Part I Foundations

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Mindfulness and Acceptance Approach to Biofeedback

"Why can't I get control of my anxiety?" "Why won't the pain go away?" "What's wrong with me, why can't I do this right?" Does any of that sound familiar? Have you heard questions like these from your clients? If your answer is yes, then this book is for you. Let us talk about how it might be useful.

Sam's Fight for Control

Sam is an accomplished professional woman in her early thirties, who is used to being able to do things she sets out to do. She has a business degree from a prestigious university, and is doing well in her career. About two years ago she started having episodes of anxiety that were difficult to handle. At first, they occurred only when she needed to give presentations to larger audiences at work, but have gradually started creeping into situations that had previously been completely comfortable, like team meetings and phone conferences. Because of how distressing this anxiety felt, Sam started trying to avoid big presentations, spoke up as little as possible at team meetings, and dreaded phone conferences. When the issue came up in her annual review with the manager, Sam realized that anxiety might really get in the way of her career, so she did what she usually does when faced with a challenge – she took the bull by the horns.

Sam came to treatment with the goal of getting control of her anxiety and she wanted to try biofeedback. She learned that dysfunctional breathing had a lot to do with her physical symptoms and with intensifying her anxiety. She became

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determined to learn and use the new breathing skills. However, Sam found breathing practices to be difficult and uncomfortable, and when she tried to use them when she was anxious, it made the anxiety worse. She worked hard to control her breathing in order to control her anxiety and it was not working. She became frustrated and was ready to give up on treatment.

I suggested a new approach. Since trying to get control was not helping, what if she were to give up trying to get control and change her goals for breathing practices and for her treatment? Sam was slightly skeptical at first, but was also open to a new approach. She was willing to let go of trying to control her anxiety and just practice breathing for the sake of breathing, attend meetings and conferences for the sake of meetings and conferences, and so on, and not for the purpose of controlling anxiety. She learned how to attend mindfully to her breath and how to make space for all of her experience, including anxious thoughts, feelings, and physical symptoms. She made it her goal to be present at her meetings and phone conferences instead of figuring out ways to control anxiety. The result? Sam's anxiety did not go away. She gets some anxiety before most presentations, and many meetings and phone conferences. So what has changed? She is now making presentations to large audiences and speaking up in her team meetings and not getting stuck in dread of phone conferences. Her attitude toward her anxiety has changed since she has allowed it to be. Her use of breathing skills has changed too. She is using biofeedback breathing in order to restore her blood chemistry and because it is helpful in bringing peace and allowing her to focus on the presentation she is about to give. Her focus changed from controlling anxiety to making choices over her actions when speaking opportunities came around. She has given up control over her anxiety and has regained control of her career.

Jack's Struggle with the Present Moment

Jack is a 50-year-old software engineer who came to me for treatment of chronic back pain that remained after a serious car accident 10 years ago. He has been through many medical treatments, has had acupuncture and massage treatments, and has seen two previous therapists. Jack spent a lot of time sitting because of his job and prolonged periods of sitting made the pain worse. Only opioid medication and lying down made the pain tolerable. He reported that his pain was constant and he spent a lot of time wishing he had not been on the road the day of the accident and wishing for the pain to go away. Jack felt trapped in the pain because he could not get away from it.

Jack came to me seeking biofeedback treatment because it was the only thing he has not yet tried. We did a biofeedback assessment and found very high levels of muscle tension and breathing dysfunction. He was somewhat frustrated with me when I suggested starting with mindfulness training before proceeding to biofeedback training. He was concerned that accepting the present moment meant giving in to the pain and giving up on ever getting better. However, eventually he under-

stood that acceptance was about making room for all of his experience in the present moment instead of keeping a narrow focus on stopping the pain and about learning to live a life worth living, instead of giving up on life.

Jack practiced mindful breathing, body awareness, and mindfulness of thoughts, feelings, and physiological sensations. He noticed that his pain was not constant, but rather coming and going. He noticed that he could attend to other parts of his experience while having pain. At that point, we began biofeedback training. He learned to recognize what it felt like when his muscles tensed up. He kept a log of his muscle tension and pain, and learned the triggers for muscle tension and for increases in pain. With surface electromyography (sEMG) biofeedback, he learned to release the tension in his muscles when he noticed it, and he learned to soften his muscles instead of bracing when his pain increased. With breathing biofeedback, he learned to change his breathing to bring balance to his blood chemistry. He learned that pain is not the same thing as suffering. Applying his biofeedback skills mindfully allowed Jack to greatly alleviate his suffering and to become a more active participant in the rest of his life. He still has some pain, which is sometimes dull, and sometimes intense, and sometimes barely there. He has learned to apply biofeedback skills to increase his openness instead of narrowing his focus in the face of pain.

Bethany's Failure

Bethany is a stay-at-home mom to two active boys. She is in her forties and has had periodic incapacitating migraines since she was a teenager. She came to see me when she thought that her migraines were getting more frequent and affecting her ability to be a good mother. When a migraine came, Bethany felt she could do nothing else except lie down in a quiet dark room, but spent much of that time beating up on herself for not being able to "get a hold of" herself.

Bethany was interested in both mindfulness and biofeedback treatment, and her neurologist recommended biofeedback. We started with a stress profile, which revealed that her finger temperature was low at baseline and got lower with each stressor with no recovery. Her breathing was also fast and shallow and her heart rate variability (HRV) was low. Bethany liked the idea of mindfulness training before proceeding to biofeedback skills. She was willing to observe her breathing and make space for her pain. She enjoyed the meditations I taught her and listened to the recordings every day.

When we started biofeedback, she learned to increase her HRV with her breathing nicely in my office. She was able to use mindful awareness to let her breathing fall in sync with her heart rate. She started practicing resonance frequency breathing at home. She was also keeping a log of her breathing practices and finger temperature. After the first week of home practice of her biofeedback skills, Bethany came back and said that she did not do so well on her own. She felt that she failed to achieve her goals. It sounded to me like she was spending a lot of time virtually beating up

on herself, and Bethany agreed that being hard on herself felt like the way to motivate herself to do and be better.

