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Going Mobile: A Case Vignette Illustrating the Integration of Mobile Technology in Psychotherapy

— Drew Erhardt and Edrick Dorian

When The Who's Pete Townshend sang about the benefits of "Going Mobile" in 1971, little could he or anyone have known just how prescient those words were to become. Four decades later, we are in the midst of "the mobile revolution," spurred by both the advances in mobile technology and the widespread adoption of that technology. The speed with which mobile devices, including smartphones, have been embraced exceeds that of any previous technology (International Telecommunication Union, 2009) and there is every indication that this widespread adoption of mobile technology will only accelerate in coming years. Indeed, recent reports forecast that there will be over 137 million smartphone users in the U.S. in 2013 (Statista, 2012), that yearly global smartphone sales will exceed one billion by 2015 (Computerworld, 2011), and that the number of mobile-connected devices will have exceeded the number of people on earth by the end of 2012 (Cisco Systems, as cited by Perez, 2012).

Coincident with the remarkable rise of mobile technology has been comparably explosive growth in software applications (or "apps") designed to perform a particular function on a mobile device. The number of apps available for iPhone and other iOS devices has grown from 800 at the time the Apple App Store debuted in 2008 to approximately 700,000 in September 2012 (About.com, 2012) with a similar number of apps currently available for Google's android platform (Gulfnews.com, 2012). The rapidly accelerating pace of app usage was reflected in Apple's announcement in January 2013 that more than 40 billion apps had been downloaded from their App Store, with nearly half of those downloads occurring in 2012 (Apple Press Info, 2013). An increasing number of these mobile apps pertain to medical or behavioral health and medical professionals have been "early adopters" in terms of integrating their use into their daily practice (Boschen, 2009; Luxton, McCann, Bush, Mishkind, & Reger, 2011).

For psychologists, mobile apps have the potential not only to extend the reach of mental health care beyond the clinic but can also be used as adjunctive tools with the potential to increase the efficacy and efficiency of traditional psychotherapy. Although clinical psychology is lagging behind medicine with respect to its adoption of this technology (Boschen & Casey, 2008; Luxton, McCann, Bush, Mishkind, & Reger, 2011), the signs that we are in the early stages of a "mobile mental health revolution" are unmistakable. These include the proliferation of apps pertaining to an ever increasing variety of mental health and behavioral problems (Dimeff, Rizvi, Contreras, Skutch, & Carroll, 2011; Roy, 2012), increased scholarly attention to the use of technology in psychotherapy including special journal issues focused on the topic (see, for example, Barnett, Kelly, & Roberts, 2011), a proposed American Psychological Association (APA) division devoted to technology and psychology (American Psychological Association, 2012), and a limited but growing amount of promising empirical findings pertaining to the feasibility and efficacy of integrating mobile apps in therapy (Aguilera & Muench, 2012; Boschen, 2009; Matthews, Doherty, & Sharry, 2008; Parks, Della Porta, Pierce, Zilca, & Lyubomirsky, in press; Rizvi, Dimeff, Skutch, Caroll, & Linehan, 2011).
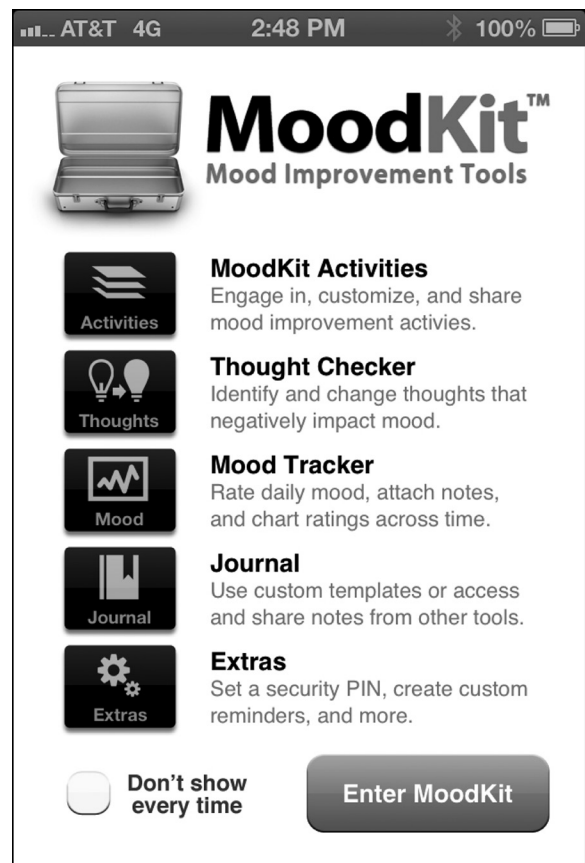

