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ENHANCING THE IMPACT OF BEHAVIORAL ACTIVATION VIA PROSPECTION

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Enhancing Behavioral Activation Via Prospction

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Prospection involves imagining future events. When people engage in positive prospections, they report increased engagement in imagined future behaviors. This study sought to increase behavioral engagement by combining prospection with a behavioral activation intervention (behavioral activation-based prospection [BAP]). In this experimental design, participants (N=54) placed in two groups (the BAP group and a control group [BA]) identified two target activities they wanted to engage in (phase one) over a one-week intervention period (phase two). After identifying the target activities, participants in the BAP group imagined themselves engaging in these activities and completing their frequency goals. In support of our hypothesis, behavioral activation-based prospection engendered more detailed representations of prospective activities than behavioral activation (BA) alone. However, contrary, to our hypothesis increased access to details of prospective activities did not result in significant between group differences in behavioral engagement. That is, both groups increased engagement in target activities from time one (baseline) to time two (post-intervention week). Relevance of results to behavioral activation-based prospection interventions for depressed and non-depressed populations are discussed.
Keywords: (prospection, episodic future thinking, behavior, behavioral activation)

Enhancing the Impact of Behavioral Activation via Prospection

"The use of mental imagery is one of the strongest and most effective strategies for making something happen for you" (Dyer, 2008, p. 49).

Mental imagery (MI) has been defined as the internal simulation of images (i.e., a detailed reproduction of an object, person, scene, etc.) that often produce sensory experiences in the absence of a direct external stimulus. The existence, nature, and function of MI have long been a source of great debate and a central topic in discussions about cognitive functioning (Iachini, 2011; Pearson, Deeprose, Wallace-Hadrill, Heyes, & Holmes, 2013; Pearson, Naselaris, Holmes, & Kosslyn, 2015; Ward, 2016). Over the last three decades, empirical findings indicate that MI is a fundamental cognitive process, which plays an important role in overall well-being (Blackwell et al., 2013; Holmes, Blackwell, Heye, Renner, & Raes, 2016; Ward, 2106; Ji, Holmes & Blackwell, 2017). MI is implicated in many cognitive processes, such as episodic memories (i.e., representations of specific times and places in the past); perception (i.e., mental representations of the present); and prospection (i.e., mental representations of the future), which and can help people make sense of the external world, : that may be explicit or implicit in nature and conscious or unconscious, respectively (Gilbert & Wilson, 2007; Addis, Wong, & Schacter, 2007). The subject of this study will be prospection.

Prospection

Prospection refers to the ability to simulate mentally or "pre-experience" a future event (Suddendorf & Corballis, 2007). This cognitive process can be focused on an *outcome*, that is, generation of images related to a goal, or on a *process*, that is, the generation of images of the steps leading to that outcome or goal. Studies have found that each can have different motivational and cognitive effects and that during prospection, individuals typically engage in a

combination of outcome and process prospection (Chan & Cameron, 2011). In addition, individuals adopt a first person (field) perspective or third-person (observer) perspective. In the first-person perspective, an event is imagined through one's own eyes, whereas from the third-person perspective an event is imagined through the eyes of an observer in which the imaginer watches themselves in the simulation as if they were an actor in a scene. Neuroimaging studies suggest that prospection is a process that individuals regularly engage in when they are not consciously perceiving the present (Gilbert & Wilson, 2007).

With the capacity to adopt both field and observer perspective, prospection relies on the integration of visual, sensory, perceptual, and kinesthetic information from episodic memory (Gilbert &Wilson, 2007; Szpunar & Jing, 2013; Schacter & Addis, 2007). As a result, it ties cognitive processes to physiological phenomena such as behavioral engagement. The relative pre-experiencing of simulated actions is impacted by the detail, vividness, and perceived plausibility of the prospection. Likewise, research indicates that when prospections are more personally important (e.g., goal-oriented), they are more detailed, vivid, and seemingly plausible. The greater the plausibility, the increased likelihood of behavioral engagement in the prospective behavior (Lehner & D'Argembeau, 2016; Renner et al., 2017; D'Argembeau, & Mathy, 2011; Chan & Cameron, 2010; Miles, Nind & McCrae, 2010; Driskell, Copper & Moran, 1994). As such, prospection impacts the way we engage with and view the world (Hallford, Austin, Takano, & Raes, 2018).

Prospection can influence behavior, emotion, and cognition (for a review see, Ward, 2016; Pearson, Naeselaris, Holmes, & Kosslyn, 2015). Studies have found that prospection interventions increase behavioral engagement in non-depressed populations. For instance, Knauper et al. (2011) found that the combination of prospection and implementation intentions

led to increased fruit consumption in healthy participants. Other studies have found that prospection leads to increases in physical activity, health behaviors, and voting (for a meta-analysis see, Conroy & Hagger, 2018; Renner et al., 2019; Chan & Cameron, 2012; Libby et al., 2007). Together, these findings suggest that prospection has the potential to increase engagement in positively reinforcing behaviors (i.e., engagement in non-depressive behaviors). Reduced engagement in positively reinforcing behaviors is a hallmark of many forms of psychopathology, and difficulty with prospection may be implicated.

