. We previously showed that positive changes in levels of activation, depression knowledge and symptom detection, and anxiety each mediated the relationship between GBGB and depressive symptoms, whereas other changes such as in physical function or utilization of formal care and services did not (Gitlin *et al.*, 2014).

In this study, we examine a different theoretically-based potential outcome of GBGB, an individual's appraisal of whether life is worth living, or valuation of life, and whether changes in appraisals mediate the impact of intervention on depressive symptoms. Valuation of life is a multi-faceted construct referring to the extent to which individuals appraise the value of life or whether life is perceived as worth living under present conditions (Lawton *et al.*, 1999; Gitlin *et al.*, 2016). Individuals are asked to consider a range of positive and negative factors including health, personal and environmental considerations from which an overall rating is derived reflecting attachment to life. High valuation of life is an indicator of the ability to positively compensate for deficits associated with aging. In a recent analysis of the psychometric properties of VOL with two different populations (African Americans with depression, older adults with functional difficulties), we also identified two subfactors, optimism and engagement (Gitlin *et al.*, 2016).

Previous research shows that valuation of life is positively associated with positive mental health indicators, and inversely related to negative mental health indicators such as depressive symptoms (Lawton *et al.*, 2001; 2002; Moss *et al.*, 2007; Gitlin *et al.*, 2016). Research also shows that although VOL is associated with depressive symptoms, there are other contributors to evaluations including perceived control or lack thereof over everyday events, having a sense of purpose, and remaining active and participatory in pleasant events. It may be that an intervention such as GBGB, which is designed to provide effective coping skills, enable older adults to achieve personal goals and exert control and become activated, improves VOL and that this, in turn, results in meaningful reductions in depressive symptoms.

The purpose of this study was threefold. First, we sought to examine whether GBGB enhanced an older adult's appraisal of whether life was worth living. Here, we are interested in whether the value one places on life is malleable through an intervention designed to reduce depressive symptoms. Second, we sought to determine if positive changes in VOL functioned as a mediator of the positive effects of GBGB on depressive symptoms; and if so, the magnitude of the change for which it accounts. Third, we wanted to examine if VOL's two subfactors (optimism and engagement) account for more or less the reductions in depressive symptoms following participation in GBGB.

Method

Study Sample and Procedures

Participants consisted of 208 older African Americans recruited from a short-term in-home support program for medically compromised individuals and the community at-large

through media announcements and presentations at local events and social agencies. Enrollment occurred in Philadelphia between May 2008 and November 2010. Eligible participants were 55 years of age, English speaking, cognitively intact (MMSE 24), with elevated depressive symptoms (score 5 on the Patient Health Questionnaire (PHQ-9)) on two sequential testing occasions two weeks apart. Other enrollment criteria enhanced study retention and included having a home telephone and planning to live in area for 8 months. Individuals with a history of serious mental illness, life-limiting illnesses, involvement in another clinical depression trial, or living in residential facilities were not eligible. Use of anti-depressant or other medications did not exclude study participation.

Those eligible and willing to participate completed a baseline home interview, were randomized to receive GBGB immediately or 4 months later (wait-list control), and then reassessed at 4 and 8-months in their homes using the same interview battery and conducted by assessors masked to participant group allocation (Gitlin *et al.*, 2012a; Gitlin *et al.*, 2013).

Interventions

GBGB, described in detail elsewhere (Gitlin et al., 2012a), is a multi-component home-based intervention drawing upon previously evaluated interventions (e.g., Healthy Ideas, Pearls), information derived from focus groups and in-depth interviews with the targeted population identifying preferred treatment approaches (Gitlin *et al.*, 2012b). The resultant intervention included: identification and screening for depressive symptoms by intake specialists at the partnering senior center, delivery of up to 10 one-hour home sessions by a licensed social worker employed by the senior center who provided care management (identifying unmet needs and deriving a plan of action), referral and linkage (making referrals to formal care and social service resources based on the care management assessment), education about depression and symptom recognition (instruction in early detection of symptoms, discussing feelings with physicians and those of a different race, therapeutic modalities including medication use and psychotherapy), stress reduction techniques (instruction in different approaches including deep breathing or counting, to reduce situational-induced anxiety), and behavioral activation (identifying daily routines, a behavioral goal, an action plan, use of pleasant events in routines). Active problem solving and motivational interviewing techniques helped participants to become activated and achieve self-identified goals.