Figure 1. Screenshot of the MoodKit app's four "tools," based on behavioral activation, cognitive restructuring, mood tracking, and journaling.

Many psychologists are likely to harbor mixed feelings regarding the inevitability that mobile technology will become an increasingly integral part of clinical practice over the coming years. Recent surveys have documented a relatively low rate of newer technology use among independent practitioners (McMinn, Bearse, Heyne, Smithberger, & Erb, 2011). In addition to feeling overwhelmed by the demand to "keep up" with technologies that are accelerating at a mind-boggling rate, contributing factors may include a degree of "technophobia" (Eonta et al., 2011) related to lack of familiarity with and confidence in emerging technologies in general, absent graduate or post-graduate training related to their use, and ethical uncertainties associated with their integration into clinical practice. At a basic level, many practitioners are curious about the potential of apps to enhance their practice and eager to stay competitive with other health care professionals who are embracing this technology, but find themselves unsure of the potential clinical uses of apps and how to implement them.

In an effort to help address these concerns, this article provides a case vignette drawn from the authors' recent clinical work using a mobile app they co-developed, entitled MoodKit (Dorian & Erhardt, 2012). Based upon principles and techniques of cognitive-behavioral therapy (CBT), the app was developed for use either as a self-help resource or to enhance psychotherapy. It integrates four distinct "tools" (based on behavioral activation, cognitive restructuring, journaling, and mood tracking; see Figure 1 - previous page) designed to improve mood and promote well-being. The vignette illustrates some of the ways mobile technology can be applied as part of routine clinical practice, while identifying some of the potential benefits associated with doing so.

Case Vignette

Client description. Anthony is a 41 year-old, married, Hispanic father of two school-aged children who works as an associate in a mid-size law firm. At intake, he met criteria for major depressive disorder (MDD) (American Psychiatric Association, 2000) and presented with a number of comorbid anxious features. Clinical history suggested that, in addition to his current episode, Anthony had suffered four prior episodes dating back to late adolescence, each with fairly identifiable environmental precipitants, and ranging in duration from four weeks to eight months.

With respect to treatment history, Anthony received pharmacotherapy (with Lexapro and Zoloft, respectively) from his primary care physician during his first two depressive episodes. Despite moderate mood improvement, he discontinued medication treatment in both instances due to some adverse side effects (viz., agitation, restlessness, reduced libido). Two years ago, following the onset of his third episode, he self-

referred for psychotherapy with a cognitive-behavioral therapist and remained in treatment for nearly three months. He reported that some of the behavioral interventions used (e.g., relaxation training) were helpful, but acknowledged that he frequently failed to complete homework assignments (e.g., mood monitoring, automatic thought records) due to a variety of factors. These including forgetting assignments or the forms needed to complete them, privacy concerns (e.g., completing written assignments when others were around, fear of family members reading his journal entries or thought records), and occasional confusion regarding the rationale for the homework or how to implement the assignment.

