

## **Exercise Dependence**

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### ***Abstract***

This chapter examines the concept of exercise dependence, sometimes termed exercise addiction, and its manifestations in both bodybuilding and endurance sport environments. We examine two hypothetical case studies of individuals displaying symptoms of exercise dependence based on our experiences in research and applied practice. Firstly we briefly explain the concept of exercise dependence and related psychological constructs, and then we introduce the case studies of Daniel, a bodybuilder, and Victoria, a triathlete. We explore the psychological issues these individuals have experienced and describe and explain the methods used in their needs analyses. We then provide suggestions of an appropriate framework to guide delivery of the interventions and tentative suggestions for possible interventions. Finally, suggestions for key future research are provided.

***Key words:*** Exercise dependence, exercise addiction, muscle dysmorphia, bodybuilding, endurance sports, triathlon.



### ***Learning Objectives***

1. To understand how the concept of exercise dependence is related to weight lifting and endurance competitions and introduce various psychological problems (muscle dysmorphia, eating disorders, steroid use) that often accompany this disorder;
2. To try to differentiate how exercise dependence differs from exercise commitment in weight lifters and elite athletes;
3. To familiarize researchers and clinicians with the preferred exercise dependence questionnaires available, compare the behaviours being measured and the validity and reliability of them, and explore different components of the construct;
4. To present various counselling, treatment, and therapies used to counter the negative medical and psychological consequences of exercise dependence in weight lifters and endurance athletes.

### ***Things to Think About***

1. Are there potential differences in abnormal behaviours between weight lifters who may suffer from primary exercise dependence and endurance athletes who may suffer from secondary exercise dependence?
2. Which questionnaires are appropriate for measuring exercise dependence/muscle dysmorphia in weight lifters and endurance athletes? Similarly, which questionnaires might be appropriate for measuring clinical issues such as obsessive-compulsive behaviours, and eating disorder behaviours?

3. What are the psychological clinical approaches currently used to treat exercise dependence and muscle dysmorphia, eating disorders, and obsessive-compulsive disorders?

## *Introduction to the Hypothetical Clients & Issues*

Though all medical practitioners agree that regular exercise should be an important part of a healthy lifestyle, some individuals develop an obsessive approach to it that can be damaging physiologically, psychologically and socially. The addictive qualities of exercise have been known to researchers for 40 years since the work of Baekeland (1970). Many researchers in this topic refer to this excessive exercise behaviour as 'exercise dependence'. Recent research has suggested that about 3-13% of adult exercisers may suffer from symptoms of exercise dependence (Allegre, Souville, Therme, & Griffiths, 2006; Hausenblas & Symons Downs, 2002; Terry, Szabo, & Griffiths, 2004).

Exercise dependence has been measured reliably and validly by the Exercise Dependence Scale (EDS; Symons Downs, Hausenblas, & Nigg, 2004). This scale was constructed based on DSM-IV criteria for substance dependence (American Psychiatric Association, 1994) and the questionnaire validation process produced seven scales: Tolerance, Withdrawal Effects, Continuance, Lack of Control, Reductions in Other Activities, Time, and Intention.

Morgan (1979) initially concluded that excessive exercise seemed to be a form of 'negative addiction' where exercisers showed the following symptoms: exercised when vocationally, socially and medically contraindicated, needed daily exercise in order to cope, said they could not live without running/exercise, and experienced withdrawal symptoms without exercise. In the last decade, exercise psychologists, clinical psychologists, and psychiatrists have been debating what term should be used to accurately describe these symptoms and under which category of psychological disorders this problem should be listed. For example, in the literature dealing with anaerobic exercise dependence in weight lifters, some have concluded that the behaviours are part of an obsessive-compulsive disorder diagnosis (e.g., Pope, Phillips, & Olivardia, 2000), while others suggest that the symptoms appear to be part of a body dysmorphia/body image disorder diagnosis (e.g., Lantz, Rhea, & Mayhew, 2001; McCreary & Sasse, 2000), and still others have sought to differentiate it from a type of primary eating disorder (e.g., Hausenblas & Symons Downs, 2002).

More recently Berczik et al. (2012) have argued forcefully that excessive exercise is a type of behavioural addiction. They believe that exercise dependence should be more appropriately labeled as exercise addiction because it includes both dependence and compulsion aspects. In addition, they speculate that the six common symptoms of addiction (salience, mood modification, tolerance, withdrawal symptoms, personal conflict, and relapse) have been already measured by numerous scales in the EDS, Bodybuilding Dependence Scale (BDS; Smith, Hale, & Collins, 1998), Exercise Dependence Questionnaire (Ogden, Veale, & Summers, 1997), and the Exercise Addiction Inventory (EAI; Terry, et al., 2004).

Exercise dependence has been measured in both aerobic (primarily runners) and anaerobic (primarily bodybuilders) athletes in past studies. Most early measures were

unidimensional, involved interviews, lacked proper psychometric validation, focused on aerobic activity (running), and lacked any theoretical basis (Hausenblas & Symons Downs, 2002). Later studies (Smith et al., 1998; Hurst, Hale, & Smith, 2000) measured anaerobic exercise dependence in weight lifters using validated, multidimensional questionnaires (e.g., BDS).

Many studies suggested that there might be different psychological motivations of ED in men and women. Whereas most women may yearn to be thin and muscular (Thompson, Heinberg, Altable, & Tantleff-Dunn, 1999), men in western societies in the last three decades are showing increasing scores in drive for muscularity (e.g., McCreary & Sasse's [2000] Drive for Muscularity Scale). Some young men (and a few women) become heavily involved in weight lifting, sometimes either becoming power lifters (strength gain goals) or bodybuilders (muscular hypertrophy goals). Some weight lifters may develop muscle dysmorphia (MD), view themselves as too thin, and feel pressure to gain muscle size and/or strength even though they may actually be quite large and muscular (Lantz, et al., 2001; Olivardia, 2001).