Prospection has also been linked with various forms of psychopathology (Miloyan, Pachana, & Suddendorf, 2017; Ji, Heyes, MacLeod, & Holmes, 2016; Brown et al., 2014; Hirsch & Holmes, 2007). Seligman and Roepke (2016) have recently proposed that "faulty prospection" underlies the development of depression, which, in turn, further exacerbates difficulty with generating prospections. Roepke and Seligman (2016) discuss three problems in prospection, namely poor generation of possible futures, negative evaluation of possible futures, and negative beliefs about the future. In support of this theory, research has demonstrated that individuals with depression generate less detailed prospections (Morina, Deeprose, Pusowski, Schmid, & Holmes, 2011), generate fewer positive prospective experiences (on average) than healthy individuals (MaCleod et al. 1997; Holmes, Lang, Moulds, & Steele, 2008), and rate poor outcomes to life problems as more likely to occur than hopeful or positive outcomes (Beck, Wenzel, Riskind, Brown, & Steer, 2006). In a systematic review, Hallford, Austin, Takano and Raes (2018) found that individuals experiencing depression, bipolar disorder, and schizophrenia generate significantly less detailed and specific prospections (episodic specificity) than healthy individuals. Likewise, a study conducted by Brown et al. (2014) produced similar findings regarding episodic specificity and post-traumatic stress disorder (PTSD).

Like the results among non-depressed participants (Conroy & Hagger, 2018; Chan & Cameron, 2012; Libby et al., 2007), research indicates that interventions that target prospection improve affect and behavioral health outcomes in depressed populations (for a review see, Roepke & Seligman, 2016; Blackwell et al., 2015; Boland, Riggs, & Anderson, 2019; Renner et al., 2017, 2019). Thus, prospection represents a promising target in the treatment of depression.

<div align="center">**Depression**</div>

In 2016, The National Institute of Mental Health (NIH) estimated the prevalence of depression at 16.2 million adults or 6.7% of all U.S. adults (Center for Behavioral Health Statistics and Quality, 2017). Despite the existence of several effective treatments for depression, the American Psychiatric Association (2000) notes that depression is highly recurrent even with the most effective treatments, with at least 50% of those who recover from a first episode of depression having one or more additional episodes in their lifetime. Those rates increase to 80% if a person has experienced more than one episode of depression. Thus, there remains considerable room for growth and development of the treatments that are commonly applied in working with individuals with depression.

Depression and Behavioral Activation

Behavioral activation (BA) is among the most widely used empirically supported interventions in the treatment of depression. BA was first developed in the 1970s and emphasized the importance of positive event scheduling and social skills training in the treatment of depression (Lewinsohn, 1974). BA is based on the conceptualization that depression is a function of increased reinforcement for depressive behaviors and decreased reinforcement for non-depressive behaviors (Lejuez, Hopko, & Hopko, 2001). For instance, a person may avoid spending time with friends (avoidance behavior) because they are too concerned about what

other people will think about them. Instead of spending time with friends, they stay in bed, which immediately relieves the anxiety caused by the prospect of socializing (increased reinforcement for the depressive behavior). However, by avoiding their friends, they do not experience positive feelings (decreased reinforcement for non-depressive behavior) associated with social connection, which may exacerbate feelings of sadness and isolation over the longer term (Werner-Seidler, Afzali, Chapman, Sunderland, & Slade, 2017). Given that avoidance behavior, such as the previous example, is pervasive in several disorders including depression, anxiety and post-traumatic stress disorder (PTSD) (5th ed.;DSM–5; American Psychiatric Association, 2013), the BA treatment model attempts to counteract these deleterious behaviors. It does so with a focus on increasing reinforcement for non-depressive behavior and decreasing reinforcement for depressive behavior by employing activity scheduling and other behavioral techniques (Lejuez, Hopko, & Hopko, 2001; Lejuez et al., 2011).

The results of several meta-analysis reveal that BA is efficacious in the treatment of depression (Cuijpers, van Straten, & Warmerdam, 2007; Sturmey, 2010; Mazzucchelli, Kane, & Rees, 2010). Several studies have found that BA increases engagement in activities, reduces avoidant behavior, and decreases symptoms of depression and substance use (Reynolds et al., 2011; Nasrin et al., 2016; Bailey & Arco, 2010; Gawrysiak, Nicholas, & Hopko, 2009; Lejuez et al., 2001). Additionally, a meta-analysis conducted by Mazzucchelli, Kane, and Rees (2010) found that BA not only reduces depressive symptoms in clinical populations but also promotes well-being in non-clinical populations and can therefore be adapted to a range of populations.

