

# AFFECT-BASED EXERCISE PRESCRIPTION

## An Idea Whose Time Has Come?

by Matthew A. Ladwig, M.S.; Mark E. Hartman, M.S., M.A.; and Panteleimon Ekkekakis, Ph.D., FACSM

### Apply It!

1. Always remember what the “prime objective” of any exercise or physical activity plan should be: encourage lifelong activity. Short-term adaptations (e.g., weight loss, fitness gains) should be considered secondary.
2. Between allowing clients to choose their own pace and deciding for them, prefer the former but monitor for extreme responses (too low, too high). Setting an intensity even slightly higher than what the client would have selected may reduce the pleasure of exercise.
3. Instructing clients to find a pace that makes them “feel good” is a good method of individualization. The process can be aided by asking them to maintain at least a +3 on a rating scale, called the Feeling Scale, where +5 is marked as “very good,” +3 is “good,” +1 is “fairly good,” -1 is “fairly bad,” -3 is “bad,” and -5 is “very bad.”
4. Just as you systematically monitor heart rate and perceived exertion, make the assessment of pleasure/displeasure responses a part of your practice.

**Key words:** Guidelines, Pleasure, Displeasure, Intensity, Behavior Change

It could be said that, for the field of exercise science, evidence-based exercise prescription guidelines and physical activity recommendations represent the culmination of the process of knowledge translation — or, in other words, the conduit via which findings from basic research inform daily practice in gymnasias, schools, clinics, and rehabilitation centers. In this article, we reflect on previous guidelines and recommendations and outline our vision for a new model that may help the field strengthen its role in promoting public health.

Since their advent in the mid-1970s, exercise prescription guidelines have been based on a “bipartite” rationale that mimics the rationale followed in the development of prescriptions for pharmaceuticals: expert panels have sought to identify the “doses” of exercise (*i.e.*, frequency, duration, intensity) that (*a*) produce fitness gains and health benefits and (*b*) minimize the risk for as large a proportion of the population as possible. Moreover, the panels have long recognized that individuals will differ in the doses they prefer or can tolerate, depending on their health, level of physical conditioning, current participation, previous experience, and personality characteristics. Therefore, guidelines have been based traditionally on a “recommended range” model, intended to allow sufficient flexibility to tailor the dose of exercise or physical activity to individual abilities and tastes.

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## TAKING STOCK OF THE PAST FOUR DECADES

More than 40 years since the publication of the first guidelines by the American College of Sports Medicine (ACSM), it may be time to revisit the rationale that has underpinned the guideline-development process. Although guidelines and recommendations have been invaluable in promoting evidence-based professional practice, there is considerable room for improvement. In particular, much more must be done toward accomplishing what is arguably the primary objective of the field of exercise science, namely the promotion of health-enhancing physical activity to a larger portion of the population.

First, guidelines and recommendations have traditionally undergone short revision cycles, with the intention of keeping them current with a rapidly evolving evidence base. Inevitably, updates result in typically minor, upward or downward adjustments of the recommended ranges of frequency, duration, and intensity. The unintended consequence of these adjustments, however, is that they do not allow sufficient time for the changes to permeate through textbooks, educational curricula, continuing education opportunities, and ultimately the professional arena. For exercise and other health professionals to learn the new guidelines and recommendations, a sufficient period of consistency is essential. We administered a short quiz to a national sample of 1,808 ACSM-certified exercise professionals, asking about the recommended ranges of frequency, duration, and intensity (12). Respondents answered fewer than half of the questions (43%) correctly. Interestingly, however, knowledge of individual elements varied widely, from those that have remained essentially unchanged since 1995 (*i.e.*, 67% remembered the recommendation for averaging 30 minutes of moderate-intensity activity per day) to the definitions of the “vigorous” and “moderate” intensity ranges, which have changed slightly with each update (*e.g.*, 14% remembered that 77% to 95% is the current definition of “vigorous” intensity in terms of maximal heart rate and 18% selected 12 to 13 on the 6 to 20 scale as the range of perceived exertion considered indicative of “moderate” intensity). It is also interesting to note that respondents perceived their knowledge as being much higher (70%) than it actually was and yet still perceived that the level of knowledge needed “to be able to function as an exercise professional safely and effectively” is even higher (83%). Although it is impossible to know whether knowledge of the guidelines would be higher if the guidelines were more consistent, these results suggest that dissemination among exercise professionals is presently less than ideal.