Anthony's current depressive episode began 2 months prior to intake, after he learned that a decision regarding his advancement to becoming a partner at his firm would be delayed by at least one year. Prominent symptoms that were among his chief presenting complaints included persistent sad mood, irritability, reduced motivation and performance related to work and personal tasks, disengagement from previously enjoyed social and recreational activities, insomnia, concentration difficulties, and fatigue. Suicidal ideation was not reported. His pre-treatment score (27) on the Beck Depression Inventory–II (BDI-II) (Beck, Steer, & Brown, 1996) fell towards the high end of the moderate severity range for depression. Comorbid anxiety related largely to frequent worries about losing his job should he never "make partner" and the resulting loss of income and status.

Treatment overview. Following a two-hour intake session, Anthony's treatment comprised 19 sessions of individual therapy over the course of 15 weeks (sessions were twice-weekly for the first four weeks of treatment and weekly thereafter). The treatment approach integrated behavioral activation (Dimidjian, Martell, Addis, & Herman-Dunn, 2008; Martell, Addis, & Jacobson, 2001) with traditional cognitive-behavioral therapy for depression (Beck, Rush, Shaw, & Emery, 1979; Beck & Alford, 2008). After the completion of diagnostic and behavioral assessments, the primary treatment components consisted of the following: (a) psychoeducation regarding depression and its conceptualization using the cognitive-behavioral model; (b) socialization to treatment; (c) collaborative goal setting; (d) behavioral activation and other behavioral interventions; (e) cognitive interventions; (f) relapse prevention; and (g) termination. Following is a description of how the app was used to facilitate and enhance the implementation of a number of these aspects of Anthony's treatment.

Psychoeducation/socialization. Anthony's understanding of depression was solicited during the first (post-intake) treatment session and incorporated into a brief psychoeducational discussion of the disorder. He was also provided with a short handout about depres-

Apr 20, 2012 - May 20, 2012

MoodKit

4/20 22 24 26 28 30 5/2 4 6 8 10 12 14 16 18 20
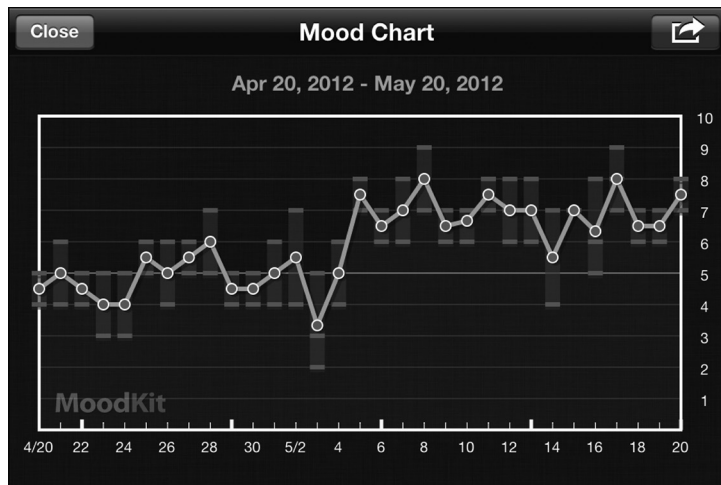
Figure 2. Screenshot of the exportable 30-day mood chart showing individual mood ratings (dashes), daily averages (circles), and daily ranges (shaded rectangles).

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sion and its treatment (Leahy, Holland, & McGinn, 2012) and asked to review it and generate questions, which were addressed during the subsequent session. Although Anthony had some familiarity with CBT based on his prior therapy experience, initial discussions indicated that he did not have a firm grasp of the essential elements of the approach. Thus, a written handout providing general information about CBT (Leahy, Holland, & McGinn, 2012) along with an in-session discussion were used to socialize Anthony to the approach.

Once Anthony indicated that he had a smartphone and was familiar with mobile apps, the therapist introduced the MoodKit app as a way to facilitate the implementation of CBT. In part, this discussion highlighted how the use of the app was consistent with many aspects of the cognitive-behavioral approach to therapy, including an emphasis on skill-building, active participation on the part of the client, regular homework assignments to build healthy behavior and thinking skills and to accelerate the pace of therapy, and explicit efforts to promote generalization. The therapist used an iPad to illustrate the app's user interface and main features, discussed the ways in which the app could be incorporated into treatment, answered Anthony's questions, and confirmed that he was interested in using the app as part of his treatment. In fact, like many clients, Anthony was highly familiar with and enthusiastic about his smartphone and responded positively to the prospect of it being integrated as part of his treatment.