Combining Prospection and Behavioral Activation Interventions

Given the prevalence of depression in the United States, the feasibility of behavioral activation interventions, and the promise of prospection interventions, researchers are beginning

to examine the efficacy of combining BA with prospection in the treatment of depression (Renner et al., 2017, 2019). At the time the current study was proposed (February, 2019) only one published study explicitly examined the potential benefit of combining positive prospection and behavioral activation for depression. Renner and colleagues (2017) recruited 150 adults meeting criteria for a current major depressive episode as assessed by a structured clinical interview (SCID-I). Participants were assigned to an experimental condition (positive prospection) or control condition (non-prospection). Participants in the positive prospection condition completed 12 positive prospection sessions over a 4-week period from their homes via the internet.

During the 4-week online intervention, six of the sessions instructed participants to engage in positive prospection using auditory instructions (e.g., participants listened to 10-second audio recordings of descriptions of everyday situations and were instructed to imagine themselves in the scenarios, which always ended positively). In the other six sessions, semantic and visual cues were used to help participants generate mental images (e.g., participants viewed ambiguous photos of everyday scenes with captions that resolved the ambiguity in a positive way). During each session participants were presented with 64 stimuli (auditory scenarios or word-picture scenarios) arranged into eight sets of eight with a break between each set. Using a 5-point Likert scale, participants rated how vividly they could imagine each event. In the first week, participants engaged in the positive imagery intervention daily, alternating between the auditory and word-picture paradigms. In the following weeks participants completed the intervention twice per week alternating between cue types (i.e., engaging with each type once per week).

The non-prospection condition differed in that the prospection component and the positive resolution contingency were removed from both paradigms. During the 4-week online intervention, six of the sessions instructed participants to ''Focus on the words and meanings'' of the audio training scenarios (e.g., participants listened to 10-second audio recordings of descriptions of everyday situations, half of which were resolved positively, and half were resolved negatively). After each training scenario participants were asked to rate ''How difficult was it to understand the meaning of the description?'', from 1 (not at all difficult) to 5 (extremely difficult). In the picture-word paradigm, half of the pictures had positive captions and half had negative captions. Participants were instructed to generate a sentence combining the picture and word, and after each picture-word combination rated ''How difficult was it to make a sentence combining the picture with the words?'' from 1 (not at all difficult) to 5 (extremely difficult).

After the 4-week intervention, both groups completed the Behavioral Activation for Depression Scale (BADS) - a questionnaire designed to measure the kinds of behaviors hypothesized to be implicated in symptom change following BA, such as activation, avoidance/rumination, work/school impairment, and social impairment - at follow-up after one, three, and six months. The results of the study revealed that overall behavioral activation increased over time for both groups, and behavioral activation significantly increased in the positive prospection condition compared to the control condition (i.e., an interaction effect between condition and time). Additionally, results revealed that there were significant between-group differences in each of the four subscales of the BADS (Activation, Avoidance/Rumination, Work/School Impairment, Social Impairment). Participants in the positive prospection condition generally reported higher Activation, and significantly greater decreases in Rumination/Avoidance and Social Impairment. Groups did not differ in their ratings on the

Work/School Impairment scale. Notably, there was also a significant interaction between imagery vividness and behavioral activation over time, indicating that participants in the positive prospection condition who imagined scenarios more vividly demonstrated a greater increase in behavioral activation over the course of the study. Additionally, Renner et al. found that participants in the prospection group who reported greater levels of imagery vividness had a more significant reduction in depressive symptoms.

While the Renner et al. study contributes to our understanding of the relations between prospection and BA, several key questions remain unanswered. For instance, the positive prospection intervention in the Renner et al. (2017) study was designed to target negative interpretation bias in depression rather than coming from a behavioral activation framework (i.e. aimed at increasing behavioral activation through positive reinforcement). Additionally, the imagined activities were prescribed (i.e. not chosen by the participants).

Proposed Study

By modifying the methodology used by Renner et al. (2017) the present study sought to build on those findings. The proposed study tailored a positive prospection intervention around increasing engagement in potentially rewarding activities using a behavioral activation protocol. Additionally, target activities were identified by the participants, with the interest of increasing external validity. In the Renner et al. study the activities in the prospection intervention did not closely match the outcome measures; however, in the proposed study the prospection intervention closely matched the outcome measures (e.g. detail generation, master activity log and behavior checkout). Other studies have explicitly targeted process or outcome imagery (Knauper, 2011; Chan & Cameron, 2011); however, this study prompted participants to use a combination of outcome prospection (generating images of the outcomes or goals) and process

prospection (generating images of the steps leading to outcomes and goals). This study was conducted in person vs online with the intention that it could easily be adapted into a clinical setting in the future.

In this study, we examined the potential clinical utility of adding prospection to behavioral activation (BA) by pairing components from BA with prospection. The goal of this study was to determine their combined effects on behavioral engagement. We hypothesized the following:

1. The prospection group would generate significantly more detailed representations of executing target activities.

2. The prospection group would engage in significantly more target activities than the control group

3. Detail generation would mediate the significant difference between groups in behavioral engagement.

Methods

Participants

Recruitment began in March 2019 and ended September 2019. A total of 103 individuals completed the prescreening survey, and 103 of those consented to participate in the study. Twenty-three participants did not qualify based on exclusion criteria (i.e., current diagnosis of a mental health condition). The remaining 80 participants were invited to participate in the study, and 56 of those participants responded to the invitation and engaged in the intervention phase of the study. Two participants were excluded from the final analyses, because they did not complete the follow-up survey resulting in final sample size of 54 participants ($N = 54$). This sample size was sufficient based on a power analysis using moderate effect size ($f = 0.25$).