**Hypothetical Client - Daniel: A bodybuilder.** Daniel is a 35 year-old competitive bodybuilder who presents himself to a sport/exercise psychology consultant, ostensibly with performance enhancement issues (frustration at ‘staleness’ and lack of progress with his training of late), but also displaying severe symptoms of both primary exercise dependence and muscle dysmorphia. The roots of these issues stretch back to Daniel’s mid-teens, when he was overweight and sedentary with a poor body image, but a high drive for muscularity. At this age he had become acutely aware of the male muscularity ideal present in the media, and felt that his overweight physique did not measure up. He began at this point to worry about his attractiveness to the opposite sex. At eighteen Daniel began 6<sup>th</sup> form-college and started to lift three times per week in the college gym, initially with the purpose of keeping fit. He liked the positive effects the training had on his physique and began to associate socially with some of the gym’s hardcore lifters. Once he finished college, keen to continue lifting, he joined Gold’s gym; at this point he began to display behaviour patterns clearly associated with exercise dependence and muscle dysmorphia. Dissatisfied with his lifting progress, he became involved with a lifting support group at the gym and increased his training time to three hours per day and while using a wide array of bodybuilding supplements. His social life now revolved entirely around the gym, and his girlfriend complained constantly that his training had become all-consuming. As his physique improved, he began to enter local bodybuilding contests.

Eventually, Daniel became more and more frustrated as his physique refused to grow past a certain point. Since improving his physique further would need more training, and this was



incompatible with the demands of a full-time job and a normal social life, he gave up his lucrative employment and his girlfriend to spend 4-6 hours daily training with a group of hardcore lifters. To make ends meet, he started working part-time at Gold's and also began to take anabolic steroids, purchased from one of his lifter friends. He began to enter regional and national bodybuilding contests, and at this point his life revolved solely around the gym and contest preparation. He increased his use of steroids, performing complex cycles of various combinations of drugs, dieted rigorously, sticking rigidly to a high protein, very low-fat diet, and made very extensive use of bodybuilding supplements. He won his first national contest and earned money from a photo shoot with a bodybuilding magazine and a minor acting role as a bodybuilder in a movie.

Despite this apparent success in bodybuilding, Daniel was profoundly unhappy. He was worried about the possible health ramifications of his drug use, having already suffered side-effects such as headaches, acne, and gynecomastia. However, terrified of losing muscle size, he felt unable to stop. He began to miss having a normal social life and a well-paid job, and despite his competition success was still very unhappy with his physique, thinking of himself as small and puny when in fact he was large and muscular. Outside of contests he would conceal his physique with baggy clothing, worried about how others would judge it. He was terrified of losing his muscular "suit of armour" as he called it and thought that easing up on any component of his bodybuilding lifestyle would cause this. However, his physical and mental exhaustion were making him feel burned out.

Daniel's feelings of physique inadequacy and consequent drive for muscularity are part of a well-documented trend for males to report increasing levels of body dissatisfaction (Leone, Sedory, & Gray, 2005; Phillips & Drummond, 2001) and to engage in pathological

behaviours to achieve the cultural ideal of a muscular physique (Grieve, 2007). In addition, Daniel's obsessive adherence to a very strict diet and extensive use of nutritional supplements have been noted by Pope et al. (2000), who found that dysmorphic weightlifters differed from non-dysmorphic weightlifters in their eating attitudes and drug use. Daniel's apparent compulsive exercise behaviour illustrates the key symptoms of exercise dependence described in the literature (e. g., Hausenblas & Symons Downs, 2002). For example, such individuals almost always grossly overtrain even when suffering from injuries or 'flu'. Also, they often place such an inordinate emphasis on their training that other important areas of their life, such as work or family, suffer (Chan & Grossman, 1988; Sachs & Pargman, 1979; Morgan, 1979; Thaxton, 1982; Veale, 1995).

**Hypothetical Client - Victoria: A triathlete.** Victoria has been running all her life. She remembers being very active as a child and constantly running with her younger brothers. She was a thin, spindly child, who succeeded regularly in outrunning boys several years older. In secondary school she began to train and run competitively on the girls' track and cross country teams. When she was 14 her body began to change; she began to develop 'womanly curves' and added more body fat. She began to control the amount of calories she would eat daily, rarely ate three decent meals a day, and rarely allowed herself sweets. When Victoria looked in the mirror, she began to worry that her extra weight was making her less competitive and fatter than the female long-distance runners that she had seen in the Olympics on television. But she continued to excel in both sports, regularly winning the mile run in track and 3K in cross-country meets. Her coach pushed her to continue training hard and win more events so she could get a track scholarship to college.

She did earn a scholarship to a prestigious university to run both track and cross country for varsity competition. Her coach was a 'win-at-all-costs' mentor, who believed that more training (above 100 miles a week) and a regimented diet were critical to success. The coach weighed her once a week on Fridays before competition, and if she was a pound or two overweight, she was told to cut back on her eating and exercise more. Secretly, Vicky began to go to the sauna with a rubber shirt on to dramatically lose weight on Fridays. Once she had competed successfully on Saturday, she would go out with teammates and splurge on pizza, eating almost a whole pizza herself. Once back in the residence halls, she began to feel guilty and began sticking a finger down her throat to vomit. This routine continued for four years of college and she remained thin and competitive, but not happy with her over-eating and problem making weight.

In the summers she began swimming and biking to stay in shape. She was a superb cyclist and a decent swimmer, and decided to enter a local triathlon. Incredibly she won the event by several minutes faster than many of her experienced competitors. She was hooked on triathlon and spent the summers racing every weekend. She upped her training from 2 to 4 hours daily and began winning every regional race, but she was still unhappy with her curvy figure and how other serious competitors might perceive it. In her senior year she was approached by a national triathlon team coach and asked if she would like to become a professional. At age 23 she found herself living at the national training center. Her life revolved around 4-6 hours of training a day, a highly regimented diet, specialized training on swimming and cycling techniques, and little social life. Her coach was even more critical of her weight, and she had to weigh in three times a week. If she was overweight, she had to put in extra workout time. Secretly she continued to purge after big meals or skipped meals altogether before weigh-ins.

For six years she trained hard as a professional triathlete and competed successfully for her country in the Olympics. Her strict diet and training had paid dividends, but she still was not winning often enough for her coach and she still thought she was carrying extra weight.

When she was 30 she married another runner but continued to compete professionally. When she was 32 she began to develop shin splint problems that ultimately were diagnosed as a stress fracture caused by incessant pounding and a poor diet. The doctor forced her to take a month off, but she continued to ride her bike and swim regularly for 2-3 hours per day. She entered a triathlon soon afterward, but struggled in the running part with terrific pain. She put this down to lack of sufficient training, putting on several pounds, and insufficient healing. She decided to further restrict her diet, take more supplements and vitamins, and secretly continued to purge. Her husband was unaware of her bulimic behaviours and her low body image. She continued with non-weight-bearing training and increased her daily workouts to 4-6 hours a day.

