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Engagement in Socially and Interpersonally Rewarding Activities as a Predictor of Outcome in ‘Engage’ Behavioral Activation Therapy for Late-life Depression

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Abstract

Objective: Loneliness and social isolation are associated with depressive symptoms, cognitive and physical disabilities, and increased risk for mortality among older adults. Socially rewarding activities reduce loneliness, and neurobiological evidence suggests that these activities may activate neural reward systems to a greater extent than other rewarding experiences among older adults. The current study was designed to investigate whether engagement in social and interpersonal activities (i.e. exposure to social rewards) predicts subsequent increase in behavioral activation and reduction in depressive symptoms in reward exposure treatment for late-life depression.

Methods: Forty-eight older adults without cognitive impairment and with major depression received nine sessions of “Engage” psychotherapy. Behavioral activation and depression severity were assessed by trained raters at baseline, weeks 6 and 9. Patients’ weekly behavioral plans were categorized into three groups: a) solitary activities; b) social-group activities (attending a social gathering or a social setting such as church or a senior center); c) individual-interpersonal activities (engaging in an interpersonal interaction with a specific friend and/or family member).

Results: Mixed-effects models showed reduction in depression severity and increase in behavioral activation over time. In linear regression models, a higher percentage of individual-interpersonal activities (but not solitary or social-group activities) predicted subsequent increase in behavioral activation and improvement of depression.

Conclusions: These findings highlight the importance of understanding the effects of engagement in specific types of rewarding activities in behavioral activation treatments for late-life

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depression. Exposure to socially rewarding interpersonal interactions with others could contribute to the efficacy of psychotherapy for late-life depression.

Social connectedness has a positive impact on well-being and psychological functioning across the life span.^{1–3} With aging, as cognitive and physical functioning declines and the need for social support increases, social networks narrow and social relationships become limited.^{4,5} Social isolation in older adults is associated with lower self-rated physical health^{6,7} and higher health-risk behaviors.⁸ Additionally, loneliness is associated with a range of negative outcomes, including increased risk for depressive symptoms, perceived stress and decreased well-being^{5,9,10}, and even mortality.^{11,12} Conversely, strong social relationships and social support are protective factors against feelings of loneliness⁵ and depressive symptoms⁹, as well as reducing the risk of mortality.¹³ Longitudinal evidence suggests that among older adults participation in social activities is associated with decrease in depressive symptoms¹⁴, loneliness¹⁵, and higher cognitive functioning.¹⁶

Neurobiological studies have investigated the neural mechanisms involved in processing socially rewarding activities, which facilitate feelings of social connectedness and reduce social isolation.¹⁷ fMRI and event-related potential studies suggest that neural systems involved in processing social information in the context of interactions with others may overlap with those involved in processing of non-social rewards in.^{18–20} Patterns of neural activation may vary by age. Older adults respond with greater activation in the right nucleus accumbens in response to social rewards while younger adults show greater activation of this structure in response to monetary reward.²¹

Reward processing is often impaired in late life depression.^{22–24} Decreased reward responsiveness has been associated with depressive symptoms^{25–28} and is correlated with severity of anhedonia.²⁹ Most neurobiological studies of reward processing have primarily investigated responses to monetary outcomes (i.e. receipt or loss of money), and have not addressed the function of the reward system within a social-interpersonal context.^{18–20,30}

Reward exposure therapies are designed to target reward deficits³¹ and to increase experiences of pleasure.³² Behavioral activation, a therapy based on reward exposure that may target central reward deficits, is efficacious in depression of adults.^{33–36} While the efficacy of reward exposure has been established, much less is known about the specific types of rewarding activities leading to symptomatic relief.³² One study reported a significant association between patients' plans to engage in pleasant activities and the outcome of case management (which included reward exposure) of late-life depression. The authors reported that patients who had plans to engage in specific identifiable interpersonal interactions or interacted with family members were more likely to show symptomatic improvement. Solitary activities were not related to outcome³⁷.