The wait-list control group did not receive any study-related intervention or contact following the baseline interview. Participants in this group, as those in the initial treatment group, were free to engage in any non-study services, depression treatments or programs they chose. After completing the 4-month follow-up interview, participants in this group received GBGB in its entirety and as delivered to the initial treatment group. This study examined mediational processes at 4 months because by 8 months, all participants received the intervention.

Measures

Demographic characteristics including age, race, sex, living arrangement (alone, with others), education (<high school, high school, >high school), and employment status (employed, unemployed) were collected during the baseline assessment.

Valuation of Life—The 13-item version of the Valuation of Life scale (VOL; Lawton *et al.*, 2001) was collected at baseline and during the 4-month follow-up assessment. Each item reflects a generalized judgment or global stance towards life (e.g., “Life has meaning for me,” “I feel hopeful right now”) that is evaluated along 5-point scales ranging from 1 (strongly agree) to 5 (strongly disagree). We previously identified and examined the convergent and divergent validity of two interrelated factors, corresponding to optimism and engagement (Gitlin *et al.*, 2016). Specifically, the optimism factor consists of eight items which reflect a cognitive, optimistic, and future-oriented stance towards life; whereas, the engagement factor consists of five items which reflect problem solving, activation towards, and confidence in obtaining one’s desired goals (Gitlin *et al.*, 2016). A total VOL score is derived by summing responses across items. Scores range from 13 to 65 (Cronbach’s $\alpha=.91$ for this sample), with higher scores indicating greater attachment to life. An optimism subscale score is derived by summing responses across eight items with scores ranging from 8 to 32 (Cronbach’s $\alpha=.87$ for this sample); an engagement subscale score is similarly derived by summing responses across five items with scores ranging from 5 to 25 (Cronbach’s $\alpha=.82$ for this sample).

PHQ-9—PHQ-9 provided a brief, psychometrically sound 9-item self-report severity measure (Kroenke and Spitzer, 2002). As the scale was administered on two subsequent occasions two weeks apart to determine eligibility, the second screen was used as the participants’ baseline value for the present analyses. A total severity score was calculated by summing responses across the nine items which were rated as occurring not at all (0), several days (1), more than half the days (2), nearly every day (3). Possible scores ranged from 0-27 (Cronbach’s $\alpha=.78$ for this sample).

Statistical Analysis

Analyses for the present study were based on 180 participants (86.5% of 208) who were retained through the 4-month assessment and provided complete data on valuation of life. A comparison of these 180 participants to the 28 participants who were not included revealed no large or statistically significant differences at baseline on basic characteristics, valuation of life, or depressive symptoms measured by PHQ-9 score (all $ps>.05$).

Treatment Effects

Multiple regression models were applied to examine the effect of participation in GBGB on VOL and its two subscales at 4 months post-baseline. A series of models was tested, with covariates added sequentially. The initial model adjusted for baseline values of VOL. Subsequent models were tested, first adding recruitment source (in-home support group or community at-large) and then adding living arrangement (alone or with others) and employment status (employed or unemployed). Similar analyses were performed for each of the two VOL subscales (optimism and engagement). Cohen’s d was calculated to measure

effect size. The differences on covariate-adjusted scores at 4 months post-baseline between GBGB and control groups were divided by the square root of the mean square error from the multiple regression model to obtain the standardized effect size (Haley *et al.*, 2011).

