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Exploring How Factors Affecting Exercise Adherence May Inform Strategies to Increase Adherence in General and Depressed Populations: A Literature Review

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by

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Abstract

Background: Exercise is associated with numerous physical and mental health benefits; however, many people struggle to exercise a sufficient amount and thus do not reap the benefits. Exercise is recognized as an effective treatment for depression with few risks. Professionals must understand the factors affecting exercise adherence to assist individuals of different backgrounds with adhering to exercise over the long term and to avoid common pitfalls that could hinder an individual's progress.

Objective: This literature review aimed to identify factors affecting exercise adherence and to explore how those factors could inform strategies to increase exercise adherence among depressed and general populations.

Method: A non-exhaustive review of peer-reviewed literature was performed to gain a broad understanding of exercise adherence and strategies that could help individuals increase the likelihood of adhering to exercise. Self-determination Theory (SDT) was used to guide the understanding of motivation.

Results: The literature consistently shows that factors such as enjoyment, habit, social support, and intrinsic motivation play instrumental roles in the likelihood of an individual adhering to exercise. Strategies to increase the likelihood of exercise adherence should prioritize exercise prescriptions tailored to an individual's needs and preferences, with the goal of developing an exercise habit in mind. Of key importance is that exercise be enjoyable and appropriately challenging. These findings have practical implications for fitness and healthcare professionals.

Keywords: exercise adherence, exercise compliance, depression, exercise strategies, physical activity

Contents

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Background

Depression is a mental health condition that is listed in the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-V) and is characterized by symptoms such as low mood, loss of interest in previously enjoyable activities, fatigue, and a lack of concentration (Knapen et al., 2015; Xie et al., 2021; Bandara et al., 2023). Nearly one of every five adults in the United States experiences depression over their lifetime (Lee, 2023). Depression varies in severity from mild to moderate to severe, depending on the number of symptoms an individual experiences (Knapen et al., 2015). Depression is more prevalent among young adults aged 18-24 and less prevalent in those aged 65 or older (Lee, 2023). Further, depressed individuals may be less likely to exercise compared to non-depressed individuals and may be at increased risk for other diseases, such as heart disease or diabetes (Krämer et al., 2014; Pollock, 2001; Glowacki et al., 2017).

The consequences of depression are far-reaching, affecting both the individual and society (Knapen et al., 2015; Schuch et al., 2015; Xie et al., 2021; Lee, 2023). Depressed individuals suffer from a 20 times greater likelihood of death by suicide and a greater likelihood of experiencing financial issues or a loss of work due to increased workplace productivity issues and more frequent absences (Knapen et al., 2015). Depression may cause impairment or dysfunction in an individual's social life, occupation, or ability to carry out day-to-day tasks (Knapen et al., 2015). Additionally, individuals with mental disorders typically experience greater impairment compared to those with long-term medical disorders, reflecting the pernicious nature of such conditions and the need for effective treatment. (Knapen et al., 2015). Depression is one of the top causes of disability globally, yet mental health disorders, in general, are treated

at much lower rates than long-term medical conditions (Schuch et al., 2015; Knapen et al., 2015).

Depression has an enormous impact on the individual as well as society. Xie et al. note findings that depression and anxiety are estimated to cost over $1 trillion per year due to time lost and that the number is expected to balloon to over $3 trillion by the year 2030 (Xie et al., 2021). It is essential to recognize that depression has continued to become a more significant problem around the world and is set to rank among the top three of all disease burdens by the year 2030 (Xie et al., 2021). Depression has high costs for the individual in the form of an increased risk of death or disability (Lee, 2023).

Depression has been shown to have a deleterious effect on quality of life, highlighting the importance of effective treatments that must be available for depressed individuals (Schuch et al., 2015). For many years, antidepressants have been viewed as the first course of action for treating depression; however, they are often ineffective on the first try, produce unpleasant side effects that make compliance an issue, or are not desired by patients (Schuch et al., 2015; Xie et al., 2021; Rethorst & Trivedi, 2013; Rheker et al., 2016). In recent years, more attention has been brought to exercise as an intervention for depression (Xie et al., 2021).

Extensive research has demonstrated that exercise interventions can be just as effective in treating mild to moderate depression as antidepressants and that exercise may be used as a standalone treatment or a complementary treatment for those with severe depression (Babyak et al., 2000; Xie et al., 2021; Rethorst & Trivedi, 2013; Knapen et al., 2015). Exercise has numerous advantages compared to antidepressants, such as low financial barriers, little likelihood of side effects, better remission, and a variety of other health benefits, such as the slowing of over 40 chronic conditions or diseases (Xie et al., 2021 Ruegsegger and Booth, 2018).

While exercise is an excellent intervention for depressed individuals, it is also essential to the health and longevity of the general population (Ruegsegger & Booth, 2018).

The positive health benefits of exercise have been studied extensively, as demonstrated by Ruegsegger and Booth's (2018) finding that, as of 2018, over 100,000 studies had been done on the subject. Exercise can improve cardiorespiratory fitness (CRF), significantly affecting overall health (Ruegsegger & Booth, 2018). Ruegsegger and Booth (2018) cite findings that CRF has been found to reduce the risk of mortality by as much as 50% in those who went from low to high CRF over eight years. Exercise may also confer psychological benefits related to increased social interaction and enhanced learning and has other potential implications for mental health related to conditions such as anxiety or Alzheimer's (Xie et al., 2021; Ruegsegger & Booth, 2018). Aside from the many physical and psychological benefits of exercise, the practice of exercise can be intrinsically motivating and allow individuals to fulfill their need for personal growth and enter a flow state (Ryan and Deci, 2017: Teixeira et al., 2012; Kimiecik & Harris, 1996).

A review of the 2020 World Health Organization (WHO) guidelines on physical activity by Bull et al. (2020) found that adults should perform 150-300 minutes of moderate-intensity physical activity or 75-150 minutes of vigorous-intensity activity each week. Intensity may be defined slightly differently on a case-to-case basis. However, intensity can generally be understood through measures such as a percentage of maximum heart rate, with percentages closer to maximum heart rate reflective of greater intensity. Exercise intensity may also be tracked using intelligent monitoring devices, and it would be interesting to see a study on whether wearable monitoring devices can implement programs to increase awareness of recommended amounts of exercise per week. While exercise's benefits are widely known, many

cannot reap those benefits because of either not partaking in exercise or struggling to adhere to regular exercise (Gabay & Oravitan, 2022). Estimates of adherence to exercise vary greatly based on the measures used and due to the lack of a universal definition for what qualifies as adherence.