Recently, Alexopoulos and Arean²² developed “Engage”, a streamlined therapy designed to target dysfunction of the reward system. Engage is a structured, stepwise personalized treatment, which relies on “reward exposure” (exposure to meaningful, rewarding activities) to reactivate and retrain the reward system over 9 sessions.^{22,23,38} Engage has been shown to reduce depressive symptoms with outcomes comparable to those of a gold-standard

evidence-based psychotherapy (Problem Solving Therapy for late-life depression³⁹). Improvement in behavioral activation, as measured by the Behavioral Activation for Depression Scale (BADS)⁴⁰, was followed by reduction of depression during the treatment phase of Engage and a 36-week follow-up.²³ While these findings suggest that exposure to rewarding activities is beneficial in reducing depressive symptoms, it remains unknown whether specific types of rewarding experiences are more beneficial than others. The current study is based on a secondary analysis of the sample above, focused on investigating the benefits of social versus non-social activities.

Identifying activities that are most beneficial in driving depressive symptom change for specific patients could guide refinement of psychosocial interventions and development of more effective, streamlined psychotherapies.⁴¹ This study tests the hypothesis that social-group as well as interpersonal-individual activities (versus solitary activities) predict greater increase in behavioral activation and greater reduction in depressive symptoms among older adults. Exploratory analyses examine whether certain types of socially rewarding activities (i.e. engagement in a social group activity versus an interpersonal interaction with another) are especially beneficial.

Method

Participants

Patients.—Participants were 48 older adults recruited by Weill Cornell Medical College and University of California, San Francisco (UCSF) for an open treatment trial of Engage therapy. The trial was approved by the institutional boards of both institutions. Included patients were: a) aged ≥ 60 years [Mean age was 71.20 (SD = 18.12)]; b) diagnosed with major depressive disorder without psychotic features using diagnostic probes from the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition [DSM-IV]⁴²; c) not exhibiting significant cognitive dysfunction (Mini-Mental State Exam ≥ 24); d) off antidepressants or on a stable dose with no intention to change regimen within the nine weeks of trial. Exclusion criteria were: a) suicidal intent or plan in the near future; b) history or presence of comorbid psychiatric diagnoses, other than primary diagnosis nonpsychotic major depression, or generalized anxiety disorder; c) use of psychotropic drugs or cholinesterase inhibitors other than mild doses of benzodiazepines. All patients signed informed consent.

Therapists.—Thirteen therapists provided therapy for the study (ten M.S.W social workers and three Ph.D. psychologists). Therapists reviewed the Engage manual and participated in two 45-minute didactic sessions before beginning therapy training. Training also included a one-to-one role play demonstration with the trainer followed by practice by the therapist. Fidelity ratings were conducted by the Engage trainer and therapists received feedback. Then, therapists were assigned „practice cases’ and required to achieve an Engage adherence score of ≥ 4 (‘good’) on two consecutive sessions before being approved to administer therapy for the study.

Measures

Depression severity and behavioral activation were assessed at baseline, week 6 and week 9 by trained raters who held at least BA-level education and received ongoing training and supervision by licensed clinicians. Depression symptoms were measured using the 17-item rater-administered Montgomery Åsberg Depression Rating Scale (MADRS⁴³), which was internally consistent in this sample (standardized Chronbach's $\alpha=.79$). Patients' engagement in rewarding experiences between sessions (which was the principle intervention of 'Engage') was measured using the 25-item Behavioral Activation for Depression Scale (BADSD⁴⁰) and found internally consistent in this sample (standardized Chronbach's $\alpha=.90$). Following prior published study,²³ we eliminated item 22 ('my work/schoolwork suffered because I was not as active as I needed to be') as it was not relevant to most patients in this sample.