She entered another triathlon a month later and felt she could succeed, but half-way through the Iron Man marathon, the pain in her shin became unbearable. She stopped, hoped it would subside, and started running again, but the pain returned with even more intensity. She tried walking and then limping home, but finally in tears she collapsed 6 miles from the end of the marathon. She felt it was the end of the world, the end of her career. She was depressed, full of self-hate at her failure, and didn't like the way her body looked after the doctor forced her to stop all exercise while she wore a walking cast.

Freimuth, Moniz, and Kim (2011) suggest that Victoria's life has progressed in four stages from recreational exercise as a child to full-blown exercise addiction as a professional triathlete. Victoria's life is dominated by the negative consequences of her addiction: long-term

impairments to her health and daily functioning, loss of critical relationships, low self-esteem and body image, and depression.

### ***Initial Needs Assessment***

***Daniel.*** The initial needs assessment with Daniel consisted of a triangulated approach combining a clinical interview, observation and questionnaires. In the interview the sport/exercise consultant explored his exercise history, drug use, supplement use, eating and training behaviours and his social and work life, using the theoretical frameworks provided by Lantz et al. (2001) for the study of muscle dysmorphia, and that of Smith et al. (1998) for the study of bodybuilding dependence. Lantz et al.'s (2001) work indicates that people with MD exhibit specific behavioural and psychological characteristics that can be divided into two categories: nutrition and physique concerns. Nutrition is comprised of behaviours concerned with pharmacological use, supplement use, and dietary behaviour. The model suggests that muscle dysmorphic persons are more likely to engage in these nutritional behaviours in pursuit of enhancing muscular, well-defined physiques than are non-dysmorphic individuals. Physique Concerns, the second category associated with the psycho-behavioural model of MD, is characterized by concerns surrounding body size/symmetry, physique protection (behaviours designed to avoid having the body viewed by others), and exercise dependence.

Exercise dependence in bodybuilders, according the findings of Smith et al. (1998), appears to have three distinct subcomponents: social dependence, training dependence, and

mastery dependence. Social dependence reflects the need to be in the bodybuilding social environment. Another subscale (training dependence) seems to reflect the need to engage in regular weight training. The third subscale (mastery dependence) appears to measure the need to exert control over training schedules.

In the interview the consultant explored all of these issues. Any of these factors alone would not constitute a diagnosis of MD, but several behaviours considered in concert would appear to be symptomatic of muscle dysmorphia.

To enable comparison of Daniel's self-perceptions and the perceptions of others regarding his behaviour, the consultant then interviewed Daniel's training partner, his trainer, and close family members. The information gained from the interviews was then supplemented by observation of Daniel in both the training environment (e.g., spending time observing his behaviour in the gym) and also eating, to determine whether his behaviours fit with the models of muscle dysmorphia and exercise dependence mentioned previously. With regard to eating behaviours, these were also to be observed to determine whether Daniel exhibited any signs of an eating disorder, and thus whether the observed exercise dependence was 'primary' (i.e., there is no evidence of an eating disorder), or 'secondary' (part of an eating disorder).

The final part of this triangulated needs analysis involved Daniel completing a number of self-report questionnaires aimed at assessing the extent to which he displayed symptoms of muscle dysmorphia, exercise dependence, and highly restrictive eating patterns. The consultant used theoretically-based, well-validated measures. In this case he used the Exercise Dependence Scale (EDS; Hausenblas & Symons Downs, 2002), which is based on the seven criteria for substance dependence identified in DSM-IV (4<sup>th</sup> Edition, American Psychiatric Association, 1994), and has a scoring logarithm that allows computation of a total score to categorize clients

as ‘exercise dependent’, ‘non-dependent symptomatic’, or ‘non-dependent asymptomatic’. Consultants could alternatively have used Terry et al. (2004) Exercise Addiction Inventory (EAI). This latter scale consists of one item for each of the seven dependence criteria and purports to be able to accurately identify people at risk for exercise addiction.

Because neither scale was constructed specifically to measure exercise dependence in an anaerobic setting (i.e., weight training), the consultant also administered the Bodybuilding Dependence Scale (BDS; Smith, et al., 1998), a three-factor, 9-item Likert-scored scale (scores range from 5-35 for Social Dependence, 3-21 for Training Dependence, and 2-14 for Mastery Dependence) aimed at measuring the three components of bodybuilding dependence. This has been well-validated by Hurst, Hale, Smith and Collins, (2000) and Smith and Hale, (2004, 2005).

To measure muscle dysmorphia, the Muscle Dysmorphia Inventory (MDI; Rhea, et al., 2004) was used. This is based upon Lantz et al.’s (2001) psycho-behavioural model of muscle dysmorphia (scoring ranges from 4-24 for Diet, Supplement, and Exercise Dependence subscales, 6-36 for the Physique Protection subscale, 5-30 for the Size/Symmetry subscale, and 3-18 for the Pharmacology subscale) and has been shown to be psychometrically sound (Rhea et al., 2004). Unfortunately, neither the Muscle Dysmorphia Inventory nor the Bodybuilding Dependence Scale offers available norm-referenced standards (cut-off scores) for a clinical population, but the authors suggest that higher scores indicate more symptomatic behaviour of ED and MD, respectively.

To examine the possibility of Daniel having an eating disorder the Eating Disorders Inventory-2 (EDI-2; Garner, 1991) was administered. Hausenblas and Symons Downs (2002) have used the subscale to categorize participants scoring above '14' as having a possible eating disorder and demonstrating signs of 'secondary exercise dependence'.

In addition to these well-validated measures, Daniel also completed a self-report 7-day exercise history (7 Day Physical Activity Recall Questionnaire; PAR; Sallis & Saelens, 2000) to determine whether his exercise behaviours met the usual criteria for exercise dependence (exercising every day [or multiple times per day] for greater than 1 hour per session at approximately the same time and place at the gym; Smith & Hale, 2011). Although elite and highly committed athletes may also follow this routine, questioning may reveal a dependent person who has no or few long-term competitive goals and feels he/she must undergo this tightly controlled regimen to keep at bay feelings of low self-esteem and poor body image. In addition, these individuals suffer an abnormal amount of overuse injuries resulting from this excessive workout programme. They experience negative affect if they miss an exercise session for any reason. With exercise dependence, the need to exercise controls the exerciser, not vice versa. Scores on these questionnaires indicated potential muscle dysmorphia and exercise dependence, with analysis of the EDS scores resulting in a classification of 'exercise dependent' using Hausenblas and Symons Downs' (2002) criteria, near-maximum scores on all MDI and BDS subscales, and the PAR indicating multiple daily exercise sessions totaling 4-6 hours per day. Daniel's EDI-2 score of 12 did not quite meet Hausenblas and Symons Down's criterion (14) for indicating an eating disorder and secondary exercise dependence, but it was high enough to warrant concern regarding Daniel's eating patterns.