A second issue associated with the frequent updates of the guidelines is the outward appearance of an evidence base that is fluid and immature. As one example, the definition of the all-important “moderate” range of exercise intensity in terms of percentages of maximal heart rate was 60% to 79%, 55% to 69%, and 64% to 76% in successive editions of the ACSM guidelines. Although exercise prescriptions and physical activity recommendations are not designed specifically to function as public health messages, they do receive media attention and may, therefore, play a role in influencing public behavior. For example, people



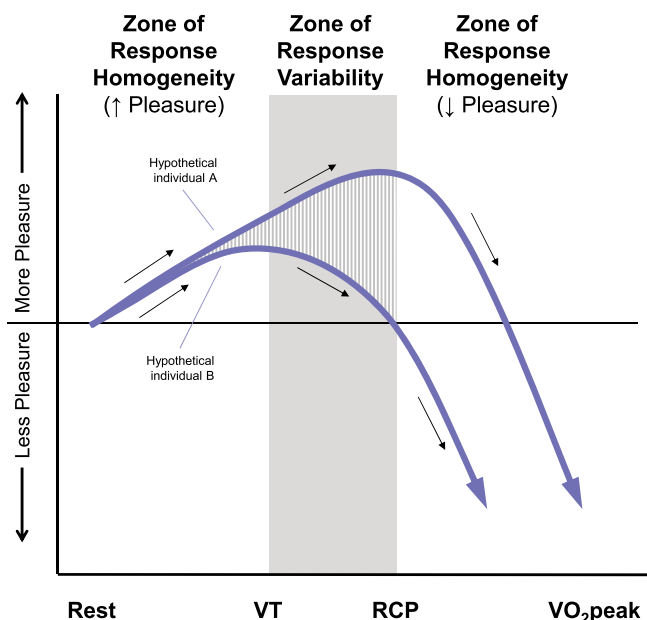
may decide whether starting an exercise program would be feasible (*e.g.*, given their time availability or perceived physical condition) based on how an adequate dose of exercise or physical activity is defined in the guidelines. In this sense, it may be time for the guideline-development process to take into account principles of social marketing. For example, it could be argued that the frequent revision of the recommended ranges of frequency, duration, and intensity constitutes a form of “counter-messaging” resulting in “message confusion.” A sedentary individual contemplating daily walks, for instance, may be led to believe that this goal is futile upon hearing experts claim that high-intensity interval training would be more effective or efficient.

Third, although the broad “recommended ranges” may allow flexibility in accommodating individual preferences and levels of tolerance, there is still no systematic method of tailoring exercise or physical activity to individuals. For example, expressed in terms of perceived exertion, activities from just above “fairly light” (*i.e.*, 12 on the 6 to 20 scale, the bottom of the “moderate” range) to “very hard” (*i.e.*, 17, the top of the “vigorous” range) are recommended (5). Described differently, activities ranging from walking at 2.5 mph (3.0 metabolic equivalent units) to running at more than 5.0 mph (8.7 metabolic equivalent units) are considered appropriate options. The absence of specific guidance on matching individuals to these options may result in problems. For example, overzealous exercise professionals may encourage new clients to “push” themselves harder during the critical early stages to accelerate visible changes. Even if the prescribed intensity is within the recommended range, depending on the physical condition and level of tolerance of the client, this approach may raise the risk of overexertion, aversion, nonadherence, dropout, or injury.

## AFFECT-BASED EXERCISE PRESCRIPTION

Finally, a striking void is the absence from exercise guidelines and physical activity recommendations of an explicit statement about lifelong behavioral change being the overarching objective or guiding principle. If the sole objective was the maximization or acceleration of fitness and health gains, then the intervention plan would probably consist of exercise 7 days per week, for 60 to 90 minutes each day, performed at the limit of tolerance. However, clearly, this is not a viable option. Instead, developing an effective plan always involves compromises. A duration that is seen as too long, for example, may act as a deterrent. However, reducing the duration to make it appear more manageable may entail increasing the intensity. In turn, a higher intensity may be aversive or risky. Because professional practice involves such difficult compromises, having a clearly delineated prime objective would be of great value. With this in mind, the limitations of the traditional “bipartite” rationale should become evident. An exercise prescription may be effective and safe on paper, but its value will remain nil unless individuals are willing to carry it out, on a regular basis, over the long haul. Because nearly all adaptations resulting from exercise and physical activity are quickly reversible upon discontinuation, the prime objective of any exercise or physical activity intervention should be to achieve sustainable, ideally lifelong, behavior change. All other objectives, including any short-term fitness gains, should be considered secondary.

**Figure.** Graphical representation of the relationship between exercise intensity and affect (pleasure/displeasure). Below the VT, most individuals feel as good as or even better than rest. Between the VT and the RCP, some individuals continue to feel better (e.g., hypothetical individual A), but others begin to feel worse (e.g., hypothetical individual B). Above the RCP, most individuals feel worse.