In their review of exercise in fitness facilities, Gabay and Oravitan cited findings that about one in two individuals exercise less after their first month of membership and that as many as 65% of those who started exercising are predicted to stop between three to six months after starting (Gabay and Oravitan, 2022 citing Gjestvang et al., 2019). Further, Sylvester et al. cite findings that most North American adults are not considered physically active (Sylvester et al., 2016, citing Centers for Disease Control and Prevention 2014). More troubling is the finding from one study by Troiano et al. (2008), which used accelerometer data and found that just 5% of adults in the U.S. exercised for a recommended amount of time, which, in this case, was 30 minutes a day. Inactivity and dropout from exercise are growing issues, and more research must be done to promote exercise and aid individuals in adopting and maintaining regular exercise (Rodrigues et al., 2021). Before going into depth about the factors that affect exercise adherence, it is vital to cover the theory underpinning motivation and address the various definitions within the field while recognizing that they are not universal. Further, depressed individuals face unique barriers to exercise and may be less likely to start and continue exercise than the general population (Pollock, 2001; Callaghan et al., 2011).

Definitions

Adherence

Adherence does not have a universally accepted definition within exercise adherence literature; however, a broader definition of adherence cited by Kruisdijk et al. (2020) defines it as

"the process in which a person follows rules, guidelines or standards" (Krusidijk et al., 2020, p. 380 citing Mosby's Dictionary of Medicine, Nursing & Health Professions 2013). Adherence to exercise may be measured through various modes such as time spent exercising, frequency of attendance, exercise tracking devices, or gym entry data. Many use the WHO guidelines on physical activity to measure whether someone is sufficiently active (Bull et al., 2020).

Physical Activity (PA) Vs. Exercise

The terms physical activity (PA) and exercise are often used interchangeably, yet they have distinctive properties that define them (Caspersen et al., 1985). PA is a broad term encompassing any body movement made by the skeletal muscles and is accompanied by energy use (Caspersen et al., 1985). While exercise is a form of PA, it differs in that it is defined as being planned, structured, and repetitive (Caspersen et al., 1985).

The planned portion of exercise refers to an individual setting goals and having an idea of what they will do so that they are more likely to exercise (Dasso, 2018). Structure refers to exercise being intentional and supporting a specific objective (Dasso, 2018). The repetitive portion of exercise can be understood as emphasizing the importance of doing something repeatedly to achieve improved fitness (Dasso, 2018). Exercise is also distinguished from PA as it must be done with the betterment or maintenance of one's physical fitness in mind (Caspersen et al., 1985). This literature review includes information on PA and exercise, as the two concepts are closely related.

Motivation

Dasso (2018, p. 47) defines motivation as an individual's "desire or willingness of someone to do something". Motivation is essential for exercise as it determines whether someone will adhere to exercise in the long term (Dasso, 2018). For this review, the central theory of

motivation used within is Self-Determination Theory (SDT), although Socioemotional Selectivity Theory will also be discussed briefly concerning how motivation can shift with age (Ryan & Deci, 2017; Steltenpohl, 2019).

Barriers and Facilitators

A barrier is some factor that makes the initiation or maintenance of exercise more difficult or prevents an individual from exercising at all. Conversely, a facilitator is any factor that increases the likelihood that an individual will initiate and adhere to long-term exercise. Barriers and facilitators to exercise must be assessed for individuals and professionals to understand better the unique factors that influence whether an individual will adhere to exercise.

Enjoyment

Many associate enjoyment with a positive affect state, yet the term has been controversial, as some argue that enjoyment is better viewed as flow (Kimiecik & Harris, 1996). That said, much of the literature on exercise adherence views enjoyment as the same as positive affect (Kimiecik & Harris, 1996). Kimiecik and Harris (1996) argue that enjoyment results from being intrinsically motivated and doing something that makes one grow better. Regardless of how researchers have defined enjoyment, the concept is closely related to positive affect, which makes sense as flow may result in positive affect (Kimiecik & Harris, 1996). For this review, it should be recognized that enjoyment was a consistent theme in the literature and that the term may have been interpreted slightly differently by different researchers (Kimiecik & Harris, 1996).

Self-Determination Theory (SDT)

Self-Determination Theory (SDT) is a theory of motivation that holds two primary forms of motivation: extrinsic and intrinsic (Ryan & Deci, 2017). Intrinsic motivation occurs when an

individual performs a behavior simply because they enjoy doing so (Ryan & Deci, 2017). Conversely, extrinsic motivation can take multiple forms in which the individual performs a behavior because they believe doing so will result in some external reward or harm avoidance (Ryan & Deci, 2017). It is also important to note that some individuals may not experience any motivation to exercise, known as amotivation (Ryan & Deci, 2017; Nam et al., 2023). SDT also recognizes competence, autonomy, and relatedness as necessary for self-actualization and intrinsic motivation (Ryan & Deci, 2017). SDT is relevant to exercise adherence as greater intrinsic motivation is associated with exercise adherence over time, while extrinsic motivation may play a role in the initiation of exercise (Ryan & Deci, 2017; Teixeira et al., 2012; see Nam et al., 2023, Table 1 for an overview of SDT as it relates to motivation to exercise).

Objectives

This literature review aims to bridge the gap between research on the factors affecting exercise adherence and research that provides practical strategies to address those factors for depressed and general populations. This review aims to accomplish the following goals: (1) To provide an overview of the field of exercise adherence; (2) To illustrate how there is a lack of operational definitions for key terms related to exercise adherence as well as a lack of guidelines for exercise prescription in the treatment of depression; (3) To encourage a holistic and personalized approach to increase the likelihood of exercise adherence; (4) To provide practical strategies which health professionals could use to promote healthy behaviors; (5) To make the information around exercise adherence accessible and centralized so that it could prompt further research; (6) To aid fitness companies and gyms in understanding the tools necessary to increase member retention by increasing the likelihood of members maintaining exercise behavior.

Methodology

A literature review was conducted regarding the factors that affect exercise adherence. Selected literature was peer-reviewed and on adults from general and depressed populations. To gain a broad understanding of exercise adherence among both depressed and general populations, it was decided that a literature review would be more suitable rather than a systematic review. It was reasoned that a literature review would enable the linking of more information related to strategies with findings on factors affecting exercise adherence.