I asked Bethany whether she was interested in learning how to be kinder to herself and how to let go of impossible-to-reach goals. She agreed. We talked about self-compassion and about setting achievable goals. Perhaps being able to stick to resonance frequency breathing rate and increase her finger temperature after one session of actual biofeedback training was unnecessary and as unrealistic as being able to power through a severe migraine. Bethany learned the loving kindness meditation. She learned to not only allow her biofeedback skills to happen at the moment she practiced them, but also to be kind to herself no matter what the outcome of her practice. Sometimes she felt she was in the zone with her breathing and her finger temperature increased. There were also times when her finger temperature did not budge. She was able to allow "a failure" to happen and move on with her day. Bethany learned to be kind to herself when she had migraines, and allowed herself to ask for help and to take care of herself by letting go of whatever self-judgments automatically came with the need to ask for help. Practicing biofeedback skills became easier when she was no longer trying to evaluate whether she was doing them right, and having her migraines, which became less frequent and less severe, became easier too.

With these three examples, I hope to introduce you to the main ways in which mindfulness may be helpful to you and to your clients. To summarize, mindfulness is useful for at least three reasons:

1. *Sometimes we work really hard to control what is out of our control*, the way Sam tried to control her anxiety. Mindfulness can teach you to tell the difference between what is and is not controllable, and choose to direct your resources toward creating the behavioral changes that are within your control.
2. *Sometimes we struggle to make the present moment be different*, the way Jack tried to stop the pain. Mindfulness gives us the freedom to choose our responses, rather than following with automatic struggle and to attend fully to our experience instead of narrowly focusing on the object of the struggle.
3. *Sometimes we judge ourselves for failing to reach our goals*, the way Bethany judged herself as a failure for failing to power through migraines and learn her skills in one week. With mindfulness, we learn to give ourselves a break, to be kinder to ourselves, which then allows us to turn toward our experiences with curiosity and interest, and gives us an opportunity to create change.

In this chapter, I give an introduction to mindfulness and acceptance approach, discuss its relevance to biofeedback, and give a brief overview of research demonstrating effectiveness of the mindfulness and acceptance approach in producing desirable physiological and neurological changes. I then focus on implementing mindfulness into your biofeedback practice, including a step-by-step guide.

What Are Mindfulness and Acceptance?

Let us begin with talking about what mindfulness is and how it is helpful. There are many definitions, each touching on slightly different aspects of mindfulness. As described by Christopher Germer, its literal translation from Pali, the language of earliest Buddhist writings, is "awareness, remembering." Awareness is most relevant to the modern definitions of mindfulness, often described as simply moment-to-moment awareness. Guy Armstrong defines mindfulness as "Knowing what you are experiencing while you are experiencing it." Finally, a definition similar to Jon Kabat Zinn's is "being in the present moment, accepting, letting go of judgment."

Ruth Baer and colleagues (2004) identified five facets of mindfulness, reflecting all the major components of mindfulness practice and mindfulness interventions. These components are:

- *Observing* – attending to internal and external stimuli
- *Describing* – labeling one's experience with words
- *Acting with awareness* – choosing action, instead of behaving automatically
- *Nonjudgmental stance* – letting go of evaluation of one's internal experience
- *Nonreactivity to internal experience* – allowing thoughts and feeling to come and go, without getting caught up in them.

I will continue referring to every one of these components throughout this chapter and the rest of the book.

Acceptance is a concept closely related to mindfulness. Steven Hayes, the founder of Acceptance and Commitment Therapy (ACT), describes it as "Active, nonjudgmental embracing of experience in the here and now." Acceptance is also a way to live with your thoughts and feelings instead of struggling against them and a way of allowing yourself to stop avoiding pain, both emotional and physical.

You might be wondering how this is relevant to biofeedback. First, awareness is something that mindfulness and biofeedback share as a necessary component. In biofeedback, we first train our clients in awareness of their physiological sensations before they are able to learn and implement biofeedback skills. Mindful awareness of the present moment will make training awareness of physiological sensations easier. Second, mindful approach will help the client focus on what is most helpful about biofeedback. Third, integrating mindfulness into biofeedback practice allows us to work with what gets in the way of biofeedback success:

- Automatic reactions to thoughts, feelings, and physiological sensations
- Attempts to control or resist
- Judgment.

And even more specifically, mindfulness can help with

- Relaxation-induced anxiety
- Feeling stuck
- Pressure to get things just right
- Feeling distracted
- Racing thoughts
- Emotional reactions to physiological issues
- Feelings of failure.

Research Findings

Before continuing to talk about specific ways of integrating mindfulness into biofeedback, I briefly review some research findings demonstrating the effectiveness of mindfulness in promoting changes relevant to biofeedback. This is not an exhaustive list by any means, but rather a selection of the most relevant studies.

Much of the mindfulness research is based on Jon Kabat-Zinn's Mindfulness-Based Stress Reduction program, or MBSR. For those of you not familiar with MBSR, it is an eight-week-long program with 2.5-hour meetings plus one full-day meeting in week 6. Stress reduction is promoted through mindfulness practices such as body scan, mindful yoga, and sitting meditation. Participants are provided with audio recordings and asked to practice for 45 minutes each day and keep a log of their practices. In research studies, it appears that the average actual practice time is about 30 minutes a day.

Richard Davidson and colleagues (2003) recruited two groups of students, one of which participated in MBSR training, and the other served as control. Both groups were asked to write about one of the most positive experiences in their lives and one of the most negative experiences in their lives. EEG recordings were made before and after the writing exercise. Both groups were also given a flu vaccine prior to the experimental group's MBSR training, and their blood was drawn after the training. The study findings revealed that MBSR group had increased activation of the left frontal region of the brain, which is responsible for producing positive emotions. Moreover, the MBSR group had more antibodies to the vaccine, meaning that their immune system function was higher, and so was their protection against the flu.

David Creswell and his colleagues (2009) demonstrated a similarly increased immune response in patients with HIV who participated in MBSR training. This group had stable CD4+ T-lymphocyte (immune cell) counts after the training and the more they practiced, the more benefit they received. The control group, however, exhibited CD4+ declines typical of patients with HIV.

In a series of studies by Linda Carlson and colleagues (Carlson *et al*., 2003, 2004, 2007), patients with breast and prostate cancer who participated in the MBSR training exhibited increased quality of life and positive changes in the function of the hypothalamic–pituitary–adrenal (HPA) axis and the immune system. These findings persisted at one-year follow up.