In order to supplement the psychoeducational efforts noted above, an early assignment consisted of having Anthony review the content provided on the app itself concerning the cognitive model of psychopathology and cognitive-behavioral psychotherapy. He subsequently reported that the accessibility of this content on his

device enabled him to review it on multiple occasions leading to greater clarity regarding the cognitive-behavioral approach and the nature and purpose of some of the techniques that were being employed in his treatment. He also noted that the content summarizing the efficacy of CBT for depression helped him to feel more hopeful about his prospects of improving with psychotherapy, even in the absence of antidepressant medication.

Mood monitoring to track progress. Anthony was told that in addition to completing the BDI-II(Beck, Steer, & Brown, 1996) every fourth session, he would be asked to make daily mood ratings so as to provide accurate, useful information regarding his mood and its fluctuations, factors influencing his mood, and any progress occurring as a result of changes he would be making to his thinking and behavior. In lieu of traditional mood rating or "diary" forms, Anthony was shown how to use the app's mood-monitoring tool, which allows clients to use a "picker wheel" (with values ranging from one to ten) to make, save, and chart daily mood ratings, along with accompanying notes (e.g., to provide contextual information such as factors that may have impacted mood). Anthony set the app's "Reminders" feature to have his device prompt him to provide ratings of his mood twice per day (viz., prior to lunch and before bed). He also set weekly and monthly reminders to export to the therapist via email the 7-day and 30-day mood charts, respectively, that were automatically produced by the app based upon his daily ratings (see Figure 2 for an example). These charts (displaying individual mood ratings, daily averages, and daily ranges) were reviewed by the therapist in advance and discussed with Anthony as part of the initial "brief update" portion of his therapy sessions. The notes accompanying Anthony's mood ratings, when not exported to the therapist in advance, were either wirelessly printed from the app or viewed directly on his device so that they could be discussed in session.

Anthony regularly provided twice-daily mood ratings as prompted by the app and, occasionally, added additional daily ratings in response to notable shifts in his mood that he wanted to document and comment upon. He remarked that, in contrast to his prior experience with CBT, eliminating the need to both remember to do this self-monitoring assignment and to carry the necessary forms with him made an enormous difference in his adherence. The regular in-session review of his mood charts and the notes accompanying his ratings helped him to appreciate that his mood fluctuated far more than he thought and that these fluctuations tended not to be random. For example, relatively higher mood ratings tended to correlate with social contact with friends, playing sports with his children, eating meals with his family, and making even minor progress on work- or personal tasks. Relatively lower ratings tended to occur on days when he had no physi-

cal activity, minimal contact with others, watched a lot of television, and procrastinated on various personal and professional tasks. In addition to providing evidence disconfirming his belief that he was "really depressed all the time," the reviews of his charts and ratings that occurred over the early part of treatment helped to provide a convincing rationale for behavioral activation (described below), as it was based not only on information provided by the therapist but also the more impactful "data" of Anthony's own self-reported experience. Additionally, review of his 30-day mood charts over the course of therapy helped to demonstrate that, despite occasional setbacks, Anthony's mood was steadily improving.

Behavioral interventions. The initial phase of active treatment focused on behavioral interventions in an attempt to produce some degree of mood improvement relatively rapidly, which would, in turn, instill hope in Anthony regarding the possibility of progress and greater receptivity to subsequent interventions. Some coping skill-building interventions were included during this phase of treatment, in part, to combat feelings of helplessness, increase self-efficacy, and to promote rewarding behaviors. These included a "booster" session to refresh Anthony's previously learned deep breathing and muscle relaxation skills (accompanied by guidance and encouragement regarding where and when to apply them). This session also reviewed his problem-solving training that focused both on promoting a "positive problem orientation" (e.g., viewing problems as challenges that he had the capacity to meet through the application of persistent effort) and teaching a systematic approach to engaging problems (including steps of problem definition, resource assessment, brainstorming possible solutions, evaluating and selecting a solution, implementation and evaluation) (D'Zurilla & Nezu, 2010).

