

# Chapter 16

## Enhancing Mindfulness-Based Cognitive Therapy with a Virtual Mindfulness Coach

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*The first rule is to keep an untroubled spirit. The second is to look things in the face and know them for what they are. Marcus Aurelius*

### Vignette

#### *Introduction and Background*

Mindfulness meditation practice has recently received much attention in mental health and represents a core element of a number of treatment approaches, including Mindfulness-Based Cognitive Therapy (MBCT) (Williams, Russell, & Russell, 2008), Dialectical Behavior Therapy (DBT) (Chapman, 2006), Mindfulness-Based Relapse Prevention (MBRP) (Bowen, Chawla, & Marlatt, 2010), and Acceptance Commitment Therapy (ACT) (Hayes, 2004).

Mindfulness is best described as a state of awareness characterized by “full attention to, and awareness of, the internal and external experience of the present moment” (Chambers, Lo, & Allen, 2008) and a nonjudgmental attitude toward whatever thoughts, images, feelings, or sensations enter awareness. A typical mindfulness practice session includes both concentration meditation and mindfulness meditation. Concentration practice involves a focus on a single stimulus, typically the breath, and as the mind wanders the meditator gently guides his/her attention to the breath. This practice often results in relaxation and the lowering of the sympathetic nervous system activity. Mindfulness practice involves paying attention to

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whatever enters awareness, accepting its presence in a nonjudgmental manner, letting it go, and awaiting with curiosity whatever may enter awareness in the next moment.

The Marcus Aurelius quote above captures both of these aspects of mindfulness practice. The concentration practice is relaxing, calming the mind, and contributing to an “untroubled spirit.” The mindfulness practice helps us “look things in the face and know them for what they are,” by clearly seeing, and accepting, the reality of the present moment. As evidence accumulates regarding the benefits of mindfulness, more and more people are seeking mindfulness training and coaching, and increasing numbers of therapists are incorporating mindfulness into their practice.

Although many training programs are available, these are often costly or unavailable in a particular geographic area, making access difficult. This chapter describes a novel way of providing mindfulness training and coaching, via a virtual synthetic character: the Virtual Mindfulness Coach. The vignette below presents a scenario describing how the virtual coach can be used by a therapist to enhance treatment.

### ***Vignette: Using the Virtual Mindfulness Coach When a Face-to-Face Meeting with a Client Is Not Possible***

#### **A Face-to-Face Meeting Is Not Possible**

Consider the following scenarios.

Yet another snowstorm has *brought* transportation to a standstill and your client Janina, a highly anxious middle-aged woman, called to cancel her appointment. She sounded very disappointed, especially as you had just begun to discuss introducing her to mindfulness meditation in the previous session. She was excited to begin to learn how to meditate and very hopeful that this will finally begin to address her long-standing anxiety issues. Janina has struggled with motivation to continue treatment, due to previous failures of therapy to provide relief from her anxiety. She has a history of dropping out of treatment when disappointed. Her distress during the phone conversation was palpable and you are concerned that her motivation will wane again and that she may terminate treatment.

Richard, a 45-year-old unemployed man, has had another panic attack last week. His symptoms have reached a level of intensity where he has been unable to leave his house to attend therapy. Unfortunately, due to your schedule and the location of his home, you are unable to do a home visit. Richard desperately wants to speak with you and continue the mindfulness training you initiated recently, but his symptoms make it impossible for him to come to his regular session in the office.

Your 6-year-old daughter Jennifer just came down with a bad cold last night. Your regular babysitter is out of town and your spouse is busy with a conference all week. You have no choice but to cancel your therapy sessions for the day. You are feeling very guilty for not being able to be there for your clients, especially since several of them are going through a crisis.