Thaddeus Pace and colleagues (2008) showed that greater amount of time spent practicing compassion during 8 weeks of training was associated with a decrease in the levels of interleukin-6, an inflammatory protein. Thus, compassion meditation seems to promote a decrease of inflammation in the body.

Since one of the main goals of biofeedback is enabling people to change their physiological functioning, these studies show that mindfulness may further aid biofeedback in creating desirable physiological change.

In a series of fascinating studies, Sara Lazar, Britta Hölzel, and their colleagues at Massachusetts General Hospital demonstrated that mindfulness meditation produces both structural and functional changes in the brain (e.g., Hölzel *et al.*, 2010, 2011). These studies looked at the brains of people who underwent MBSR training using functional magnetic resonance imaging (fMRI) and compared them with the brains of people with no MBSR training. The results showed that some parts of the brain became larger (increased gray matter), some became smaller, and others became more active. The following list shows a summary of findings from several studies:

- Increased gray matter in:
  - hippocampus, responsible for learning, memory, and emotion regulation
  - right insula, responsible for interoceptive awareness, empathy, and perspective taking
  - temporoparietal junction (TPJ), responsible for conscious experience of the self, social cognition, and compassion
  - posterior cingulate cortex (PCC), responsible for integration of self-referential stimuli
  - lateral cerebellum and cerebellar vermis, responsible for emotional and cognitive regulation: speed, capacity, consistency, and appropriateness of cognitive and emotional processes
- Decreased gray matter in:
  - right amygdala, responsible for fear and anxiety
- Increased activation in:
  - anterior cingulate cortex (ACC), responsible for regulation of attention and behavioral control
  - right insula.

Furthermore, Sara Lazar *et al.* (2005) also showed that experienced meditators, those with at least 2000 hours of meditation experience, exhibit greater cortical thickness in the prefrontal cortex, which is responsible for executive function activities such as planning, problem solving, and attention. Similarly, Jha *et al.* (2007) demonstrated that mindfulness training is associated with improvement in attention.

Many of the functional and structural changes observed in these studies are directly relevant to the issues we often encounter in our biofeedback practice. For example, a decreased size of the right amygdala is relevant for clients struggling with

anxiety and any kind of chronic condition with symptoms that evoke fear. Mindfulness meditation can be helpful in reducing the automatic amygdala-mediated response to the feared physiological sensations, while biofeedback can provide these clients with skills in addressing the arising symptoms.

There also exists a large body of research demonstrating efficacy of mindfulness-based interventions in reducing symptoms of anxiety (Roemer *et al.*, 2008; Hofmann *et al.*, 2010; Treanor *et al.*, 2011), depression (Teasdale *et al.*, 2000; Hofmann *et al.*, 2010), substance abuse (Bowen *et al.*, 2006), and fibromyalgia (Grossman *et al.*, 2007), as well as improving well-being and quality of life (e.g., Carmody and Baer, 2008).

The Practical: How Do You Integrate Mindfulness into Your Biofeedback Practice?

Giving up the futile effort of trying to control

Control is a word very frequently used in biofeedback. So often our clients come to us wanting to learn to "get control" over their pain, or anxiety, or some other unpleasant experience. Sam, whose experience I described at the beginning of this chapter, had just this goal in mind.

In many ways, it makes sense: a sense of control is very important to every human being and many nonhuman animals. You have probably read about Martin Seligman's experiments on learned helplessness, which showed that having control over a difficult situation helps people, as well as dogs, to get through it. There are studies showing that employees who do not have much control over their work, their schedule, and their environment have many more physical and mental health problems than those who do have the ability to make choices at work. There are many more examples of people's need for control over their lives.

Therefore, why not talk about control in biofeedback? Why not talk about control over one's pain and anxiety? Would it not be wonderful if we had that kind of power? The problem is that we do not have immediate control over much of our internal experience. If you have ever tried to control your anxiety or pain, you may have found it does not do what you want it to do. Our internal experience is always changing, with sensations sometimes getting stronger, sometimes becoming weaker, and sometimes staying the same. The wonderful thing is that when physical or emotional pain is intense, it will change. Our actions (such as biofeedback skills) may facilitate the change, but cannot control it. Our efforts to control the internal experience itself are likely to be counterproductive and lead to exacerbation, instead of alleviation, of the problem.

Think about what happens with efforts to control. As with any kind of effort, the sympathetic nervous system is activated. This is usually the opposite of what we are trying to achieve. Most biofeedback skills we teach to our clients are aimed at reduc-

ing sympathetic activation and activating the parasympathetic response. And in doing the opposite of what we are trying to achieve, we are tying up our resources in a pointless fight and setting ourselves up for failure because we are trying to achieve an impossible goal.

As a specific example, let us take the idea of "trying to relax," which is something our clients do on a regular basis. Trying involves sympathetic activation. Relaxation involves parasympathetic activation. Both sympathetic and parasympathetic branches of the autonomic nervous system cannot be dominant at the same time. Therefore, "trying to relax" is physiologically impossible. The term "trying to relax" is an oxymoron.

Two studies by Daniel Wegner and his colleagues (1997) demonstrated exactly this phenomenon. In these studies, participants were instructed to relax while engaging in challenging mental tasks. The skin conductance response of these participants increased during the tasks and was significantly higher than the skin conductance of a control group that was not instructed to relax while performing the same mental tasks.

In earlier studies, Wegner and colleagues (e.g., Wegner *et al.*, 1987) showed that efforts to control and suppress thoughts, such as thoughts about a white bear, significantly increased the occurrence of these thoughts compared with people who were specifically asked to actively think about the white bear. These findings were further confirmed by many studies, including one by Koster *et al.* (2003), which demonstrated that thought suppression during a threatening event results in increased experience of anxiety and anxiety-related thoughts following the thought suppression exercise.

Similarly, Roy Baumeister and his colleagues conducted a series of studies in which they showed that efforts to control one's emotional experience lead to lowered blood glucose levels and worse performance on difficult cognitive tasks. In one such study (Baumeister *et al.*, 1998), two groups of college students watched a very emotional scene from the movie *Terms of Endearment*, where a young mother is dying and saying good-bye to her children. One of these groups was instructed to control and suppress their emotional experience while watching the movie clip. The other group was instructed to have their emotional experience the way it is. The group that was instructed to suppress their emotions performed significantly worse on an anagram-solving task that followed the movie clip than the group that was not suppressing their emotions.