*Victoria.* Victoria's initial assessment came as a result of her husband's insistence that she go to the doctor at the training center to have him examine her for her continued depression and refusal to accept the diagnosis of a seriously dysfunctional stress fracture. The physician at the center immediately noticed her lethargic, down demeanor and put it down to her injury. But when she refused to give up training for the next 3 months, he became concerned. After viewing her X-ray of her stress fracture, he had her undertake an osteoporosis test which proved positive for osteopenia. Finally he noticed the signs of acid burns on her fingers and that her weight had continued to drop even after she had ceased training. He decided that she needed to see the licensed sport psychologist at the center to further discuss her state of mind. She reluctantly agreed to see him.

On her first session with the sport psychologist, who was a clinical psychologist by training, he listened to her discuss her down moods, loss of energy and emotions, and pessimistic attitude toward the lack of competition in the future. But like the physician, he also noticed the telltale acid burns on the tips of her fingers and the canker sore she had developed on her mouth.

The sport psychologist also used a triangulated method of diagnosis with Victoria. For his clinical interview, he interviewed Victoria about her athletic history, her injury history, her diet, her social and married life, and her state of mind prior to and after her stress fracture. He noticed that she seemed overly dedicated to training and competition, seemed to have her whole identity immersed in triathlon, and often exercised while she was hurt or sick. Since he could no longer observe her actual training and exercising, he talked to her coach, fellow triathletes, and husband about her training attitudes and regimen. They reported that she seemed driven to exercise, never took time off from training, continuously focused on increasing her training regimen, was very judgmental about herself based on her performance, and didn't seem to have a

social life outside of competition and training. Her husband also said that she ate irregular meals, and often after a large meal she disappeared into the bathroom for long periods. The sport psychologist had her complete the Exercise Dependence Scale (Hausenblas & Symons Downs, 2002), the 7 Day Physical Activity Recall Questionnaire (Sallis & Saelens, 2000) for a typical training week, and the Drive for Thinness (DFT) Scale of the Eating Disorder Inventory-2 (Garner, 1991). When all three scores were calculated at extremely high levels, he concluded that she might be suffering from a potential eating disorder that was compounded by her addictive need to exercise many hours a day. Research (Freimuth et al., 2011) shows that 39-48% of people suffering from eating disorders also have exercise dependence. He knew that he did not have the proper training to deal with eating disorders, so he made a referral to his local friend who was a clinical psychologist who specialized in treating eating disorders.

### ***Framework and Intervention for Delivery***

Both Daniel and Victoria displayed symptoms consistent with one or more psychiatric disorders. Due to the nature of their symptoms and the sport context in which they exist, it was

important for both Daniel and Victoria to be evaluated by a licensed mental health practitioner who also had training in sport. Given Victoria's eating-related symptomology, it was especially important that she was referred to a practitioner who also had specific training in identifying and treating eating disorders.

Both athletes required an interdisciplinary treatment approach which is recommended for all patients grappling with eating disorders and related concerns (American Psychiatric Association, 2006). In addition to ongoing mental health treatment, both athletes worked closely with a licensed medical professional, a registered dietician, and a psychiatrist who prescribed and monitored medication. This interdisciplinary treatment team regularly consulted with one another in order to coordinate care. Regular consultation ensured that all treatment providers had the same data with which to work, and where discrepancies existed they were clarified with the patient. It was also important for one treatment providers to "take point" on the case in terms of directing treatment. Initially, the medical professional on the team directed care to ensure medical stability for both patients. Thereafter, the professional with the most experience working with the primary psychiatric diagnosis was considered the team leader which in both cases was the treating psychologist.

When the patient's physical health is compromised it is best for the medical professional to direct care; however, when medical issues are stabilized and the mental health concerns can be more cogently attended to, it will likely be best for the mental health professional to direct care. One caveat to this is when a complex disorder such as an eating disorder or body dysmorphia are present. If it is determined that one or both of these diagnoses are appropriate, the individual with the most knowledge and experience with treating these disorders should direct the patient's care. For example, a highly skilled general practitioner physician may be untrained in terms of

medical complications with eating disorders. Therefore, it may be appropriate to defer to the eating disorder expert, regardless of their discipline, on the treatment team in terms of which medical tests should be conducted and what constitutes normal results (Tyson, 2010).

In addition to getting a treatment team in place, it was also important to identify other important or influential individuals in the patient's lives particularly in the context of sport. Thompson and Sherman (2010) recommend that a "sport management team" is also assembled. They have recommended the importance of including this type of team when working with athletes with eating disorders and related concerns for more than 25 years (Thompson, 1987). They note that individuals on this team (e.g., coaches, athletic trainers, and sport psychologists who are not providing treatment) can be invaluable for providing information to the treatment team about how the athlete is doing. Thompson and Sherman (2010) also noted that the sport management team should be managed by one of the health care providers on the treatment team which also includes the health care provider indicating in what ways the members of the sport management team can be an asset in helping the athlete recover.

Finally, family members involved in the treatment process were encouraged to seek some form of support for themselves. Getting one's own support while supporting someone with a psychiatric illness can result in one's own reduction in distress and sense of feeling burdened (Hibbs, Rhind, Lappanen, & Treasure, 2014). Thus, support team members were provided with book titles, online resources and information about local support groups.

***Daniel's intervention.*** Upon further assessment it was determined that Daniel's symptoms were consistent with a diagnosis of Body Dysmorphic Disorder (BDD). Muscle dysmorphia is not a specific diagnosis as such, but is a form of body dysmorphia, and is included

as a diagnostic specifier in the Diagnostic and Statistical Manual of Mental Disorders, 5<sup>th</sup> Edition (DSM-5; American Psychiatric Association, 2013). The diagnosis of BDD is supported when a patient is preoccupied with a perceived physical flaw or deformity which is not noticeable by others. In Daniel's case he was highly focused on the size and shape of his muscles. He perceived that they were not large enough, when in fact, others indicated that they were. During the course of treatment he also revealed that he perceived his muscles to be significantly asymmetrical. This, too, was something that others did not see either at all or to the degree that he did. The diagnosis of BDD was further warranted by the level of distress Daniel experienced regarding his physique and the lengths he has gone to pursue muscular perfection at the cost of his relationships and his job. In addition to BDD, a co-occurring diagnosis of depression was also identified which is the most common co-occurring disorder (Phillips et al., 2010).

