

# Application and prospect of mindfulness in the field of physical exercise

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**Abstract:** Mindfulness is a specific way to perceive, live in the present and don't judge. In recent decades, mindfulness has become one of the hot issues in research. In the field of exercise psychology, applying its theory and therapy to the field of physical exercise can provide theoretical reference and new ideas for teenagers to relieve psychological pressure. This paper uses the methods of literature review and inductive analysis to study and analyze mindfulness in the field of physical exercise. Although the concept of mindfulness is still controversial, some studies have found that mindfulness practice can promote people's physical and mental health. By combining the research status of mindfulness and physical exercise, this study comprehensively analyzes the mechanism and function of mindfulness in physical exercise and healthy behavior, and puts forward some suggestions for future research and practice on the basis of existing research.

**Keywords:** Mindfulness; Physical exercise; Application and prospect

## 1. Introduction

In recent years, the topic of mindfulness has become more and more "hot" in China, which is defined as "focusing on the present in a purposeful and non-judgmental way". Mindfulness, as a new psychotherapy method, has been widely used in various social fields. After decades of development, foreign research on mindfulness has extended to the field of physical exercise, and many scholars have conducted research on mindfulness promoting physical and mental health, which provides useful insights for promoting adaptive exercise behavior and enhancing exercise experience from the quality of exercise experience and the regulation of exercise behavior [1].

By searching the related literature of mindfulness, domestic related research first appeared in the late 1990s, and since 2010, it has shown an exponential growth trend. Mindfulness has been paid more and more attention in many disciplines in China, but it is mainly used in the field of clinical psychology. In the field of competitive sports, the existing research mainly focuses on athletes' sports performance and mental health, but less on physical exercise. This study summarized the concept of mindfulness, introduced the theoretical model of mindfulness, and expounded the research status and future research direction of mindfulness in the field of sports.

## 2. Overview of Mindfulness

### 2.1. The concept of mindfulness

The word "mindfulness" originated from Buddhism and has a history of more than 2500 years in the field of oriental Buddhism. Mindfulness is one of the Buddha's "eight righteous ways", and it is a kind of doctrine and method (namely meditation) commonly used to alleviate the suffering of practitioners and realize self-awakening. Mindfulness is "Sati" in Pali and has been translated into English "Mindfulness" since the beginning of the 20th century. In the process of introduction and research in the West, the concept of mindfulness gradually diluted its religious color and covered a wider range of meanings, becoming a scientific concept [2]. Duan Wenjie, a Hong Kong scholar, divided the evolution of the concept of mindfulness into three stages: original intention, descriptive definition and operational definition. Mindfulness initially has three meanings: Awareness, Attention and memory [3]. At present, the widely accepted definition is put forward by Kabat-Zinn, that is, "Mindfulness is perceived in a certain way, that is, consciously perceiving, living in the present and not making judgments [4]". Bishop and more than 10 other scholars held a seminar in Toronto, and the two-dimensional operational definition of mindfulness was recognized by more and more scholars. In their view, mindfulness means "shifting attention from the unconscious internal activities to the present

experience, and keeping a curious, open and receptive attitude towards the present experience" [5]. It can be seen that the operational definition is a further deepening of the descriptive definition. By combing the literature about mindfulness at home and abroad, researchers have their own opinions on the definition of mindfulness, but their understanding of its concept pays attention to the current feelings, awareness and non-critical attitude, which is also the key element of mindfulness.

## 2.2. Measurement of Mindfulness

So far, a variety of evaluation tools for measuring mindfulness state and mindfulness effect have been developed by western scholars. Because scholars have different understandings of the concept of mindfulness, there are some differences in the focus and dimensions of the preparation of mindfulness scale: from the perspective of dimension orientation, the existing scales are mainly divided into single-dimensional structure, two-dimensional structure and multi-dimensional structure, among which the multi-dimensional structure of mindfulness scale is mostly four-dimensional scale; From the perspective of content orientation, the existing scales are mainly divided into state orientation, ability orientation, cognitive orientation and trait orientation.(see Table 1)<sup>[6]</sup>