Another controlled study by the same group (Gailliot *et al.*, 2007) demonstrated that acts of self-control, such as emotion suppression, decrease participants' blood sugar levels. Lower blood sugar levels were associated with worse performance and quicker giving up on challenging cognitive tasks.

Therefore, futile efforts to control the uncontrollable literally drain us of resources. Glucose is the most basic source of energy for our bodies, including the brain. Trying to control what is not in our control, such as our thoughts and feelings, focuses our available resources on that futile fight, not leaving sufficient energy for much of anything else.

At this point you may be scratching your head and wondering how this could possibly be relevant to biofeedback, since biofeedback is all about change. Therefore, let us make one thing very clear – we are not giving up on improving functioning, and we are not giving up on change. We are just giving up futile efforts to control what is not under our control. We are reallocating our resources to what is possible to control and what is possible to change in the moment, which are our responses and our actions.

We have choices when it comes to the way we *respond* to our thoughts and feelings, but we do not have control over the thoughts and feelings themselves. We have choices in the way we respond to physical sensations, but we do not have control, in that moment, over the physical sensations themselves. Biofeedback skills are most effective when used as a part of an intelligent response to feeling bad instead of as part of a futile effort to control thoughts and feelings. My client Sam learned that efforts to control her breathing in order to control her anxiety made things worse. When she learned to allow her breathing to change as a way of responding to having anxiety, her experience changed as well.

Getting unstuck

Our clients work so hard to fight with their present experience that they unwittingly end up getting stuck in the misery. An ACT metaphor describes this experience perfectly: imagine you are walking, going about your business, and unexpectedly step into quicksand. Your legs sink up to the ankles. What is your initial automatic reaction? You try to get away by lifting one leg out. And as a result, you reduce the area of your body in contact with the quicksand, increase the pressure, and sink some more. The more you struggle, the more you sink. How do you get out? The best way is to move slowly to change your position and lie down on your back to allow your body to float on the quicksand. This way you are reducing the pressure on quicksand, by increasing the surface area of your body in contact with the quicksand. You can actually float on quicksand much easier than on water because quicksand is denser than water. Once you are floating on your back, you can paddle to the edge of quicksand, come out and move on (Figure 1.1).

Here is one more fact about quicksand you may not have known – it is actually not nearly as dangerous as people often think it is. It is almost impossible to drown in quicksand, as it is rarely more than a couple of feet deep. It is possible to get stuck in quicksand and have difficulty getting out (i.e., the main danger of quicksand), which happens mostly if you struggle. Giving up the struggle and allowing as much of your body as possible to touch quicksand is the way to get out and move on.

People's experience of getting stuck in difficult feelings is very similar. When you first notice the presence of difficult emotions or physiological sensations, the initial automatic reaction is to get away from them, to struggle. The effort to get away increases the focus on and the resources devoted to the difficult feelings, and it gets you stuck. Just like with quicksand, the more you struggle, the more stuck you get.

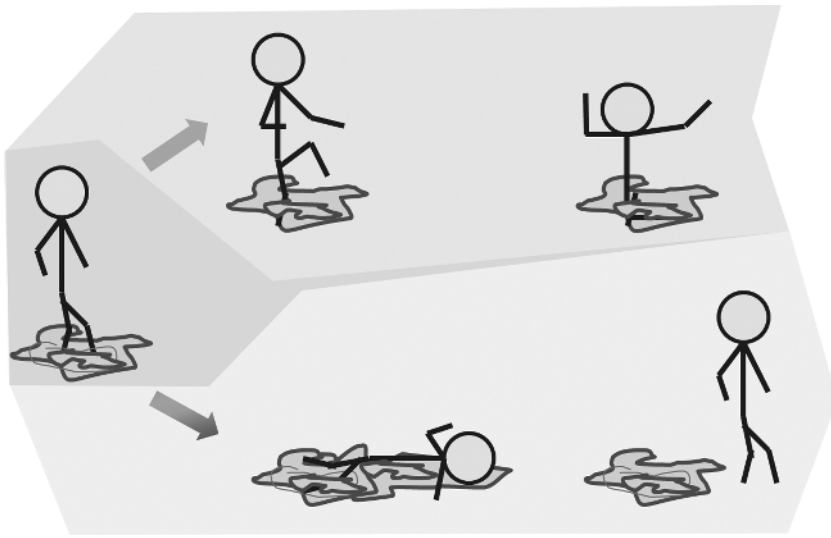

Figure 1.1 Quicksand metaphor illustration. Drawn by Roger Khazan.

Just like with quicksand, the solution is to open up to the difficult emotions or physiological sensations, "float" on them, and eventually be able to move on. Again, just like quicksand, these difficult feelings are rarely dangerous; people only think that they are. Giving up the struggle and allowing yourself to have your feelings just the way they are is the way to get unstuck and move on.

With mindfulness, you can learn to recognize the automatic struggle reaction and pause long enough to choose the most helpful response.

Changing the intention

The way to give up futile efforts to control and to get unstuck is through changing the intention for your action, the intention of your response to difficult feelings. If your intention remains to stop being anxious or to get away from the pain in that moment, your actions are still likely to lead you into struggle and into being stuck. Changing the intention will change the result. If you change the intention from getting away from anxiety to allowing anxiety while you focus on what is most important in that moment, your experience of anxiety will change, and you will be more present in that moment of your life. If you change your intention from stopping pain in that moment to taking care of yourself because you are in pain, your experience of pain will change, and you will feel less distress and suffering.

Strangely enough, the action guided by the new intention may look exactly the same as the action you would have taken with the old intention. And yet, the result

will be different. Remember Sam who was anxious before giving a presentation? Before learning mindfulness, her intention would have been to get away from anxiety. She would have engaged in her biofeedback breathing skills in an effort to stop being anxious before and during the presentation. As a result, a large part of Sam's mental resources would have gone toward stopping anxiety; her breathing would have been effortful with a greater chance of overbreathing. Her anxiety would have still been there or gotten worse and her full attention would not have been on the presentation. With mindfulness training, Sam's response to the anxiety may still be the same biofeedback breathing skills, but with the intention of balancing her blood chemistry and helping her focus on the presentation. With the new intention, having given up the fight to stop anxiety, Sam is now able to allow the helpful change in her breathing and to bring attention to the goals of her presentation, which may be to connect with her audience and deliver a clear message.