Among the final pool of participants, ages ranged from 18 to 61 (*M age* = 24.30, *SD* = 8.897). Regarding gender identity, 20 (37%) individuals identified as men, and 34 (63%) identified as women. In regard to ethnicity, the breakdown of the sample is as follows: 50 identified as White/European-American (92.6%), 2 as Asian or Pacific Islander (3.8%), 1 as Latino/Hispanic (1.9%), and 2 as Native American/American Indian (3.7%).

Materials

Each participant completed the following measures: a demographics questionnaire, the Beck Depression Inventory (BDI-II), the Behavioral Activation for Depression Scale (BADS). Additionally, participants completed a master activity log, and behavior checkout. The behavior checkout included a pre- and post-measure of behavioral activation (i.e., activity engagement). The Beck Depression Inventory (BDI-II) (Beck, Steer, & Brown, 1996) is a 21-item self-report questionnaire that assesses the presence and severity of depression. Each item corresponds to a symptom of depression and has a four-point scale ranging from 0 to 3. Item ratings are summed to give a single score for the BDI-II with higher scores indicating elevated depressive symptomology: 0-13 (*minimal*), 14-19 (*mild*), 20-28 (*moderate*), and 29-63 (*severe*). The BDI-II shows high reliability to discriminate between depressed and non-depressed subjects with good internal consistency (0.90) and test-retest reliability (0.73 to 0.96).

The Behavioral Activation Scale for Depression (BADS) is a 25-item scale that specifically assesses the behaviors believed to be responsible for change according to the BA treatment model (Martell et al., 2001). The BADS consists of four subscales, Activation, Avoidance/Rumination, Work/School Impairment, and Social Impairment. The BADS possesses good internal consistency (0.87) and test-retest reliability (0.74).

The Autobiographical Interview (AI; Levine et al., 2002) is a method of assessing autobiographical memory from within a single narrative and has been adapted to research looking at detail generation during prospection (Madore & Schacter, 2014, 2016; McFarland, Primosch, Maxson, & Stewart, 2017). The coding method separates episodic details (i.e., information pertaining to an imagined event and includes details about people, objects, actions, feelings, thoughts, location, and time, among others) from semantic details (i.e., general information, factual statements, or other details not specific to the event).

Experimental Design

The proposed study used a between-groups design with experimental (behavioral activation-based prospection [BAP]) and control (behavioral activation [BA]) conditions. The Brief Behavioral Activation Treatment for Depression (BATD; Lejuez, Hopko, & Hopko, 2001) was used to identify desired activities and monitor those activities during the study period. In a clinical setting the treatment is implemented over 10 to 12 sessions. However, for research purposes the treatment was reduced to one intervention session, lasting between 60 and 90 minutes (Gawrysiak et al., 2009; Nasrin et al., 2016). This study consisted of two phases (described in detail below).

Procedure

Phase One. Phase One of the study was completed in a laboratory setting. Using a computer, participants completed a demographics questionnaire, along with the Beck Depression Inventory (BDI-II) excluding item 9 regarding suicidal ideation, and the Behavioral Activation Scale for Depression (BADS). A research assistant was available to answer participant questions. Based on alternating sequence participants were assigned to a group, (i.e., experimental, behavioral activation-based prospection [BAP] or control, behavioral activation [BA]). Once

participants were assigned to a group, they began Phase One of the study. During Phase One of

the study research assistants administered the intervention in a one-on-one session. For both

groups research assistants used Unit 5 of the Brief Behavioral Activation Treatment for

Depression (BATD) manual to help participants identify two specific, measurable, action-

oriented, relevant, and time-limited activities they wanted to engage in during phase two of the

study (i.e., the one-week intervention interval).

Using a modified script from the BATD manual (Appendix A) research assistants asked

participants to consider activities in the following life areas: relationships, education/training,

employment, physical/health issues, spirituality, and several other life areas. Once participants

identified which areas they wanted to focus on they identified target activities using the life

activities checklist from the BATD manual (Appendix B) and listed them on the Life Areas

Assessment form (Figure 1, Appendix B) (McPhillamy & Lewinsohn,1971). Target activities

were defined as activities that participants were not currently engaging. The target activities did

not have to be novel (i.e. something they had never done) but they had to be activities they had

not engaged in, at least two weeks prior to participating in the study.

Once the life area assessment was complete, participants used the activity identification

ranking sheet (Figure 2, Appendix B) to rank the activities from most desirable to least.

Subsequently, participants selected their two most desirable activities and set frequency goals to

engage in activities one, once during Phase Two and activities two, three times during Phase

Two. Participants in both groups were given instructions on charting their behavioral

engagement with a modified version of the master activity log (Figure 3, Appendix B) and the

daily behavior checkout log (Figure 4, Appendix B).