Treatment

All patients received 'Engage' therapy, a form of personalized step-wise treatment for late-life depression. The main intervention of Engage is an adapted form of Behavioral Activation tailored for older adults focused on "reward exposure," namely, encouraging patients to engage in (i.e. expose themselves to) rewarding activities between sessions in order to enhance activation of the reward system. At each session, patients were guided to select a rewarding activity they had not engaged in recently or wanted to do more often. Then, the clinician helped patients develop a plan to engage in the selected activity and to cope with potential difficulties when exposed to such rewarding situations. If a patient did not successfully engage in planned rewarding activities and show clinical improvement by the third session, the clinician added techniques to address barriers to reward exposure, which included negativity bias, apathy, and emotion dysregulation (see^{22,23} for more comprehensive description of the treatment protocol).

Behavioral Plan Tracking

Patients worked with their therapists to develop a plan for reward exposure at each session. The plan had to be clear, succinctly defined, and include distinct steps for its completion. The manual provided examples of potential activities the therapist could offer such as social goals (e.g. spending more time with family/friends; meeting new people; volunteering; working); physical activity goals (e.g. exercising more; gardening; finding a hobby; losing weight; managing an illness); or "other" activities (e.g. financial; legal; hoarding/clutter; spiritual; educational). For the purpose of this study, patients' weekly behavioral plans were categorized into three groups: a) solitary activities; b) social-group activities (attending a social gathering or going to a social setting such as church or a senior center); c) individual-interpersonal activities (engaging in an interpersonal interaction with a specific friend and/or family member). Appendix A gives of a list example activities from this sample.

Statistical Analyses

Descriptive statistics for demographic and clinical variables in our sample are presented in Table 1. We conducted a mixed-effects linear model to investigate change in depression severity over time, as measured using the MADRS. Analysis was conducted using lme4

package in R.⁴⁴ The model included subject-specific random intercept and fixed effects for time. Site was initially included in our models (main and interaction effects) with no significant results and was thus removed. Significant improvement over time in behavioral activation, as measured by the BADS, was established in a previous published study.²³ Fixed Effects plot for BADS change over time is presented in Figure 1. All patients completed the 9-session treatment; patients who had less than half data points available for choice of plans (at least 5 activities out of 9) were excluded. This was done in order to reduce the risk of biases in our calculation of percentages of choice of activities in each category from a small pool of activities per patient when over 50% of data was missing. The overall percentage of solitary, social-group, and individual-interpersonal activities was calculated for each patient over 9 sessions. This was done in order to create a within-person index of choice of activities, rather than an absolute number of activities from each category, which is dependent on the number of available activities. Then, a series of separate linear regressions examined whether engagement in solitary, social-group, or individual-interpersonal activities predicted change first in behavioral activation and then in depressive symptoms. All models controlled for baseline levels of the outcome under investigation (i.e. depressive symptoms or behavioral activation).

Results

Change in depressive symptoms over time

Change in depression severity was assessed using the MADRS. The mixed-effects linear model was significant ($F[2, 75] = 48.5$; $p < .001$), indicating reduction in symptoms over the course of treatment. Post-hoc analyses with Bonferroni correction revealed a reduction of 7.97 points on the MADRS from baseline to session 6 ($t = 6.96$, $df = 78$, $p < .001$), and reduction of 2.6 points from session 6 to 9 ($t = 2.20$, $df = 74$, $p = .09$) (see Figure 2).

Social-group vs. Individual-interpersonal vs. Solitary Activities

On average, patients' choices of rewarding activities included 48% solitary activities (i.e. activities performed alone, such as reading or gardening) and 52% social activities (involving others). The latter category included 26% social-group activities (i.e. engagement in group activities in social settings, such as volunteering or attending community events) and 26% individual-interpersonal activities (i.e. engagement in interaction with significant others such as a family member or a friend).