Anthony's acquisition of the latter skills was facilitated by a pre-formatted template provided as part of the app's journaling tool, which presents prompts mirroring key steps of problem-solving. He was encouraged to complete this template when faced with day-to-day problems. The resulting journal entries were saved and either emailed to the therapist in advance of sessions or wirelessly printed during sessions for review. Anthony reported that this journaling process helped him to

internalize and more habitually apply the basic steps of problem-solving and, more generally, increased his inclination to engage rather than avoid problems.

The primary focus of this phase of treatment was behavioral activation. When presented with a choice, Anthony opted to use the calendar app on his smartphone rather than a printed activity chart to record his daily activities along with accompanying "pleasure" and "mastery" (or accomplishment) ratings. In addition to reviewing these ratings in session, his daily activity logs were compared to his mood charts (described above) in order to identify how both specific activities and his overall activity levels related to his mood. As often found with depressed clients, this process revealed Anthony to generally be experiencing low levels of positive reinforcement, to be prone toward avoidant coping responses, and to often engage in passive, isolative activities (e.g., watching television, web-surfing, lying awake in bed) that reliably lowered his mood and further distanced him from various types of potential rewards. However, it also demonstrated that his mood tended to be better when he was more active and engaged, which helped to underscore the rationale for behavioral activation.

Treatment then focused on identifying activities to be encouraged that would both counter inertia and improve his mood. In part, this was guided by the results of his activity monitoring (e.g., his mood tended to be better when he spent time outdoors) and discussions to identify activities that had been rewarding for him in the past or "untried" activities that he thought might be enjoyable or convey a sense of accomplishment. This process was also informed by efforts aimed at clarifying his values, envisioning what those values would "look like" when enacted in his everyday life, and highlighting disparities between that vision and his actual day-to-day activities (Hayes, Stosahl, & Wilson, 1999). Anthony was asked to complete for homework one of the app's pre-formatted journal templates focused on identifying and living in accordance with one's values. Subsequent discussion of this journal entry in session helped to highlight how, consistent with the Latino cultural values of *familismo* and *respeto* (Falicov, 1998), Anthony placed great importance on being a good father, spending time with his family, providing for them, and earning their respect. Values associated with good health, career success,

Figure 3. Screenshot of the behavioral activation tool and the categories by which its mood-enhancing activities are organized (lower section).

charity, and maintaining friendships were also noted.

The app's behavioral activation tool also proved to be useful in generating "target" activities and in implementing this phase of treatment. This component of the app provides suggestions for over 150 mood-enhancing activities along with examples and implementation tips. The activities are organized by category (see Figure 3 - previous page) and users can also create their own customized activities. Anthony and the therapist used this option to generate a variety of custom activities (e.g., more frequent family meals; helping his children with their homework) that were anticipated to enhance his mood based on the assessment process described above.

