Katherine R. Arlinghaus, MS, RD, John P. Foreyt, PhD,
and Craig A. Johnston, PhD

The Issue of Aversion in Lifestyle Treatments

Abstract: *Increasing evidence suggests that vigorous physical activity (PA) is more beneficial than moderate PA for reducing adiposity and improving bone health in youth. However, beginning a vigorous PA program is not an easy behavior adjustment and the change is likely to be aversive for some individuals. In order to benefit from vigorous PA, health care providers need to help individuals increase self-efficacy.*

Keywords: aversion therapy; self-efficacy; vigorous physical activity; youth

More than 75% of American youth do not meet the recommendations for physical activity (PA).¹ Barriers to meeting recommendations differ depending on the individual, but one of the most commonly cited reasons is time.^{2,3} As discussed by Owens et al⁴ in this issue, increasing evidence suggests that vigorous activity is more beneficial than moderate PA relative to adiposity and bone health in youth. Because vigorous activity typically occurs in shorter bouts, individuals may be able to achieve these specific health benefits in less time. While this strategy could be an effective solution to the time barrier to PA for some, doing vigorous activity comes

with its own set of challenges that should be considered.

The plethora of weight loss and diet products marketed as quick-fixes^{5,6} illustrates a common desire for immediate solutions to managing personal health. This desire combined with the growing body of evidence showing vigorous activity is beneficial

item is to withdraw. Some of the first treatments for lifestyle diseases focused on the power of aversion.¹⁰⁻¹² Aversion therapy capitalizes on the innate human response to avoid unpleasant experiences by training people to develop a repulsion to an unwanted behavior. Examples of aversive stimuli include the snap of a rubber band,¹³

. . . doing vigorous activity comes with its own set of challenges that should be considered.

for multiple health outcomes has made exercise programs with short, vigorous workouts a recent fitness trend.^{7,8} In youth, competing academic priorities often leave very little time for PA in the school day^{3,9}; short vigorous workouts could be the answer. As is the case with most lifestyle solutions, these benefits come at a cost. Vigorous PA, by definition, is hard and can be aversive.

Aversion

Aversion is a strong dislike that brings about discomfort. Our natural response when faced with an aversive situation or

electric shocks,¹⁴⁻²¹ unpleasant tastes,^{22,23} and noxious odors.^{24,25} Although considerable research was done in this line of research, aversion therapy was ultimately shown to be ineffective in the treatment of many lifestyle behaviors.¹⁰⁻¹²

Smoking Cessation

In the case of smoking cessation, most studies were conducted using either shock¹⁷⁻²¹ or cigarette smoke itself²⁶⁻³² as the aversive stimulus to deter subjects from smoking. For example, a number of studies²⁶⁻³⁰ used a rapid smoking method in which subjects were instructed to smoke at an increased rate so that the subject was

DOI: 10.1177/1559827616680554. From Department of Health and Human Performance, University of Houston, Houston, Texas (KRA, CAJ); and Department of Medicine, Baylor College of Medicine, Houston, Texas (JPF). Address correspondence to Craig A. Johnston, PhD, Department of Health and Human Performance, University of Houston, Houston, TX 77204-6015; e-mail: cajohn25@central.uh.edu.

For reprints and permissions queries, please visit SAGE's Web site at <http://www.sagepub.com/journalsPermissions.nav>.

Copyright © 2016 The Author(s)

puffing about every 6 seconds until they were unable to tolerate it any longer. Although some short-term positive results were reported, aversion therapy efforts for smoking cessation have largely been abandoned.¹² Despite this type of aversion therapy that created an association that was closely related to the undesirable behavior such that it could serve as a natural stimuli, actual aversions were not created, only associations. Most individuals can fairly quickly cognitively overcome these associations after a period of time.

Obesity Treatment

Similar to smoking cessation, a substantial body of research was conducted using aversive therapy in obesity.^{10,33} While a variety of aversive stimuli have been used,^{13-16,22,24,25,34} the following example²⁴ illustrates the general procedure of using a noxious odor as the aversive stimulus. Subjects were presented with the scent of a desirable food that led to overeating behavior (eg, the smell from a dessert being baked). This smell was immediately followed by the presentation of a repulsive odor such as pure skunk oil. From this, subjects learned to associate the desirable smell of tempting foods with the foul smell of pure skunk oil. Even though the researchers successfully reduced the subjects' desire to eat specific foods, the distaste was not generalizable to other foods. This failure to generalize was further compounded by the issue that the environment in which we live has practically unlimited options for food substitutions. Additionally, subjects in these studies had prior experience enjoying eating the tempting foods used, and despite the associated rancid smells, they eventually began to eat them again because of the preferred taste.

