

A Review of Research on the Impact of Physical Exercise on Mobile Phone Addiction Among Junior High School Students

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ABSTRACT

This paper systematically reviews the current research on the relationship between physical exercise and mobile phone addiction among junior high school students, delves into the underlying mechanisms of influence, and summarises effective intervention strategies utilising physical exercise. It provides theoretical foundations and practical references for preventing and alleviating mobile phone addiction among this demographic. Method—A literature review approach was employed to retrieve, organise, and analyse relevant domestic and international studies.

KEYWORDS

Physical exercise; Mobile phone addiction; Influence mechanisms; Intervention studies

1 Introduction

With societal development and technological advancement, mobile phone addiction among junior high school students has garnered increasing attention. In recent years, issues such as internet addiction and mobile phone addiction have become increasingly prominent within this demographic, severely impacting their physical and mental health as well as their overall development. Mobile phone addiction denotes a behavioural dependency arising from excessive smartphone usage coupled with an inability to control such behaviour, resulting in impaired social functioning and associated psychological and behavioural issues. Research indicates that mobile phone dependency amplifies negative consequences such as academic decline, learning fatigue, and sleep deprivation ^[1-2]. Consequently, mobile phone addiction among secondary school pupils has become an urgent societal issue requiring resolution. The secondary school years represent a critical period for adolescents' physical and psychological development, characterised by heightened sensitivity to their environment. External influences during this phase may profoundly shape lifelong behavioural patterns, health outcomes, and career trajectories ^[3]. Existing research indicates that physical exercise effectively prevents the onset of mobile phone addiction. Exercise independently influences psychological factors such as psychological resilience and self-control, which regulate addictive behaviour. Notably, under the influence of exercise, self-control exerts a more significant effect on mobile phone addiction than psychological resilience ^[4]. Further research indicates that higher levels of exercise persistence correlate with lower mobile phone addiction tendencies; similarly, greater self-control is associated with reduced addiction propensity. Self-control mediates the relationship between exercise persistence and mobile phone addiction tendencies ^[5]. Thus, time appears to exert a certain degree of influence on mobile phone addiction. This paper will discuss and summarise the association between physical exercise and mobile phone dependency, its influencing mechanisms, and practical applications.

2 Theoretical foundations and association analysis of physical exercise and mobile phone addiction

2.1 Negative influence mechanism of physical exercise on mobile phone addiction

Physical exercise exerts a significant negative influence on mobile phone addiction. Numerous studies indicate that mobile phone addiction is closely associated with factors such as lack of exercise, sedentary behaviour, weight issues, poor time management, and insufficient self-control. However, physical exercise has been proven to be one of the effective means of intervening in mobile phone addiction among junior high school students. Those who actively participate in physical exercise tend to exhibit fewer problems with mobile phone addiction.

Physical exercise constitutes a form of regular physical activity that requires long-term commitment and voluntary participation. Firstly, physical exercise demands substantial time commitment, occupying significant leisure hours and requiring sustained, long-term dedication. This cultivates habitual engagement with exercise, effectively reducing dependence on mobile phones. Secondly, during physical activity, the cerebral cortex enters an excited state. This helps redirect the attention of mobile-addicted secondary school students away from their phones towards other pursuits,

effectively alleviating mobile phone addiction.

Engaging in physical exercise also brings mental and physical well-being to secondary school pupils. Scientific research indicates that moderate physical activity stimulates the pituitary gland to release endorphins. These substances compete with addictive substances in the brain's central nervous system for receptors, inducing feelings of excitement and pleasure, thereby effectively alleviating mobile phone addiction among secondary school pupils. Furthermore, physical exercise cultivates self-control in secondary school pupils. Research indicates a strong correlation between the persistence of physical activity and self-control abilities. Exercise can be viewed as a form of self-control training; consistent participation strengthens pupils' self-restraint, thereby reducing mobile phone dependency.

Further research indicates that participation in physical exercise enhances secondary school pupils' social skills, thereby alleviating social anxiety. Social anxiety is a significant contributing factor to mobile phone addiction among secondary school pupils. Some pupils, experiencing social anxiety, avoid social activities and instead become engrossed in mobile gaming, ultimately developing addiction.

2.2 Operational definition of mobile phone addiction

Scholars internationally have defined mobile phone addiction from various perspectives. This study adopts the definition proposed by Liu Qinxue et al. in *Smartphone Addiction: Concepts, Measurement, and Influencing Factors*, which defines mobile phone addiction as: "a behavioural addiction where an individual's excessive and uncontrollable use of smartphones leads to impaired social functioning and psychological and behavioural problems" ^[6].