## **A ‘Virtual Mindfulness Coach’ Provides Mindfulness Training and Coaching**

In the past, these situations would have created gaps in care as your clients would have had to wait for the next session. Now, however, there is another solution. You have recently introduced the *Virtual Mindfulness Coach* into your mindfulness-based cognitive therapy practice (MBCT). The coach is a virtual character, an embodied conversational agent, that provides interactive, customized mindfulness training and coaching to your clients between sessions. Clients can access the coach on multiple devices: tablets, smart phones, laptops and desktops. No specialized hardware or communication media are necessary. Following an initial download from the internet (and occasional updates), the Virtual Mindfulness Coach is available on the clients’ devices and does not require internet connectivity, unless the client wishes the clinician to actively participate in a training or coaching session.

The coach offers a 4-week training program in mindfulness meditation, followed by customized, interactive coaching (Hudlicka, 2013). The training period provides the information necessary to begin a mindfulness practice, includes didactic material and guided meditations, and provides ample opportunities for questions. The material is provided in four lessons, with one lesson introduced each week. Following the 4-week training period, the coach provides ongoing support to help your clients establish a regular practice. This involves addressing particular common problems that novice meditators typically experience (e.g., restlessness, boredom, sleepiness), as well as keeping track of client-specific preferences or problems and targeting the coaching assistance accordingly.

The coach interacts with your clients in natural language and displays facial expressions that convey appropriate emotions, to enhance your clients’ engagement—empathy and concern when their practice is not going well, and joy when they report success. The coach character’s appearance can be modified to match your clients’ individual preferences for ethnicity and demographics. (Your elderly client might prefer a younger-looking female coach, whereas your young adult client may prefer a middle-aged male coach, who reminds her of one of her college professors.) The coach’s style of interaction can also be customized to your client’s preferences. (A young adult will likely prefer a less formal style of conversation, whereas a middle-aged client will probably feel more comfortable with a more formal style.)

## **The Virtual Mindfulness Coach Meets the Required Privacy Requirements**

Following an initial downloading of the virtual mindfulness coach software and content, over a secure connection, all subsequent interaction with the virtual coach is conducted locally, on the client’s device. All HIPAA privacy requirements are therefore maintained. If the client prefers to be connected with the therapist during a training or coaching session, this can be accomplished via established secure communication channels. The client also has the option to share some of their dialogue with the coach with you and thereby provide you with additional information

to support treatment. Since this information is encrypted, transmission of this information over secure connections is possible and meets established privacy requirements.

### **The Virtual Mindfulness Coach Gets to Know the Client**

Much as you have come to know your clients over time, the Virtual Mindfulness Coach also learns about your clients, as they interact with the coach during the initial 4-week training period, and the subsequent coaching. For example, the coach knows that your anxious client struggles with restlessness during meditation sessions, so she/he frequently checks in about this client's anxiety level and makes specific suggestions on how to address feelings of restlessness. The coach also keeps track of what has worked for particular clients in the past and what was not so helpful, so she/he can customize the advice she/he offers. Furthermore, with the client's consent, you can interact with the coach directly, to provide additional information about the client that will enhance the coach's "affective user model" of the client and enable the coach to provide more individualized, customized training and coaching, to increase effectiveness.

### **Therapist Can Join Client-Coach Sessions, If Requested by the Client**

While some clients may prefer to work with the coach on their own, others may prefer to have you involved in the interaction, at various points during the training and coaching. Your involvement can take several forms, depending on your client's preferences and your availability. It may be as simple as speaking with your client during a mindfulness training or coaching session, providing additional support, clarifying some content, offering additional suggestions, or answering a specific question. This can be done by via any HIPAA-compliant communication medium, either audio-only or including video, to enhance engagement and the sense of presence.

Alternatively, you may join the training or coaching session in a manner that allows you to see all of the interaction that is taking place with the Virtual Mindfulness Coach and augment the interaction as necessary, to ensure that the client's needs are met. For example, if the client asks a particular question and you feel that the coach's answer is not complete, you can provide additional information, customized to the client's needs, based on your knowledge of his/her background.

