

Experimental Study on the Intervention of Skiing on the Mental Health of Teenagers

Wenping Lu

Physical Education Department, Northeast Normal University, Changchun, Jilin, 130024, China

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Abstract: This study aims to explore the intervention effect of skiing on the mental health of adolescents. Based on theories such as self-efficacy and positive psychology, this research expounds the mechanism by which skiing regulates psychological states through physiological activation, attention diversion, and the acquisition of a sense of achievement. The study adopted a randomized controlled trial design to implement an 8-week structured skiing course intervention on adolescents with mild emotional distress, and evaluated them using a combination of standardized psychological scales and qualitative interviews. The results showed that compared with the control group, the anxiety and depression levels of the teenagers in the experimental group significantly decreased, their self-efficacy and psychological resilience significantly improved, and the intervention effect had a certain degree of sustainability. Research shows that skiing is an effective way to promote the mental health of teenagers. It is suggested that it be included in the optional scope of school sports and community activities to provide diversified paths for the intervention of teenagers' mental health.

1. Introduction

Adolescence is a critical period when psychological problems are prone to occur, with phenomena such as anxiety, depression and confusion about self-identity becoming increasingly prominent. Traditional methods of mental health education face the challenge of insufficient effectiveness in some aspects. Therefore, it is particularly important to explore experiential and physical activity-based intervention approaches. Skiing, as a sports activity that integrates the natural environment, physical challenges and skill learning, has unique potential in promoting mental health. It requires participants to fully immerse themselves in the present moment, which helps to prevent the rumination of negative thoughts. Its step-by-step process of skill acquisition can continuously provide a sense of achievement and is an ideal situation for building self-efficacy. At the same time, in the face of cold environments and speed challenges, an individual's psychological resilience in coping with pressure is also exercised. This study aims to systematically examine the practical effects of structured skiing courses on alleviating emotional distress and enhancing positive psychological qualities among adolescents through empirical methods, and to provide theoretical basis and scheme references for related practices.

2. The Theoretical Basis of Skiing for the Mental Health of Teenagers

2.1. The psychological regulatory effect of skiing

Skiing, as a comprehensive sports activity that combines the natural environment, physical challenges and skill acquisition, has a multi-dimensional and profound regulatory effect on the mental health of teenagers. This regulation is first reflected at the physiological level. When teenagers glide at high speed on the ski slopes, their bodies release neurotransmitters such as adrenaline and endorphins. The secretion of these substances not only generates a natural sense of pleasure but also effectively alleviates anxiety and stress, laying a physiological foundation for mental health. More importantly, skiing requires participants to focus all their attention on the current body movements, terrain changes and speed control. This state of total concentration can help teenagers free themselves from the daily study pressure and negative rumination thoughts, and enter what psychology calls a "flow" state. In this state, the sense of time vanishes and self-awareness weakens. Instead, there is a high degree of concentration and inner peace, which has an immediate effect on alleviating the psychological pressure of teenagers.

The promoting effect of skiing on mental health is also reflected in the reconstruction of self-perception. From the initial staggering steps to the final smooth gliding, this learning process provides teenagers with a continuous sense of achievement. The mastery of every new skill, whether it is successful braking or smooth turning, is an affirmation of one's own ability. This kind of successful experience gained through personal practice is the most effective way to build self-efficacy. As teenagers' skiing skills improve, their self-evaluation will also increase. This positive self-awareness will gradually spread to other areas of study and life, forming a virtuous psychological cycle. At the same time, skiing is essentially an activity that constantly faces challenges. When facing steep slopes and speeds, teenagers must learn to assess risks, manage their fears and make appropriate decisions. This process itself is an excellent psychological resilience training. Through repeated practice, they can learn how to remain calm in high-pressure situations, and this ability has significant transfer value in dealing with various pressures in daily life.

On the social level, skiing offers a unique interactive platform for teenagers. Whether it is group courses or gliding together, the naturally formed atmosphere of mutual assistance and encouragement among participants can effectively meet the social belonging needs of teenagers. When they guide each other during practice, share experiences, or encourage one another when challenging difficult ski runs, this positive social interaction not only reduces feelings of loneliness but also helps them build healthier interpersonal relationship patterns. It is particularly worth noting that social interaction in skiing relies more on non-verbal tacit understanding and support, which is especially beneficial for teenagers who are not good at expressing themselves verbally. In conclusion, skiing forms a complete psychological regulation system through multiple pathways such as physiological activation, attention diversion, self-affirmation, resilience cultivation, and social interaction. It can promote the mental health development of teenagers from multiple dimensions, enabling them to enjoy the fun of sports while achieving comprehensive psychological growth.

