The Utility of Exercise for Weight Control

Abstract

In August of 2009, TIME magazine created a minor uproar among exercise professionals with their cover story The Myth About Exercise stating that it "… won't make you lose weight". Many of us were quick to point out that if exercise was indeed futile in weight control efforts, obesity prevalence would be greatest among active individuals while sedentary individuals would be those with healthy body weights. Many dietitians, on the other hand, supported TIME's claims, noting that the 'energy in' part of the weight loss equation often influences energy balance to a far greater degree than energy expended. For example, a McDonald's quarter pound bacon and cheeseburger contains about 600 kilocalories. Depending on how hungry (and motivated) you are, it could potentially take you less than 10 minutes to eat this cheeseburger. To expend this energy; however, it may take over an hour of exercise. It is far easier to consume less energy than expend more when weight loss is the goal. This has generally been accepted, although it has also been accepted that exercise is part of the prescription for a healthy body weight. The American College of Sports Medicine has issued recommendations for exercise to induce weight loss and numerous weight loss programs have a physical activity/exercise component. Common knowledge persists that exercise is good for weight loss; although many published research studies are beginning to shed light on the energy balance equation and how exercise can effect energy balance in more ways than we once thought.

Keywords: Exercise; Weight loss; Energy intake; Hunger; Food reinforcement

Opinion

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Abbreviations: ACSM: American College of Sports Medicine; GLP1: Glucagon-like Peptide 1; RRV_{food}: Relative Reinforcing Value of Food

Introduction

The general perception amongst Americans is that exercise is a great way to lose weight, 71% of us to be exact [1]. As a health professional, I would never refute this or discourage anyone whose goal is to lose weight from engaging in exercise. After all, the American College of Sports Medicine has issued specific recommendations for exercise when weight loss is the primary goal [2] and some have shown that aerobic exercise by itself results in meaningful weight loss [3,4]. For weight loss to occur, energy expenditure must exceed energy intake, making it is easy to assume that increasing energy expenditure through exercise would favorably tip this balance towards weight loss. Despite this seemingly simple reasoning, there are just as many studies that show little to no weight loss with exercise [5-8]. Of course there are many variables that can impact an exercise intervention's success (participant adherence, exercise dose/intensity prescribed, sample population) leading many of us exercise advocates to conclude that weight loss interventions that used exercise and failed were flawed in some way. Although it is becoming more apparent that the relationship between energy intake and expenditure if far more complex, with many other facets contributing to the simple energy in – energy out equation. These include reductions in resting metabolic rate and non-exercise energy expenditure and improved metabolic efficiency as the human body naturally strives to maintain energy balance regardless of the situation [9-12]. These factors, however, are negligible when compared to the much greater contributor to this equation: increased dietary energy intake [12].

Many individuals are aware that to achieve weight loss success they will have to, at the very least, pay attention as what they are eating. Individuals who successfully reduce energy intake upon initiating an exercise program often experience the greatest weight loss, where those who fail to monitor their energy intake often compensate for the energy expended through exercise by increasing their intake [10]. In fact, if one does not deliberately control energy intake, it is very likely they will naturally compensate, at least to some degree, regardless of exercise dose [12,13]. General reasoning may suggest that exercise makes one feel hungrier, driving individuals to eat more than they would without exercise. Although it seems this isn't always the case, as the general consensus is that acute bouts of exercise do not cause compensatory changes in appetite, food intake, and appetite regulatory hormones [14-16]. Although my hunch is that the loose coupling that exists between energy balance and energy intake [17] prevents the detection of these changes when assessed in acute settings. Even studies over the course of 24 or 48 hours investigating hunger, food intake, and appetite regulatory hormones [18-20] have failed to observe consistent changes with exercise. It is therefore possible that energy intake is spontaneously increased over a period of several days in effort to maintain energy balance. It also may be possible that a factor other than hunger is driving energy intake during periods

of exercise-induced negative energy balance. For instance, the hormones ghrelin and glucagon-like peptide 1 (GLP-1) both act on the meso-accumbal dopamine system to play a role in reward-driven feeding [21-22] and preliminary data has shown these are altered with long-term exercise. The meso-accumbal dopamine system is essential for experiencing appetitive reward and assimilating information about energy balance [23]. This reward driven feeding is often termed the "relative reinforcing value" of food (RRV_{food}) [24,25] and is a strong predictor of greater energy intake and body weight. It is very possible that exercise induces food cravings that are separate from hunger. This is often observed anecdotally, as people (especially novice exercisers) often feel the need to "treat" themselves after exercise or feel that since they exercised today they can/should eat that second helping of dessert (for example). Even if those exercising don't specifically think about "treating" themselves, it is very possible that they are naturally drawn towards the reinforcing aspects of food- a mechanism the body is using to maintain energy balance.

Conclusion

A negative energy balance, although needed for weight loss, is perceived as a threat to the body and elicits mechanisms to maintain energy balance. This is problematic for those exercising in effort to lose weight, as the hard work put into expending energy and creating this negative energy balance is concurrently being fought by the human body. One thought is that exercise promotes greater energy intake through increases in hunger, although this is not observed after acute exercise sessions. It is possible that hunger may be driving greater energy intakes with exercise, but slowly. This process of energy compensation may last over a period of several days, with only marginal differences in single meals or across one day. A less studied possibility that may drive energy intake and maintenance of energy balance with exercise is an increase in reward driven feeding. Future research should focus on elucidating these mechanisms and how to structure an exercise program to most favorably attenuate the compensatory response to energy expended during exercise.

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Conflicts of Interest

Dr. Flack declares no conflict of interest.

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