Because this review is non-exhaustive, it is essential to note that the findings reported herein should be interpreted with care and the understanding that their generalizability may be limited to specific populations or based on particular protocols. Searches were conducted to find the barriers and facilitators of exercise adherence. Once patterns were identified in the exercise adherence literature, further research was conducted to identify ways to increase adherence through strategies such as building habits. Because of the broad scope of this literature review, not all findings will be practical as they may only apply to specific healthcare experts who are qualified to implement them.

Literature Review Findings

In their review, Gabay and Oravitan (2022) examined the factors that affect adherence to physical activity and exercise in spaces, such as gyms, designed for the improvement of fitness. They ended up with 19 studies on adherence within fitness facilities (Gabay & Oravitan, 2022). Note that this review only included studies with healthy individuals and was limited to fitness facilities (Gabay & Oravitan, 2022). They identified six main categories affecting adherence: habit, professional assistance, barriers, motives, the social environment, and individual demographics (Gabay & Oravitan, 2022).

Findings from Gabay and Oravitan (2022) provide the scaffolding to construct a more complete view of exercise adherence directly related to strategies that can help professionals and individuals be more successful. The categories from Gabay and Oravitan (2022) partially inform the strategies in this review while also serving as a starting point for going into more detail about the most critical factors that affect adherence. Habit and enjoyment play prominent roles in exercise adherence and are essential to consider when identifying strategies to promote adherence (Gabay & Oravitan, 2022). It is important to note that some of the findings from Gabay and Oravitan (2022) may be limited by the inability to know whether exercise may be continued in a setting other than the one where the study was conducted.

While there are countless studies related to exercise and health generally, less attention has been devoted to research related to exercise adherence and, more specifically, research on adherence in depressed individuals (Ruegsegger & Booth, 2018). It is hypothesized that depressed individuals and non-depressed individuals experience many of the same facilitators and barriers to regular exercise. This review addresses factors that affect adherence among general and depressed populations and will give special attention to unique factors that might make adherence to exercise more challenging for depressed individuals. It is essential to recognize that many variables impact adherence to exercise. While certain things may facilitate exercise for some, it is crucial to understand that countless other lifestyle factors could affect an individual's likelihood of adherence.

Facilitators and Strategies

Many facilitators to exercise adherence have been identified and many apply to both general and depressed populations. In one study, Rogerson et al. (2012) interviewed individuals with symptoms of depression and coronary heart disease (CHD) to see what the individuals

perceived to be barriers as well as facilitators to exercising. While the study was small (n=15), most participants cited psychological benefits as playing a role in facilitating adherence to PA (Rogerson et al., 2012). The individuals in the study varied in how they viewed the psychological benefits of PA, with some wanting a distraction from problems and others reporting enhanced relaxation or a feeling of having accomplished something (Rogerson et al., 2012). Findings from this study were in line with the notion that PA and exercise can provide numerous psychological benefits, such as reducing depressive symptoms, improving self-efficacy, boosting self-esteem, and helping with anxiety (Rogerson et al., 2012; Babyak et al., 2000; Xie et al., 2021; Ruegsegger and Booth., 2018).

Aside from the psychological benefits of exercise, which have been demonstrated through numerous studies, social support has also been identified as a facilitator of PA and exercise adherence (Ruegsegger & Booth, 2018; Gabay & Oravitan, 2022; Rogerson et al., 2012; Gjestvang et al., 2021a). Support from family and friends was the second most reported facilitator to PA in the study by Rogerson et al. (2020). They found that individuals highly value the support of those close to them—a finding supported by other studies (Rogerson et al., 2012; Gabay & Oravitan, 2022; Gjestvang et al., 2021a). While the support of friends and family may facilitate exercise adherence, support from personal trainers and other health professionals may also play a significant role in exercise adherence (Gabay & Oravitan, 2022; Sperandei et al., 2016; Keller-Varady et al., 2023).

The Role of Supervision and Enjoyment

Adherence rates in unsupervised settings are poor, with one study finding that under 4% of individuals are predicted to remain engaged in continuous exercise at a gym for more than one year (Sperandei et al., 2016). The poor adherence to regular exercise in unsupervised settings

such as gyms indicates an area where individuals are vulnerable and could benefit from professional help (Sperandei et al., 2016). One possible explanation for the poor adherence rates to exercise in unsupervised settings may be that individuals, both depressed and non-depressed, who are new to exercising lack the knowledge to feel competent and thus do not adhere due to a lack of motivation and low self-efficacy (Ryan & Deci, 2017; Krämer et al., 2014; Knapen et al., 2015). Depressed individuals may benefit particularly greatly from professional support when initiating exercise due to certain hallmarks of depression, such as fatigue and low mood, which could make exercising more difficult (Keller-Varady et al., 2023). Well-qualified fitness experts may be able to guide individuals who are new to exercise and help them understand how often to train, how to find enjoyable workouts, and how to come up with strategies that help them adhere to exercise and make it a habit (Rhethort & Trivedi, 2013).

Enjoyment of exercise is consistently cited as being an essential component of a good exercise program as it can contribute to the likelihood of an individual adhering (Thomlinson-Perez et al., 2022; Teixeira et al., 2022; Shakudo et al., 2011; Rodrigues et al., 2021; Nam et al., 2023). In one study, Rodrigues et al. (2021) examined how past actions impact future actions among gymgoers. While the study was conducted using a convenience sample, they found that enjoyment was related to intention and that those with greater intention were more likely to adhere to exercise (Rodrigues et al., 2021). These findings that enjoyment and past behavior serve as predictors of exercise adherence point to the importance of individuals finding forms of exercise that facilitate enjoyment and intrinsic motivation (Rodrigues et al., 2021; Ryan & Deci, 2017). Because individuals have unique preferences, professionals must work collaboratively to identify various forms of exercise that could be enjoyable, as well as check in regularly to make adjustments.

The Role of Exercise Diversity

Research on exercise diversity has received more attention recently (Sylvester et al., 2015). In one study, Sylvester et al. (2015) looked at what effect programs with different levels of exercise diversity had on college students who were not active [they defined this as performing less than or equal to two 20-minute or greater sessions of moderate to vigorous exercise per week]. The students were assigned to either a high-variety resistance training program in which they were told to do various exercises or a low-variety program in which they were given the same exercises each time (Sylvester et al., 2015). While both protocols were designed to be similar in aspects such as intensity, length, and frequency, the high-variety group experienced greater adherence (Sylvester et al., 2015). Interestingly, they also found that while exercise variety impacted exercise adherence, it did not have an impact on the fulfillment of Ryan and Deci's basic psychological needs, such as relatedness, competence, and autonomy, suggesting that exercise diversity alone is insufficient to maximize the successfulness of an exercise protocol (Sylvester et al., 2015; Ryan & Deci, 2017).