All statistical analyses regarding treatment effects were performed in SAS 9.4.

Mediation effects

Structural equation models were applied to determine whether improvements in valuation of life (total score, and for each subfactor) mediated the beneficial impact of the intervention on depressive symptoms at 4-months post-baseline. Mediation models that utilized baseline-adjusted change scores on the mediator and the outcome were used (Roth and MacKinnon, 2012). The change score (4 month minus baseline) for the mediator (valuation of life) was analyzed as a function of its baseline value and the intervention, while the change score in the outcome (PHQ-9 score) was analyzed as a function of its baseline value, the intervention, and baseline and change score in mediator value. Recruitment source (in-home support group or community at-large), living arrangement (alone or with others) and employment status (employed or unemployed) were also included as covariates for the mediating factor and outcome variable in the final model.

Figure 1 reflects our final model. The “a” path represents the intervention effect on the mediator, and “b” path represents the effect of the mediator on the outcome. The mediated or indirect effect is estimated as “a*b.” The standard error of the a*b mediation effect was calculated using the Sobel method. The c’ path represents the unmediated or direct effect of intervention on the outcome after controlling for the mediator, and the sum of a*b and c’ comprises the total intervention effect on outcome. The proportion of the total effect that is mediated is estimated as $((a*b)/((a*b)+c'))$. The root mean square error of approximation (RMSEA) was used as fit criterion, where a RMSEA = 0.06 indicates good fit to the observed data (Hu and Bentler, 1999). Mediation analyses were conducted using Mplus Version 7 (Muthén and Muthén, 2012).

Results

Study attrition

Study attrition was low at 12.5 % from baseline to 4-month follow-up. However, more participants in the intervention group (N=17) than wait-list control group (N=9) were lost to follow-up for reasons unknown. Nevertheless, there were no large or statistically significant differences on baseline variables between those with follow-up data and those lost to follow-up. As to intervention, of 106 participants assigned to the initial treatment group, seven refused any intervention sessions for reasons unknown, and 93.9% (N=93) completed >3 sessions, the minimum number considered for a treatment benefit.

Sample characteristics

Of 180 participants included in this study, most were recruited from the community at large (71.7%), female (79.4%), unemployed (91.7%), not married (87.8%), and had a high school or higher level of education (77.7%), and some to a lot of difficulty paying for basics (67.8%).

Participants were on average 69.4 (SD=8.6) years of age, had 6.6 (SD=3.0) health conditions and a PHQ-9 score of 12.9 (SD=5.0) indicating moderate depression severity with close to one third expressing mild symptoms, more than one third expressing moderate symptoms, close to one quarter indicating moderately severe symptoms and about 12% having severe symptoms.

Except for pain medication in which 51.4% reported its use, less than a quarter of participants reported taking anti-depressants (21.2%) or anti-anxiety medications (16.2%).

There were no large or statistically significant differences between participants in the two groups except for living arrangements and employment status. Most control group participants (68.8%) compared to those receiving treatment (48.3%) lived alone; whereas slightly more treatment group participants (12.6%) were employed than control group participants (4.3%).

Effect of GBGB on VOL

At baseline, participants reported moderate attachment to life (Table 1, Mean=47.24, SD=8.21). The correlations among the variables analyzed in the mediation models are displayed in Table 2. As expected, there were significant correlations between VOL at baseline and for the 4-month change scores.

Using standard analyses of covariance, with the baseline score as the covariate, GBGB was found to have a significant effect on VOL and its subscales (all $p < .001$). In each case, the findings indicated that improvements were observed in the GBGB group that exceeded any changes observed in the wait-list control group. For all three scores, the size of the effect, using Cohen's d , was moderately strong. Similar to our previously reported findings for depressive symptoms, we found no differential treatment effects on VOL by age, gender, education or number of health conditions. Participants regardless of characteristics benefited similarly from intervention.