Now let us return to Jack and his pain. Before mindfulness training, when Jack was in pain, he would have tried to relax his muscles with the intention of stopping pain in that moment. He would have put effort into the exercise, creating rather than releasing muscle tension. With mindfulness training, and with a new intention of taking care of himself because he is in pain, Jack now uses the same biofeedback skills to release the muscle tension and soften his muscles instead of bracing for pain. The result is different now as his experience of pain changes and his suffering decreases.

In the following list, I include some examples of changing the intention with respect to biofeedback skills. Instead of using biofeedback skills in order to stop or get away from a feeling or physiological sensation, help your clients use biofeedback skills in order to:

- take care of themselves at the time of distress or suffering
- restore balance to blood chemistry
- restore balance to the nervous system
- allow the body to become more peaceful
- allow the mind to refocus on the present moment
- bring comfort when feeling bad.

Mindful language

Mindful language plays a significant role in change of intention and in promoting helpful physiological changes. The human mind forms a strong association between words and certain automatic reactions, including those of the autonomic nervous system. Choice of words may make the difference between activation of the sympathetic and parasympathetic nervous systems.

Words like "control," "effort," "try," and "work" have strong associations with sympathetic activation. As I previously said, trying to relax is physiologically impossible because trying activates the sympathetic nervous system, when parasympathetic activation is necessary for relaxation. When our clients talk and think about

their biofeedback skills using words like "work" and "try," they are that much more likely to end up fighting to produce a response that is only possible with a passive attitude.

Examples of words that are likely to activate the sympathetic nervous system are:

- Try
- Control
- Effort
- Work
- Hard
- Push
- Must
- Should.

Examples of words more likely to promote parasympathetic activation are:

- Allow
- Permit
- Let
- Guide
- Effortless.

Mindfulness practice

Now let us talk about ways to practice mindfulness. Let me note that this is a brief introduction to the practice of mindfulness. The scope of the chapter limits how much I am able to include. My goal is to give you enough practical information to begin using mindfulness for yourself and, in combination with biofeedback, with your clients, to become more curious about the practice and to want to explore it further. There are many wonderful books available to help you learn more, such as Christopher Germer's *The Mindful Path to Self-Compassion* (2009) and Ronald Siegel's *The Mindfulness Solution* (2009).

Mindfulness meditation typically consists of three components, each of which can be practiced on its own and then combined into one practice.

1. *Concentration* – awareness is directed to a single focus, such as the breath, the soles of one's feet, surrounding sounds, a warm cup of tea, or a favorite food. The practice is useful for stabilizing attention and calming. This is often the first step to take when you are in distress. A concentration practice will give you an opportunity to pause instead of reacting automatically and gather your resources to choose a helpful response.

   The concentration practice itself is simple: start with choosing an anchor and let your attention focus on it. Whenever your mind wonders, which it will do frequently, gently bring it back to the anchor, letting go of whatever judgments may come as a result. Allow your attention to be focused, but relaxed.

Examples of concentration practices include:

- Breath meditation
- Walking meditation
- Sound meditation
- Mantra meditation
- Eating meditation (raisin).

Sample scripts for some of these meditations are included in Appendix I.

2. *Mindfulness* – being open to take in whatever predominates in your field of awareness. In open-field practices, the focus may be on your thoughts, emotions, physical sensations, sights, and sounds around you. These practices bring equanimity and insight, and are particularly helpful in learning to allow sensations to be the way they are at that moment in order to make mindful changes to the way you respond to those sensations. When dealing with difficult emotions or physical pain, mindfulness practices will help to make space for all the sensations, seeing each particular sensation as only a part of the whole experience, instead of placing a narrow focus on unpleasant sensations.

   To practice open-field awareness, allow your mind to focus on all arising experiences, whether it be thoughts, feelings, sensations, or sounds around you, one after another, as they come up moment to moment. Pay attention to every sensation in your mind as it arises, without engaging with it, simply observing. Return your attention to the breath if your attention gets lost in the sensation.

   Examples of open-field mindfulness practices include:

   - Mindfulness of body sensations (body awareness or "body scan")
   - Difficult emotions practice
   - Thoughts on leaves
   - Mindfulness of thoughts, feelings, and physical sensations.

   Sample scripts for these meditations are included in Appendix I.

3. *Loving kindness and compassion* – awareness is placed on promoting good will and kindness toward oneself and others. Kristen Neff, one of the first to conduct scientific research on self-compassion, emphasizes the focus on changing your response to the present moment from self-criticism to self-kindness, from isolation to common humanity, and from emotional entanglement to mindfulness. Christopher Germer coined the term "mindful self-compassion" and defined it as "Bearing witness to one's own pain (mindfulness) and responding with kindness and understanding (compassion)."

   Self-compassion is necessary because blame and judgment cultivate aversion and struggle, while compassion allows gentle attention. Self-compassion practices are particularly useful for comfort, soothing, and acceptance during the times of distress and suffering.

   To cultivate self-compassion, allow yourself to let go of blame and judgment and ask yourself the following questions: "How can I cut myself some slack?" "How can I give myself a break?" "How can I take better care of myself?" The practice of mettā (loving kindness) meditation is a great way to bring self-

compassion into your life and into your practice. A sample script for mettā is included in Appendix I.

Concerns clients may have about mindfulness practices

It sometimes happens that as soon as I bring up the subject of mindfulness, my clients respond with skepticism and doubt. Some people think of mindfulness and meditation as too New Agey and of self-compassion as too touchy-feely. Most of the time, talking about their preconceptions and dispelling some of the myths helps people buy into the idea of being mindful and become willing to bring the practice into their lives. In the succeeding sections I discuss some of the more frequent misconceptions about mindfulness, acceptance, and self-compassion.