Aversion Toward Healthy Behaviors

While aversion therapy does not appear to contribute toward effective lifestyle interventions, the power of aversion should not be discounted. Aversion takes place in multiple healthy lifestyle behaviors. For example, infants have a pronounced aversion to bitter tastes that is protective against the ingestion of

poisons.³⁵ Unfortunately, the phytonutrients responsible for the bitter taste in vegetables are also responsible for many of the health benefits.³⁶ Despite understanding that vegetables are healthy, individuals report not eating vegetables primarily due to the aversive taste.³⁵ Similarly, PA can be aversive. In youth, PA is associated with feelings of being out of breath, injury, and social embarrassment.³⁷ In many cases, individuals "overexercise," which causes feelings of soreness and often results in them completely stopping PA. PA becomes even more aversive when it is performed at a vigorous level.

Self-Efficacy

One way to increase the likelihood that patients will engage in aversive behaviors is to improve self-efficacy. The theory of self-efficacy is rooted in the idea that for individuals to change behavior, they must be confident in their ability to successfully perform the behavior and that the behavior will lead to the desired outcome.³⁸ Since vigorous activity is difficult, it is likely that many people will not feel confident in their ability to successfully do it, and, even if they believe it can improve their health, they are unlikely to attempt it. Thus, the challenge for health care providers is to build self-efficacy in their patients. The following 5 steps describe the main components of Bandura's model of self-efficacy³⁸ as applied to vigorous PA, and are designed to provide the basis for health care providers to support self-efficacy in their patients.

Explain the Importance

Explaining how the behavioral prescription being given is going to improve a patient's health is critical. Talking to individuals about how other patients have been successful with the change or how science supports these changes is important. A clear explanation of how vigorous activity can bring about better health is the first step to increasing self-efficacy.

Give Behavioral Meaning

Vigorous activity is likely to connote different thoughts and feelings depending

on the individual. For example, some will associate high levels of activity with physical reactions such as vomiting after a workout or extreme soreness. Because of this, health care providers need to clearly define vigorous activity for their patients. According to the American College of Sports Medicine, vigorous PA is defined as any PA greater than 6.0 metabolic equivalent of tasks (METs).³⁹ A MET is the amount of energy used sitting for a minute. So, a vigorous activity is one that expends 6 times the energy used to sit quietly for a minute. Age, gender, and fitness level contribute to individual differences in the intensity of activity that is needed to reach 6 METs. Vigorous PA will vary between patients. Health care professionals should relate this to their patients and assist them in determining specific activities that are vigorous for them.

Scale the Behavior

Specifically defining vigorous activity does not address the issue that PA is likely to be aversive, and patients are apt to avoid it. Scaling vigorous PA into progressive steps addresses this issue and increases patients' confidence in their ability to perform the activity. Not only does the activity itself need to be scaled but volume and frequency do as well. The level of activity at which patients start may not meet the definition of vigorous PA, but modifications to volume and frequency can gradually lead to reaching the vigorous activity goal.

Modeling

In addition to having a starting point, patients will likely need to know that others have successfully engaged in these activities. Patients who have never physically performed specific activities ideally should be referred to trainers who can model the movements. This will not only help ensure that the patient does the activities correctly to prevent injury but will also provide confidence. Another strategy is to have patients engage in group PA. Seeing others successfully complete vigorous activity may reduce anxiety associated with the behavior. An additional approach to lessen anxiety would be to have patients

include a relaxing stretching routine before performing vigorous activity.

Continued Support

Repeated success in the scaled vigorous activity will lead to higher levels of expected capabilities. This established efficacy is likely to be generalized to other, similar activities. Health care providers can take advantage of this by suggesting opportunities for scaled vigorous activity of multiple types, encouraging patients to explore different activities to determine which ones they prefer.

Conclusions

Vigorous PA has been shown to be the most effective form of activity in youth for improved adiposity and bone health and may require less time than moderate PA to achieve such health benefits.⁴ However, some consider vigorous activity to be an aversive behavior, decreasing the likelihood that they will try or sustain vigorous PA. Enabling youth to engage in vigorous PA will require health care providers to work with patients to develop their self-efficacy. Increasing self-efficacy toward vigorous activity is vital in supporting the long-term use of a healthy, but aversive, behavior.

Authors' Note

This work is a publication of the Department of Health and Human Performance, University of Houston (Houston, TX).

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. [AJLM](#)