2.2. Characteristics of Mental Health Problems among Teenagers

The mental health problems of contemporary teenagers are characterized by dynamic development and multi-dimensional interweaving. Their manifestations have transcended the single emotional distress and formed a complex ecosystem. In terms of emotional expression, continuous academic competition, family expectations and peer comparisons constitute the main sources of stress, leading to the widespread and younger trend of anxiety and depression. It is worth noting that

these emotional disturbances often manifest through somatization symptoms such as irritability, inattention, and sleep disorders, rather than direct emotional expressions, making it more difficult to identify the problems in a timely manner. At the behavioral level, it is prominently manifested in two extremes: some teenagers fall into evasive behaviors in the online world, showing withdrawal from real social interactions and fragmentation of attention; Another part may show difficulty in impulse control, such as unplanned risky behaviors. These two behavioral patterns jointly point to the insufficient development of self-regulation ability. At the level of self-awareness, teenagers are in a critical period of building self-identity. They are extremely sensitive to external evaluations but lack a stable self-worth assessment system, which leads to their fragile and changeable self-image and makes them prone to comprehensive self-denial due to setbacks. In terms of interpersonal relationships, they long for recognition from their peer groups, but due to their lack of empathy and communication skills, they often fall into the predicament of relationship tension or social avoidance. This contradiction between the desire for connection and social confusion intensifies their experience of loneliness. These interrelated psychological characteristics constitute the core difficulty of current intervention work, highlighting the limitations of the traditional mental health education model that mainly relies on verbal guidance. For this reason, physical activities like skiing, which can simultaneously offer physical challenges, sensory stimulation, achievement experiences and team support, can precisely bypass the psychological defenses of teenagers and start from their behavioral patterns and physiological states, opening up new paths for psychological intervention.

2.3. Relevant theoretical support mechanisms

The mental health benefits of skiing can be solidly supported by multiple classic psychological theories. First is Bandura's theory of self-efficacy, which holds that an individual's confidence in their ability to complete a certain task is of vital importance. Skiing offers a clear and step-by-step path for skill improvement. Through hands-on practice, teenagers can directly observe their progress from being unable to stand to gliding smoothly, thereby continuously gaining mastery experience. This is the most effective way to build a strong sense of self-efficacy. Secondly, there is the theory of positive psychology, which focuses on people's positive qualities and positive experiences. Skiing can directly bring about positive emotions such as joy, a sense of achievement and flow experience, effectively expanding the psychological resources of teenagers and building a lasting psychological capital. This is in line with the aim of positive psychology to enhance happiness. Another theory is the stress coping theory, which divides coping styles into problem-focusing and emotion-focusing. In skiing, teenagers need to confront the "challenging pressure" brought by the physical environment and solve problems by adjusting their technical movements, which exercises their ability to focus on problem-solving. At the same time, the cathartic effect and attention-diverting function of exercise itself are also a healthy emotional focus coping strategy. In addition, social support theory also explains the benefits of group skiing. The experience of jointly challenging difficulties in a safe environment can quickly build a deep network of peer support. These theories together constitute the deep logic of skiing's intervention in the mental health of teenagers.

3. Implementation and Evaluation of Ski Sports Intervention

3.1. Design of intervention subjects and samples

To ensure the reliability and validity of the research, the screening of intervention subjects should follow the principle of scientific rigor. This study can adopt a randomized controlled trial

design to recruit volunteers from the second grade of junior high school in an ordinary middle school in a certain city. The screening criteria should be clear: The age and gender ratios of the teenagers in the experimental group and the control group should be basically matched. Pre-tests were conducted through the "Adolescent Anxiety Scale" and the "Self-Rating Depression Scale", with priority given to individuals who had mild to moderate emotional distress (i.e., scale scores within the critical or abnormal range), but no major physical illnesses, and no skiing experience. The determination of sample size should be based on statistical test power analysis to ensure the representativeness of the results^[1]. All selected participants and their guardians are required to sign an informed consent form and be informed that they can withdraw from the study at any time. The control group maintained their regular learning and living conditions during the experiment, did not receive any form of skiing intervention, and only participated in the same psychological assessment before and after the study, which served as the baseline control. This design can control irrelevant variables to the greatest extent, thereby attributing the observed changes in psychological indicators more reliably to the skiing intervention itself.