Table 1 Mindfulness measurement tools

survey tools	Dimensions (number of questions)	investigator
Freiburg Mindfulness Inventory	Attention (12); no judgment on oneself and others; attitude (7); openness to negative mental states (7); insight of the process (4)	Buchheld et al.(2001)
Mindfulness Attention Awareness Scale	Mindfulness (15)	Brown&Ryan(2003)
Kentucky Inventory of Mindfulness Skills	Observation (12); description (8); act consciously (10); accept without judgment (9)	Baer et al.(2004)
Five Facet Mindfulness Questionnaire	Observation (8); description (8); conscious action (8); non-judgmental acceptance (8); non-response to experience (7)	Baer,Smith,Hopkins Krietemeyer,&Toney (2006)
Toronto Mindfulness Scale	Curiosity (6); decentralization (7)	Lau et al.(2006)
Experience questionnaire	Decentralization (11)	Fresco et al.(2007)
Cognitive and Affective Mindfulness Scale Revised	Attention (3); current attention (3); awareness (3);acceptance / no judgment (3)	Feldman et al.(2007)
Southampton Mindfulness Questionnaire	Mindfulness (16)	Chadwick et al.(2008)
Philadelphia Mindfulness Scale	Consciousness (10); acceptance (10)	Cardaciotto et al.(2008)
Mindfulness Scale	New sex seeking (6); new sex generation(6); participation (5); flexibility (4)	Haight al.(2011)

The above scales are all from foreign countries. When domestic scholars measure mindfulness, most scholars use mindfulness awareness scale (MAAS) and five-factor mindfulness scale (FFMQ). In 2003, Brown and Ryan compiled the MAAS scale. The difference in frequency is mainly used to evaluate the emergence of individual trait mindfulness or state mindfulness, so as to pay attention to whether there is attention and awareness in current events. The scale is a one-dimensional measurement table, which contains 15 items. Due to the late start of mindfulness research in China, at present, there is only one empirical study on the five-factor mindfulness scale and reliability and validity test in China. Therefore, future research needs to develop China's localized mindfulness measurement tools, and at the same time, consider the measurement method combining subjective and objective.

## 3.The theoretical basis of mindfulness

### 3.1. Mindfulness Re-perception Model

The hypothesis of mindfulness "re-perception" processing mechanism is based on the model of three elements of mindfulness (intention, attention and attitude) [7]. They found that mindfulness

promoted the change of individual's habitual sexy perception through intentional attention and open and non-judgmental cognitive processing, which was called "re-perception". Re-perception promotes the positive changes in human inner world through four direct mechanisms: self-regulation, value clarification, flexibility and exposure of cognitive emotional behavior, which can be facilitated and promoted through mindfulness. Shapiro and others believe that re-perception is an important "meta-mechanism" in which mindfulness plays an active role, and it promotes a fundamental change in self-perception from "egocentrism" to "self-observation" [8].

### ***3.2. Mindfulness coping model***

Park's clinical research shows that mindfulness plays a central role in positive cognitive reappraisal. On this basis, the researchers put forward the causal model of mindfulness in the process of positive reappraisal-"Mindfulness coping model", which points out that when evaluating the threat, damage or injury degree of a specific event when an individual is beyond his ability, he makes a decentralized adaptive response to stress assessment in a mindfulness way. Individuals evaluate stress events by expanding metacognition and positive cognition, reconstruct or redefine stress events, and finally produce positive emotions, thus alleviating stress [9].

### ***3.3. Mindfulness Emotion Regulation Model***

The model was put forward by Chambers and others, and researchers are carrying out research on mindfulness and emotion. The research shows that the emotional experience of people who are stimulated by the outside world does not need to be suppressed, re-evaluated or changed, that is, they do not need consciousness to deal with emotional experience [10]. They process their own Awareness and Nonreactivity through systematic training. In this model, researchers emphasize that individuals need to focus on their own attention and consciousness when training mindfulness meditation, rather than perceiving psychological goals. In the process of paying attention to awareness, individuals can consciously choose and identify thoughts, emotions and feelings [11], thus gradually eliminating negative emotions and establishing an automatic evaluation process.

### ***3.4. Monitoring and Acceptance Theory***

Monitor and acceptance theory, MAT) is a new theory of mindfulness. On the basis of previous theoretical and practical research, MAT systematically constructed the definitions of mindfulness attention and acceptance, and initially explained the specific psychological processes involved in the two key components of mindfulness [12]. Monitoring and acceptance are the basic components of mindfulness and its intervention, and under the mutual synergy of these two components, negative emotions can be alleviated together. MAT emphasizes the synergy of mindfulness monitoring and acceptance to alleviate negative emotions and the key role of acceptance in it.

