Exercise in Eating Disorders Treatment: Systematic Review and Proposal of Guidelines

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ABSTRACT

COOK, B. J., S. A. WONDERLICH, J. E. MITCHELL, R. THOMPSON, R. SHERMAN, and K. MCCALLUM. Exercise in Eating Disorders Treatment: Systematic Review and Proposal of Guidelines. *Med. Sci. Sports Exerc.*, Vol. 48, No. 7, pp. 1408–1414, 2016. **Introduction**: Although exercise is an effective intervention for many psychological health issues, it has often been overlooked as a potential adjunct to eating disorder (ED) treatment. Thus, our objective was to summarize the literature by synthesizing themes identified in clinical studies and explicit guidelines or recommendations for the use or management of exercise in ED interventions into a proposed set of guidelines for the use of exercise in ED treatment. **Methods**: A literature search in exercise science, health psychology, and the ED literature was conducted. The focus was to obtain articles that reported on therapeutic effects and/or guidelines for the therapeutic use of exercise in individuals with ED. **Results**: Our review identified 11 core themes describing techniques that have been successful in using exercise therapeutically in ED treatment. These 11 guidelines are as follows: employ a team of relevant experts, monitor medical status, screen for exercise-related psychopathology, create a written contract of how therapeutic exercise will be used, include a psychoeducational component, focus on positive reinforcement, create a graded exercise program, begin with mild-intensity exercise, tailor the mode of exercise to the needs of the individual, include a nutritional component, and debrief after exercise sessions. **Conclusion**: Our review identifies specific guidelines that may enhance ED treatment outcomes. It is the first to summarize divergent literature and synthesizes previous successes that may guide the use of therapeutic exercise in some, but not all ED patients. This review provides a practical set of guidelines for the clinical management and therapeutic use of exercise in ED treatment by focusing on empowering individuals with exercise as a tool for healthy living. **Key Words:** EXERCISE IS MEDICINE, EXERCISE TREATMENT, EATING DISORDERS, GUIDELINES, LITERATURE REVIEW

Eating disorders (ED) are the most common psychiatric disorders afflicting young women (35) and contribute to great detriments in psychological, social, and physical health (18,25,39). The severe nature of ED, the high cost of treatment, and the added health care burden provide rational support for examining efficacious, easily disseminated, innovative, and cost-effective ED interventions that may improve treatment outcomes (16,31). Although exercise is an effective intervention for many psychological health issues (e.g., anxiety, depression), it has often been overlooked as a potential ED treatment.

The suggestion of including exercise in the treatment of ED may be viewed as provocative and controversial. However, there is a growing body of evidence suggesting that closely monitored, nutritionally supported exercise is safe and may convey multiple benefits in individuals with ED. For example, previous research has demonstrated an effect for exercise to decrease obligatory exercise attitudes and behaviors (7), to reduce the drive for thinness and bulimic symptoms, to decrease body dissatisfaction (10,41), to facilitate weight gain in anorexia nervosa (AN) (7,8), to increase strength (17), to reverse cardiac abnormalities in severe AN (26), and to improve quality of life (9,11,14,15). This area of research suggests that substantial help may be possible from delivering an appropriate exercise treatment protocol as part of an ED treatment. Consequently, several literature reviews (22,33,48) and a recent meta-analysis (34) have all independently concluded that exercise is safe for all ED variants provided that nutritional needs are met. Taken together, the extant research indicates that carefully managed therapeutic exercise may reflect the American College of Sports Medicine's "Exercise is Medicine" initiative in ED patients. However, the lack of a comprehensive list of guidelines that may explain how to effectively use exercise as a part of ED treatment demonstrates a need for further review and synthesis of the literature.

The purpose of this review was to provide a critical analysis of the literature describing how exercise has been

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used in ED treatment. Consolidating details of successful application of exercise in ED treatment will provide a list of guidelines that may be empirically tested in future randomized controlled trial research and also inform clinical practice. Simply stated, a great need exists to scientifically elucidate previously unknown or confusing aspects of exercise in ED and to carefully consider what this information provides in terms of empirically testable clinical recommendations regarding exercise in ED treatment.

METHODS

Protocol. The protocol outlined in the "Preferred Reporting Items for Systematic Reviews and Meta-analyses" (32) was followed.

Eligibility criteria and study selection. To be eligible for inclusion in this study, publications had to be English research articles, systematic reviews, meta-analyses, or reports that included clinical recommendations or protocols on how to manage exercise or use therapeutic exercise in ED treatment. Publications reporting only outcome results of individual studies were excluded.