### HOW DO PEOPLE FEEL WHEN EXERCISING AT DIFFERENT INTENSITIES?

Research over the past two decades has established how the intensity of aerobic exercise relates to the pleasure and displeasure people feel when they exercise (4). Pleasure and displeasure emanating from the body can be thought of as primordial cues, favored by natural selection for signaling to consciousness potential benefits and risks, respectively. Examples of these functions abound. Think of the delight of a cool breeze on a hot and humid day, signaling the need to lower core temperature. Or think of the malaise of fever, forcing one to rest and preserve energy. Once felt in a certain situation or in response to a certain stimulus, pleasure and displeasure become encoded as an inextricable part of the memories of these experiences. Thus, recalling a fond life event or seeing a food that had caused poisoning automatically induce a pleasure or displeasure reaction that resembles the original experience, prompting one to repeat or avoid it.

Given how closely pleasure and displeasure reflect beneficial or threatening bodily states, it is perhaps unsurprising that, during exercise, pleasure and displeasure are linked to important metabolic landmarks (see Figure). Specifically, below the ventilatory (gas exchange) threshold (VT), one can exercise for a long time while maintaining a physiological steady state (*i.e.*, without a substantial increase in heart rate, oxygen uptake, or blood lactate over time). Because hunting and gathering activities that were essential for survival in human ancestral environments occupied large parts of each day, it is reasonable to assume that these activities had to be carried out mostly below the VT. Presumably, as an incentive to encourage such indispensable subsistence activities, most individuals report a steady or increasing level of pleasure at this range of intensity.

Between the VT and the respiratory compensation point (RCP), physiological variables indicative of metabolic strain begin to creep up, and the continuation of the activity, although possible, becomes increasingly challenging. Being able to tolerate the intensifying cues from the body is a double-edged sword; it can enable someone to cover more ground or persist in the pursuit of prey, but, on the other hand, this is done at increased risk of injury or exhaustion. Because the implications of this range of intensity are ambiguous (some potential benefit, along with some potential risk), some individuals feel better but others start to feel worse.

Finally, when exercise intensity exceeds the RCP, maintaining a steady state becomes impossible; physiological variables rise continuously until exhaustion and, by all indications, the body enters a state of severe stress. This level of intensity cannot be sustained for more than a few minutes. The activity must be stopped to prevent the impending metabolic crisis and irreparable harm. The way that the body ensures that the effort is reduced or terminated is through an overwhelming surge of displeasure. Interindividual differences found at lower intensities vanish above the RCP because a universal and powerful surge of displeasure is



needed to force the cessation of the intensity causing the severe homeostatic perturbation and ensure safety.

It is important to emphasize that, although the VT for a young, healthy, and athletic individual may require vigorous activity, this metabolic marker can be exceeded by common activities of daily life in individuals who are low active, overweight or obese, and of poor cardiorespiratory fitness. For example, a woman in her 60s, with a level of cardiorespiratory fitness considered “poor,” may have a maximal oxygen uptake of 25 ml of oxygen per kilogram of body mass per minute. If the VT occurs at 50% of maximal capacity (*i.e.*, 12.5 ml/kg per minute), this means that she would be working above her VT while performing activities associated with only 3.5 times her resting metabolic rate. Examples of such activities include walking for transportation (2.8–3.2 mph) without carrying extra weight, slow bicycling (5.5 mph), playing with children, or washing the car. These casual everyday activities would likely result in this hypothetical individual feeling worse, underscoring the challenge faced by exercise professionals who are called to identify activity options that are not only effective and safe but also pleasant.

### IMPLICATIONS OF THE INTENSITY-PLEASURE RELATIONSHIP FOR EXERCISE PRESCRIPTION

Many people, including many exercise professionals, perhaps presume that, at least for people starting out after a long period of inactivity, exercise will inevitably result in some degree of displeasure. Some may even believe that displeasure is a good criterion by which one can judge the effectiveness of exercise (“no pain, no gain”). Some years ago, in a best-selling book (6), a personal trainer to celebrities wrote that “when most people are left to their own devices, they will adopt an exercise intensity that is too low.” This is allegedly because the *appropriate* intensity is “the highest intensity that is safe,” which must induce “a definite feeling of fatigue” and take people “past [their] level of comfort.” To the extent that these opinions are shared by other exercise professionals, they suggest that the field may still be operating under a “no pain, no gain” mentality.