Additionally, in order to mirror the individual tailoring that is part of effective behavioral activation(Dimidjian, Martell, Addis, & Herman-Dunn, 2008), the app incorporates an algorithm that will suggest activities based on the results of a brief rating scale that assesses recent involvement in various types of mood-enhancing activities. Anthony's ratings were generally low but particularly so with respect to socializing, physical activity, and engaging in enjoyable activities. Therefore, as he perused the offerings provided by the app, items related to these types of activities were preferentially suggested. As each activity is presented, the app allows the user to commit to implementing it, select it as a favorite, share it with others, schedule it directly in their calendar, and record notes about it prior to or following completion (e.g., to note its mood-enhancing effects). Anthony resonated with and committed to implementing a number of the suggested activities (including those related to enhancing his sense of control at work, acting altruistically, sleep hygiene, catching up with friends, getting closer to nature, revisiting favorite books and films, and rekindling his involvement in cycling). He reported that "committing" to certain activities, sharing his intent with significant others, and relying on the calendar integration and reminder features helped him to follow-through despite his initial pessimism. His self-report, mood ratings, and the notes he attached to the various activities he committed to doing all indicated that behavioral activation helped to improve his mood and enhance his sense of living more consistently with his values.
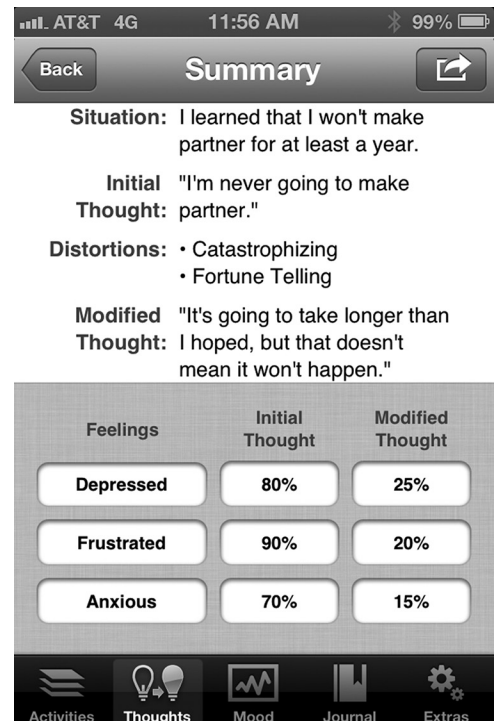
Cognitive interventions. Following the initial focus on behavioral activation, cognitive interventions were introduced. Building on earlier psychoeducational efforts (see above) that had exposed Anthony to the basics of the cognitive model (e.g., the reciprocal relationships among thoughts, feelings, and behavior), he was educated about cognitive distortions and how they often contribute to and/or compound an individual's distress. In addition to reviewing them in session, Anthony was directed towards a list of common distortions provided in the app, asked to review it for

homework, and to categorize some of his frequent distressing automatic thoughts using these labels.

Subsequently, treatment focused on cognitive restructuring aimed at teaching Anthony to identify, categorize, and modify maladaptive thoughts using a variety of techniques (e.g., viewing thoughts as hypotheses as opposed to "truths," examining the evidence, distancing, cost-benefit analysis).

Figure 4. Screenshot of the cognitive restructuring tool's final "summary" screen, displaying side-by-side comparisons of mood intensity ratings before and after thoughts have been evaluated and modified.

These efforts were supported by the use of a cognitive restructuring tool included in the app, designed to help clients manage negative feelings related to a specific situation by identifying, classifying, and generating adaptive alternatives to the thoughts that contribute to such feelings. In contrast to the static nature of printed thought records, step-by-step screens guided Anthony through the process of identifying distressing situations, specifying his accompanying feelings and thoughts, determining whether his thoughts represented common cognitive distortions, modifying such thinking, and evaluating the impact on his feelings. Each usage of this tool was time/date stamped and a single-screen summary of the information Anthony had entered for each step of the process was saved by the app (see Figure 4 for an example). Using exporting options within the app, Anthony would either email these summaries to the therapist in advance of sessions or wirelessly print them during sessions. This made it very convenient for the therapist to review (either prior to seeing Anthony or collaboratively in sessions) multiple instances where he had practiced cognitive restructuring, provide feedback, and respond to questions.

