Peripheral temperature can be monitored with various equipment ranging from digital or glass thermometers to mood rings. This article reports on an additional “yummy” temperature feedback approach, milk or dark chocolate, as an indicator of successful hand warming. The chocolate feedback was discovered initially by a trainee to reduce symptoms associated with syringomyelia. In addition, the article summarizes data demonstrating that hand warming is easily learned. Using a thermometer, 219 participants—students and physical therapists—rapidly warmed their hands an average of 10.1°F when guided with imagery. For the subset of 106 university students, their subjective stress levels decreased by 49% as their hands warmed. Regardless of the technique, hand warming provides a useful demonstration that voluntary self-control is possible.

Introduction

Most biofeedback devices are sophisticated electronic instruments designed to monitor and feed back complex biological functions. Although computer-based equipment allows for data storage and feedback signal analysis and manipulation, the educational challenge is to have trainees generalize the skills in their home or work environments. Depending on the physiological signal to be monitored, portable digital biofeedback devices are available to monitor and feed back blood pressure, heart rate variability, peripheral temperature, electroencephalograms, and so on. Besides the electronic devices, many common objects also may be used for feedback, such as protractors to measure hand and arm rotation, bathroom scales to teach balance, Scotch™ tape over the forehead to monitor frowning, or a glass thermometer and mood ring to teach peripheral hand warming (Finn, 1982; Peper & Robertson, 1976; Peper, Tylova, Gibney, Harvey, & Combatalade, 2008; Scharff, Marcus, & Masek, 2002).

Elmer Green and his associates at the Menninger Foundation in the late 1960s integrated temperature biofeedback training with autogenic phrases to successfully teach trainees voluntary hand warming (Green & Green, 1977). Hand warming demonstrated that voluntary self-control over autonomic physiological functions was possible. Raising peripheral temperature usually facilitates general relaxation and has been used as a treatment strategy for disorders such as migraine headaches, Raynaud’s disease, and hypertension (Fahrion, Norris, Green, Green, & Snarr, 1986; Herman & Blanchard, 2002; Rose & Carlson, 1987; McGrady, 1994).

Clinical outcome is often more successful when trainees practice the skill in their daily lives and make this practice part of their own discovery process, so that the home practices are fun instead of work. For home practice many temperature feedback devices have been used, such as digital or glass thermometers, biodots, or mood rings. This article reports on an additional “yummy” temperature feedback device—melting chocolate—as an indicator of hand warming. A small piece of chocolate held between the thumb and index finger offers ongoing temperature feedback and gives a positive reward for successful peripheral hand warming.

The Discovery of Chocolate as a Feedback Signal

A student researcher (A.C.) was exploring how temperature training could be used to reduce discomfort in a trainee with syringomyelia. Syringomyelia is a genetic disorder in which a cyst or cavity forms within the spinal cord. The cyst may expand over time, destroying the spinal cord. This trainee’s symptoms included weakness and stiffness in the back, shoulders, arms, or legs; headaches; neuropathic-like pain in the neck; weakness, numbness, and muscle wasting in the arms and forearms; and loss of sensations of hot or cold, especially in the hands.

The training was complicated by the trainee’s inability to sit in a chair for more than a few minutes without moving around to relieve pain and the inability to travel to
the laboratory location because travel increased symptoms, thus requiring a “cocktail” of additional narcotic pain medication and coffee to manage pain and stay alert.

The training protocol focused on increasing hand temperature to reverse the poor circulation (cold fingers and reduced temperature sensation in her fingers). The training guidance was via phone and home visits. During a home visit, the trainee gave a dark chocolate bar to the trainer as an appreciation for all the work she did. After the trainer shared the chocolate with the trainee, she noticed that the piece of chocolate she held in her hand was melting. She grabbed a napkin to wipe her hand and offered the trainee a napkin to clean up in case her chocolate also melted. The trainee laughed and said there was no possibility of the chocolate melting in her hands. She knew from her training as a pastry chef and her experience working with dark chocolate that it melted between 90°F and 93°F. The trainee joked about the chocolate “biofeedback” the state of her cold hands. A few days later, the trainee and trainer started to explore the idea of chocolate as a biofeedback tool. Consequently, the trainee held a piece of milk chocolate while practicing a relaxation imagery exercise. She chose milk chocolate, knowing it melts at a lower temperature than dark chocolate. To her surprise, the chocolate melted!

With this success, chocolate-melting became part of the home biofeedback training procedure. The hand-warming process included slow-paced breathing and imagery of warming. The trainee imagined herself at her favorite place on the beach, putting her hands in warm sand and noticing how nice it felt on her hands, and then imagined herself feeling happy, relaxed, and pain free. Using the trainee’s pastry chef experience and knowledge of “the science of chocolate,” the trainer-trainee team chose to use the sequence of melting of milk chocolate followed by a piece of dark chocolate, each day. During the training, the trainee practiced hand-warming exercises in many situations such as walking. While walking, she would hold chocolate squares in her hands; however, the chocolate squares would melt and slip from her hands. This was disappointing because it caused her to lose her reward of eating the chocolate after it had melted.

Once the trainee had demonstrated to herself after 2 weeks of training that she consistently was able to melt the milk chocolate, she decided that she would try to use only dark chocolate. In addition, she had concerns about the amount of chocolate that she was eating daily—she ate an entire bar of chocolate once it was opened. Thus, she started to use semisweet chocolate chips that she carried around with her in a small candy tin. She found chocolate chips to be portable, easy to hold between her fingers (see Figure 1), and less messy to lick from her fingers.

The trainee’s creativity and ongoing use of the chocolate as a feedback signal confirmed for her that change was possible—seeing is believing! She also reported that she felt confident about herself and her abilities, and she is now more hopeful about her health situation in general as well as feeling pleased with the process of creative experimentation. The trainee reported that after 4 weeks of training with the hand-warming procedure, her pain was significantly reduced.

Everyone Can Learn

This anecdote of using chocolate to confirm temperature warming is an example that most people can learn to warm their hands when guided through imagery techniques. Peper and Gibney (2003) showed that 219 participants in various group settings (physical therapists in the Netherlands [86 women and 26 men; mean age = 39.4 years, SD = 8.4] and students at San Francisco State University [81 women and 25 men; mean age = 25.4, SD = 7.7]) could warm their hands when they were guided through a standardize imagery procedure described in Peper, Gibney, and Holt (2002).

The average temperature increased 8.1°F (SD = 6.9°F) from 85.3°F to 95.4°F during the guided exercise, as shown in Figure 2. In addition, the change in subjective stress level as measured from university students decreased from 4.3 to 2.2 (on a scale from 0, relaxed, to 9, tense), as shown in Figure 3.
Discussion
Voluntary hand warming consistently demonstrates that physiological changes, as indicated by increased finger temperature, is possible and reduces subjective stress levels. This concept of experiential knowing that hand warming has occurred helps transform helplessness beliefs (“I have no control and there is nothing I can do”) into empowering beliefs (“It may be possible and I can do something”). Hand warming is an experiential demonstration to evoke hope.

Common to the successful guided imagery is passive attention to a body area that often causes temperature to increase. Gently focusing on the area or imagining an internal flow or sensation of warmth or air flowing through the arm and out the finger is a mindfulness practice. Each time the person is distracted by thoughts, feeling, or external stimuli, the instructions are to bring the attention back gently to the task and awareness of hand warming. This practice generally reduces sympathetic activation and allows the person to become quieter and to experience safety, which encourages an anabolic/trophotropic state that promotes regeneration and healing. A simple glass or digital thermometer can be used for feedback; however, melting chocolate is also a perfect feedback device to encourage training.

References