We investigated whether higher percentage of solitary, social-group, or individual-interpersonal activities predicted improvement in behavioral activation, as measured using the BADS (see Figure 1 for change in BADS over time). First, we observed that a higher percentage of individual-interpersonal activities predicted an increase in behavioral activation at the end of treatment ($F(2, 29) = 8.16$; $p < .001$; $R^2 = .36$; $B = 37.29$, $\beta = .40$, $t = 2.68$, $p = .01$), when controlling for baseline BADS scores within the model ($B = .41$, $t = 2.99$, $\beta = .44$; $p < .001$). Second, we tested whether engagement in social-group activities predicted reduction in behavioral activation. The overall model was significant ($F(2, 29) = 6.08$; $p < .01$; $R^2 = .32$), but contrary to prediction, higher percentage of social-group activities predicted reduction in behavioral activation ($B = -39.54$, $\beta = -.35$, $t = -2.25$, $p = .03$), when

controlling for baseline BADS scores in the same model ($B = 0.37$, $\beta = .40$, $t = 2.62$, $p = .01$). Third, we tested whether higher percentage of engagement in solitary activities predicted subsequent change in behavioral activation ($F(2, 28) = 3.96$; $p = .03$; $R^2 = .22$), with no significant effects for percentage of solitary activities ($B = -10.78$, $\beta = -.13$, $t = -.77$, $p = .45$), when controlling for baseline BADS scores ($B = 0.43$, $\beta = .46$, $t = 2.76$, $p = .01$).

We tested whether percentage of engagement in individual-interpersonal activities predicts improvement in depression at termination, as measured by the MADRS ($F(2, 30) = 3.24$; $p = .053$; $R^2 = .18$). We found that higher engagement in these activities predicted greater reduction in depression severity ($B = -12.01$, $\beta = -.41$, $t = -2.46$, $p = .02$); when controlling for baseline levels of depressive symptoms in the same model ($B = 0.06$, $\beta = .04$, $t = 0.27$, $p = 0.79$). The model testing engagement in social-group activities as a predictor of depression severity was not significant ($F(2, 30) = 0.64$; $p = .53$; $R^2 = .04$), showing that these activities did not predict significant change in depression ($B = 6.20$, $\beta = .18$, $t = 0.96$, $p = .34$), when controlling for baseline MADRS scores within the same model ($B = .10$, $\beta = .08$, $t = 0.42$, $p = .68$). Similarly, the model testing engagement in solitary activities as a predictor of MADRS change was nonsignificant ($F(2, 29) = 1.19$, $p = .31$; $R^2 = .08$), showing that higher engagement in these activities did not predict depression change ($B = 6.80$, $\beta = .25$; $t = 1.42$, $p = .17$), when controlling for baseline MADRS scores in the same model ($B = 0.17$, $\beta = 0.12$, $t = 0.66$, $p = .51$).

Discussion

The principal finding of this study is that engagement in interpersonal-individual activities, which involved a significant other (a family member or friend), predicted increase in both behavioral activation and reduction in depression in older adults with major depression receiving Engage therapy. This finding is consistent with the view that individuals have a basic need for frequent pleasant interactions with significant others,³ as well as previous findings suggesting that engagement in interactions with family members was beneficial for older adults.³⁷ A national study of 7,367 older adults found that social support is most strongly related to improved well-being when provided by one's spouse/partner, followed by children, and then friends.⁵ Our results are consistent with the premise that significant others serve as a powerful social reward.³⁰

Contrary to our prediction, we did not find that engagement in social group activities, such as attending religious services or events in the community, predicted reduction of behavioral activation was related to depressive symptoms reduction. While null findings should be interpreted with caution, it is possible that these group activities may be insufficient in facilitating a sense of belonging and affective interpersonal interactions with others, and thus may not serve as a strong social reward. It may be that when patients attend social gatherings, they may continue to avoid direct interpersonal interactions and remain passive, and thus, do not experience mastery and pleasure, which is crucial in positive reinforcement and achieving therapeutic gains.³¹