More recently, Bandara et al. (2023) released recommendations to aid in increasing exercise adherence among individuals with major depressive disorder (MDD). Exercise diversity was one of three strategies suggested by Bandara et al. (2023). They were specifically interested in improving adherence and satisfaction within group fitness programs as they cited the environment as more conducive to social support (Bandara et al., 2023). In particular, they stressed the importance of providing intensity modifications in group fitness classes, which they define as "the 'load' associated with a workout" (Bandara et al., 2023, p. 149). By providing more challenging forms of exercise and more accessible forms, individuals of all abilities may be more likely to feel competent and thus be more likely to adhere to the program (Bandara et al.,

2023). In line with suggestions from Bandara et al. (2023), Callaghan et al. (2011) found that exercise of preferred intensity contributed to better exercise adherence while still providing health benefits, although the study only included women with depression.

Moreover, exercise diversity enables individuals to customize their workout based on their energy levels and potential injuries (Bandara et al., 2023). Exercise diversity goes beyond offering different intensity levels to providing individuals with various exercise modalities such as dance fitness, mind-body practices, sports, and swim classes, all of which can help prevent an individual from becoming bored (Bandara et al., 2023). Exercise diversity is an excellent tool that can be used in tandem with others to help maximize the likelihood of long-term exercise adherence (Bandara et al., 2023).

The Role of Motivational Interviewing

Exercise adherence is only possible when an individual wants to exercise and has decided to change their life—this is where motivational interviewing and stages of change come into play (Brinks & Franklin, 2011). Motivational interviewing is a tool that enables professionals to work collaboratively with their clients to help them recognize the benefits of a change, which, in this case, would be making exercise a regular part of life (Brinks & Franklin, 2011). Motivational interviewing is underpinned by four key elements, which include being empathetic, helping the individual to recognize the difference between where they are and where they would like to be, empowering the individual to be a part of the problem-solving process, and helping the individual to recognize that they can make a change (Brinks & Franklin, 2011).

The concept of motivational interviewing suggests that it is essential to be supportive of individuals and that it may be ineffective only to tell individuals what they should be doing differently, as such an approach could make the individual feel as if they are not being given

autonomy (Brinks & Franklin, 2011; Ryan & Deci, 2017). Brinks and Franklin (2011) note that studies have shown motivational interviewing can help increase one's confidence in one's ability to exercise. They also suggest using the Stages of Change theory, which allows professionals to understand what phase of change an individual is in (see Brinks and Franklin, 2011, for counseling techniques at each stage). Professionals should be aware that while they may be able to help individuals recognize the benefits of exercise and nudge them towards change, it is ultimately the individual's decision and will be up to them to become intrinsically motivated (Brinks & Franklin, 2011).

The Role of Intrinsic Motivation

When individuals first adopt exercise, they tend to be motivated by extrinsic factors; however, those who adhere to exercise long-term tend to be more intrinsically motivated (Teixeira et al., 2012). One study from Gjestvang et al. (2019) found that 92.8% of individuals new to training and new to a gym reported increased physical fitness as their main reason for exercising. In that same study, Gjestvang et al. (2019) found that neither body composition nor one repetition max tests were associated with attendance at the gym, suggesting that individuals could become disappointed if they realized that their primary goal of improved physical fitness was not being met. Note that maximum oxygen uptake (VO2 max) did improve among the groups who attended more regularly (Gjestvang et al., 2019). Because intrinsic motivation facilitates long-term exercise adherence, professionals may be more effective in helping their clients by using strategies to encourage intrinsic motivation (Teixeira et al., 2012; Gjestvang et al., 2019; Gjestvang et al., 2020).

Fortunately, professionals can play a role in fostering intrinsic motivation within their clients. When clients feel intrinsically motivated to exercise, they do so because they enjoy it, not

because they are necessarily waiting for some far-off external goal, such as looking a certain way or winning a race (Gjestvang et al., 2020; Ryan & Deci, 2017). Note that individuals can simultaneously be motivated by intrinsic and extrinsic factors (Kimiecik & Harris, 1996). Fostering intrinsic motivation can be achieved by prompting individuals to recognize the intrinsically motivating aspects of exercise, such as feeling good or experiencing flow (Knapen et al., 2015).

Different exercises may be more or less intrinsically motivating based on an individual's unique preferences, and as such, professionals must take into consideration the possibility that certain forms of exercise may not be conducive to intrinsic motivation and that re-assessment may be necessary to find a better fit (Knapen et al., 2015; Brinks & Franklin, 2011). One study from Rogerson et al. (2012) also found that factors such as making exercise meaningful and being mindful of its benefits can facilitate adherence, suggesting that it is likely that if professionals can help individuals identify ways to make exercise meaningful and recognize the various benefits that they will then be more likely to adhere. While intrinsic motivation facilitates long-term exercise adherence, research is being done on whether extrinsic motivations can play a role in adopting exercise (Teixeira et al., 2012; Mitchel et al., 2013).

The Potential Role and Risk of Behavioral Economics

With a rise of interest in behavioral economics, organizations and governments around the globe have begun to wonder whether monetary compensation could help facilitate exercise adherence (Mitchel et al., 2013). A review from Mitchell et al. (2013) looked at the research on using financial incentives to encourage exercise and found 11 studies, of which the majority focused on short-term exercise adherence. They found that the majority (8/11) of the studies showed a positive relationship between compensation and improved exercise adherence;

however, only one study suggested the efficacy of incentives for a period of greater than one year (Mitchel et al., 2013). Interestingly, while the review did point to the fact that compensation in higher amounts to as much as over $46 a week had a greater effect on exercise adherence, they still found that compensation as low as just under $3 could affect adherence as well (Mitchel et al., 2013). The field of behavioral economics is fascinating and could be instrumental in developing new government programs and public health campaigns, yet it is still in its infancy (Mitchel et al., 2013).

The findings from the review by Mitchel et al. (2013) must be interpreted with great caution, given the lack of sufficient evidence for the long-term use of financial incentives to promote exercise adherence. Additionally, there is the potential for incentives to corrupt intrinsic motivation and make individuals see exercise as something done for extrinsic rewards (Mitchel et al., 2013; Ryan & Deci, 2017). Financial incentives have a very limited potential use case for individuals who struggle with the initiation phase of exercise (Mitchel et al., 2013). However, the long-term implications of such a strategy have yet to be discovered (Mitchel et al., 2013). It would be fascinating to see a study done examining whether financial incentives can be combined with a supervised exercise protocol designed to encourage intrinsic motivation to see whether individuals will be more likely to adhere to long-term exercise once financial incentives are ceased compared to just receiving financial incentives (Mitchel et al., 2013 Knapen et al., 2017). Further, new exercisers may benefit from the assistance of healthcare professionals whom they do not traditionally expect to provide in-depth guidance on how to adhere to exercise (Pollock, 2001). The general population may be aware of personal trainers; however, other professionals such as therapists and psychologists may be able to play a significant role in facilitating exercise adherence as well.