Concerns about mindfulness and meditation

- "*I can't empty my mind of thoughts*" – many people have the idea that meditation requires an empty mind, and since their minds are never empty, they think that they cannot meditate. In fact, mindfulness meditation is all about having thoughts, and feelings, and sensations. The point is not to get rid of them, but to observe them without engaging and judging.
- "*It is too difficult*" – this is a common response to a wandering mind and finding it too difficult to stay focused without distraction. Every single person who meditates has the experience of his or her mind wandering off and getting lost in a stream of thought. This is just part of the meditation experience, not something that should not happen. As soon as you notice your mind has wandered off, gently bring it back. It does not matter how many times your mind wanders, just keep bringing it back, gently, every time.
- "*It does not work to make pain go away*" – people sometimes see meditation as a way to get rid of pain, when in fact that is not the goal at all. The goal of meditation is to observe pain and respond to it in a helpful and kind way. It is true that sometimes pain relief results from meditation, but that is not the goal.
- "*It's the same as the relaxation exercises I've tried in the past*" – meditation is often listed among relaxation exercises in many stress management workbooks and Web sites. However, meditation is not a relaxation exercise. Relaxation is often a side effect of meditation, but never its goal. Again, the goal of meditation is to observe the experience and choose your response, of which a relaxation exercise may be one.
- "*You have to be religious or spiritual in order to meditate or practice mindfulness*" – this is very much a myth. Mindfulness was born as a secular concept, and has since been used in both religious and secular contexts. You and your clients can choose how to practice mindfulness for yourselves.

Concerns about acceptance

- "*It is equivalent to complacency, resignation, or inaction*" – my clients sometimes worry that when I talk about acceptance, I mean that they should just accept

that they will be miserable and in pain for the rest of their lives, and resign themselves to not being able to fully participate in their lives. In fact, acceptance is very much about enabling people to live their lives fully. What you are accepting is the present moment. By accepting the present moment, you are giving up a futile fight and freeing up resources to choosing actions that will enable you to respond to pain in the most helpful way in the future.

Concerns about self-compassion

- *"It is selfish and self-indulgent"* – this is the most common concern I have heard from my clients about self-compassion. Many people feel that it is ok to be compassionate toward others, but too selfish to be compassionate toward themselves. My response is simple – how can you possibly take good care of other people and be compassionate toward others, without first taking good care of yourself? Think about the instructions you get on the airplane before every takeoff: if there is ever a need for oxygen, an oxygen mask is going to come down, put one on yourself first, and then assist those around you. This means that even if you are traveling with a 3-month-old infant or a 95-year-old grandmother, you should still put the mask on yourself before helping your companions, no matter how helpless they may be. If you do not first take care of yourself, you cannot possibly take care of others.
- *"It means allowing myself to be lazy and to slack off"* – my ambitious and driven clients often comment that if they stop being self-critical, they will not achieve their goals. This is especially relevant for biofeedback, where these clients are much more likely to be harshly critical of themselves in an effort to achieve results with biofeedback. In fact, self-kindness and self-compassion are a way to motivate yourself in a gentler way, which tends to be much more effective than beating up on yourself – carrot rather than the stick approach, if you will.
- *"It's just sugarcoating"* – some of my clients initially believe that in talking about self-compassion, I am just trying to convince them that their experience is not all that bad and that they need to find the good in their pain. Self-compassion is actually the exact opposite of sugarcoating. The point is not to convince them to see pain as a good thing, but rather be open to it and see it for what it is.
- *"I don't want a pity party"* – sometimes people see self-compassion as a way to complain and wallow in self-pity. In fact, self-compassion is a way to disengage from pain and self-pity, and to move on to what is important in life.

Step-by-step guide for integrating mindfulness into biofeedback

In this section, I attempt to bring together the information about mindfulness I previously introduced into a step-by-step guide to integrating mindfulness into your biofeedback practice.

Step 1 Conduct your typical initial evaluation and biofeedback assessment(s). Let your client know that mindfulness and acceptance are a part of how you conduct biofeedback, give a brief introduction to mindfulness, and address any concerns the client might have about the approach.

Step 2 Introduce mindfulness and acceptance of the current experience, allowing it to be the way it is, making no changes. This step is necessary in order to help the client develop awareness of thoughts, emotions, and physiological sensations and let go of the struggle with the present experience.

Teaching your client mindfulness exercises is an important part of this step. Begin with teaching one or two concentration practices, such as the raisin exercise (often the easiest for clients to start with) and mindfulness of the breath. First do the practice(s) in the session with the client, address any difficulties or concerns the client may have, and then ask the client to practice the exercise at home. Help the client to choose a practice frequency goal that is realistic to accomplish. Encourage the client to perform various routine daily activities, such as showering, brushing teeth, drinking the morning beverage, or walking somewhere mindfully.

Once the client is comfortable with concentration practices, move on to open-field awareness practices that would be particularly useful for the biofeedback modalities you will be focusing on (based on your biofeedback evaluation).

Examples of mindfulness practices corresponding to biofeedback modalities (sample scripts in Appendix I) are the following:

- *Breathing* – mindfulness of the breath
- *Electromyography (EMG)* – body awareness
- *Heart rate variability (HRV)* – mindfulness of the breath
- *Temperature* – mindfulness of temperature sensations
- *Skin conductance* – awareness of thoughts, feelings, and physiological sensations.

Step 3 Once the client is able to stay with the present experience, begin teaching biofeedback skills with the focus on making mindful changes. As necessary, continue teaching your clients mindfulness practices that may further aid the biofeedback skills you are teaching. Refer to the troubleshooting section for ideas of practices that may be useful as issues come up in biofeedback training.

While teaching biofeedback, use the mindfulness approach. Using mindfulness in teaching biofeedback involves:

- *Change of intention* – to let go of the effort to control internal experience and the struggle with the present moment. This will allow biofeedback skills to become a part of a helpful intelligent response to distress and suffering, without engaging in automatic struggle.
- *Mindful language* – to promote mindful change without triggering semantic associations with struggle.

- *Observation and labeling* – to disengage from unhelpful thoughts, create space, and free up resources for choosing a response instead of responding automatically.

  This is a very important step in mindfulness training, because it allows people to pause long enough to decide how they would like to respond to a difficult experience. Labeling thoughts and emotions that arise literally allows the brain to respond differently. David Creswell and colleagues (2007) conducted an fMRI study demonstrating that affect labeling is associated with: (1) less activity in the amygdala, which is responsible for the fight-or-flight and fear and anxiety responses, and (2) more activity in the prefrontal cortex, which is responsible for the executive function, the ability to plan, problem solve, sustain attention, and regulate emotion.