References

- Dentro KN, Beals K, Crouter SE, et al. Results from the United States' 2014 report card on physical activity for children and youth. *J Phys Act Health*. 2014;11(4 suppl 1):S105-S112.
- Pate RR, Saunders RP, O'Neill JR, Dowda M. Overcoming barriers to physical activity: helping youth be more active. *Health Fit J*. 2011;15:7-12.
- Allison KR, Dwyer JJM, Makin S. Perceived barriers to physical activity among high school students. *Prev Med*. 1999;28:608-615.
- Owens S, Galloway R, Gutin B. The case for vigorous physical activity in youth. *Am J Lifestyle Med*. 2017;11:96-115.
- Butler D. Science of dieting: slim pickings. *Nature*. 2004;428:252-254.
- Hirsch J. Magic bullet for obesity. *BMJ*. 1998;317:1136-1138.
- Dawson MC. CrossFit: fitness cult or reinventive institution? [published online June 30, 2015] *Int Rev Sociol Sport*. doi:10.1177/1012690215591793.
- Thompson WR. Worldwide survey of fitness trends for 2017. *Health Fit J*. 2016;20(6):8-17.
- Hammerschmidt P, Tackett W, Golzynski M, Golzynski D. Barriers to and facilitators of healthful eating and physical activity in low-income schools. *J Nutr Educ Behav*. 2011;43:63-68.
- Abramson EE. A review of behavioral approaches to weight control. *Behav Res Ther*. 1973;11:547-556.
- Leventhal H, Cleary PD. The smoking problem: a review of the research and theory in behavioral risk modification. *Psychol Bull*. 1980;88:370-405.
- Hajek P, Stead LF. Aversive smoking for smoking cessation. *Cochrane Database Syst Rev*. 2004;(3):CD000546.
- Abramson EE, Jones D. Reducing junk food palatability and consumption by aversive conditioning. *Addict Behav*. 1981;6:145-148.
- Wolpe J. Reciprocal inhibition as the main basis of psychotherapeutic effects. *AMA Arch Neurol Psychiatry*. 1954;72:205-226.
- Thorpe JG, Schmidt E, Brown PT, Castell D. Aversion-relief therapy: a new method for general application. *Behav Res Ther*. 1964;2:71-82.
- Meyer V, Crisp AH. Aversion therapy in two cases of obesity. *Behav Res Ther*. 1964;2:143-147.
- Best JA, Steffy RA. Smoking modification procedures tailored to subject characteristics. *Behav Ther*. 1971;2:177-191.
- Steffy RA, Meichenbaum D, Best JA. Aversive and cognitive factors in the modification of smoking behaviour. *Behav Res Ther*. 1970;8:115-125.
- Conway JB. Behavioral self-control of smoking through aversive conditioning and self-management. *J Consult Clin Psychol*. 1977;45:348-357.
- Carlin AS, Armstrong HE Jr. Aversive conditioning: learning or dissonance reduction? *J Consult Clin Psychol*. 1968;32:674-678.
- Berecz JM. Reduction of cigarette smoking through self-administered aversion conditioning: a new treatment model with implications for public health. *Soc Sci Med*. 1972;6:57-66.
- Moss FA. Note on building likes and dislikes in children. *J Exp Psychol*. 1924;7:475-478.
- Whitman TL. Aversive control of smoking behavior in a group context. *Behav Res Ther*. 1972;10:97-104.
- Foreyt JP, Kennedy WA. Treatment of overweight by aversion therapy. *Behav Res Ther*. 1971;9:29-34.
- Kennedy WA, Foreyt JP. Control of eating behavior in an obese patient by avoidance conditioning. *Psychol Rep*. 1968;22:571-576.
- Schmahl DP, Lichtenstein E, Harris DE. Successful treatment of habitual smokers with warm, smoky air and rapid smoking. *J Consult Clin Psychol*. 1972;38:105-111.
- Best JA, Owen LE, Trentadue L. Comparison of satiation and rapid smoking in self-managed smoking cessation. *Addict Behav*. 1978;3:71-78.
- Dawley HH Jr. Aversive cigarette smoking with an habitual, excessive smoker. *Percept Mot Skills*. 1975;41:1008-1010.
- Lando HA. A comparison of excessive and rapid smoking in the modification of chronic smoking behavior. *J Consult Clin Psychol*. 1975;43:350-355.
- Lichtenstein E, Harris DE, Birchler GR, Wahl JM, Schmahl DP. Comparison of rapid smoking, warm, smoky air, and attention placebo in the modification of smoking behavior. *J Consult Clin Psychol*. 1973;40:92-98.
- Wilde GJ. Behavior therapy for addicted cigarette smokers: a preliminary investigation. *Behav Res Ther*. 1964;2:107-109.
- Resnick JH. Effects of stimulus satiation on the overlearned maladaptive response of cigarette smoking. *J Consult Clin Psychol*. 1968;32:501-505.
- Abramson EE. Behavioral approaches to weight control: an updated review. *Behav Res Ther*. 1977;15:355-363.
- Stollak GE. Weight loss obtained under different experimental procedures. *Psychol Psychother*. 1967;4:61-64.
- Mennella JA, Bobowski NK. The sweetness and bitterness of childhood: insights from basic research on taste preferences. *Physiol Behav*. 2015;152:502-507.
- Drewnowski A, Gomez-Carneros C. Bitter taste, phytonutrients, and the consumer: a review. *Am J Clin Nutr*. 2000;72:1424-1435.
- Grieser M, Vu MB, Bedimo-Rung AL, et al. Physical activity attitudes, preferences, and practices in African American, Hispanic, and Caucasian girls. *Health Educ Behav*. 2006;33:40-51.
- Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*. 1977;84:191-215.
- Pescatello LS. *ACSM's Guidelines for Exercise Testing and Prescription*. 9th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2014.