The Role of Mental Health Professionals

While exercise is as effective as certain antidepressants and better at preventing remission, mental health professionals are often hesitant to devote significant time to promoting exercise interventions for depressed individuals (Babyak et al., 2000; Pollock, 2001). Professionals might be hesitant to seriously consider exercise interventions as a first approach to treating certain forms of depression for various reasons, such as concerns about adherence or a lack of training in the subject (Pollock, 2001). Pollock notes that previous research has shown that physicians often report that their patients do not take their health advice, which may make them view their patients negatively for not changing their behavior (Pollock, 2001, citing Feinstein et al., 1999). Further, simply telling someone that a lifestyle change, such as regular exercise, would be beneficial may not be enough for them to change---this is why Pollock (2001) argues that psychotherapists should play a more involved part in leading their patients to success.

Pollock (2001) argues for a collaborative and personalized approach to promoting exercise adherence like that of Brinks and Franklin (2011), which emphasizes meeting individuals where they are based on different stages of change. Because exercise interventions are relatively new and still underutilized for depressed patients, it follows that individuals seeking treatment may not expect to work on a plan to exercise—this is a significant issue that professionals must be trained to overcome (Pollock, 2001). While promoting exercise initiation to individuals is certainly a barrier, professionals may be able to facilitate exercise in individuals who are ready for change and provide alternate strategies for those who are not (Pollock, 2001). Pollock (2001) notes that there are various facilitators to exercise among depressed patients, which include knowing that exercise can help with depression, being very inclined to want to get better from depression, feeling that the therapist wants to work collaboratively, having the

support of friends and family, and having easy access to spaces to workout. Professionals may benefit from taking the time to understand how many facilitators an individual has to exercise to predict better the likelihood of an exercise intervention being successful (Pollock, 2001).

Understanding Exercise Relapse

Once individuals start exercising, they are at risk of either stopping altogether or exercising infrequently—this raises the issue of exercise relapse and how to address it (Pollock, 2001). Interestingly, Pollock (2001) notes that exercise relapse suffers from underreporting, which suggests that therapists may wish to be proactive about discussing the potential for relapse. Further, therapists and other health professionals must be sure to brief their patients on relapse so that they understand that shame is not conducive to exercise adherence and that relapse may be a part of the process (Pollock, 2001). It is not only the patient who should be aware of feelings arising from relapse as Pollock (2001) also notes that therapists may experience countertransference in which they might become upset and feel that they have failed--professionals must be mindful to prevent this reaction from harming the quality of the patients care. The issue of exercise relapse is relevant to personal trainers and anyone else in the fitness industry, as all professionals can benefit their clients by encouraging them not to shame themselves for relapse but to see it as a learning opportunity (Pollock, 2001).

The Role of Worksheets During Intake

Therapists and mental health professionals interested in implementing exercise into their practice may wish to see Pollock (2001) for assessments to identify barriers to exercise and for guidance on worksheets to identify patients' preferences for certain forms of exercise. The worksheet provided by Pollock assesses individuals for various factors related to exercise preferences, including preferred time of exercise, preferred social environment (i.e., alone or

with others), preferred location, the preferred amount of exercise diversity, preferred exercise type, preference for or against music, and more (See Pollock, 2001, Table 2). The importance of an individual having control over their social environment is underscored by one study from Harada et al., which showed that depressed individuals with PTSD may prefer to exercise by themselves (Harada et al., 2013). Pollock presents another worksheet that is designed to have individuals rank activities they might like that are not often considered to be exercise but can contribute to their overall PA—these include cycling, playing different types of sports, doing various forms of cleaning, dancing, performing activities in a wheelchair (See Pollock, 2001, Table 3).

Worksheets are simple tools that professionals can use to understand individuals' preferences and create a plan more conducive to exercise adherence (Pollock, 2001). Exercise preference assessments can address misconceptions about exercise, which could help individuals realize that exercise can be enjoyable and take various forms (Pollock, 2011; Brinks & Franklin, 2011). While Pollock (2001) advocates for mental health professionals to play a more engaged role in providing tailored exercise recommendations, individuals and fitness professionals could benefit from simple preference assessments to understand which forms of exercise will facilitate enjoyment and maximize the likelihood of long-term adherence. Professionals such as therapists may be uniquely qualified to help individuals overcome barriers and identify facilitators; however, all can benefit from understanding the role of habit in facilitating exercise adherence (Pollock, 2001; Lally & Gardner, 2013; Brinks & Franklin, 2011; Gabay & Oravitan, 2022; Kaushal & Rhodes, 2015; Kaushal et al., 2017).

The Role of Habit, Consistency, and Exercise Frequency

Another major facilitator to exercise adherence is habit (Gabay & Oravitan, 2022; Lally & Gardner, 2013; Brinks & Franklin, 2011; Kaushal & Rhodes, 2015; Kaushal et al., 2017). Lally and Gardner (2013, p. 137) define habits as "automatic behavioural responses to environmental cues, thought to develop through repetition of behaviour in consistent contexts". Habits are of crucial importance to exercise adherence because they allow individuals to make exercise a part of their lives, which becomes automatic over time, thus increasing the likelihood of adherence (Kaushal & Rhodes, 2015; Kaushal et al., 2017; Gabay & Oravitan, 2022; Lally & Gardner, 2013). Given the importance of habits in exercise adherence, the natural follow-up is to understand the conditions necessary to build habits (Kaushal & Rhodes, 2015). Scholarship on habit formation is varied, and the minimum recommended frequency of exercise may not always be based on the ideal frequency to build a habit (Rodrigues et al., 2021; Kaushal & Rhodes, 2015).