Information sources. PubMed, Cochrane Library, EBSCOhost, ERIC, Google Scholar, MedlinePlus, and PsychINFO databases were searched between August 2013 and July 2014. In addition, reference lists from relevant articles and book chapters were searched. Finally, relevant authors were contacted for additional data when needed.

Search. The following search terms were used as independent terms and in combination in all databases: exercise, ED, anorexia, bulimia, guidelines, therapeutic exercise, physical activity, therapy, recommendations, protocols, and management.

Study selection. Published articles, clinical reports, books/chapters, and position statements that described how exercise was used as part of an ED treatment were included.

Data collection process. Data collected from eligible studies included themes identified in clinical studies and explicit protocols or recommendations for the use or management of exercise in ED interventions.

Data items. Our review focused on identifying the content themes that have summarized the therapeutic use of exercise in ED treatment. Thus, the data items sought from the literature addressed qualitative themes, conclusions, and recommendations that have been previously presented across disciplines. Therefore, our study attempted to synthesize this knowledge into one interdisciplinary review of therapeutic exercise in ED.

Risk of bias. To help avoid bias, we included reviews from the ED literature and also expanded our search to other areas of expertise. That is, focusing solely on articles published within one area (e.g., the ED literature and exercise science literature) inherently ignores the advances made in other areas of science and clinical work that have examined the issues of how to understand, manage, and treat individuals with ED that exercise or the potential of exercise as a part of treatment.

Summary measures. The summary measures used in this review were conclusions identified in previous research and any protocols or specific recommendations for the use of exercise in treatment settings.

Synthesis of results. There is a need to provide a detailed set of ED-specific recommendations that reflect knowledge from interdisciplinary translational research in ED treatment, health psychology, and exercise science. On the basis of our review of the literature, we identified core themes of how exercise has been efficaciously included as an ED treatment for individuals with ED.

RESULTS

Study selection. Our search of the literature initially returned 149 articles: seven focused solely on binge eating disorder, 29 described correlates of exercise in ED, 49 described interventions, 23 reported on various other aspects of ED without mention of exercise, eight reported outcomes of treatment studies, 19 provided ED therapy recommendations, and 14 were review articles. Articles were excluded for the following reasons: articles that focused on binge eating disorder, correlates of exercise in ED, other aspects of ED, and general outcomes. Of the intervention articles, 32 described interventions without providing any details as to how exercise was used therapeutically, 6 were excluded for being case reports, 2 were excluded for only including animals, and 1 was not in English. Of the review articles, exclusion was due to the following reasons: two reviews were on bone health in ED, two reviews proposed theory only, and two review articles did not discuss exercise at all. Finally, of the articles with recommendations, exclusion was due to the following reasons: five did not include exercise recommendations, four did not include individuals with ED (i.e., rather, they included obesity), two were focused on treatment providers' attitudes about exercise in ED, one was a call for more research to be done in examining the role of exercise in ED treatment, one advocated for a self-help approach to treating ED, one simply discussed features of exercise in ED, and one described caloric requirements during ED treatment. Thus, our search for articles that provide specific details of how therapeutic exercise protocols have been used in ED treatment yielded 18 articles.

Study characteristics. Of the 18 articles, 2 articles described principles for the therapeutic use of exercise in the fields of exercise science and behavioral medicine (36,45), 7 were interventions that included specific protocols for the use of therapeutic exercise (i.e., five of these were from the ED field [4,7,23,41,42], two were from exercise science [38,40]), 2 were a list of protocols derived from clinical practice (one from an ED treatment center [27] and one from a physical therapy practice [5]), 1 was a meta-analysis of exercise in the therapy of AN (34), and 6 were narrative reviews of the literature (i.e., three from the exercise science literature [22,33,43], two from the mental health literature [46,47], and one from the ED literature [48]).

Results of individual studies. The themes present in the literature that have examined the potential for the therapeutic use of exercise in ED treatment are presented in Table 1.

Synthesis of results. On the basis of our review of the literature, we have identified the following 11 core themes, principles, or strategies for how exercise has been, or may be, efficaciously included as part of an ED treatment.