Using a script with similar language to the BATD manual (Appendix A; Lejuez, Hopko, & Hopko, 2001), participants were told that the master activity log and the behavior checkout were useful tools for tracking behavioral engagement over the week. With help from the research assistant, participants began by filling out the master activity log. Both the participant and research assistant had a copy of the participant's master activity log. Next, using a script (Appendix A), participants were given instructions on tracking their daily activity using the behavior checkout log (Figure 4, Appendix B). Each day the person circled Y if they completed the activities and N if they did not.

Following the behavioral activation intervention participants in the control group were asked to type about each activity in as much detail as possible. Participants were allowed 3 minutes to type about engaging in each activity in as much detail as possible.

Positive imagery intervention. The procedure for the experimental group (BAP) and the control group (BA) were the same until the completion of the behavior checkout. After participants were given instructions on completing the behavior checkout participants in the experimental group engaged in a prospection task.

Using a script, research assistants guided participants through a positive imagery intervention in which participants were instructed to imagine themselves engaging in each target activities in as much detail as possible, including information about people, objects, and actions (McFarland et al., 2017) and successfully meeting their frequency goals. Subsequently, participants typed about engaging in each activity in as much detail as possible for 3 minutes.

Phase Two. Phase Two of the study required participants to follow the instructions provided during Phase One to record their behavioral engagement using the behavior checkout over the next seven days. Participants were informed that they could contact the research

assistant via email if they had any questions. After Phase Two ended participants used the master activity log to record the number of times, they met their frequency goals for each activity. At the end of Phase Two participants were emailed a Qualtrics survey. They completed the BDI-II, BADS, and entered the data from their master activity log and behavior checkout into the survey. Once they completed the survey, they were granted research credit for their participation.

<div align="center">

Results

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Analytic Plan

After determining inter-rater reliability Cohen's d ($d = 0.84$), the rest of the qualitative entries were coded. Next, to test between group differences of detail generation about each target activity an independent t-test (significance level alpha .05) was run.

Next, we examined the effects of combining behavioral activation and prospection on behavioral engagement using a repeated measures ANOVA with condition (experimental - behavioral activation-based prospection [BAP]) vs control - behavioral activation [BA]) as the between-subjects factor and time (baseline, post-intervention week) as the within-subjects factor. A moderate effect size ($f = 0.25$) could be observed with 95% certainty using 54 participants.

To determine the mediating effect of detail generation on behavioral engagement, a linear regression analysis was used. Changes in behavioral engagement from baseline to post-intervention were the outcome variables, with detail generation entered as the predictor. Our proposed sample of 54 participants was sufficient at 95% power to observe a moderate effect size ($f = 0.25$) for one predictor in a linear regression model.

Additional exploratory analyses focused on differences between conditions on overall behavioral activation and depressive symptoms from pre to post intervention using repeated-

measures ANOVA with condition (BAP vs BA) as the between-subjects factor and time (baseline, post-intervention week) as the within-subjects factor.

Preliminary analyses

Baseline ratings of selected activities and baseline questionnaires. Comparing baseline behavior ratings and scores on baseline questionnaire measures (i.e., prior to the experimental manipulation) confirmed no significant difference between the groups prior to the experiment ($M = 53.43$, $SD = 10.819$). Scores on scales assessing depression were low on average ($M = 10.04$, $SD = 7.463$), and in the normal mood range according to established cutoffs.

Testing of hypotheses

Detail generation. In line with our hypothesis the experimental group (BAP) generated significantly more detail, ($M = 13.19$, $SD = 5.758$) for activity one than the control group (BA), ($M = 10.30$, $SD = 4.268$); $t(52) = 2.094$, $p = .041$), $d = 0.507$. Participants in the BAP group also generated significantly more detail for activity two, ($M = 14.04$, $SD = 4.686$) than the BA group, ($M = 10.30$, $SD = 4.427$; $t(52) = 3.015$, $p = .004$) $d = 0.82$.

Behavioral activation. For engagement in activity one, a main effect for time was found, $F(1,52) = 91.647$, $p < .001$, $\eta_p^2 = 0.638$, meaning that both groups significantly increased their engagement in activity one from time one (baseline) to time two (post-intervention week). Consistent findings were found for activity two, $F(1,52) = 150.452$, $p < .001$, $\eta_p^2 = 0.743$. Contrary to our hypothesis, the interaction was not supported, meaning that we did not find significant differences in behavior engagement between groups. Given that there was no interaction we did not run a mediation analysis.

Exploratory analyses. Exploratory analyses using repeated-measures ANOVA with condition (BAP vs experimental BA) as the between-subjects factor and time (baseline, post-

intervention week) as the within-subjects factor revealed a main effect for time. That is, from time one (baseline) to time two (post-intervention week) we observed decreases in scores on the BDI-II, F (1,52) = 40.033, $p < .001$, $\eta_p^2 = 0.143$ and increases on the BADS F (1,52) = 18.186, $p < .001$, $\eta_p^2 = 0.435$ for both groups.