### **Client-Coach Interaction Can Be an Additional Source of Information About the Client's Progress and Needs**

Another level of interaction is possible if your client wishes to share with you more details about the interactions she/he has with the coach. This enables you to have access not only to the actual dialogue that your client conducts with the virtual

coach, but also to the information the virtual coach gathers about your client, to support customized interaction: the “affective user model” of the client.

Access to this information enables you to not only track your client’s progress and identify any gaps in knowledge or hindrances to practicing mindfulness, which you can then address directly, but also to become aware of any acute issues your client may be facing, which may require your attention or intervention. For example, your client may reveal to the virtual coach that she/he is feeling increasingly anxious or depressed, or that she has recently resumed some undesirable behavior (e.g., smoking, substance use). With the client’s permission, alerts can be set in the coach that allow you to be notified of these developments. This in turn enables you to provide the appropriate interventions in a timely manner. It is important to note that any of this information sharing must be allowed by the client and can be terminated by the client at any point.

### **Positive Outcomes**

Use of the Virtual Mindfulness Coach, in conjunction with face-to-face therapy, has a number of potential positive outcomes. First, the coach provides additional training material and delivers customized training anywhere and anytime, between sessions, and when you are not available. The ability to customize the training materials to each client’s needs increases engagement and the likelihood that the training program will be successful.

Second, the coaching component of the Virtual Mindfulness Coach provides the support necessary to help clients establish a regular mindfulness practice. Many students of mindfulness fail to establish a regular practice and thus fail to obtain the benefits of mindfulness, which require frequent and regular practice. The coaching segment provided by the virtual coach addresses this problem directly, by providing individualized suggestions about how to overcome specific and typical problems encountered by novice meditators (e.g., restlessness, boredom) and by providing practical advice regarding the establishing of a regular practice (e.g., set up a dedicated place in the house, a regular time, etc.). Preliminary data suggest that the coach is effective in helping clients establish a regular practice (Hudlicka, 2013).

Finally, by providing additional, accessible, and customized training and coaching, use of the coach has the potential to improve treatment outcomes of therapeutic approaches that directly incorporate mindfulness practice (e.g., MBCT, DBT, ACT).

In conclusion, with the Virtual Mindfulness Coach available as an adjunct to your face-to-face practice, you feel less concerned about your clients missing a session. The coach helps your clients stay on track with their practice, so they can get the full benefit of a mindfulness-based therapy. In addition, if your client agrees to share with you his/her communication with the coach, the additional information you may obtain from these interactions may help you provide better care, by quickly becoming aware of the client’s problems and emerging needs. The virtual coach may also help the client feel more connected to you in-between sessions, and this may reduce the need for between session contacts, or even require fewer sessions as the treatment progresses.

## Training Required for Psychotherapist

Use of the virtual coach as a component of therapy requires, at a minimum, a license to practice psychotherapy, as well as personal experience with mindfulness. Ideally, the clinician also has a regular practice of mindfulness, as that will enhance his/her ability to guide their clients in establishing a regular practice. In cases where mindfulness is a component of another therapeutic protocol, such as MBCT or DBT, familiarity and training in the specific approach is also necessary. Beyond this, the only other general requirement is an openness and interest in the use of advanced technologies (artificial intelligence, affective computing, virtual agents) and their use in clinical practice.

The clinician must also be familiar with the functionality and capabilities of the Virtual Mindfulness Coach; that is, with the course content and the coach's adaptation and coaching strategies, as well as with the structure and use of the affective user model that the coach generates as it interacts with the clients. This knowledge will allow the clinician to make the best use of the coach's functionality and enable him/her to answer any questions the clients may have, as well as to troubleshoot in situations where the limits of the coach's capabilities are reached; e.g., when the coach does not understand some natural language input. Gaining this basic level of familiarity with the coach requires 1 or 2 days of training and an additional 1 or 2 days of practice.