  Mindfulness practices such as thoughts on leaves and mindfulness of thoughts, feelings, and physiological sensations (see Appendix I) are helpful in teaching clients the skill of labeling. During biofeedback training, encourage the client to label his or her thoughts and emotions as they come up, and to continue doing so when he or she encounters difficult situations outside of your office and needs to choose a response.
- *Self-compassion* – to let go of judgment and bring comfort. Self-compassion practices, such as the mettā and difficult emotion practice (see Appendix I), are particularly helpful when the client is in a lot of distress. The purpose of the mettā is not to make pain go away, but to bring comfort and make it easier to have the pain (reduce suffering). I often compare mettā practice to having someone bring you chicken soup when you have the flu – it will not make the flu go away, but you will feel better overall. Self-compassion is also a helpful practice to teach your self-critical clients who tend to judge themselves harshly when they do not achieve a goal they think they should be able to achieve.

What to do about relaxation exercises

My students often ask me what to do about relaxation exercises in biofeedback training. Since trying to relax is not helpful and relaxation is not a goal of meditation, they wonder whether they should still be teaching relaxation exercises which are so often used in biofeedback. My answer is "yes," teach and utilize relaxation exercises, but change the intention behind their use and use mindful language.

Changing the intention with relaxation exercises means using relaxation exercises as a way of taking care of oneself, perhaps as part of a chosen response to pain and distress. Teach your clients to practice relaxation because it is a nice thing to do for themselves, with no effort or pressure. Relaxation should not be used as a way to achieve a particular goal, such as becoming less anxious, or reducing pain, or going to sleep.

Mindful language in relaxation means using phrases like "giving yourself permission to relax," "letting the muscles release," and "allowing yourself to feel warm and comfortable," while avoiding words like "try," "make," and "should." See Chapter 6 on the relaxation profile for sample scripts of mindfully phrased relaxation techniques.

Using mindfulness to troubleshoot

There are several issues that can get in the way of biofeedback success. Many of them can be addressed with mindfulness skills and practices. In the following list I give examples of mindfulness skills and practices that may be of help to you in dealing with several common issues that can occur during biofeedback training:

- *Relaxation-induced anxiety* may be triggered by the sensations of relaxation itself, possibly because they are unfamiliar or because they are associated with difficult experiences from the past. Mindful awareness and acceptance of the sensations that arise will help your client to gradually allow relaxation to happen. The following practices may be particularly helpful:
  - Body awareness
  - Mindfulness of thoughts, feelings, and physical sensations
  - Self-compassion (mettā)
- *Feeling stuck* may happen as a result of a struggle or self-criticism. Learning to let go of efforts to control and accepting the present moment as it is will help your client make progress. The following practices may be particularly helpful:
  - Self-compassion (mettā)
  - Thoughts on leaves meditation and just labeling thoughts and emotions in the moment
  - Mindfulness of thoughts, feelings, and physical sensations
- *Pressure to get things just right* is likely to result from harsh self-criticism and unrealistic expectations. Learning to accept the thoughts and feelings that come when the client does not achieve the exact result he was hoping for and to let go of judgment about it will help him move on. The following practices may be helpful:
  - Thoughts on leaves meditation and just labeling thoughts and emotions in the moment
  - Mindfulness of thoughts, feelings, and physical sensations
  - Self-compassion (mettā)
- *Feelings of failure* are particularly likely for people who set high unrealistic expectations and tend to judge themselves harshly for failing to achieve their goals. These feelings are also likely for people who have trouble achieving success in biofeedback for any reason. Learning to become aware and to let go of judgment is a helpful skill in dealing with feelings of failure. The following practices may be helpful:
  - Self-compassion (mettā)
  - Thoughts on leaves meditation and just labeling thoughts and emotions in the moment
  - Difficult emotions practice
- *Feeling distracted* is quite common and can get in the way of biofeedback practice (especially home practice with no computer screen to focus attention) if the client is spending much of biofeedback practice thinking about something else or daydreaming. As I discussed previously, mindfulness meditation has been

shown to improve attention, so any mindfulness practice is likely to be helpful. The following practices may be especially helpful:
    - Focused awareness (e.g., raisin exercise, breath awareness, sound meditation)
    - Field of vision exercise
        - Ask the client to sit in a comfortable position in a place with an open view, such as a park bench. Ask him to look straight ahead, without moving his head. Give the following instructions: *Notice whenever an object, whether living or not, comes into your field of vision, observe the object while it is in your field of vision, but do not follow the object as it moves out. When your eyes follow the object and your head moves, notice that, and return the eyes into their original position.*
- *Racing thoughts* are a common reason for feeling distracted and particularly common for people who suffer from anxiety. The following practices may be particularly helpful in disengaging from racing thoughts:
    - Thoughts on leaves meditation
    - Similar practices focused on watching thoughts pass by
        - Seeing thoughts go by at the bottom of a TV screen
        - Seeing thoughts go by on top of train cars, as the train goes by
        - Tying thoughts, one at a time, to a helium balloon and letting it fly up into the sky
- *Emotional reactions to physiological sensations* are common for people with chronic physiological or psychophysiological conditions that produce a lot of suffering or distress. At the first sign of a recurrence or exacerbation of the physical symptoms, strong emotional reactions may occur. If the client has difficulty disengaging from those emotions, they can get in the way of biofeedback practice. The following practices may be particularly helpful in disengaging from difficult emotions and choosing a helpful response:
    - Labeling thoughts and emotions
    - Difficult emotions practice
    - Self-compassion (mettā).

Summary

In summary, in integrating mindfulness into your biofeedback practice, include the following elements:

- Change your intention
- Use mindful language in session
- Cultivate nonjudgment and self-compassion
- Practice and encourage nonjudgmental observation and labeling
- Encourage choosing a response instead of automatic reaction

Table 1.1 The do's and don'ts of mindful biofeedback practice.

Do	*Do not*
Make room for every aspect of your experience	Attempt to control thoughts, feelings, and physiological sensations
Attend to all of your experience with kindness and curiosity	Struggle with the present moment
Learn to get better at feeling	Try to feel better
Give yourself a break	Judge your internal experience
Give yourself space to choose a response	React automatically to your internal experience

- Teach mindfulness and self-compassion practices prior to and together with biofeedback skills
- Use mindfulness techniques to troubleshoot.