Discussion

Prospection is a cognitive process that allows people to pre-experience future events in ways that influence present and future behavior, emotion, and cognition (for a review see, Ward, 2016; Pearson, Naeselaris, Holmes, & Kosslyn, 2015). Given its pervasiveness in daily life, it is important to identify ways that prospection can be used and enhanced. Prospection strategies have been shown to increase behavioral engagement in clinical and non-clinical populations (Conroy & Hagger, 2018; Renner et al., 2017, 2019; Chan & Cameron, 2012; Libby et al., 2007). This study used a non-clinical population to examine whether combining prospection with a behavioral activation intervention leads to more behavioral engagement than behavioral activation alone. We predicted that participants assigned to the experimental-behavioral activation-based prospection (BAP) group, would generate more detailed representations of the prospective target activities; therefore, they would engage in more target activities than participants in the control-behavioral activation (BA) group.

In the present study, behavioral activation-based prospection engendered more detailed representations of prospective target activities than behavioral activation alone, as hypothesized. Unexpectedly, however, more detailed representations of target activities did not produce significant between group differences in behavioral engagement. In fact, both the experimental and control groups significantly increased engagement in target activities from time one (baseline) to time two (post-intervention week).

In a between-group design, such as was used in this study, there are many factors relating to individual propensity for behavioral engagement that might explain an absence of between-group differences. One explanation for the absence of between-group differences in behavioral engagement might be that the BA group engaged in spontaneous use of imagery (i.e., tended to use imagery spontaneously without being prompted). This explanation for an absence of between-group differences in behavioral engagement was recently proposed by Renner et. al (2019). In their study, they hypothesized that behavioral activation-based prospection would result in more engagement in six participant-selected target activities than behavioral activation with a daily reminder, or than behavioral activation alone. They found significant between-group differences between the behavioral activation-based prospection group (BAP) and the behavioral activation with reminders group but not between the BAP and behavioral activation alone group. That is, the BAP group engaged in more activities than the behavioral activation with reminders group, but not the behavioral activation alone group. In the Renner et al. study, the *Spontaneous Use of Imagery Scale (SUIS)* was administered at baseline to assess participant's use of imagery in everyday life. Participants in the behavioral activation alone group scored higher on the SUIS than the other groups. Therefore, Renner et al. speculated that the absence of between-group differences in behavioral engagement might be explained by greater spontaneous use of imagery in the behavioral activation alone group. The present study did not administer the SUIS at baseline, and thus, we are unable to assess the level of spontaneous imagery in either group. Future studies might administer the SUIS at baseline to assess for between-group differences in spontaneous use of imagery.

A second reason for the absence of between-group differences might be that behavioral frequency goals (engage in behavior one once and behavior two three times over the week) were

met and exceeded by all participants in each group, resulting in a ceiling effect. Results from a one-sample t-test revealed that on average participants engaged in activity one twice over the week and activity two three times over the week. Had we set the frequency goals higher we might have observed more variance in behavioral engagement. Additionally, we asked participants to select two activities that they "wanted" to complete; therefore, most participants selected activities that could be classified as enjoyable and easy to complete. For instance, for activity one, 14 (25.9%) participants selected "social activities", and 21 (38.9%) participants chose "pampering self" for activity two. Renner et al. (2019) had participants select three enjoyable activities and three routine activities, for a total of six activities to engage in over the one-week intervention period. Selecting more activities, including those less enjoyable or more routine, might allow for more variability in activity completion. Given that avoidance of behavioral engagement is transdiagnostic, particularly for behaviors that are more challenging or aversive, future studies might build off of Renner et al. (2019) by having participants select types of activities that are enjoyable, routine, and challenging/aversive.

A third reason for the absence of between-group differences in this study might best be explained by the methodology. For instance, we did not have participants engage in activity scheduling for this study. Instead, we used the goal setting component of behavioral activation (i.e., we had participants set frequency goals and track their activity daily). While our intervention was consistent with our outcome measures of behavioral frequency and goal completion, it differed from Renner et al. (2019) whom had participants engage in "activity scheduling" which is another component of behavioral activation. Had our study used activity scheduling we might have replicated the findings of Renner et al..

Consistent with Renner et al. (2019), exploratory analyses revealed changes for both groups on all subscales (e.g., activation, avoidance/rumination, work/school impairment, and social impairment) of the Behavioral Activation for Depression Scale (BADS) and the Beck Depression Inventory (BDI). These findings suggest that combining prospection and behavioral activation and behavioral activation alone have positive effects on overall behavioral engagement and mood over a one-week intervention period in a non-clinical population. This is important because it indicates that these interventions can be helpful for anyone, and not only among clinical populations.