For clinicians who may be more interested in the actual underlying technology, there is also the additional possibility to work with the coach designers and developers to enhance the content and the coach's adaptive strategies.

Last but not least, the clinician must be familiar with any organization-, state-, and license-specific privacy requirements for the use of telemental health technologies and technologies in general. As these rules and requirements are still evolving, as are the associated technologies, keeping up to date with emerging guidelines and requirements is essential.

In terms of a more personal story: my own path to clinical practice and telemental health is not typical. My PhD is in computer science, more specifically, in the area of artificial intelligence (AI). Within AI, my interest in cognitive modeling led to a job in the Department of Cognitive Sciences and Systems at BBN Labs, where I gradually transitioned from artificial intelligence research to cognitive modeling. Our cognitive modeling research focused on models of stress on decision making, and it was during this time that I began to recognize the strong influence of emotion on decision making and on cognition in general. I also became interested in psychotherapy and intrigued by the possibility of developing computational models of emotions and exploring their usefulness in understanding the mechanisms of psychotherapeutic action.

While still at BBN, I decided to pursue my interest in psychotherapy more formally. The shortest path to obtain the necessary training to practice psychotherapy was via an MSW, and I obtained my MSW part time, while continuing my research in cognitive modeling at BBN, and gradually becoming increasingly interested in

emotion modeling. I very much enjoyed the clinical work, and my plan was to have a dual career practicing psychotherapy and continuing to work in cognitive/affective modeling. I saw then, and continue to see, much synergy between these two areas. During my second year internship in clinical work, I was fortunate to have a clinical supervisor who shared my vision of the usefulness and promise of combining computational modeling and psychotherapy.

After finishing my MSW, I began actively pursuing funding for emotion modeling and founded my own company, Psychometrix Associates, to focus on this research area. My work at Psychometrix focused primarily on the development of computational models of affective biases on decision making, to help identify the underlying mechanisms mediating these effects. Understanding these processes has direct implications for psychotherapy, as it would enable more detailed assessment and individualized treatment plans. An example of this type of modeling work is described in Hudlicka (2008b). I also began to pursue more applied research in this area, in the form of affect-adaptive interaction and affective user modeling (Hudlicka & McNeese, 2002). During this time, the field of affective and social computing was growing rapidly, and affective virtual characters and social robots began to emerge, with a variety of applications in mental health (Hudlicka, 2005; Hudlicka et al., 2008, 2009) (see also discussion in section “Effectiveness of Virtual Character-Mediated Training and Coaching in Mental Healthcare” below). My interest in applying affect-adaptive interaction in mental health technologies led to the development of the Virtual Mindfulness Coach described in this chapter.

Affective and social computing technologies are increasingly being applied in mental health, and their potential for enhancing assessment and service delivery is just beginning to be recognized (Hudlicka, 2008a; 2016). The use of these technologies is particularly relevant for telemental health. It is important to understand that these synthetic agents are not intended to replace human therapists or face-to-face therapy; it will be a long time before synthetic agents have the linguistic, conceptual, and empathic capabilities of human therapists. Many researchers express well-founded doubts whether this could ever happen. However, the intent is not to replace human therapists, but rather to enhance treatment by supporting homework exercises and by providing problem-solving assistance, psycho-education, and direct support for behavior change, as an adjunct to face-to-face therapy.

## **Pros of the Employment Position**

This is an exciting time to be engaged in clinical work! Increasing emphasis on evidence-based treatments, emerging research from affective and cognitive science and neuroscience, and the increasing availability of advanced technologies such as affective and social computing are all contributing to the creation of customized, accessible, and innovative treatment approaches in mental healthcare. The Virtual Mindfulness Coach described in this chapter is just one example of these technologies. The ultimate objective is of course to provide more effective and efficient

services to clients, by improving access to, and effectiveness of, evidence-based treatments. At the same time, a great deal of personal satisfaction can also be derived from the use and exploration of these technologies.