In one study, Rodrigues et al. (2021) looked at how the past actions of individuals affected future actions related to exercise. They found that individuals with a history of exercising were more likely to exercise in the future, suggesting the importance of making exercise a habit and feeling competent (Rodrigues et al., 2021). Interestingly, Rodrigues et al. (2021) recommended exercising at a minimum of two times per week to increase the likelihood of adherence. Conversely, one study from Kaushal and Rhodes (2015) looked at how habits are formed in individuals new to the gym, finding that individuals should exercise a minimum of four times per week to make exercise a habit. Further, Kaushal and Rhodes (2015) emphasized the importance of adhering to exercise during the six weeks after starting, as that was how long it took for individuals to create a habit. Gabay and Oravitan (2022), in their review of exercise

adherence, found that recommendations for exercise frequency vary from around two to four times per week. Given the lack of a universally accepted guideline for the minimum exercise frequency, it seems that individuals would benefit from aiming to be on the high end of the range, especially within the first six weeks after initiating exercise, to maximize the likelihood of creating a habit and adhering long term (Kaushal & Rhodes, 2015).

Exercise frequency is one part of habit formation, yet bad habits might also need to be broken to facilitate exercise adherence (Kaushal & Rhodes, 2015). In one review, Lally and Gardner (2013) examined theories related to the facilitation of habits. They found that bad habits could be addressed by changing the individuals' environment by identifying where and when they tend to occur and doing things such as placing a note as a reminder not to do something (Lally & Gardner, 2013). They also recommend that individuals self-monitor bad habits by noting each time the behavior is performed to become aware of the context in which the habit is performed (Lally & Gardner, 2013). Research has shown that smoking is associated with reduced participation in exercise (Castro Monteiro et al., 2021). As such, it follows that strategies to break habits, such as reducing triggers, could help individuals adhere to exercise by reducing barriers (Castro Monteiro et al., 2021; Lally & Gardner, 2013).

A more recent study from Kaushal et al. (2017) divided exercise habits into two phases: preparatory and performance. They examined the role of a preparatory phase, which they define as "behaviours conducted to transition individuals to an exercise-ready state," in forming exercise habits (Kaushal et al., 2017, p. 432). Actions taken within the preparatory phase include laying out gym clothes, consuming food and liquids at an appropriate time before exercising, and any other activity an individual might do before working out (Kaushal et al., 2017). The performance phase is marked by the individual doing the intended exercise (Kaushal et al.,

2017). They found that preparatory habits and the intention to exercise are good predictors of exercise, suggesting that individuals can benefit from creating a consistent pre-workout strategy (Kaushal et al., 2017). In addition, research from Sinnott et al. (2013) suggests that depressed individuals may benefit from encouragement from others, a finding which suggests that it might be beneficial for health professionals to provide regular encouragement when it comes to building preparatory habits (Kaushal et al., 2017). It follows that individuals and experts should be aware of the benefits of preparatory habits and make a plan to help individuals exercise consistently, around four times per week, if possible (Kaushal et al., 2017).

Special Considerations for Depressed Individuals

Individuals with depression may require more support to facilitate exercise adherence due to associated symptoms such as low motivation and low energy (Knapen et al., 2015). Individuals who show signs of depression may benefit from referral to mental health providers as personal trainers are not able to diagnose depression but may play an essential role in providing their clients hope and resources. Further, depressed individuals may have other comorbidities, which Knapen et al. (2015) suggest should be considered when doing risk assessments and while creating a personalized exercise plan. Knapen et al. (2015) also suggest adapting levels of exercise difficulty depending on an individual's risk and recommend moderate-intensity walking as relatively safe. Like Pollock (2001), Knapen et al. (2015) also recommend discussing unique barriers to identify strategies to overcome them and educating the individual on the benefits of exercising. Of particular importance for depressed patients is regular supervision and positive feedback, as well as continued contact into the future to help encourage the patient to maintain exercise adherence. Finally, they recommend counseling individuals to remember the benefits of exercising whenever they relapse to help them start again (Knapen et al., 2015).

The Use of Assessment Tools

Various assessment tools have been used to examine exercise adherence in both general and depressed populations. Researchers and certain qualified professionals can benefit significantly from using assessment tools to maximize the likelihood of exercise adherence. Certain assessment tools may be more relevant to mental health professionals while others might be relevant to fitness professionals. The following is a brief overview of tools that previous researchers have used that might be helpful to healthcare professionals followed by a brief overview of tools more relevant to fitness professionals.

One study by Herman et al. (2002) used various assessment tools to examine exercise cessation in depressed populations. They found that life satisfaction and anxiety could be facilitators or barriers to exercise adherence (Herman et al., 2002). They used tools such as the Life Satisfaction Index, which is composed of 20 items that are scored from one to three (Herman et al., 2002, citing Neugarten, Havighurst, & Tobin, 1961). Anxiety was measured with the Spielberger State-Trait Anxiety Inventory (Herman et al., 2002, citing Spielberger, Gorsuch, & Lushene, 1970). Self-esteem may also play a role in exercise adherence and can be measured with the Rosenberg Self-Esteem Scale (Herman et al., 2002, citing Rosenberg, 1965).

Given the importance of social support for exercise adherence, the Perceived Social Support Scale may help professionals gauge social support (Herman et al., citing Blumenthal et al., 1987). Kaushal and Rhodes (2015) have used the Self Report Behavioral Automaticity index in their research on habit—this index could prove helpful in evaluating whether exercise habits have been formed (Kaushal & Rhodes, 2015, citing Gardner 2012 and Gardner et al., 2012).

Fitness professionals might be inclined to use certain tests such as body composition tests, however, research from Gjestvang et al. (2021b) has found no association between tests of

body composition and exercise adherence, suggesting that the use of specific tests alone may not be beneficial and may be an unnecessary expenditure of time and money. They also note that individuals who received personal training (just 4.4% did personal training in the first year at the gym) exercised more frequently than those who did not, pointing to the fact that trainers can provide support and help facilitate intrinsic motivation rather than just focusing on a measurement such as body composition (Gjestvang et al., 2021b). While body composition testing alone may not facilitate exercise adherence, other tools may help professionals measure progress and help individuals feel that they are progressing and challenging themselves in line with the principles of SDT (Gjestvang et al., 2021b; Ryan & Deci, 2017). It should also be noted that depressed individuals might benefit from submaximal tests, such as the six-minute walk test or the Franz ergo cycle test, cited by Knapen et al. (2015), as alternatives for those without the energy to perform maximal tests.