3.2. Contents of the skiing exercise plan

The core of this intervention program is to design a set of structured, standardized skiing courses that are both safe and interesting. The entire plan takes promoting positive psychological changes as the implicit main thread and skill mastery as the explicit carrier. The course period is set at 8 weeks, with one concentrated activity held each week, each lasting 3 hours, to ensure the continuity of the intervention and adequate dosage. The location is strictly selected in a professional ski resort with a complete safety management system, with the beginner ski runs as the main activity area and the intermediate ski runs as the platform for later challenges.

The specific implementation of the plan is divided into three organically connected stages. The first stage is the adaptation and basic skills period (Weeks 1-2), with the core objective of establishing a sense of security and initial control. The activity starts with getting familiar with the ice and snow environment and equipment, focusing on teaching how to fall and stand up correctly. This design aims to implant the positive belief that "failure is safe and reversible" at the behavioral level. The practice of basic techniques such as plow braking enables teenagers to experience for the first time that they can effectively control speed and direction through their own movements, bringing them the most basic sense of self-efficacy. The second stage is the period of skill enhancement and confidence building (Weeks 3 to 6), which is a crucial stage for the accumulation of psychological capital. At this stage, the system teaches plow turns and speed control, guiding teenagers to practice alternately on gentle slopes and slightly steep slopes. This kind of controlled and challenging exposure can effectively exercise their risk assessment ability and emotional regulation ability. The coach will encourage participants to actively choose ski runs slightly above their comfort zone for a try under full protection. Each successful challenge becomes a solid foundation for the growth of their self-confidence. At the same time, the introduction of group collaboration games, such as high-fiving while sliding or completing simple formations, not only enhanced skill proficiency but also strengthened the bonds of the social support network. The third stage is the consolidation and autonomous sliding period (Weeks 7-8), focusing on the elevation and transfer of achievement experiences. At this stage, participants are guided to smoothly connect individual turns and experience the joy and sense of achievement of gliding freely on the intermediate slopes. The purpose of small-scale fun competitions or team exploration tasks organized by organizations, such as "Treasure Hunt Sliding" or team timed relay races, is not to compete for rankings. Instead, it is to create a situation where individual skills serve collective goals, allowing teenagers to feel a sense of belonging and value through cooperation and celebration^[2].

Safety assurance and psychological support run through the entire process. In addition to professional skiing instructors ensuring the standardization of technical movements and personal safety, the psychological counselors equipped in the team play a crucial role. They do not engage in traditional psychotherapy but act as perceptive observers and active guides. Their work includes: helping members express and share their fears and joys during sliding through group-guided discussions during breaks in activities; They promptly identify and individually encourage members who hesitate when facing challenges; they also capture and magnify every tiny progress, transforming it into positive self-evaluation. The entire plan, through this "physical and mental" synchronous advancement model, ensures that skiing is not only a learning of physical skills but also a profound experience of psychological growth.

3.3. Data collection and analysis methods

The research adopts a combination of quantitative and qualitative methods for a comprehensive assessment. Quantitative data collection includes three time points: within one week before the intervention (T1), within one week after the intervention (T2), and three months after the intervention (T3, for tracking long-term effects). The measurement tools selected are standardized psychological scales with good reliability and validity, mainly including: the Self-Rating Anxiety Scale (SAS) and the Center for Epidemiological Investigation Depression Scale (CES-D) for evaluating core emotional indicators. The General Self-Efficacy Scale (GSES) is used to measure changes in self-confidence. The Connor-Davidson Resilience Scale (CD-RISC) is used to assess the ability to cope with adversity. All data were processed using SPSS statistical software after being entered into the computer^[3]. The analytical methods include: presenting sample characteristics using descriptive statistics; The paired sample t-test was used to compare the intra-group and inter-group differences in the scores of each scale between the experimental group and the control group at time points T1, T2, and T3. When necessary, repeated measures analysis of variance was used to investigate the interaction effect between time and grouping^[4]. In addition, after each activity, short semi-structured interviews are conducted with the participants, and their activity diaries are collected. Content analysis is carried out on these qualitative data to obtain in-depth information about individual experiences, gains and challenges, serving as a powerful supplement to the quantitative results.