Our results are consistent with longitudinal studies showing that older adults who engage with others in the social world are less likely to experience depressive symptoms¹⁴,

loneliness¹⁵, and cognitive decline¹⁶ over time. It is possible that patients with stronger social and interpersonal skills were more likely to select interpersonal-individual activities and experience those activities as more rewarding and pleasurable. Others have suggested that depressed patients with interpersonal problems have more difficulty engaging in treatments based on reward exposure^{45,46}. Some behavioral activation therapy manuals emphasize the importance of targeting patients' capacities to navigate interpersonal interactions, especially when patients struggle socially, which prevents them from engaging in rewarding social interactions.³² Reward exposure therapies may encourage engagement in interpersonal interactions and address difficulties as they emerge.

The current findings should be considered in the context of several limitations. First, our study was an open trial and did not include a control group. Second, our sample was relatively small and thus the study was underpowered for use of longitudinal analyses, such as cross-lagged panel modeling, which allow one to disentangle within-patient from between-patient effects. Studies with larger samples will be required in order to conduct those analyses. Furthermore, we did not manipulate exposure to social rewards in this study and thus results are correlational and be interpreted with caution.

Despite the above limitations, to the best of our knowledge, this is the first study which examines the benefits of exposure to social reward over the course of psychotherapy. These preliminary findings are in line with emerging evidence from neurobiological studies highlighting the importance of studying the association between social rewards and psychological distress and well-being,^{18,19,21,30,47} as well as results suggesting that social reward may be especially relevant in older adults populations.²¹ Additionally, our findings are in line with neurobiological evidence suggesting that neural reactivity to rewards predicts treatment response in cognitive behavioral therapies among adults with comorbid depression and anxiety.⁴⁸

The present results suggest that social reward exposure could be a potential mechanism of change in treatments like Engage, which rely on patient social and physical activation. Future studies may examine whether changes in social reward are associated with neurobiological and symptomatic changes in treatment for late-life depression. Finally, this study is in line with advancements towards integration of psychotherapy research and neurobiological studies in mood disorders. Collaborations between clinicians, clinical researchers, and neuroscientists can advance our understanding of specific treatment components that may lead to greater benefits for depressed individuals.^{33,49,50}

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Highlights

- This study examines whether engagement in socially rewarding meaningful activities predicts subsequent reduction in depression severity and increase in behavioral activation in depressed older adults receiving nine weeks of reward exposure psychotherapy.
- Patients who engaged in more interpersonal activities (i.e. interactions with family members or friends), but not in solitary or social-group activities, showed greater reduction in depression severity and increase in behavioral activation.
- Repeated exposure to social rewards in the context of interpersonal interactions may be especially beneficial to older adults with late life depression.

FIGURE 1.

Fixed effects plot for changes in behavioral activation over the course of Engage; Error bars represent standard errors. BADS = Behavioral Activation for Depression Scale.

FIGURE 2.

Fixed effects plot for changes in depression severity over the course of Engage; Error bars represent standard errors. MADRS = Montgomery Åsberg Depression Rating Scale.

TABLE 1.

Characteristics of 48 patients receiving 9-weeks of Engage psychotherapy

Characteristics	% (N)	Mean (SD)
Age		71.7 (8.2)
Education (Years)		16.1 (5.6)
Baseline scores		
MMSE		28.8 (1.2)
MADRS		22.5 (5.64)
BADS		80.3 (25.3)
Gender		
Female	36 (67)	
Male	12 (33)	
Ethnicity		
Non-Hispanic	43 (89.6)	
Hispanic	5 (10.4)	
Race		
White	85.4 (41)	
Black/African American	6.3 (3)	
Native Hawaiian/Pacific Islander	2.1 (1)	
Other	6.3 (3)	

Notes. MMSE = Mini-Mental State Examination; MADRS = Montgomery Åsberg Depression Rating Scale; BADS = Behavioral Activation for Depression Scale