Mediation Effects

The unstandardized estimates that correspond to the paths illustrated in Figure 1 are reported in Table 4 for each mediator-depressive symptom measure combination. These findings indicate highly significant mediation effects for VOL overall as well as for its two subscales, optimism and engagement (all $p < .01$), for mediating the effect of GBGB on the measure of depressive symptoms. The mediation effects were similar in magnitude of total intervention effect, with the proportion mediated being 71% for VOL total score, 67% for optimism subfactor, and 52% for engagement subfactor. The unmediated or direct effect of the intervention was no longer statistically significant in any model.

Discussion

Depressive symptoms, whether mild to severe, are common among older adults, with mild symptoms more frequently occurring and having dire consequences. This is particularly true for older African Americans, who are at increased risk for depressive symptoms due to their higher exposures to contributory factors including chronic conditions and financial strains.

Older African Americans tend to prefer nonpharmacological treatment approaches identified as first-line treatment (Gitlin *et al.*, 2012). Thus, identifying treatments that effectively address depressive symptoms, are culturally acceptable and which can be delivered within existing aging services, is an important strategy for addressing disparities in depression detection and care. GBGB is one such intervention that we previously showed can be effectively integrated within the staffing and operations of senior centers. Moreover, it can be delivered in a relatively short time frame (4 months) and for minimal cost (\$584.64), resulting in clinically meaningful reductions in depressive symptoms as well as other positive outcomes including functional and quality of life improvements (Pizzi *et al.*, 2014). Unclear however is the mechanism by which GBGB has a treatment effect on depressive symptoms.

Valuation of life has not previously been considered in depression intervention research. However, this study demonstrates the importance of this construct in depression care. Anchored in positive psychology (Gable and Haidt, 2005; Seligman and Csikszentmihalyi, 2000), VOL includes a wide range of factors in addition to health and mood that may inform an older adult's appraisal as to whether life is worth living. This study provides further validation of the VOL construct and confirms that although VOL is somewhat related to depression ($r=-0.39$, $p<.001$ for this study sample), it is not a substitute for it; rather mood is one of many factors impacting appraisals and in turn, appraisals of VOL impact depressive symptoms.

We also show that the appraisal of whether life is worth living is not trait-based or immutable. Rather, appraisals appear to have a temporal dimension, reflecting an older adult's active and ongoing consideration of a range of changing life circumstances. As such, appraisals appear malleable, and hence, amenable to improvement through intervention.

GBGB, in keeping with positive psychology, seeks to strengthen internal resources to promote well-being. This is in contrast to other depression treatments that are based in a deficit approach and seek to reduce symptomatology (Zarit and Robertson, 2006). The GBGB intervention provides participants with ways to reconnect, engage in and obtain control of daily life goals and events. Specifically, it provides positive coping skills (e.g., stress reduction techniques to reduce situational anxiety), education about depression and symptom recognition (e.g., identification of events, feelings, conditions precipitating symptoms), identification of objective barriers to achieving personal goals (e.g., through systematic care management), strategies for addressing barriers (referral and linkage), and techniques for achieving self-identified daily goals (e.g., motivational interviewing and behavioral activation).

The study shows that this constructive approach to working with older African Americans as reflected in the combination of treatment components, positively impacts how they appraise whether their life is worth living. Compared to a wait-list control group, participants in GBGB, improved significantly and positively in total VOL score and on each subfactor (optimism and engagement), and regardless of age, gender, education or number of health conditions.

Using mediational analyses, this study demonstrated that it is the improvement in how older adults appraise the value of their life that accounts for most of the intervention's positive effects on depressive symptoms for this study sample. That is, a significant mechanism by which the intervention had its effect on depressive symptoms appears to be through the change in appraisals as to whether life is worth living. Although it is not possible to determine the clinical significance of changes in VOL scores, the mediational analyses suggest that improvements were meaningful clinically given the resultant reductions in depressive symptoms.