The most interesting findings from the present study were observed between-group differences for detail generation. That is, BAP produced more detailed representations of prospective activities than BA alone. This finding is of particular interest because research shows that individuals with depression have less detailed prospections, which contributes to the maintenance of depressive symptoms via decreased behavioral engagement in prospective behaviors. Therefore, based on findings from this study, future studies could explore the effects of combining prospection and behavioral activation in clinical populations that have impaired prospective abilities (e.g., less detailed prospections). Despite an absence of observed between-group differences in this study, we hypothesize that access to more detailed representations of prospective behaviors might lead to increased behavioral engagement over and above behavioral activation alone in clinical populations with impaired prospective abilities, such as those with depression.

Behavioral activation is an empirically supported treatment for depression that has been implemented in clinical settings for over three decades. Given that depressed individuals often have known deficits in prospective abilities, a growing body of literature is exploring the

enhancing effects of prospection on behavioral activation. To date, only one published study explicitly examines the effects of combining an empirically supported behavioral activation intervention with prospection in a non-clinical population (Renner et al., 2019). Findings reveal that behavioral activation-based prospection leads to increased behavioral engagement over and above behavioral activation with reminders but not behavioral activation alone. Given the findings from the present study and Renner et al., future studies might build off these findings by modifying and adapting these methodologies, eventually using a clinical population to explore the clinical utility of behavioral activation-based prospection.

The current study had several limitations. We recruited a homogenous, non-clinical, university undergraduate sample from the general population and had participants select a limited number of potentially enjoyable and rewarding activities. We did not include measures of spontaneous imagery, which limits the conclusions we can make about our findings. Participants tracked their behavioral engagement using paper and pencil, so we were not able to monitor adherence to the protocol in real-time (i.e., if participants recorded their activity daily). Future studies might utilize an electronic method for activity monitoring such as the "Behavioral apptivation" phone application.

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Appendix A

Identifying Potential Activities

As a first step in this protocol, you must determine the activities you would like to target. In determining these activities, you might want to consider activities related to the following life areas (adapted from Hayes, Strosahl, & Wilson, 1999):

1. Family relationships (e.g., What type of brother/sister, son/daughter, father/mother do you want to be? What qualities are important in your relationship with those in your family?)

2. Social relationships (e.g., What would an ideal friendship be like to you? What areas could be improved in your relationships with your friends?)

3. Intimate relationships (e.g., What would your role be in an intimate relationship? Are you currently involved in this type of relationship, or would you like to be?)

4. Education/training (e.g., Would you like to pursue further education or receive specialized training? What would you like to learn more about?)

5. Employment/career (e.g., What type of work would you like to do? What kind of worker would you like to be?)

6. Hobbies/recreation (e.g., Are there any special interests you would like to pursue, or new activities you would like to experience?)

7. Volunteer work/charity/political activities (e.g., What contribution would you like to make to the larger community?)

8. Physical/health Issues (e.g., Do you wish to improve your diet, sleep, exercise, etc.?);

9. Spirituality (e.g., What, if anything, does spirituality mean to you? Are you satisfied with this area of your life?)

10. Psychological/emotional issues (e.g., What are your goals for this treatment? Are there other issues besides depression that you would like to explore?).

Once you have determined areas you would like to address, you are ready to start identifying actual activities and listing them in (Figure 1, appendix B). For specific ideas, take some time to review (Figure 1, appendix B) and place a check mark next to those activities that sound interesting. In completing this exercise, you likely will identify clusters of activities that make up larger long-term goals. For example, a long-term goal of attending college might include enrolling in classes, saving money to purchase textbooks, and studying several hours per week. As another example, a long-term goal of developing a closer relationship with a family member may include spending more time together, engaging in more activities that she or he enjoys, offering to baby-sit for her or his child, or initiation of mutually agreed-on family counseling. Although completing a cluster of activities aimed at a specific long-term goal can be satisfying, it is important to also select other activities across a wide range of life areas from social contact to the completion of life responsibilities. In general, if you believe that completing it would bring a sense of pleasure and/or accomplishment, then it probably would be good to include it. When selecting activities, they should be both observable by others and measurable. Therefore, a general goal like "thinking more positively" is not appropriate. Instead, a more appropriate activity might include "visiting my brother at least twice per week." Please, do NOT select activities you already are completing on a regular basis. Choose activities you are not currently engaging in but would like to engage in more. In total, you should select between 5 -15 activities that are personalized to your own needs and desires as much as possible. As you select an activity, add it to (Figure 2, Appendix B) in no order, and then rank them from 1 (most desired) to 15

(least desired) creating the activity hierarchy. After you have constructed and ranked your list

of activities select two activities that you would like to engage in more during the next week.

You will set a goal of engaging in one of the activities one time over the next week and you

will set a goal of engaging in the other activity three times over the next week.

The Master Activity Log and the Behavior Checkout

Master activity log.

Once you have identified the two target activities, you will need a plan for how you will work

these activities into your life and how you will assess your progress. The master activity log

(Figure 3, Appendix B) is a useful way of tracking your progress on a weekly basis. In the first

column, you and the research assistant will copy your two target activities. In the columns next

to the activity, you should list the following: (a) the number of times you would like to complete

the activity in a 1-week period (i.e., ideal frequency one or three times). Both you and the

research assistant should have a copy of the master activity log.

Behavior checkout.