## **4. Research on the application of mindfulness in many fields**

Studies in the past 30 years have shown that mindfulness practice is helpful to physical and mental health. Mindfulness research started late in China, and its attention has been increasing in recent years. It is widely used in many fields, such as mental psychology, physical diseases, education and teaching, sports and so on, with fruitful results.

### ***4.1. Research on the application of mindfulness in the field of mental psychology***

Zhang Runqin believes that mindfulness therapy can significantly improve the bad symptoms of patients with mild and moderate anxiety and depression [13]; Anxiety is generally manifested as extreme nervousness and fear of some unexpected unfavorable situation in the future. Effective intervention on anxiety and depression plays a vital role in people's physical and mental health. At present, the commonly used drugs in clinical treatment can not effectively alleviate the anxiety and depression symptoms of most patients. Mindfulness therapy, as a psychological technique for treating anxiety and depression, has been universally studied and discussed. The combination of medicine and mindfulness therapy can better control the anxiety symptoms of female anxiety disorder [14].

### ***4.2. Research on the application of mindfulness in the field of physical diseases***

Mindfulness therapy is widely used in patients with cardiovascular diseases, including hypertension,

heart failure and coronary heart disease, which can significantly improve patients' depression and anxiety [15]; Meta-analysis was used to study cancer patients, and it was found that MBSR can reduce the anxiety and depression level of cancer patients [16]; A study on patients with chronic gastritis found that compared with the control group, the symptoms of anxiety and depression in MBSR group were significantly improved [17].

#### **4.3. Research on the Application of Mindfulness in Education and Teaching**

Xu et al. conducted an experiment on 91 college students and found that mindfulness can effectively improve attention and reduce the incidence of mental wandering [18]. The researchers carried out mindfulness training for college students for four weeks, while the control group received relaxation training. The research shows that mindfulness can significantly improve working memory [19]. Chen Cuicui and others conducted an experimental intervention on 28 students with learning difficulties for 8 weeks, and evaluated the intervention effect by using attention test and academic emotion scale. The results showed that mindfulness training could significantly improve the attention stability and transfer ability of students with learning difficulties [20].

To sum up, mindfulness, as a psychotherapy, plays a positive role in improving the psychological state and quality of life of cancer patients, helping them to accept themselves better, paying more attention to self-experience and enhancing their ability to resist frustration. Mindfulness training can improve working memory, and its application has been verified to some extent. However, due to the different definitions and methods of mindfulness training, the mechanism of mindfulness training affecting memory is still unclear [21]. Compared with foreign countries, domestic related research and practice is still in its infancy, so more and more scholars need to pay attention to mindfulness and conduct multi-level, multi-faceted and multi-dimensional research.

### **5. Research on the application of mindfulness in sports**

At present, psychological training based on mindfulness has been developed for about 30 years, and remarkable achievements have been made in many fields. Mindfulness is not only used in clinic and education, but also in the field of sports. The application of different mindfulness training methods in the field of competitive sports should be combined with the characteristics of sports events, and mindfulness training should be integrated into the field of sports according to the physical and mental characteristics of sports events and teenagers, which can continuously improve the physical quality of teenagers and enhance their psychological self-control and ability. However, there are few empirical studies on the combination of mindfulness and physical exercise. The following will sort out the research status of mindfulness in the sports field.

#### **5.1. Research on the Application of Mindfulness in Competitive Sports**

Mindfulness is a kind of personality psychology, which pays attention to and produces awareness of current experiences and ideas in a non-reactive, non-judgmental and broad-minded way [22]. Mindfulness includes trait mindfulness and state mindfulness. Trait mindfulness is a long-term change in cognition, feeling and self-awareness, and it is a personality characteristic in pan-scenario [23]; State mindfulness refers to a state of consciousness in a specific situation, which is a temporary change in cognition, feeling and self-awareness after mindfulness practice [24]. Some studies have applied mindfulness to work situations and teaching situations, forming working mindfulness [25] and teaching mindfulness [26] respectively. Some researchers have studied the application of mindfulness in the field of physical exercise, and formed the exercise mindfulness [27].