Anthony initially most appreciated the inconspicuous, non-stigmatizing nature of practicing cognitive restructuring via his smartphone, as he reported previously

feeling self-conscious about completing thought record forms in public. As he noted, "so far as anyone else knows, I'm just another guy texting or checking email, not someone completing a therapy assignment." Given that both his phone and the app itself were passcode protected, he also felt comfortable being completely candid in recording his thoughts and feelings, now free from the concern that he might inadvertently leave a completed form where a family member or coworker could see it. Over time, however, he (as well as his therapist) increasingly appreciated the way in which the app promoted a much greater density of practice with cognitive restructuring than would have been possible with paper forms. This helped him to fairly quickly recognize his propensity towards certain cognitive distortions (e.g., negative filtering, fortune telling, catastophizing) and to build his skills in challenging them using techniques learned in therapy. Moreover, frequent repetition via the app helped him to achieve one of the primary goals of cognitive therapy; the internalization and generalization of the process of more effectively managing emotional distress by identifying and modifying maladaptive thinking. Thus, after a number of weeks, Anthony reported that he found himself using the app's cognitive restructuring tool less frequently because the process of "thinking about my thinking and coming up with better ways to look at things" was becoming a habit.

Relapse prevention. Once his acute depressive symptoms had remitted, parts of the final two therapy sessions were devoted to relapse prevention (Antony, Ledley, & Heimberg, 2005). This was considered an integral part of Anthony's treatment in light of his history of recurrent episodes. In addition to encouraging realistic expectations following termination (e.g., predicting setbacks), these efforts included identifying likely triggers (e.g., stressful events related to work). They also included reviewing early warning signs of possible recurrence (e.g., withdrawal, increased passivity, insomnia), and specific strategies to cope with those triggers and symptoms based on what had proven to be useful during treatment (e.g., mood monitoring, relaxation, problem-solving, cognitive restructuring, behavioral activation, contacting the therapist).

Numerous features of the app helped to facilitate relapse prevention. Customized journal templates were created to provide Anthony with ready reminders of early warning signs of depression paired with coping strategies that had proven to be useful. Anthony was also encouraged to sustain regular mood monitoring and journaling as ways to increase ongoing awareness of his mood and to promote attitudes and mindsets conducive to coping, happiness, and well-being. Use of the cognitive restructuring tool when facing distressing situations was highlighted as a way to help him manage upsetting feelings and promote healthy thinking. Engaging in one or more of the activities

included in the app's behavioral activation tool (particularly those that he had customized or marked as favorites) was identified as an always accessible coping strategy when detecting early warning signs of depression. Finally, Anthony was reminded that all of the notes and summaries produced through his use of the app to date and moving forward would always be available for his review. Given the volume of these records, Anthony noted how it would likely be helpful to have them immediately accessible via his smartphone as opposed to being stored in a thick therapy notebook the whereabouts of which he would "probably forget along the way."

Outcome and conclusions. Anthony reported that he was no longer depressed at the end of treatment. This progress was substantiated by both his 30-day mood charts and his results on the BDI-II (Beck, Steer, & Brown, 1996), the latter of which trended downward over the nearly four months of treatment, ending with scores (viz., 6, 4) that fell in the minimal range for depressive symptomatology. He noted significant improvements in his mood, sleep, energy, motivation, work performance, and overall "engagement" with family, friends, and life in general. He no longer personalized the delay in his being considered for partner at his law firm and believed, subsequent to a meeting with his supervisor, that he was doing all that was reasonable to maximize his chances of eventually making partner. This, along with his use of relaxation and cognitive coping skills, also resulted in a significant reduction in his anxiety. Additionally, Anthony expressed appreciation for "reconnecting" with his core values and living in ways that were more reflective of them.

As illustrated by this case, the use of mobile apps in psychotherapy is associated with numerous advantages. They enable therapy to proceed with minimal reliance on paper forms while protecting client privacy. They make therapeutic information and techniques highly accessible and convenient to use by embedded them in devices that people are highly familiar with and increasingly have with them at all times. They also elicit higher levels of client engagement and accelerate the pace of therapy by promoting more frequent practice and more rapid acquisition and generalization of targeted skills. Despite their very recent introduction, it is clear that mobile apps represent an extremely useful adjunctive tool with the potential to make therapy more accessible, efficient, and portable for clients while improving the implementation and impact of many of our interventions.

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