As noted above, effective treatment for Daniel required attention to his mental health, his physical health, and his dietary intake. His attending physician was able to determine that Daniel was not, at the time of treatment, experiencing negative effects of steroid use coupled with his restrictive diet. His registered dietician, however, helped Daniel reconnect with what his body needed in order to perform not only its vital functions, but also what was needed to maintain muscle mass since that was a significant concern of Daniel's. Daniel entered treatment with erroneous assumptions and misinformation about what he actually needed to eat and/or avoid in order to obtain the results he desired. Daniel's dietician had a well-developed understanding of sport nutrition as well as body dysmorphic disorder and was able to help him consume what he needed in order to be healthy and to sustain a reasonable amount of muscle mass. Finally, Daniel's psychiatrist monitored his psychotropic medications. The FDA has not yet approved medications for the treatment of Body Dysmorphic Disorder; however, Selective Serotonin

Reuptake Inhibitors (SSRIs) have limited evidence that they may be effective in alleviating some symptoms of BDD (Ipser, Sander, & Stein, 2009). Because Daniel is also coping with depressive symptoms the SSRI may also help to alleviate those symptoms. The use of medication to reduce the intensity of Daniel's symptoms had the effect of allowing him to engage more fully in psychotherapy.

Throughout the course of psychotherapy, Daniel struggled significantly with letting go of the idea that his body needed to be perfect. Thus, an important part of his treatment was to address his misperception of what his body looks like. Cognitive Behavioural Therapy (CBT) is often useful in helping patients identify the specific thoughts they have about themselves including when these thoughts occur, how negative the thoughts are, and what emotions are associated with the thoughts (Jarry & Cash, 2011). Daniel, for example, had thoughts not only about how "bad" he believed his body looked but also consistent negative thoughts about his overall self-worth. It was common for Daniel to report that because he could not get rid of his body's flaws he was a "failure" and that he "was not good enough" until he could grow his muscles and make them perfectly symmetrical. Identifying these patterns and themes in Daniel's thoughts helped help him learn about not only what he thinks about himself and how that contributed to him feeling anxious much of the time, but it also allowed him the opportunity to attack his negative thinking and make positive changes. Prior to Daniel developing this type of cognitive awareness he was unable to acknowledge let alone change his negative thinking.

Daniel also benefitted from Motivational Interviewing (Miller & Rollnick, 2002). Motivational Interviewing is essentially an approach that utilizes the patient's own goals and drives to help them make changes that align with what they want for themselves and their life. It can be particularly effective for those who are ambivalent about making any changes which was

the case with Daniel. Although Daniel's primary sources of motivation were muscle- and competition-related, he did state that he was interested in having a long-term romantic relationship in his life again adding that he had regret about ending his previous relationship in order to devote more time to his bodybuilding. Work around these issues focused on putting his body-building goals in context and help him identify what he has had to give up in his life in order to pursue muscle perfection at all costs.

Finally, although not always desired by the patient nor necessary for effective treatment, Daniel benefitted from Psychodynamic Psychotherapy. The benefit of pursuing this form of treatment is not only for "insight" into the problem but also to help the patient identify when he is headed down a similar path and knowing how he got there (Parker, 2010). Through this type of insight oriented work Daniel became aware of how his pursuit for muscle perfection was connected to early childhood experiences. He noted that while growing up he was consistently picked on for being "small" and "puny." He also recalled that his older brother picked on him for these reasons as well. As a result, Daniel developed an overwhelming sense of shame about his body. Daniel remembered that when he was introduced to weight lifting in middle school gym class he was determined to transform his body and ensure that no one would ever think he was puny again. Despite bulking up he still regularly dressed in baggy clothing to hide what he perceived to be an inadequate body. Having this awareness helped Daniel further put his excessive pursuit in perspective. He was able to contemplate whether the goal of making sure no one ever thought he was small again was more important than having a partner with whom he might one day have a family.

When patients are able to recognize familiar behaviour patterns (e.g., pursuit of perfection, avoidance of shame, focusing on a singular pursuit at the expense of other interests)

and why they are so powerfully drawn to them, they have the opportunity to prevent destructive behaviour patterns and make healthier choices. Without this degree of understanding it is much easier to “rationalize” why old, destructive behaviours are in fact good and healthy.

***Victoria’s intervention.*** Victoria’s case was as complicated as Daniel’s; however, she was engaged in behaviours that were potentially much more lethal. Based on Victoria’s symptoms, a Feeding and Eating Disorder (DSM-5) diagnosis was warranted. Eating disorders themselves have one of the highest mortality rates of any psychiatric illness primarily explained by Anorexia Nervosa (Neumärker, 2000). As noted in the initial assessment prior to referral Victoria’s weight has continued to drop and was at 100 pounds which is approximately 15% below her ideal weight. A diagnosis of Anorexia Nervosa, Purging type was rendered due to Victoria’s steadily dropping weight, fear of gaining weight, and her regular use of self-induced vomiting as a method to manipulate her weight. Victoria’s low weight in combination with excessive exercising and regular self-induced vomiting can lead to numerous serious or lethal physical complications including complications with cardiorespiratory, gastrointestinal, endocrine, and neuropsychiatric functioning (Academy for Eating Disorders, 2012). Having a medical professional on the treatment team who is well versed in the treatment of athletes as well as eating disorders can be illustrated by the importance of being able to distinguish between a low heart rate (bradycardia) as a result of athletic participation or as a result of malnutrition (Thompson & Sherman, 2010). Additionally, the cessation of one’s menstrual cycle is often viewed by those in the sporting culture as a marker of commitment by the female athlete to their training programme. Amenorrhea has a direct impact on bone health and if left uncorrected can lead to osteoporosis (American College of Sports Medicine, 2011). In the world of sport participation low energy availability, menstrual abnormalities, and decreased bone density is



referred to as the Female Athlete Triad (initially conceptualized by Yeager, Agostini, Nattiv, & Drinkwater, 1993) and there is evidence that Victoria is experiencing all three. Regardless, the presence of any one of these three elements warrants an assessment of the other two.

Victoria was referred to a physician trained in the assessment and treatment of eating disorders to evaluate her medical stability. Ongoing medical evaluation and monitoring was indicated in order to prevent irreversible medical issues including loss of bone density, heart damage, gastro-intestinal issues, dental damage, etc. Victoria has already been diagnosed with osteopenia (precursor to osteoporosis) and has shown signs of regular self-induced purging. Results of Victoria's blood work, however, which included the recommended tests for thyroid functioning, complete blood count, serum metabolic profile, electrolytes and enzymes, and electrocardiogram (Academy for Eating Disorders, 2012) were, at this point, negative. Since negative findings in this regard are not unusual for those with anorexia nervosa who do not use purging type behaviours (Brown, Mehler, & Harris, 2000) it is highly likely that Victoria's future tests will reveal evidence of pathological functioning, thus it was particularly important for her to routinely have blood work done.