1. Team approach
   Including an exercise program in the treatment of ED requires specific knowledge related to exercise prescription, physiology, and nutrition, in addition to medical and psychological factors relevant to ED treatment. Therefore, a multidisciplinary team of experts in exercise, nutrition, mental health, medicine, and physical therapy should work collaboratively to develop individually tailored exercise programs, with participation contingent upon adherence to ED therapy. The team also should closely monitor ED patients to ensure safety. Thus, therapeutic exercise may be most appropriate for hospital-based or residential treatment ED patients.
2. Medical concerns/contraindications
   Safety is the primary concern when adding exercise to ED therapy, and all precautions must be taken to prevent harm. Beginning an exercise routine generally presents minimal health risks; however, ED patients present additional physiological and psychological concerns beyond that of an individual without an ED.
3. Screen for exercise-related psychopathology
   Identifying individuals that endorse pathological attitudes and behaviors toward exercise (e.g., exercise dependence, exercise addiction, and compulsive exercise) may indicate when unsupervised exercise will exacerbate ED pathology.
4. Create a written contract
   A written contract that details program rules, goals, outcomes, expectations, and contingencies for progression and regression of exercise activity should be agreed upon by all members of the treatment team and the patient to foster an inclusive and collaborative exercise program that compliments standard ED treatment.
5. Include a psychoeducational component
   Psychoeducation is a main component of cognitive–behavioral therapy and has been described as a key component to most ED-specific exercise programs.
6. Focus on positive reinforcement.
   Unsupervised exercise may result in overexercise because of the reinforcing value of exercise, thereby allowing negative consequences of overtraining and burnout. Thus, programs have attempted to manage excessive or unhealthy patterns of exercise by making exercise an available contingent on treatment compliance.
7. Create a graded program.
   The careful and incremental application of exercise is paramount in successfully managing exercise delivered in therapy. Thus, graded exercise programs beginning with small amounts of low-intensity exercise should be emphasized.
8. Start with mild intensity and slowly build to moderate
   A primary goal must be to initially limit ED individuals to short bouts of mild-intensity activities that will allow the gradual conditioning of physiological systems.
9. Mode of exercise
   Amounts of aerobic and resistance exercises included in an exercise program should be tailored for the physiological and psychological needs of the patient. For example, successful programs described resistance training for weight restoration in individuals with AN, and aerobic activity for weight loss, reductions in drive for thinness and bulimic symptoms, and body dissatisfaction in individuals with bulimia nervosa.
10. Nutrition
    Dietitians with expertise in ED refeeding and weight restoration must be a part of the comprehensive treatment team. Moreover, exercise should not be attempted until the individual with an ED has made sufficient progress in weight stabilization (for those with bulimia nervosa) and caloric and nutritional consumption to support the activities chosen.
11. Debriefing
    Preferably during the exercise session, but certainly afterward, the individual should be "debriefed" regarding sensations, emotions, and thoughts evoked by exercising.

TABLE 1. List of themes in therapeutic exercise in ED.

	Theme	Reference
1.	Adopt a team approach with experts from a variety of relevant disciplines	5,23,27,41,45
2.	Continuously monitor medical status and safety concerns	5,7,23,27,36,41
3.	Screen for exercise-related psychopathology	5,7,22,27,36,38,45
4.	Create a written contract of how and when exercise will be used in treatment	5,45
5.	Include a psychoeducational component	5,7,23,33,38,40,42,46,47
6.	Focus on positive reinforcement	4,33,46–48
7.	Create a graded program	4,27,34,38,48
8.	Start with mild intensity and build slowly	27,33,34,38,41,45–48
9.	Tailor the mode of exercise to the needs of the individual	7,22,27,33,34,36,38,41–43,45
10.	Include a nutritional component to account for the physiological needs during exercise	5,33,40,42
11.	Debrief after exercise sessions	7,23,38,42

DISCUSSION

The purpose of this review was to provide a critical analysis of the literature describing how exercise has been used in ED treatment. This review resulted in aggregating a comprehensive set of guidelines that may inform clinicians in using exercise as an adjunct to treatment in hospital-based or residential treatment populations and also provide empirically testable recommendations for future randomized controlled trials. Our review has provided an interdisciplinary rationale for the continued examination of exercise in ED treatment by proposing a comprehensive set of exercise guidelines synthesized from previous successful interventions in exercise science, health psychology, and ED treatment. In

addition, our review has elucidated intricacies that may guide the next generation of exercise management in ED and research that empirically tests the effect of exercise as a potential component of ED treatment. This comprehensive approach, which includes physical and psychological aspects related to exercise, may offer viable options for some, but not all, individuals seeking ED treatment.

To be clear, our review and recommendations of exercise guidelines do not suggest that exercise is appropriate for all individuals with an ED. Rather, our suggested guidelines summarize previous clinical recommendations (2,3,5,27,45) and research evidence (22,33,34,43,46–48) that may guide clinicians and researchers alike in examining how to tailor the health benefits of appropriate exercise mode, amount, and intensity to support physiological and psychological changes that may enhance ED treatments. Safety is the ultimate concern when applying these exercise guidelines. Thus, much attention should focus on the individuals' medical needs, presence of contraindications, nutritional state, attitudes about exercise (e.g., compulsions, exercise dependence, and obligatory attitudes), and treatment plan before exercise is introduced to any treatment program.