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An important question that arises, then, is whether pleasure is indeed incompatible with exercise. To answer this question, we



reviewed all studies in which participants were allowed to self-select their intensity (3) to assess whether most people “will adopt an exercise intensity that is too low” under such conditions. We found that, in most studies, participants chose intensities within the range that ACSM recommends for the improvement and maintenance of cardiorespiratory fitness (5). We also conducted a simulation study (7) involving healthy but sedentary middle-aged women. When we asked them to exercise on a treadmill for 20 minutes and told them that they could change the speed as they wished (the incline was set to zero), without making reference to modality (walk, jog, run), they gradually increased their intensity, eventually stabilizing at an intensity just below VT, corresponding to 84% of their peak heart rate (*i.e.*, within the “vigorous” range). Despite this intensity, the women reported feeling “good” throughout the bout, with no decline over time. Similar results have been reported by other investigators, who explicitly instructed participants to select an intensity that makes them “feel good”; participants intuitively picked an intensity that approximated their VT and was within the range recommended by ACSM for the improvement and maintenance of cardiorespiratory fitness (2,10). When we brought the women back to the lab, we had them perform another 20-minute bout, but this time, we set the treadmill speed to be 10% faster than the speed they had self-selected during the previous bout (*e.g.*, 3.3 instead of 3.0 mph). This small increase resulted in the women exceeding their VT (115% of the oxygen uptake associated with the VT) and approaching the upper boundary of the “vigorous” range (91% of peak heart rate). Importantly, they also reported a continuous decline in pleasure throughout the bout. Collectively, these studies suggest that, contrary to common misperceptions, exercise does not have to be unpleasant to be fitness enhancing and health promoting.

Subsequent research has shown that an intervention in which participants are instructed to exercise at an intensity that makes them “feel good” can improve parameters of cardiorespiratory fitness (8). Furthermore, early randomized controlled trials have shown that participants instructed to regulate their pace to ensure they “feel good” (1) or simply to self-regulate their pace, which naturally resulted in them feeling good while exercising (11), did more physical activity than participants given a standard

## AFFECT-BASED EXERCISE PRESCRIPTION

range-based exercise prescription (*i.e.*, 64% to 76% of maximal heart rate). These results are consistent with a body of correlational evidence showing that the pleasure or displeasure participants report during exercise is associated with their level of physical activity (9).

### LOOKING FORWARD

Over the past four decades, exercise prescription guidelines and physical activity recommendations have had a transformational effect on the field of exercise science by enabling professionals to base their practice on a foundation of scientific evidence. However, as the field looks to the future, it is important to recognize that exercise prescriptions and physical activity recommendations also have implications for behavior change. To promote behavior change at the population level, exercise science must take a new, bold, interdisciplinary approach in developing future exercise prescriptions and physical activity recommendations. We propose that the essence of this new approach should be the supplementation of the current bipartite approach focusing on the optimization of effectiveness and safety with a tripartite model (4) that also takes into account which doses will likely be experienced as pleasant, such that individuals will want to remain physically active over the long haul.

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The emerging evidence we discussed suggests that identifying a prescription or recommendation that is simultaneously (*a*) effective in promoting fitness and/or health, (*b*) safe, and (*c*) pleasant is possible. However, translating this evidence to practice will require more research and, importantly, a significant shift in outlook on the part of guideline-development panels and exercise professionals. As we noted, it is crucial for future guidelines and recommendations to be consistent and memorable,

offer a straightforward system of tailoring to individuals, and be guided by an unambiguous overarching objective, namely the promotion of lifelong physical activity. In this article, we proposed that the instruction to participants to self-regulate their exercise and physical activity such that they “feel good” could, despite its ostensible simplicity, accomplish the multiple goals of promoting effectiveness, safety, consistency, clarity, memorability, and behavior change.

Certainly, considerable work remains. One direction of ongoing research addresses the nature of individual differences. Although the findings we summarized here apply to group averages, or to most individuals within a group, some individuals will inevitably respond differently. For example, when asked to select an intensity that “feels good,” some individuals will pick either an intensity that is too low to be effective or one that is too high to be safe. The factors responsible for these divergent patterns must be explored to assist professionals in identifying individuals who may be prone to such responses and tailoring their interventions. Finally, another major objective of ongoing research is to test innovative methods for improving affective responses to exercise and physical activity for individuals across the lifespan (*e.g.*, children with obesity, chronically sedentary adults).

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## Recommended Readings:

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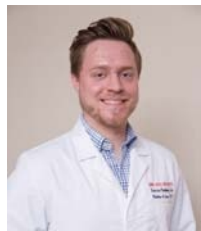


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**Disclosure:** The authors declare no conflict of interest and do not have any financial disclosures.



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## BRIDGING THE GAP

For more than 40 years, exercise prescription guidelines and physical activity recommendations have been developed with two goals in mind: (a) ensure effectiveness in promoting fitness and/or health and (b) minimize risk. It is now becoming clear that, besides being effective and safe, prescriptions and recommendations also should promote pleasure to increase the likelihood of sustained behavior change. Instructing individuals to regulate their pace to “feel good” may accomplish the goals of (a) effectiveness, (b) safety, and (c) behavior change.