4. Research Results and Implications

4.1. Data analysis of intervention effects

Statistical analysis of quantitative data shows that the intervention of skiing sports has produced significant effects. The independent sample t-test indicated that before the intervention (T1), there were no significant differences in the scores of all psychological scales between the experimental group and the control group, ensuring homogeneity between the groups. After 8 weeks of intervention (T2), the results of the paired sample t-test showed that the scores of the experimental group on the anxiety and depression scales were significantly lower than those before the intervention, and the decrease was significantly greater than that of the control group in the same period. At the same time, their scores on the self-efficacy and psychological resilience scales showed a significant increase. The follow-up test (T3) data further indicated that although the various indicators of the experimental group fluctuated slightly compared with the immediate posttest (T2), their levels of anxiety and depression were still significantly lower than the baseline before the intervention, while self-efficacy and psychological resilience remained at a relatively stable and high level. There was no such trend in the control group. Repeated measures analysis of

variance revealed a significant interaction between the "time" and "grouping" variables on the primary dependent variable, which strongly demonstrated that the improvement of psychological indicators was indeed attributed to the skiing intervention. The analysis of qualitative interview data distilled several key themes: such as "Feeling long-lost freedom and relaxation", "discovering that I am braver than imagined", "Feeling a great sense of achievement in overcoming difficulties together with teammates", etc. These subjective reports and quantitative data mutually corroborated each other, jointly outlining the positive effects of the intervention.

4.2. Discussion and Interpretation of Results

The results of this study confirm that an 8-week structured skiing program can effectively alleviate anxiety and depression in adolescents and enhance their sense of self-efficacy and psychological resilience. This achievement can be explained from multiple perspectives. Firstly, the "flow" experience and physiological activation provided by skiing directly counteract the core symptoms of anxiety and depression - rumination and low mood^[5]. Secondly, the step-by-step process of mastering skiing skills provides the most intuitive and powerful evidence for the enhancement of self-efficacy. This belief of "I can do it" will generalize from the field of skiing to other aspects of study and life. Furthermore, the experience of constantly challenging one's own limits in a cold environment greatly refines the willpower and psychological endurance of teenagers, which is precisely the key to the formation of psychological resilience. It is worth noting that group activities not only offer social support but also create a "peer demonstration" effect. When seeing peers of similar level succeed, it greatly motivates individuals to make more efforts. Furthermore, an interesting finding of this study is that the improvement of psychological resilience maintained good stability in the follow-up test, suggesting that the psychological qualities cultivated through sports may have a more lasting effect. Of course, this study also has limitations, such as a relatively single sample source. Future research can expand the sample range and add control groups for different sports to further verify the unique contribution of skiing.

4.3. Suggestions for Practical Application

Based on the beneficial findings of this study, we put forward the following practical application suggestions. First, at the educational level, it is suggested that schools and education departments incorporate seasonal outdoor sports such as skiing into the optional scope of youth physical education and extracurricular activities. They can also establish cooperative relationships with nearby ski resorts, organize winter study Tours or special sports courses, and provide more teenagers with the opportunity to get in touch with and benefit from this sport. Secondly, at the community and family levels, communities can organize winter youth skiing training camps, and parents should also encourage and support their children to participate in outdoor ice and snow activities in winter, regarding it as an effective way to relieve academic pressure and promote all-round physical and mental development. Thirdly, in terms of specific implementation, the principle of "safety first, fun foremost" should always be adhered to. Any intervention plan must be equipped with a sufficient number of professional coaches and safety officers to ensure that the equipment is qualified and the venue is safe. The design of activities should downplay competitiveness, highlighting challenge, exploration and collaboration, and avoid introducing new pressure due to excessive emphasis on technical assessment. For teenagers who initially show signs of fear, more patience and personalized guidance should be given, with the focus on guiding them to experience the process rather than pursue the outcome. In the future, it is possible to explore the integration of skiing with mindfulness training, group psychological counseling and other elements to develop more comprehensive mental health promotion programs.

5. Conclusions

This study confirmed through empirical analysis that an 8-week standardized skiing exercise intervention can effectively improve the mental health status of adolescents. Specifically, after the intervention, the anxiety and depression of the members in the experimental group were significantly relieved, and at the same time, their self-confidence and psychological resilience when facing challenges were significantly enhanced. This result verifies that skiing exerts a psychological promoting effect through multiple mechanisms, such as providing "flow" experiences, promoting the generation of positive emotions, and strengthening self-belief through mastery experiences. Therefore, taking skiing as a beneficial supplementary intervention measure has significant practical value. It is suggested that the education department work in collaboration with families and communities to incorporate such ice and snow activities into the winter physical exercise and quality expansion system for teenagers under the premise of ensuring safety, thus opening up a new path for their mental health development that combines education with entertainment and promotes both physical and mental well-being. Future research can further explore the effects of different doses and forms of skiing activities, and pay attention to their targeted intervention effects on specific psychological problems.

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