Beyond this, other scholars offer differing perspectives on "mobile phone addiction". For instance, Xiong Jie et al. (2012) proposed that mobile phone addiction denotes inappropriate mobile phone usage resulting in psychological and physiological discomfort symptoms ^[7]. Cui Guanghui et al. defined the concept of mobile phone addiction as excessive mobile phone usage causing discomfort in both physiological and psychological aspects, while simultaneously exerting a series of impacts on an individual's social functioning and physical and mental health development. Domestic research on mobile phone addiction first emerged in 2005, with Han Dengliang and Qi Zhifei positing that mobile phone addiction constitutes a symptom of somatisation and psychological discomfort arising from mobile phone users' misuse of the device during usage ^[6].

As early as 1996, Professor Mark Griffiths of Nottingham Trent University first proposed a definition of mobile phone addiction. Given Griffiths' research focus on "behavioural addiction" and his prolific output—averaging one paper every two days—his academic contributions have guided research directions for countless international scholars. Subsequently, international scholars widely recognised mobile phone addiction as an addictive behaviour analogous to "internet addiction" and "gaming addiction". Symptoms exhibited by mobile phone addicts manifest in four distinct characteristics: individuals experience withdrawal reactions; tolerance to mobile phone usage duration and frequency increases; excessive mobile phone use occurs; and impaired physiological functioning and social functioning are observed ^[7].

Park et al. (2011) characterised mobile phone addiction as a compulsive usage behaviour, manifested by the need to keep the device constantly nearby and engage in frequent use across diverse settings. Shin et al. (2013) proposed the concept of "problematic mobile phone use", positing that excessive mobile phone usage escalating to impulsive use leads to disregard for others' circumstances and anxiety when unable to access the device. This overdependence may have negative consequences for both the individual and others ^[8]. Horwood and Anglim (2019) employed the term "problematic mobile phone use" to denote mobile phone addiction, referring to high-frequency, inappropriate mobile phone usage that adversely affects physical and mental development, emotional states, and social capabilities. Some scholars have also proposed the term "mobile phone dependency," describing excessive mobile phone use without regard to time or place, thereby creating a dependency on the device ^[9].

In summary, while researchers internationally have yet to establish a unified definition of mobile phone addiction, there is consensus that it encompasses inappropriate mobile phone usage, demonstrates dependency on the device, and produces detrimental effects on one's physiological and psychological well-being.

2.3 Definition of physical exercise

The concept of physical exercise cited herein is derived from Ji Liu (2006), who defines it as a regular, planned, and repeatable form of activity related to cardiorespiratory fitness, body composition, muscular strength, endurance capacity, and flexibility. Furthermore, physical exercise is defined as planned, organised physical activity aimed at enhancing physical fitness, improving health levels, ameliorating psychological states, or cultivating motor skills. Its core lies in promoting the comprehensive development of an individual's physiological, psychological, and social functions through regular, structured physical load stimulation. Lu Yuanzhen (2002) defines physical exercise as various physical activities undertaken by individuals to improve mental state, enhance athletic ability, strengthen physical fitness, and promote physical and mental health. The Dictionary of Physical Education also explicitly states that physical exercise is a form of

physical activity aimed at fitness training, therapeutic purposes, and recreational leisure.

2.4 Research on the negative correlation between physical exercise and mobile phone addiction

Multiple empirical studies indicate a significant negative correlation between the frequency, duration, and intensity of physical exercise participation and levels of mobile phone addiction. Research reveals that secondary school pupils engaging in physical exercise more than three times weekly exhibit significantly lower mobile phone addiction scores than their non-exercising or minimally exercising peers.

3 Exploring the mechanisms: how physical exercise reduces mobile phone addiction

3.1 Psychological and social mechanisms

Research indicates that a range of physical activities—such as ball games and running—can significantly reduce mobile phone addiction levels. Lower-intensity activities can alleviate stress and release depressive emotions among secondary school pupils. Rhythmic exercises incorporating music evoke feelings of pleasure and relaxation while diverting attention. Team sports cultivate interpersonal skills; enhanced social abilities substantially lessen reliance on mobile phones, redirecting time and energy from digital immersion towards physical engagement. This allows pupils to experience the enjoyment of sport while escaping the virtual world.