With the continuous development of competitive sports in China, the research of mindfulness training in the field of sports has made great achievements. Kabat-Zinn applied mindfulness to rowers for the first time [28]; Mindfulness can predict the free throw percentage of college basketball players, and at the same time, free throw skills and competition experience can also predict the performance of athletes [29]. Zhang Hui made an experimental analysis of college students' swimmers, and found that the mindfulness experimental group was obviously superior to the control group in eliminating physical and psychological fatigue, improving mood, and improving the athletes' final performance. The effect of eliminating psychological fatigue and improving mood is obviously better than that of the control group, and it also improves the final competitive level of athletes [30]. In the past, researchers conducted intervention research on the mindfulness training of Sanda athletes, and found that the awareness, perception and performance of Sanda athletes have been improved [30].

## 5.2. Research on the Application of Mindfulness in Physical Exercise

The recovery therapy based on mindfulness can improve the motivation of physical exercise and improve the unhealthy lifestyle through cognitive control from top to bottom. Roberts thinks that college students' trait mindfulness is significantly related to physical exercise fun and daily exercise level, and positively predicts daily physical exercise behavior [31]. Schizophrenia patients can effectively improve their quality of life by integrating mindfulness into yoga exercise, thus increasing their persistence in yoga exercise [32]. Xu Wei thinks that trait mindfulness may be an antecedent variable, an intermediary variable and a result variable of physical exercise, and it is a multidimensional psychological factor. Through the empirical research on the level of physical exercise and mindfulness among college students, the research shows that college students' physical exercise has a significant impact on trait mindfulness [33]. The state mindfulness of physical exercise can not only indirectly improve the level of independent motivation of physical exercise through the satisfaction of basic psychological needs, but also directly improve the independent motivation of physical exercise. This is the same as Hagger and others' research results, that is, higher trait mindfulness is related to physical exercise willingness, thus promoting more active physical exercise behavior [34].

To sum up, mindfulness practice can improve athletes' skills and performance. Scholars have done a lot of research in the field of competitive sports, but it is rare in the field of physical exercise. It is very feasible to take mindfulness training as a means to improve physical exercise, which can effectively improve the level of mindfulness and positive emotions of exercisers and reduce their negative emotions. Mindfulness training does not have so much capital investment, and the teaching form is relatively simple, which is easy to carry out in the process of physical exercise and can achieve certain results. However, there is no relevant measure to integrate mindfulness training into physical exercise in China, and I hope the follow-up research can be further explored. How to integrate mindfulness into physical exercise and give full play to the beneficial influence of mindfulness on people needs more researchers and physical education workers to invest in this research.

## 6. Conclusions and Outlook

Physical exercise is widely regarded as a preventive factor, which can help people improve their mental health, quality of life and overall happiness feeling. A great deal of evidence supports taking physical exercise as a kind of "medicine" because it can prevent and treat various diseases. Combining physical exercise with mindfulness exercise, based on meditation, gentle movements and breathing skills focused on physical and mental exercises, can improve self-awareness and relax mental state. In exercise psychology, the research on mindfulness and physical exercise is relatively new, and there are relatively few published documents. In terms of mental health, the promotion effect of physical exercise has been confirmed by a large number of studies, but the research on physical exercise mechanism is still very weak.

From the foreign research, mindfulness plays an active role in promoting physical exercise, but the related research needs to be further explored. First of all, because the existing research is generally based on horizontal research, future research can examine the mechanism of mindfulness through vertical research, and then clarify the causal relationship or interaction between variables. Second, although there is a symbiotic relationship between mindfulness and physical exercise, the direction of this relationship is still unclear. In the future, experimental research is needed to test the relationship mechanism between mindfulness and physical exercise, and to explore the potential mechanism of mindfulness exercise, and how they can promote healthy physical exercise behavior and inhibit unhealthy or dangerous behavior. Thirdly, the research and practice in the field of physical exercise should take into account the health benefits and reciprocity of mindfulness practice and physical exercise behavior, and integrate mindfulness training into daily physical training and daily training of skills and tactics, so as to continuously improve teenagers' psychological adjustment ability and psychological self-control ability, make them devote themselves to exercise, and actively respond to difficulties and challenges in the field of sports, thus maintaining their mental health. Finally, future research should evaluate physical exercise through objective measurement (such as accelerometer or pedometer) and compare different types of exercise, so as to determine the real influence of mindfulness on physical exercise.

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