The 11 guidelines presented as a result of this review follow the general principles for using exercise as a treatment modality in the following ways:

Including a *Team Approach* (guideline 1) and monitoring *Medical Concerns/Contraindications* (guideline 2) ensures that proper expertise will be available to oversee the nuances of delivering exercise therapy properly and distinguishing when exercise needs to be prevented or seriously modified or stopped if a patient's medical or psychological status deteriorates.

Screening for Exercise-Related Psychopathology (guideline 3) may help to identify psychological variables (e.g., exercise pathology/compulsion) (30) that may be a positive predictor of negative eating attitudes and behaviors (1,12) that appear to mediate the relationship between exercise and ED (10,14,15) and are associated with detriments in ED-specific health-related quality of life (9). For example, a recent prospective study has found that reductions in exercise pathology scores (e.g., exercise dependence) are correlated with reduction in ED psychopathology (6).

Creating a Written Contract (guideline 4) may provide a collaboratively written set of program rules, goals, outcomes, expectations, and contingencies for progression and regression of exercise activity and may provide a transparent example of treatment and exercise goals in ED treatment.

Including a Psychoeducational Component (guideline 5) may help clinicians challenge the distorted beliefs and cognitions about exercise that are commonly observed in individuals with ED. For example, potential areas of content that are related to exercise in ED and therefore can be emphasized include the following:

a. The appropriate use of exercise for health benefits (20)
b. How to recognize when exercise is becoming problematic (12,20)
c. Developing healthy attitudes and exercise behaviors (1,9,12)
d. Body awareness (i.e., understanding physiological states, injury, and pain) (20)
e. Enjoyment of exercise and exercising for fun rather than as a behavior that may serve a functional role in maintaining an ED (20)
f. Exercise identity (19,44)
g. Identifying factors related to overtraining or burnout (21)

Focusing on Positive Reinforcement (guideline 6) may help to change the function of exercise in ED. Specifically, exercise is a highly reinforcing activity for some individuals, and the strength of this reinforcing value may be the reason for overuse or excessive patterns of exercise that are associated with ED severity (13,15,24,37). Consequently, emphasis should be placed on making appropriate exercise contingent on treatment compliance and success (41) rather than leaving exercise unmonitored and up to the ED individual to control.

Creating a Graded Program (guideline 7) and *Starting with Mild Intensity and Slowly Build to Moderate Intensity* (guideline 8) emphasize the appropriate use of exercise, understanding bodily responses to exercise, and "listening to one's body" when physiological resources are being exhausted. Therefore, exercise treatment must underscore slow progression as not to let the exercise become uncontrollable. A physical therapist may provide the necessary expertise in delivering this guideline. Thus, beginning with small amounts of low-intensity exercise should be emphasized, for example, starting with stretching or a half mile walk at a slow pace. Exercise amount and intensity can be very gradually increased as the patient demonstrates progress with standard ED treatment, weight restoration, and any other predetermined therapeutic outcome. It is possible that the recognition of bodily states related to exercise exertion may continue to be impaired even after weight restoration because impairment in recognizing other sources of pain (e.g., hunger, fullness, and exercise) often occurs during the development and maintenance of the ED. Therefore, emphasis should be placed on understanding physiological feedback, bodily states, distinguishing appropriate feelings of muscular exertion from pain and/or injury, heart and breathing rates, recovery, rest, and bodily acceptance. To these ends, additional time beyond that which is needed to obtain physical conditioning should be spent at each level of exercise after physiological conditioning has occurred. Such a guideline matches recommendations for the use of exercise as an adjunct to treatment for other mental health conditions (45) and initiating activity in an individual without much knowledge of healthy exercise routines (20).

Tailoring the Mode of Exercise to the Needs of the Individual (guideline 9) is perhaps the most useful in applying exercise therapeutically. Therefore, exercise amounts and intensities should not exceed the current recommendations of the American College of Sports Medicine (20). With regard to maximum effort, a reasonable upper limit may be 30–40 min at 70%–80% of maximum effort. For example, machine-assisted activities can be adjusted to provide more or less

resistance or support of body weight and therefore may be used to gradually increase intensity.