Research further indicates that participation in physical exercise not only directly reduces mobile phone usage time and frequency but also indirectly aids in overcoming phone addiction by strengthening psychological resilience and self-control. Individuals who regularly engage in physical activity demonstrate greater self-discipline, better control over undesirable behaviours, and lower dependence on mobile phones. Through participation in sports, secondary school pupils also experience a notable enhancement in their psychological fortitude. Numerous studies reveal that moderate-intensity physical exercise enables secondary school pupils to overcome challenges and setbacks, thereby tempering their resilience. This constitutes a vital measure for fortifying their psychological fortitude. Individuals possessing robust psychological resilience can better regulate their own behaviour, preventing excessive energy expenditure on mobile phones. Consequently, this reduces usage frequency and lowers the likelihood of developing mobile phone dependency. Secondly, research indicates that mobile phone dependency among adolescents can be predicted through the mediating effect of self-efficacy enhancement and the chain mediating effect of psychological resilience and self-efficacy development. Moderate-intensity physical exercise enables students to overcome greater physiological and psychological barriers, strengthening their willpower and serving as a vital pathway to enhance psychological resilience in secondary school pupils.

3.1 Time substitution mechanism

Physical exercise demands substantial time commitment, directly occupying periods that might otherwise be spent on mobile phones. This reduces opportunities for mobile phone use, behaviourally disrupting the addiction cycle.

3.2 Psychological benefits mechanism

Emotional Regulation: Physical exercise releases endorphins, alleviating negative emotions such as stress, anxiety, and depression—often triggers for mobile phone addiction. Students derive pleasure from exercise, diminishing their reliance on the virtual gratification offered by mobile phones.

Enhanced Self-Control: Regular, sustained physical activity demands overcoming inertia and adhering to schedules, serving as excellent training for self-discipline. Strengthened self-control enables more effective resistance to mobile phone temptations.

Self-Esteem and Social Fulfilment: Particularly in team sports (such as football), students gain a sense of achievement, belonging, and genuine social interaction. This fulfilment reduces the need to seek validation and psychological compensation through mobile networks.

4 Practical application and case analysis of physical exercise interventions for mobile phone addiction

Taking football as a specific example, this team sport necessitates substantial time for coordination among teammates and tactical drills. Junior secondary pupils participating in football require substantial time for practice and training, significantly reducing both the duration and frequency of mobile phone use. Furthermore, the sport necessitates extensive communication and coordination with teammates. Engaging in football enhances pupils' interpersonal skills

and alleviates feelings of loneliness, encouraging greater involvement in physical exercise and social activities. This reduction in loneliness effectively mitigates mobile phone addiction among junior secondary pupils. These aspects collectively exert positive influences on mitigating mobile phone addiction among secondary school pupils. Furthermore, research indicates that physical exercise demonstrates significant efficacy in intervening against adolescent internet addiction, with consistent findings unaffected by publication bias. Studies reveal that moderate-intensity exercise interventions yield superior outcomes when addressing adolescent internet addiction, encompassing activities such as dance, sports games, and outdoor cycling. Research findings indicate that subject variations and differing internet addiction measurement tools do not cause significant bias in study outcomes ^[10]. Further studies reveal that a 12-week table tennis programme had no significant impact on enhancing self-control abilities among Year 2 primary school pupils; specifically, it significantly improved the dimension of self-delayed gratification but showed no significant effect on dimensions of planning, persistence, self-restraint, or self-awareness. Twelve weeks of table tennis instruction significantly enhanced self-control abilities among Year 5 primary pupils. Specifically, it markedly improved perseverance and self-restraint dimensions, while showing no significant effect on delayed gratification, planning, or self-awareness dimensions. Furthermore, several studies indicate: (1) Swimming training significantly mitigates mobile phone addiction among adolescents and partially reduces their feelings of loneliness. (2) Swimming intervention exhibits both immediate and delayed effects, improving mobile phone addiction and loneliness in the short term while demonstrating strong persistence after the intervention concludes ^[11].

5 Conclusions

This study reveals that physical exercise plays a positive role in preventing and intervening in mobile phone addiction among junior high school students, with football—as a team sport—demonstrating particularly pronounced effects. Physical exercise exhibits a negative correlation with mobile phone addiction. It demands substantial time investment while cultivating self-control and enhancing social skills among junior high students, factors that collectively mitigate mobile phone addiction issues. Schools, families, and society should collectively recognise the importance of physical exercise, creating diverse conditions to help secondary school students avoid mobile phone addiction. Examples include establishing school sports competitions, organising after-school sports training, encouraging joint parent-child exercise, and participating in training programmes offered by community sports organisations.

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