Tools such as the Physical Activity Enjoyment Scale have been used to assess enjoyment of forms of exercise such as high-intensity interval training; however, they may be seen as controversial because of the way enjoyment is defined (Heisz et al., 2016, citing Kendrierski and DeCarlo, 1991; Kimiecik & Harris, 1996). A more recent assessment, the Exercise Maintenance Motivation Scale (EMM), was developed by Nam et al. (2023), based upon Ryan and Deci's (2017) principles of SDT, although it should be noted that the assessment was tailored to Vietnamese fitness club members to be more culturally relevant. They found that higher motivation scores on the EMM were a good predictor of exercise adherence, suggesting that the scale could play an important role in identifying the amount of support an individual might need (Nam et al., 2023). Finally, tools such as the Borg Rating of Perceived Exertion can be useful in helping individuals estimate the intensity of their workout (Heisz et al., 2016, citing Borg, 1982).

The tools mentioned in this section are intended to be informative and provide information in a centralized location; however, this is not an exhaustive list.

Barriers

While barriers have been discussed briefly prior, this section goes into more depth about them. In a recent study, Gjestvang et al. (2020) identified barriers to exercise adherence among new gym members. New members were given multiple questionnaires over one year related to barriers and exercise attendance (Gjestvang et al., 2020). They found that participants who dropped out reported that priority, such as a lack of time, was the most significant barrier to exercise (Gjestvang et al., 2020). While priority is the most common barrier to exercise adherence, other factors, such as fear of judgment and a lack of knowledge, were also reported as barriers (Gjestvang et al., 2020). Other medical conditions may also contribute to individuals fearing that exercise could result in injury (Brinks & Franklin, 2011).

One review from Glowacki et al. (2017) looked at barriers to exercise, specifically among those with depression. Through a systematic review, they identified 13 studies related to barriers to exercise adherence in individuals with depression (Glowacki et al., 2017). They found 52 barriers to exercise among depressed individuals, although they did note that, at times, a barrier can also be a facilitator (Glowacki et al., 2017). Because barriers can also be facilitators depending on the person, this section is shorter than the section on facilitators (Glowacki et al., 2017). The barriers were then classified into 14 domains, of which the domain of emotion was found to be of crucial importance (Glowacki et al., 2017). Within the emotional domain, they reported findings of common barriers, including not having energy, negative moods, fatigue, sickness, boredom, feeling embarrassed about exercising, and not enjoying exercising (Glowacki et al., 2017). Other noted barriers were related to lack of confidence, general fears, and

insufficient support (See Glowacki et al., 2017). Research from Krämer et al. (2014) has shown that depressed individuals may have volitional deficits, which suggests that barriers could pose a more significant threat to them than to non-depressed individuals. Further, those who are inactive may also present with more barriers to exercise than those who are active (Rogerson et al., 2012).

With an understanding of the most salient barriers and facilitators to exercise adherence, it becomes possible for professionals to create more successful exercise prescriptions, increase the likelihood of exercise maintenance, and improve business by retaining more clients. Professionals are responsible for helping their clients or patients. As the study of exercise adherence continues to develop, the industry will benefit significantly from an increase in long-term clients. Individuals who exercise frequently can reap the many health and longevity-promoting benefits that come with it (Ruegsegger & Booth, 2018). It is hoped that more research will be done to advance novel protocols to make exercise interventions more accessible to individuals of all socioeconomic statuses, particularly those who cannot afford personal training. Given the high cost of depression on the individual and the economy, the government and corporations would benefit significantly from identifying effective programs designed to encourage the initiation of exercise and how to maintain adherence (Lee, 2023).

Discussion

A Personal Approach to Encouraging Exercise Adherence

Individuals experience unique barriers and facilitators to exercise, underscoring the importance of creating a customized plan instead of a cookie-cutter one (Glowacki et al., 2017). For example, someone with fears of injury due to past injuries might benefit from lower-risk exercises that allow them to feel confident, thus promoting the SDT principle of competence

(Brinks & Franklin, 2011; Ryan & Deci, 2017). Before starting an exercise routine, individuals should take inventory of their background and consider their current fitness, health, and motives (Brinks & Franklin, 2011). Supervision through personal training or group fitness is an excellent way of increasing exercise adherence, especially when first forming an exercise habit, and is highly underutilized (Gjestvang et al., 2021b; Kaushal & Rhodes, 2015). Those who cannot afford personal training and are receptive to being in a social environment may consider group fitness classes (Gjestvang et al., 2021b; Pollock, 2001; Whiteman-Sandland et al., 2018).

Further, individuals who cannot afford a gym membership may find enjoyable forms of exercise at no cost, such as running outdoors, cycling, or watching exercise tutorials online (Brinks & Franklin, 2011). The research shows that individuals should strive to exercise at least four times a week at a consistent time; however, two times a week may be sufficient for those who are unable to work out four times a week (Rodrigues et al., 2021; Kaushal & Rhodes, 2015; Gabay & Oravitan, 2022; Lally & Gardner, 2013). Exercise should be enjoyable, intrinsically motivating, and encouraged by professionals and friends (Thomlinson-Perez et al., 2022; Teixeira et al., 2022; Shakudo et al., 2011; Rodrigues et al., 2021; Nam et al., 2023). Professionals may also wish to consider findings from Steltenpohl et al., which suggest that older adults may be more motivated by present-oriented goals than younger adults—a finding in line with socioemotional selectivity theory (Steltenpohl et al., 2019).

Further, one study by Krogh et al. (2014) found that age was associated with exercise attendance, thus highlighting the potential need for exercise interventions to provide additional support to young, depressed individuals. While exercise has countless benefits, individuals, both depressed and non-depressed, must still be mindful of other lifestyle factors that impact health, such as adequate sleep and nutrition (Ruegsegger & Booth, 2018). It follows that professionals

may wish to consider referrals to appropriate professionals, such as those specializing in sleep or nutrition, as they are uniquely qualified to address issues that might contribute to fatigue, a known barrier to exercise (Keller-Varady et al., 2023). Possibly one of the findings with the most significant transformative power is the suggestion from Knapen et al. (2015) to encourage individuals to notice the positive effects while working out as a means of encouraging intrinsic motivation---this recommendation is simple and practical for individuals and professionals to use. Finally, all stakeholders can benefit from understanding exercise relapse and recognizing that exercise is not all or nothing and that goals should be achievable (Pollock, 2001; Knapen et al., 2015).