Finally, see Table 1.1 for a summary of do's and don'ts in mindful biofeedback practice.

References

Baer, R.A., Smith, G.T., and Allen, K.B. (2004). Assessment of mindfulness by self-report: the Kentucky Inventory of Mindfulness Skills. *Assessment*, 11, 191–206.

Baumeister, R.F., Bratslavsky, E., Muraven, M., and Tice, D.M. (1998). Ego depletion: is the active self a limited resource? *Journal of Personality and Social Psychology*, 74(5), 1252–1265.

Bowen, S., Witkiewitz, K., Dillworth, T.M., Chawla, N., Simpson, T.L., Ostafin, B.D., Larimer, M.E., Blume, A.W., Parks, G.A., and Marlatt, G.A. (2006). Mindfulness meditation and substance use in an incarcerated population. *Psychology of Addictive Behaviors*, 20(3), 343–347.

Carlson, L.E., Speca, M., Faris, P., and Patel, K.D. (2007). One year pre-post intervention follow-up of psychological, immune, endocrine and blood pressure outcomes of mindfulness-based stress reduction (MBSR) in breast and prostate cancer outpatients. *Brain, Behavior, and Immunity*, 21(8), 1038–1049.

Carlson, L.E., Speca, M., Patel, K.D., and Goodey, E. (2003). Mindfulness-based stress reduction in relation to quality of life, mood, symptoms of stress, and immune parameters in breast and prostate cancer outpatients. *Psychosomatic Medicine*, 65(4), 571–581.

Carlson, L.E., Speca, M., Patel, K.D., and Goodey, E. (2004). Mindfulness-based stress reduction in relation to quality of life, mood, symptoms of stress and levels of cortisol, dehydroepiandrosterone sulfate (DHEAS) and melatonin in breast and prostate cancer outpatients. *Psychoneuroendocrinology*, 29(4), 448–474.

Carmody, J. and Baer, R.A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine*, 31, 23–33.

Creswell, J.D., Myers, H.F., Cole, S.W., and Irwin, M.R. (2009). Mindfulness meditation training effects on CD4+ T lymphocytes in HIV-1 infected adults: a small randomized controlled trial. *Brain, Behavior, and Immunity*, 23(2), 184–188.

Creswell, J.D., Way, B.M., Eisenberger, N.I., and Lieberman, M.D. (2007). Neural correlates of dispositional mindfulness during affect labeling. *Psychosomatic Medicine*, 69(6), 560–565.

Davidson, R.J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S.F., Urbanowski, F., Harrington, A., Bonus, K., and Sheridan, J.F. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine*, 65(4), 564–570.

Gailliot, M.T., Baumeister, R.F., DeWall, C.N., Maner, J.K., Plant, E.A., Tice, D.M., Brewer, L.E., and Schmeichel, B.J. (2007). Self-control relies on glucose as a limited energy source: willpower is more than a metaphor. *Journal of Personality and Social Psychology*, 92(2), 325–336.

Germer, C.K. (2009). *The Mindful Path to Self-Compassion: Freeing Yourself from Destructive Thoughts and Emotions*. New York: The Guilford Press.

Grossman, P., Tiefenthaler-Gilmer, U., Raysz, A., and Kesper, U. (2007). Mindfulness training as an intervention for fibromyalgia: evidence of post-intervention and 3-year follow up benefits in well-being. *Psychotherapy and Psychosomatics*, 76, 226–233.

Hofmann, S.G., Sawyer, A.T., Witt, A.A., and Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: a meta-analytic review. *Journal of Consulting and Clinical Psychology*, 78(2), 169–183.

Hölzel, B.K., Carmody, J., Evans, K.C., Hoge, E.A., Dusek, J.A., Morgan, L., Pitman, R.K., and Lazar, S.W. (2010). Stress reduction correlates with structural changes in the amygdala. *Social Cognitive and Affective Neuroscience*, 5(1), 11–17.

Hölzel, B.K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S.M., Gard, T., and Lazar, S.W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research*, 191(1), 36–43.

Jha, A.P., Krompinger, J., and Baime, M.J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive Affective and Behavioral Neuroscience*, 7, 109–119.

Koster, E.H.W., Rassin, E., Crombez, G., and Naring, G.W.B. (2003). The paradoxical effects of suppressing anxious thoughts during imminent threat. *Behavior Research and Therapy*, 41, 1113–1120.

Lazar, S.W., Kerr, C.E., Wasserman, R.H., Gray, J.R., Greve, D.N., Treadway, M.T., McGarvey, M., Quinn, B.T., Dusek, J.A., Benson, H., Rauch, S.L., Moore, C.I., and Fischl, B. (2005). Meditation experience is associated with increased cortical thickness. *Neuroreport*, 16, 1893–1897.

Pace, T.W., Negi, L.T., Adame, D.D., Cole, S.P., Sivilli, T.I., Brown, T.D., Issa, M.J., and Raison, C.L. (2008). Effect of compassion meditation on neuroendocrine, innate immune and behavioral responses to psychosocial stress. *Psychoneuroendocrinology*, 34(1), 87–98.

Roemer, L., Orsillo, S.M., and Salters-Pedneault, K. (2008). Efficacy of an acceptance-based behavior therapy for generalized anxiety disorder: evaluation in a randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 76(6), 1083–1089.

Siegel, R.D. (2009). *The Mindfulness Solution: Everyday Practices for Everyday Problems*. New York: The Guildford Press.

Teasdale, J.D., Segal, Z.V., Williams, J.M., Ridgeway, V.A., Soulsby, J.M., and Lau, M.A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*, 68(4), 615–623.

Treanor, M., Erisman, S.M., Salters-Pedneault, K., Roemer, L., and Orsillo, S.M. (2011). Acceptance-based behavioral therapy for GAD: effects on outcomes from three theoretical models. *Depression and Anxiety*, 28(2), 127–136.

Wegner, D., Broome, A., and Blumberg, S. (1997). Ironic effects of trying to relax under stress. *Behavior Research and Therapy*, 35(1), 11–21.

Wegner, D.M., Schneider, D.J., Carter, S.R. 3rd, and White, T.L. (1987). Paradoxical effects of thought suppression. *Journal of Personality and Social Psychology*, 53(1), 5–13.