Mediation analysis provides an analytic framework for evaluating factors that can account for how an intervention may effect or cause changes in a given outcome (Roth *et al.*, 2012). However, it continues to be underutilized in depression trials. In a previous study of mediators of this intervention, we found that increasing behavioral activation, enhancing depression knowledge and symptom recognition, and decreasing anxiety each independently mediated a significant proportion of the intervention's impact on depressive symptoms, and also jointly explained over 60% of the intervention's total effect on depressive symptoms. The present study suggests that VOL is a stronger mediator in that it explained 71% of the change in depressive symptoms by itself. While there is some overlap between measures, future research is needed to examine the relationships among these different mediators to understand their specific pathways. Understanding mediators is helpful in refining GBGB or other interventions in several ways. Clinicians could assess changes in identified mediators as part of and throughout the therapeutic process and make adjustments accordingly if changes are not achieved on these variables, thus making the intervention more responsive. Also, knowing mediators can inform which treatment components are essential or not, making the intervention more efficient.

Several considerations are noteworthy. First, it is possible that a depression intervention mediates VOL; better mood could improve a person's attachment to life, optimism, and engagement. Thus, there may be a reciprocal relationship between depression and VOL. Second, generalizability of findings are unclear. VOL may serve as a mediator for this particular intervention and study population. Other mechanisms may reduce depressive symptoms for different interventions and race/ethnic groups. For example, as hopelessness is associated with depression in whites more so than in African Americans, this may be a better target for and predictor of change in depression for that group (Assari and Lankarani, 2016). Finally, there is the slight potential for confounding. Nevertheless, we controlled for treatment group differences at baseline and show no differential treatment effects.

In conclusion, our approach confirms the value of developing depression treatments from a positive psychology perspective in which participants are provided resources and skills versus addressing only the interpersonal and/or biological basis of depression and focusing on symptom reduction.

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Up to Four Key Points

1. Older adult's valuation of life reflects an appraisal of whether life is worth living under current conditions and is associated with but distinct from depressive symptoms.
2. A behavioral multi-component intervention, Get Busy Get Better, Helping Older Adults Beat the Blues, for depressive symptoms enhanced older adults' valuation of their life at 4 months.
3. Valuation of life mediated the effects of Get Busy Get Better on depressive symptom severity at 4 months such that improved mood was due mostly to the enhanced appraisals of the value of one's life.
4. Get Busy Get Better helped older adults become activated and adopt an optimistic stance, two components of valuation of life that contributed to a reduction of depressive symptoms.