Implications For Healthcare Professionals

Psychologists and counselors may consider working extensively with clients to encourage exercise initiation and adoption (see Pollock, 2001). Doctors can play a significant role in encouraging patients to consider exercise and helping them realize how it could help them work toward their goals through motivational interviewing (Brinks & Franklin, 2011). Professionals must work collaboratively with patients and meet them where they are based on their readiness for change (See Brinks & Franklin, 2011). Physicians may wish to consider promoting group fitness to patients with depression as it provides social support and may be particularly useful due to individuals receiving guidance from the instructor; however, all patients can benefit from exercise (Brinks & Franklin, 2011; Ruegsegger & Booth, 2018). Take, for example, one study that found yoga to be well-accepted as a part of exercise referral schemes (Thomlinson-Perez et al., 2022). This suggests that physicians might consider developing a network of qualified instructors to whom they can refer patients (Thomlinson-Perez et al., 2022). Table 1 includes a collection of practical strategies that healthcare professionals could implement to increase the

likelihood of their clients or patients adhering to exercise, however, not all strategies are mentioned therein.

Table 1

Proposed High-Impact Strategies for Healthcare Professionals

1. Evaluate the individual for readiness to change and use motivational interviewing to help identify the benefits of exercise for the individual (Brinks & Franklin, 2011).
2. Assess the individual for their exercise preferences and help them identify forms of exercise that they could find enjoyable (Pollock, 2001). This is especially important when the individual expresses the belief that exercise cannot be enjoyable due to misconceptions about what it means to exercise (Brinks & Franklin, 2011)
3. Physicians and other healthcare workers may develop and implement exercise referral schemes to help individuals attain the benefits of exercise (Thomlinson-Perez et al., 2022).
4. Counsel individuals on exercise relapse before it occurs to help mitigate the likelihood of individuals feeling shame and increase the likelihood of them viewing the relapse as a learning experience (Pollock, 2001).
5. Encourage individuals to seek out social support and regularly check in with individuals to ensure that they are still enjoying their exercise routine (Gabay & Oravitan, 2022).

Implications For Trainers, Group Fitness Instructors, And Gyms

Personal trainers and group fitness instructors may not be qualified to diagnose depression and, as such, may wish to refer their clients to mental health professionals when they see signs an individual might be depressed. Personal trainers may be able to increase the likelihood of their clients adhering to exercise by first gaining a detailed understanding of their client's background as well as brainstorming a variety of exercises that the client could see themselves enjoying (Brinks & Franklin, 2011; Sylvester et al., 2015; see Pollock, 2001 for exercise preference worksheets). Personal trainers and other fitness professionals should be encouraging and careful not to make their clients feel guilty about relapse (Knapen et al., 2015). Professionals may benefit from understanding that habit formation can take around six weeks and that individuals should exercise regularly to form the habit (Kaushal & Rhodes, 2015). Trainers and instructors can encourage individuals to notice the positive effects of exercise while working to promote intrinsic motivation, thus increasing the likelihood of exercise being viewed as meaningful and the client adhering to exercise in the long term (Knapen et al., 2015).

Trainers should note that body composition testing has not been shown to increase the likelihood of exercise adherence and, as such, should be used with caution (Gjestvang et al., 2021b). Both instructors and trainers must provide progressions and regressions of all exercises so that clients can feel confident adjusting their workout based on their ability and energy levels (Bandara et al., 2023). Finally, trainers may wish to encourage clients to find social support, such as family and friends whom they can work out with to help them adhere to exercise (Ruegsegger & Booth, 2018; Gabay & Oravitan, 2022; Rogerson et al., 2012; Gjestvang et al., 2021a). Table 2 provides a non-exhaustive collection of practical strategies for those working in a fitness environment.

Table 2

Proposed High-Impact Strategies for Fitness Professionals

Personal trainers may wish to increase their awareness of signs and symptoms of common mental health conditions to be able to refer clients to mental health professionals when necessary.
Ask the client about their exercise preferences and help them find ways of exercising that will enjoy and do regularly (Pollock, 2001).
Provide modifications for exercises so that the client can feel a sense of competence and autonomy in addition to being appropriately challenged (Bandara et al., 2023; Ryan & Deci, 2017).
Help clients understand the importance of building exercise habits and counsel them on strategies such as developing a routine before exercising, exercising at a consistent time, and exercising at least four times per week if possible, during the first six weeks (Kaushal et al., 2017; Kaushal & Rhodes, 2015).
Consistently prompt individuals to be mindful of the enjoyable aspects of exercise that occur during exercise to help facilitate intrinsic motivation and long-term exercise adherence (Knapen et al., 2015).

Limitations

Note that there is no universally accepted standard of exercise adherence, which explains why studies often have slightly different results. This review was non-exhaustive, and more factors could affect exercise adherence than were mentioned herein. However, efforts were made to detail the most common factors that affect exercise adherence. There could also be more strategies to improve exercise adherence, which were not covered in this review. While exercise initiation was discussed as a part of the literature, this review only covers some of the literature related to exercise initiation and focuses mainly on exercise maintenance. The literature around exercise adherence often lacks homogeneity in operationalized definitions of constructs such as enjoyment, making it challenging to interpret what is being measured (Kimiecik & Harris, 1996). It should also be noted that certain studies took place during the COVID pandemic, during which time many people reduced their PA (Keller-Varady et al., 2023).

Conflict of Interest Statement

There are no conflicts of interest to note as of writing.

Conclusions

One of the most significant barriers to exercise among depressed and general populations is a lack of time (Gjestvang et al., 2020; Glowacki et al., 2017). Most people report physical fitness as their main reason for exercising (Gjestvang et al., 2019). Exercise tends to be motivated by extrinsic factors at the start and intrinsic factors for those who adhere long term (Teixeira et al., 2012; Ryan & Deci, 2017). A holistic approach to exercise prescription is necessary to maximize the likelihood of adherence (Pollock, 2001; Brinks & Franklin, 2011; Sinnot et al., 2014; Keller-Varady et al., 2023). Exercise variety and modification are essential to prevent boredom and increase the likelihood of enjoyment, which can increase the likelihood of

exercise adherence (Sylvester et al., 2015; Bandara et al., 2023). Habit formation is vital for exercise adherence and can take around six weeks when the individual consistently exercises four times per week (Kaushal & Rhodes, 2015). A pre-workout plan may help build exercise habits and increase adherence (Kaushal et al., 2017).

Hopefully, this review has bridged the gap between the literature on exercise adherence and strategies to increase adherence from various disciplines. More research is needed on interventions for depressed individuals to identify new ways of encouraging exercise adherence. More public messaging is needed to address the importance of regular exercise and counter common misconceptions so that individuals realize it can be fun and enjoyable (Brinks & Franklin, 2011). Exercise has tremendous benefits for depressed and non-depressed individuals, illustrating its potential to improve lives drastically, increase productivity, and reduce the costs associated with inactivity (Ruegsegger & Booth, 2018; Lee, 2023; Schuch et al., 2016; Xie et al., 2021).

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