An additional consideration in Victoria's treatment was determining the appropriate level of care she needed in order to be both physically and psychologically healthy. Although Victoria's weight was significantly below what would be healthy for her given her sex, age and height the normal medical findings and her reported willingness to engage in treatment suggested that outpatient therapy was appropriate. Victoria's treatment team consisting of her physician, psychologist, psychiatrist and registered dietician conferenced regularly (i.e., every other week or weekly as needed). Regular contact among treatment providers allowed them to comprehensively monitor her progress. Initially, Victoria was required to at least maintain her

weight and continue to abstain from exercise until her stress fractures were completely healed. Once healed she was severely restricted in the amount and intensity of exercise. She was then expected to start slowly gaining weight. Without adherence to these initial treatment goals Victoria would have been admitted either to an inpatient facility or a residential treatment center.

Admittance to an inpatient facility specializing in the treatment of eating disorders would have been indicated should Victoria's medical stability have been in question which would have included such things as low values for heart rate, glucose and/or potassium, electrolyte imbalance, compromised renal and/or cardiovascular functioning, and poor social support (American Psychiatric Association, 2006). Should Victoria have required inpatient care managing the "refeeding" process would have been a point of focus in her medical recovery. Improperly refeeding someone who is severely underweight can lead to 'refeeding syndrome' (Academy for Eating Disorders, 2012), which can result in issues such as catastrophic problems with cardiovascular and/or respiratory function and potentially death. By contrast, placement in a residential treatment center would have been appropriate for Victoria should she have been medically stable [e.g., no need for IV fluids or tube feedings, nor required lab tests more than once daily (American Psychiatric Association, 2006)] but unable to enact necessary recovery based behaviours (e.g., follow exercise prescription, eat appropriately as identified by the registered dietician).

Victoria, however, was able to adhere to treatment recommendations and showed slow but steady progress. Her most significant struggle was in reducing the amount and intensity of her exercise. She was concerned not only about what would happen to her weight if she was unable to ramp up her exercise regimen, but also about what she feared would happen to her performance level. Thus, an important part of psychological treatment was to help Victoria

address her erroneous thoughts and fears about weight gain and performance (Thompson & Sherman, 2010).

Although the prescription to abstain from weight-bearing exercise was indicated due to Victoria's stress fractures, it was also warranted based on her weight being too low (based on her age, gender, height, weight history, and activity level) and restrictive food intake. This was, of course, devastating for Victoria and led to an exacerbation of depressive symptoms. Based on the eating disorder diagnosis alone, the directive to cease all activity is not always clear cut – this is particularly true for athletes and regular exercisers (Madison & Ruma, 2003; Sherman & Thompson, 2001). Researchers have found that engaging in regular physical activity can improve overall quality of life (Penedo & Dhan, 2005) and reduce psychiatric symptoms including those related to anxiety (DeBoer, Power, Utschig, Otto, & Smitts, 2012). Moreover, someone for whom physical activity is a part of their identity (e.g., a triathlete) not being “allowed” to engage in physical activity can be a contributing factor in the development, or exacerbation of, a depressive or anxiety-based syndrome. Thus, when Victoria's fracture eventually healed to the point that someone without an eating disorder would be cleared to re-engage in physical activity, additional medical (e.g., negative blood work) and psychological markers (e.g., ability to reframe her exercise to become a part of her life rather than being her life) were evaluated to determine if, or to what degree, she was able to resume physical activity. Once cleared Victoria's activity level in terms of duration, type of activity, and intensity was monitored so that she did not reengage in over-exercising. Her primary source of support (i.e., her husband) was instrumental in helping to ensure the treatment team received accurate information with respect to Victoria's physical activity.

Relearning how to eat appropriately was necessary alongside relearning how to exercise appropriately. Although Victoria was well-versed on the nutritional content of most foods (e.g., calories, fat content, fiber content) she no longer knew what a normal meal looked like nor how much she needed to consume in order to keep her vital systems working and to fuel her high level of training. A Registered Dietician with training and experience in working with individuals with eating disorders (and who has knowledge of treating athletes) was critical in helping Victoria manage reintroducing foods she had eliminated from her diet as well as increasing her overall caloric intake. This process was severely distressing for Victoria which is not uncommon. Fears about gaining weight, a presumed decline in athletic performance, and potential rejection by others for “getting fat” were intensified for Victoria early in the treatment process. When these fears surfaced the Registered Dietician was able to communicate this to the treatment team so Victoria’s concerns could be adequately addressed by the treating mental health professional in order to help Victoria effectively managed these reactions.

Victoria continued to struggle with fears not only about losing training time, because her training was severely restricted, but also with getting healthy which for Victoria translated into weight gain and to her meant that she wouldn’t be able to perform at the same level. It is important to note that although Victoria initially noticed an improvement in performance prior to her referral for treatment and which seemed to coincide with the eating disorder behaviours, she also experienced inevitable performance decline and injury (Thompson & Sherman, 2010). Her body simply no longer had what it needed to perform at its peak level and to repair itself because it was not being properly fueled and it had depleted the nutritional stores that did exist. Victoria also experienced intense fears about gaining weight and becoming fat. This was particularly an issue early on in the treatment process as her body adjusted to having more fuel available. Initial

weight gain is disproportionately fat and tends to deposit in the abdominal area (Pagliato, Corradi, Gentile, & Testolin, 2000; Scalfi et al., 2002) while she was re-nourishing her body. Her body therefore ‘held on to’ as much fuel as possible since it has been in a starved or semi-starved state for so long. As a result Victoria experienced bloating, especially in the abdominal area. Part of treatment, therefore, involved not only helping her to cope with this experience, but also providing education around what is happening with her body and the fact that the initial changes are temporary.