Opportunities exist not only for the enhancement of individual treatment, but also for research that systematically explores the effectiveness of technology-enhanced treatment and contributes to the further development of mental healthcare technologies. Opportunities exist for productive collaborations among researchers and practitioners from multiple disciplines, including clinicians, affective science researchers, and computer scientists. Such collaborations hold the promise of identifying an increasing number of areas where technology can enhance treatment and improve outcomes. These include applications of the virtual coaching technologies across a variety of contexts that involve training and behavior change coaching, as well as supportive, psycho-education, and problem-solving interventions. Examples of other promising technologies include serious games to support skill acquisition and a variety of cognitive-behavioral treatments and social robots to provide social skill training for children on the autism spectrum.

## **Cons of the Employment Position**

Clearly, use of technologies such as the Virtual Mindfulness Coach requires a positive attitude toward these types of advanced technologies and an understanding of their potential to enhance clinical practice. For clinicians who do not have this mind-set, the use of these technologies may feel sterile or even frustrating.

Assuming a generally positive attitude to advanced clinical technologies, there is no downside to integrating these technologies into one's practice. Of course, ongoing monitoring is necessary to ensure that the clients are benefiting from the use of these technologies. It is assumed that technologies such as the Virtual Mindfulness Coach would only be used with the clients' explicit permission and their desire for, and benefit from, their use.

Ideally, feedback would be possible to the designers and developers, so that modifications can be made to better meet clients' needs, to incorporate emerging findings about the treatment protocols involved, and to take advantage of continued advances in technologies. In the case of the virtual coach, these would be virtual agent technologies, affective user modeling, natural language understanding, speech understanding, and affective computing: all of these used to enhance the coach's interaction capabilities and effectiveness. A possible drawback of using the virtual coach could occur in situations where there was inadequate coordination with the designers and developers of these technologies, which would hinder necessary modifications and updates.

Beyond this, the only possible problems with the use of these types of technologies are regulatory and reimbursement issues. The rapid advances in technologies supporting behavioral health treatment represent a challenge to the regulatory bodies in mental health. Rules for the appropriate use of these technologies are emerging, and new guidelines are being formulated by both regulatory agencies (e.g., state licensing



boards) and by professional organizations (e.g., APA, American Telemedicine Association). These trends are likely to continue for some time, as the regulatory agencies and professional organizations catch up to the rapid technological developments and advancements, and as empirical data regarding the efficacy and appropriate use of these technologies become available. The potential downside of this state of affairs for the practitioner is a degree of uncertainty regarding rules and guidelines for the use of these technologies and the associated necessity to keep up with emerging changes.

Related to the above is the issue of reimbursement. As is the case with regulatory agencies and professional organizations, insurance companies are also grappling with the best ways to integrate advanced technologies into mental health treatments and establish guidelines for reimbursements. This degree of uncertainty requires the clinician to both stay abreast of emerging reimbursement rules, but also to engage in advocacy to ensure that emerging technologies are available to clients, and that clinicians using these technologies are appropriately reimbursed for their efforts.

## **Evidence-Based Interventions**

Virtual coaches represent advanced technologies that have only recently begun to be explored in psychotherapy. Extensive empirical evaluations will be necessary to determine when and how these technologies are most usefully integrated into practice, to enhance clients' therapeutic experience and treatment outcomes, as well as to improve access to evidence-based treatment methods.

While extensive empirical studies have yet to be conducted with virtual therapeutic agents, evidence from three related areas suggests that virtual character-enhanced treatments, and virtual character-mediated training and coaching, represent promising areas in technology-enhanced and telemental health practice. Below I discuss evidence from these related areas: (1) demonstrated efficacy and benefits of psychotherapeutic approaches that incorporate mindfulness as an integral component of treatment (e.g., DBT, MBCT, MBRP); (2) demonstrated benefits of a regular practice of mindfulness on mental and physical health, cognitive and executive functions, and a general sense of well-being; and (3) increasing evidence regarding the effectiveness of virtual character-mediated training and coaching in mental health settings.