Including a Nutritional Component to Account for the Physiological Needs during Exercise (guideline 10) is paramount in providing the necessary substrates to allow for proper weight restoration, addressing physiological deficits, and accounting for the increased demands of exercise. Therefore, dietitians with expertise in ED refeeding, weight restoration, and the energy demands of exercise (e.g., a sports dietitian) ideally should be a part of the comprehensive treatment team. Introducing any exercise into a treatment protocol will inherently affect the caloric balance, and therefore intake should be adjusted accordingly. Moreover, exercise should not be attempted until the individual with an ED has made sufficient progress in caloric and nutritional consumption to support the activities chosen. That is, exercise intensity, timing, and duration will affect macro- and micronutrient distribution over the course of the day. Thus, it is important to focus on proper energy balance to adequately support weight regain or stabilization and exercise. Energy balance is a major concern, for example, in individuals that have regained weight but have not yet returned to or developed normal menses. Because of the increased risk of cardiac complications and death, addressing deficiencies is especially important with regard to micronutrients (e.g., minerals and electrolytes) and adequate glycogen stores and blood glucose levels that play a role in cardiovascular function (29).

Debriefing After an Exercise Session (guideline 11) may facilitate a better understanding of the sensations, emotions, and thoughts evoked by exercising. Queries might inquire about bodily sensations such as pain or tiredness/fatigue. It can be used to assess psychological aspects of exercise, such as difficulty following the guideline, difficulty stopping exercising, and/or experiencing a "high." Debriefing allows the patient to develop body awareness that differs from that experienced during previous symptomatic activity, while allowing treatment providers to obtain valuable information regarding how the person physically and psychologically experiences the activity. That information can then be shared with the treatment team and used as necessary.

Several limitations are present in our review and in the guidelines we offer. First, there is a lack of consensus on exactly which exercise behaviors correspond to specific outcomes in each ED variant. Therefore, we are not able, at this point, to provide specific guidelines that are tailored for particular outcomes. More research is needed to establish mechanistic relationships, dose response, and an understanding of outcomes associated with exercise programs tailored for each variant of AN, bulimia nervosa, binge eating disorder, ED not otherwise specified, and avoidant restrictive food intake disorder. Second, although several randomized controlled trials were listed in the meta-analytic and narrative reviews included in our study, there are relatively few large-scale, high-quality randomized controlled trials that have examined the use of exercise in ED treatment. Thus, more research is needed to fully understand this potential. The guidelines presented in our review may provide a reasonable guide that may be empirically tested in such future studies. Third, despite the multiple recommendations for nutritional education, we have not provided specific guidelines detailing exact nutritional needs to support exercise and associated outcomes. Although the literature is clear that exercise may elicit such benefits when nutritional needs are met, it is not clear which nutritional intake patterns will facilitate such strength and body compositional changes in ED patients. Fourth, although it may seem counterintuitive because hospital-based or residential treatment ED patients are typically the more severe cases, we have focused our recommended guidelines on residential ED patients because of the increased need for close monitoring of all medical and psychiatric factors related to treatment and exercise. Future studies should examine how to tailor guidelines to other populations such as outpatient care, athletes, and adolescents. Finally, our review did not reveal any long-term follow-up studies that have examined outcomes for those whom exercise was included as part of ED treatment. Thus, we are not able to comment on expected outcomes, rates of recidivism for ED or exercise pathology, or potential complications that may arise after exercise in ED treatment. Overall, initial work examining the efficacy and safety of exercise as part of an ED treatment suggests that more research is warranted to address the limitations present in our review and proposed guidelines.

CONCLUSION

Our review of the literature has resulted in a comprehensive list of guidelines for the use of exercise in ED treatment. These guidelines reflect the overall goals of an "exercise is medicine" approach by tailoring exercise to maximize health effects in a unique population. Of importance when applying these guidelines, the general goals of an exercise program as an adjunct to ED treatment should be developed "from the ground up" by a multidisciplinary team of experts. Specific content should focus on safety while reeducating patients about the proper methods to perform exercise, the attitudes related to motivation, and the transparency about the health benefits and potential detriments as a result of increased exercise. This approach begins with very low-intensity exercise (i.e., walking at a slow pace and stretching) for a short period. Progression to increased intensity and amounts of exercise must occur only when the individual understands the bodily sensations, psychological motivations, and health outcomes related to exercise at low levels. The specific content of a therapeutic exercise program can also be tailored to elite level athletes with ED by focusing on relationships among the athletes' body, exercise, psychological characteristics, and food/nutrition used to fuel athletic performance. Thus, our suggested approach for the inclusion of exercise in ED treatment is to empower the individual with exercise as a tool for healthy living (3).

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