Figure 1.
Model for Mediation Analyses

Table 1

Baseline characteristics of GBGB and control participants

Characteristic	Total sample (N=180)	GBGB (n=87)	Control (N=93)	p-value
Age, mean (SD)	69.4 (8.6)	69.0 (8.7)	69.8 (8.5)	.50
Recruitment source, n (%)				
IHSP	51 (28.3)	27 (31.0)	24 (25.8)	
Community at large	129 (71.7)	69 (69.0)	69 (74.2)	.44
Sex, n (%)				
Male	37 (20.6)	17 (19.5)	20 (21.5)	
Female	143 (79.4)	70 (80.5)	73 (78.5)	.74
Education, n (%)				
< HS	40 (22.2)	18 (20.7)	22 (23.7)	
HS/GED	53 (29.4)	22 (25.3)	31 (33.3)	
> HS	87 (48.3)	47 (54.0)	40 (43.0)	.32
Employment status, n (%)				
Employed	15 (8.3)	11 (12.6)	4 (4.3)	
Unemployed	165 (91.7)	76 (87.4)	89 (95.7)	.04
Paying for basics, n (%)				
Not difficult at all	36 (20.0)	12 (13.8)	24 (25.8)	
Not very difficult	22 (12.2)	13 (14.9)	9 (9.7)	
Somewhat difficult	70 (38.9)	34 (39.1)	36 (38.7)	
Very difficult	52 (28.9)	28 (32.2)	24 (25.8)	.18
Marital status, n (%)				
Not married	158 (87.8)	73 (83.9)	85 (91.4)	
Married	22 (12.2)	14 (16.1)	8 (8.6)	.13
Living arrangement, n (%)				
Alone	106 (58.9)	42 (48.3)	64 (68.8)	
With others	74 (41.1)	45 (51.7)	29 (31.2)	<.01
Health conditions, mean (SD)	6.6 (3.0)	6.7 (2.7)	6.4 (3.3)	.49
Antidepressant medication, n (%)	38 (21.2)	22 (25.3)	16 (17.4)	.20
Anxiety medication, n (%)	29 (16.2)	12 (13.8)	17 (18.5)	.40
Pain medication, n (%)	92 (51.4)	44 (50.6)	48 (52.2)	.83
PHQ-9 Score (second screen), mean (SD)	12.9 (5.0)	13.0 (5.3)	12.8 (4.7)	.70
PHQ-9 Score (second screen), n (%)				
Minimal/no depression (0–4)	0 (0.00)	0 (0.00)	0 (0.00)	
Mild depression (5–9)	54 (30.0)	27 (31.0)	27 (29.0)	
Moderate depression (10–14)	63 (35.0)	30 (34.5)	33 (35.5)	
Moderate/severe depression (15–19)	42 (23.3)	17 (19.5)	25 (26.9)	
Severe depression (≥ 20)	21 (11.7)	13 (14.9)	8 (8.6)	.45
Valuation of life, mean (SD)	47.2 (8.2)	47.7 (7.7)	46.8 (8.7)	.46

Pearson Correlation Coefficients between Valuation of Life and Depression Symptoms at Baseline and 4 Months (n=180)

Table 2

	Baseline		Change at 4 months	
	PHQ-9	VOL	PHQ-9	VOL
Mean (SD)	12.89 (4.95)	47.24 (8.21)	-5.26 (6.03)	3.33 (8.21)
Baseline				
PHQ-9	1.00			
VOL	-0.39 ***			
Change at 4 months				
PHQ-9	-0.50 ***	0.01		
VOL	0.17 *	-0.43 ***	-0.46 ***	

PHQ-9 = Patient Health Questionnaire; VOL = Valuation of Life

* p -value < 0.05;

** p -value < 0.01;

*** p -value < 0.001

Table 3

Treatment outcomes for Valuation of Life and its Two Subscales at 4-months

Outcomes	GBGB		Control		Adjusted Mean Effect (95% CI)	P-value	Cohen's d
	Baseline, Mean (SD)	4-Months, Mean (SD)	Baseline, Mean (SD)	4-Months, Mean (SD)			
VOL total	47.71 (7.65)	53.08 (7.53)	46.81 (8.72)	48.23 (9.23)	4.67 (2.53, 6.80)	<.0001	0.66
Optimism	30.92 (4.85)	33.57 (4.42)	30.33 (5.39)	30.66 (5.75)	2.87 (1.55, 4.18)	<.0001	0.66
Engagement	16.79 (3.50)	19.51 (3.67)	16.47 (3.88)	17.57 (4.07)	1.84 (0.82, 2.86)	0.0005	0.55

Note: Values shown reflect analyses adjusted for baseline value, recruitment source, living arrangement and employment status.

Table 4

Standardized estimates of change of mediator from baseline to 4-month

Mediator	a	b	ab	C'	ab/(ab+c')	RMSEA
VOL total	4.669 ***	-0.375 ***	-1.752 ***	-0.718	0.71	0.000
Optimism	2.866 ***	-0.585 ***	-1.675 ***	-0.822	0.67	0.000
Engagement	1.840 ***	-0.706 ***	-1.299 **	-1.199	0.52	0.000

*** $p < 0.001$,
** $p < 0.01$,
* $p < 0.05$