### ***Benefits of Therapeutic Approaches Incorporating Mindfulness***

Above I listed several therapeutic approaches that incorporate and/or emphasize mindfulness. Due to the relatively recent emergence of mindfulness as an adjunct to therapy, fewer evaluation studies exist than for more established treatment methods (e.g., exposure therapies for anxiety disorders). Nevertheless, emerging evidence from clinical studies, and from meta-analyses of existing data, suggests that

mindfulness-based treatments are effective and that the mindfulness component of these treatments enhances outcomes.

A recent meta-analysis of 6 RCTs of Mindfulness-Based Cognitive Therapy (MBCT) (total  $N=593$ ) (Piet & Hougaard, 2011) concluded that MBCT was effective in preventing a relapse of depression in patients with recurrent major depressive disorder in cases of three or more episodes of depression. Preliminary evaluations suggest that MBCT may also be effective for active depression, anxiety disorders, and bipolar disorder (Sipe & Eisendrath, 2012). A number of studies have shown the effectiveness of another therapeutic approach that emphasizes mindfulness: Dialectical Behavior Therapy (DBT) (Chapman, 2006). Finally, Acceptance and Commitment Therapy (ACT) has also recently undergone formal evaluation studies. While the data are still preliminary, and some of the reported studies have methodological limitations, nevertheless a recent meta-analysis of ACT treatment provides evidence of medium to large effect sizes (Hayes et al., 2006; Powers et al., 2009), and the APA now classifies ACT as an empirically supported treatment with moderately strong empirical support (Gaudiano, 2011).

### ***Benefits of Mindfulness***

Regular practice of mindfulness meditation is associated with a number of health benefits. Evidence from existing studies indicates that mindfulness practice enhances health-related quality of life, affecting both physical and psychological symptoms (Lazar, 2005; Reibel, Greeson, Brainard, & Rosenzweig, 2001). Benefits of mindfulness meditation have been demonstrated in stress reduction (Shapiro, Schwartz, & Bonner, 1998), pain reduction (Kabat-Zinn, 1990), enhanced immune responses (Davidson et al., 2003), reduction of symptoms in anxiety disorders (Evans et al., 2008), prevention of relapse in major depression (Teasdale et al., 2000), improvement in a subjective sense of well-being (Brown & Ryan, 2003), and improvements in cognitive functions (Chambers et al., 2008).

### ***Effectiveness of Virtual Character-Mediated Training and Coaching in Mental Healthcare***

Virtual coaches use the emerging technologies of *embodied conversational agents* (ECA's) (Cassell, Sullivan, Prevost, & Churchill, 2000) and *relational pedagogical agents* (Bickmore, 2003). ECAs are animated virtual characters, displayed on a computer or a mobile device screen. ECAs play the roles of teachers, mentors, advisors, social companions, and, increasingly, of virtual coaches (Clarebout, Elen, Johnson, & Shaw, 2002; Hayes-Roth, Amano, Saker, & Sephton, 2004; Johnson, Rickel, & Lester, 2000; Prendinger & Ishizuka, 2004; Rickel et al., 2002). The use of ECAs requires minimal or no training, due to their capability to engage

in natural interaction with humans through dialogue and nonverbal expression. The latter includes facial expressions, gaze, and gestures, which together help control conversation flow and augment the ECA's visual and behavioral realism. *Relational pedagogical agents* represent a subset of ECAs, designed both to train a particular subject or skill and to develop the type of a longer-term relationship with the user that helps facilitate coaching (Bickmore, Gruber, & Picard, 2005). The use of ECAs and relational pedagogical agents has recently begun to be explored in healthcare settings, where these virtual entities act as coaches, trainers, and counselors.

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