What would not be temporary, of course, would be the inevitable weight gain necessary for her overall health. This was the most significant treatment obstacle even after eating disorder behaviours were significantly diminished. Body image issues are often one of the last concerns to extinguish – and for some, may persist even after they have recovered from their eating disorder (Eshkeviri, Rieger, Longo, Haggard, & Treasure, 2014). Reminders of the weight gain will be experienced in terms of how one’s clothes fit, how the body feels when it moves, how the individual looks in the mirror and photographs, and comments that others may make about how they look. When treating these concerns a combination of both Supportive Psychotherapy (McIntosh et al., 2006; Stiles-Shields et al., 2013), for the purpose of empathizing with the difficulty of living with a body that looks and feels different, especially in the context of a weight obsessed culture, and Cognitive Behavioural Therapy to help manage negative thoughts and feelings that surround the change in physique can be beneficial (Cash & Hrabosky, 2003). This combination of approaches is also helpful as the patient navigates the coinciding changes in their food intake.

Identifying the antecedents of Victoria’s restricting and purging behaviours was helpful. It is common for there to be a pattern to the circumstances that led up to the desire to restrict

and/or to purge. It is not always easy for patients to identify what immediately precedes these behaviours. The focus of this part of treatment should be on the patient's thoughts. Usually the predicting variable is not so much a specific type of event or experience, but the thoughts and feelings the patient experiences about these situations. For Victoria, the themes revolved around fears of being rejected. She was able to determine that prior to a binge-purge episode or an intense run she felt rejected by someone important in her life. If her coach constructively criticized her she felt like she was not good enough for him and thus felt rejected. A similar pattern emerged in her relationship with her husband. She noticed what whenever they got into a fight she would either go on a punishing run or overeat to the point of needing to vomit to relieve the physical discomfort. Once these patterns were identified Victoria was able to begin the work of determining whether or not her coach or husband were actually rejecting her. She usually knew the answer was that they were not; however, if she was unsure, she learned how to ask for reassurance in an assertive, direct way. This type of psychodynamic work (see Winston, 2012 for discussion of treatment recommendations and a brief review of evidence base in use of this approach with eating disorders) was useful for Victoria and might also aid in identifying other themes and concerns such as perfectionism, desire for control, history of trauma, lack of a sense of identity apart from athletics and/or the eating disorder, and difficulties in interpersonal relationships.

Finally, psycho-education specifically with Victoria's coaches was indicated. Both the National Collegiate Athletic Association (2009) and the International Olympic Committee (2006) have crafted statements regarding eating disorders and athletes addressing the role coaches should play issues related to eating concerns. Both organizations recognize the need for the athlete's health and well-being to supersede athletic participation, and that coaches should not

comment on nor monitor an athlete's weight. Coaches who conduct weigh-ins and advise whether or not an athlete should gain or lose weight may put athletes at risk for medical issues and may contribute to the development of an eating disorder.

***Future prognosis.*** Both Daniel and Victoria have the potential to recover from their unhealthy pursuits and live happy and healthy lives. Their engagement in their respective sports at a competitive level does not have to end but will have to be approached with a perspective much different from what they each currently have. Because both Daniel and Victoria have been dealing with some aspect of their current concerns for many years (upwards of more than a decade), they may require longer-term treatment in comparison to those whose concerns are identified within months or a just few years of when they began. Regardless, a positive outcome for both athletes will require a coordinated and collaborative interdisciplinary treatment team that has regular contact with one another. It will also require a well-educated support team which may include friends, family, teammates, coaches, and athletic trainers. Of course, both Daniel and Victoria will have to engage in their respective treatment processes in order to get healthy; however, they may not be fully 'on board' with the treatment and recommendations made especially if their activity is restricted. That simply means that any initial component of treatment will focus on helping each of them see what their unhealthy pursuit of their sport has cost them and what it will continue to cost them should they continue with their current approach.

### ***Self-Reflection***

Weight training participants, endurance athletes, health care specialists, sport and exercise psychologists, clinical and counselling psychologists, and psychiatrists need to become more aware of the potential dangers of exercise dependence and eating disorders and should have

access to educational information about the causes, consequences, and symptoms of each disorder. Like other addictive and compulsive behaviours, if people know the warning signals and outward symptoms (e.g., highly regulated workout regimens, unhealthy eating patterns or pervasive withdrawal responses, regular compulsive thoughts and words about exercise, etc.), often participants can change their own behaviours or external helpers can recommend things that will help avoid the short- and long-term deleterious effects of these disorders. Helpers in the athletic and exercise realms, such as coaches and personal trainers, should be educated about such behaviours and unhealthy attitudes and have intervention or referral strategies available for their local clientele.

Bodybuilders and endurance athletes also need to be self-aware, monitoring their own thoughts and behaviours. Alarm bells should ring if they have an obsessive-compulsive personality, suffer from low body image and self-esteem, had prior problems with an eating disorder, have a history of obesity as a child, or have a family history of obsessive-compulsive disorders or eating disorders. If their daily train of thought is dominated by thoughts of exercising and they cannot seem to control and limit their workout motivation, they are likely at risk for exercise dependence or muscle dysmorphia. Self-awareness may help keep exercisers from transforming from committed, healthy patterns into dependent, unhealthy behaviours.

Behavioural strategies can be very useful in avoiding or limiting the early onset of exercise dependence or muscle dysmorphia. Berger, Pargman, and Weinberg's (2007) list of strategies, which we regard as very sensible suggestions, include: keeping exercise workouts brief and not too frequent (limited to 3-4 times per week for 30-60 minutes), alternating hard and easy training days to avoid overuse injuries, finding a workout partner who is not obsessed with



exercise, scheduling regular rest days, setting realistic short- and long-term goals, and when injured making sure of full recovery before restarting.

We would also add that moderation should be a goal in exercisers' activity schedules with a cross-training component added to their regimen that avoids the same repetitive, high intensity anaerobic or aerobic workout to control compulsive addictive behaviours and limit physiological and psychological damage. Modeling of other non-compulsive behaviours by trainers and coaches can also help lifters to realize that other workout or coping strategies are available. Exercisers should learn self-monitoring skills for their work out behaviours, practice coping strategies to help deal with stress, and develop behaviours to help them improve relationships and foster interests outside of the gym.

Serious exercise dependence, muscle dysmorphia, and eating disorder behaviours warrant serious clinical and psychiatric interventions. While weight lifters may not suffer from the early life-threatening damage that many anorexics or bulimics do, the continuous damage caused by years of excessive exercise, overuse of legal and illegal ergogenic aids, poor diet, and social and psychological isolation is also very unhealthy and can lead to a premature demise. When exercise or psychological helpers notice clients with potentially damaging behaviours, attitudes, and cognitions, they need to encourage these lifters to seek professional counselling or make a referral for these individuals. In this chapter, since we are both exercise/sport psychology consultants and a licensed clinical psychologist, we have based our suggested interventions primarily on both Cognitive-Behavioural and Supportive Psychotherapeutic models. We believe that disorders such as primary and secondary exercise dependence and muscle dysmorphia require a team approach to treatment since specialized skills are needed from many areas. For both Daniel and Victoria, referrals should be made to specially-trained nutritionists, professional

coaches and trainers, sport and exercise psychologists, physicians, clinical and counselling psychologists, and psychiatrists.