Now you are ready to record your progress daily, using the weekly behavior checkout (Figure 4,

Appendix B). Like the master activity log, you write down the frequency goals in the appropriate

columns for each activity you have selected for the week. Each day you circle Y if you

completed the activity and N if you did not. To ensure that you maintain accurate records, it is

best if you allocate a specific time of the day to complete this task (e.g., before bedtime). Again,

you should complete the behavior checkout daily. After the week has come to an end, you should

go back to the Master Activity Log and record the number of times that you met your frequency

goals for each activity.

Control (BA) group instructions.

Participants in the control group (BA) will be instructed to type about each target activity in as much detail as they can. They will be given three minutes to type about each activity.

After participants are done typing about each activity read the following:

After the 1-week is complete you will be sent a link to a Qualtrics survey. You will use the paper copy of your master activity log and behavior checkout to complete the online survey. After you have completed the online surveys you will be granted credit for your participation in the study.

Experimental (BAP) group instructions.

Beginning with activity one, imagine engaging in the activity in as much detail as possible, including information about people, objects, and actions (McFarland et al. 2017). Imagine yourself in the scenario "as if actively involved, seeing them through their own eyes" (Holmes et al. 2006). Imagine that you are successfully engaging in the activity; meeting your frequency goals. Participants will be allowed 3 minutes to generate/type out the details for each activity.

Once participants have completed typing their responses, read the following:

After the 1-week is complete you will be sent a link to a Qualtrics survey. You will use the paper copy of your master activity log and behavior checkout to complete the online survey. After you have completed the online surveys you will be granted credit for your participation in the study.

LIFE ACTIVITIES CHECKLIST

EXCURSIONS/COMMUNITY	✓	ENTERTAINMENT	✓
1. Taking a trip or vacation		1. Watching TV or listening to the radio	
2. Going to a fair, carnival, circus, zoo or amusement park		2. Bingo, gambling, playing the lottery	
3. Going to the beach		3. Going to the movies	
4. Going on a picnic		4. Going to concerts	
5. Going out to dinner		5. Going to the races (horse, car, boat, etc)	
6. Taking a road trip		6. Going to a play, musical, comedy show	
7. Riding on an airplane, hot air balloon, helicopter		7. Going to a sporting event	
8. Staying at a hotel or bed and breakfast		8. Other:	
9. Camping		**SPORTS AND GAMES**	
10. Going to a museum or exhibit		1. Swimming, Snorkeling, or Scuba Diving	
11. Shopping, garage sales, flea markets		2. Biking, Skating or Roller-blading	
12. Going to the library or a book store		3. Hunting or Shooting	
13. Going out to the country		4. Playing lawn sports (croquet, horseshoes, badminton)	
14. Other:		5. Jogging, Hiking or Walking	
INTERACTIONS WITH OTHERS OR SOCIAL ACTIVITIES		6. Tennis, Racquetball, Table Tennis, Handball, Squash	
1. Going to or giving a party		7. Golf or Miniature Golf	
2. Giving and receiving physical affection		8. Fishing	
3. Reminiscing, talking about old times		9. Birdwatching	
4. Group activities		10. Playing board games	
5. Having a frank and open conversation		11. Playing card games	
6. Getting together with friends		12. Puzzles, crosswords, brain teasers	
7. Discussing a topic of interest (sports, fashion, politics, news)		13. Rockclimbing or Mountaineering	
8. Having family visit or visiting family		14. Baseball or Softball	
9. Meeting someone new		15. Boating (canoeing, kayaking, sailing)	
10. Eating out with friends or associates		16. Pool, Billiards or Shuffleboards	
11. Visiting friends or having friends visit		17. Computer Games	
12. Other:		18. Other:	

Life Areas Assessment

Instructions: Describe activities that you would like to accomplish in these areas.

1. Family Relationships
_____
_____
_____

2. Social Relationships
_____
_____
_____

3. Intimate Relationships
_____
_____
_____

4. Education/Training
_____
_____
_____

5. Employment/ Career
_____
_____
_____

6. Hobbies/ Recreation
_____
_____
_____

7. Volunteer Work/ Charity/ Political Activities
_____
_____
_____

8. Physical Health Issues
_____
_____

9. Spirituality
_____
_____

10. Psychological/ Emotional Issues
_____
_____
_____

Figure 1. Life Areas Assessment

Rank	Activity	How frequently do you currently engage in this activity?	How many times would you like to engage in this activity over the next week?

Figure 2. Activity Identification Ranking Sheet.
List your activities in order of desire. Answer how frequently you currently engage in each activity and how frequently you would like to engage each activity over the next week.

Master Activity Log

Activity	Ideal Goal Frequency	Week 1 Frequency (How many times did you engage in this activity in the last 7 days?)
	1	
	3	

Figure 3. Master Activity Log.

Behavior Checkout

Activity	Frequency (Goal)	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	1	Y N	Y N	Y N	Y N	Y N	Y N	Y N
	3	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 4. Behavior Checkout.
At the end of each day circle Yes if you engaged in the activity or N if you did not.