For initial evaluation, a triangulated method of assessment is necessary to accurately measure and diagnose unhealthy attitudes towards exercise and eating, excessive exercise behaviours, and related psychological disorders. For Daniel's body dysmorphia, this would involve an interview exploring his exercise history, drug use, supplement use, eating and training behaviours, observation of training regimen and practices, coaches, and workout partners, and extensive use of valid self-report questionnaires such as the EDS, EAI, MDI, BDS for exercise dependence and other questionnaires such as the EDI-2 and PAR to investigate eating and exercise habits. For Victoria, since an eating disorder was suspected, the EDI-2, a clinically-structured interview questionnaire, and other psychological inventories for depression and obsessive-compulsive disorders may be appropriate for diagnosis in addition to the specific exercise dependence questionnaires suggested for Daniel. Psychologists, coaches, family, and training partners should also observe Victoria's exercise and eating habits. Shorter questionnaires (e.g., EAI, DFT, BDS) could be administered regularly to Daniel and Victoria to closely monitor behaviours and evaluate the effectiveness of psychological interventions over time, though it should be noted that the sensitivity to these measures to short term changes has yet to be tested. Recently a study by Heaney, Ginty, Carroll, and Phillips (2011) showed that exercise dependent participants displayed a blunted cardiovascular and cortisol reaction to stress, similar to those seen in alcohol and smoking dependence; this finding may offer a more accurate, objective measurement of exercise dependence that could be monitored throughout diagnosis and intervention phases with patients.

As exercise psychology consultants and clinical psychologists, our specialised expertise and training would limit the interventions that individually we would undertake with both Daniel and Victoria. We must operate within our competencies and refer to sport and clinical specialists when the client needs another specialized intervention. It would be our professional responsibility to refer both individuals to physicians, licensed clinical or counselling psychologists, eating disorder specialists, or psychiatrists since both are suspected of having serious psychological disorders. As the first two authors are exercise psychology consultants, our role would be to help gather information for further diagnosis by observation and questionnaires, undertake limited exercise-behavioural interventions, and make the proper referrals to knowledgeable, expert clinicians like our clinical psychologist third author.

In this chapter we have presented hypothetical interventions by psychological professionals for both Daniel and Victoria based on several psychological approaches. We realize that other professionals might base their intervention programme on a diagnosis of an obsessive-compulsive disorder, body dysmorphic disorder, or addictive behaviour model that may utilise a different set of questionnaires, observational procedures, and behaviour change strategies that differ from the approach we have selected. Because exercise dependence is not specifically included under new DSM-5 criteria, it is difficult to recommend a specific treatment approach. Freimuth et al. (2011) stated that most treatment programmes to date are based on Cognitive-Behavioural principles utilised in behavioural addiction management, but other treatments may be effective when early diagnosis occurs. For example, Dunn, Deroo, and Rivara (2001) have shown that Motivational Interviewing, a technique for increasing motivation to change, has been successful in creating positive behaviour change in individuals with chemical or behavioural dependency. We suggest that professionals dealing with exercise dependence

become familiar with a variety of intervention approaches that may work differently for individuals with primary vs. secondary exercise dependence and muscle dysmorphia. In particular, for the diagnosis of primary vs. secondary exercise dependence, we suggest that practitioners become aware of differing diagnostic criteria summarized by Adams (2009) in the first table of his review article. In addition, while Daniel's hypothetical treatment programme may be successfully undertaken in an out-patient clinic, it may be necessary to treat Victoria's potentially life-threatening eating disorder in a full-time, live-in clinical setting. Furthermore, Adams (2009) offered a decision-making tree for diagnosing and treating exercise dependence which may offer guidance to those not familiar with potential exercise dependence disorders.

Since we lack the qualifications to dispense medications that may help in these intervention programmes, we are reluctant to advise usage or point to specific drug intervention regimens. For example, like Pope et al. (2000) have documented, some psychiatrists might prescribe serotonin-reuptake or dopamine-reuptake inhibitors to limit the effects of diagnosed OCD behaviours and enhance mood for Daniel's hypothesized intervention. In addition, anti-depressant medications might be part of the intervention programme that Victoria receives. Further research is necessary to see if these drugs specifically relieve the varied symptoms of primary and secondary exercise dependence.

Dependent and addictive behaviours may be difficult to totally eliminate, but with proper help, they can be controlled. The first step is awareness and education in both participant and helper. Although many professionals may believe that exercise dependence is of minor concern in the face of the obesity/sedentary epidemic of the last 30 years, it is a behavioural disorder that can have serious consequences for over-committed exercisers. It is our hope that this information will reduce its prevalence and lead to more effective interventions in the future.

### ***Further Reading***

**Adams, J. (2009). Understanding exercise dependence. *Journal of Contemporary Psychotherapy*, 39, 231-240.**

The author provides a basic conceptual basis for exercise dependence, reviews some theoretical explanations, and provides lists of diagnostic criteria and treatment steps.

**Berczik, K., Szabo, A., Griffiths, M.D., Kurimay, T., Kun, B., Urban, R., & Demetrovics, Z. (2012). Exercise addiction: Symptoms, diagnosis, epidemiology, and etiology. *Substance Use and Misuse*, 47, 403-417.**

The authors present a strong argument that exercise dependence is really just another form of exercise addiction with a strong review of current knowledge.

**Hale, B.D., & Smith, D. (2012). Bodybuilding. In T. Cash (Ed.), *Encyclopedia of body image and human performance* (pp.63-77). Oxford, UK: Elsevier.**

In this chapter the authors review the history of research, possible symptoms and causes, and possible interventions of exercise dependence and muscle dysmorphia in bodybuilders.

**Smith, D. & Hale, B.D. (2011). Exercise Dependence. In D. Lavallee & D. Tod (Eds.), *The psychology of strength training and conditioning* (pp.126-147). London, UK: Routledge.**

The authors examine the concept of exercise dependence from an applied perspective as it relates to weight lifting and offer case studies of bodybuilders.

**Thompson, R.A., & Sherman, R.T. (2010). *Eating disorders in sport*. New York: Routledge.**

The authors discuss the clinical elements of eating disorders including how this class of disorders manifests in sport, and how to identify and intervene with athletes who may have an eating disorder.

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