

The Role of Physical Activity in Addressing the Mental Health and Sleep Quality of Children and Adolescents: Literature Review



Hardiansyah¹, Sulistiyono²

^{1,2}Departement of Sport Science, Faculty of Sport and Health Science, Yogyakarta State University, Yogyakarta, Indonesia

ABSTRACT: Physical activity is an important thing to do, physical activity has many benefits for the body, especially in dealing with mental health and can improve sleep quality. Using a literature review and analysis of online references on the role of physical activity on the mental health and sleep quality of children and adolescents, the aim of this paper is to gather evidence and reinforce the assertion that activity is so important in addressing mental health and poor sleep quality. The analysis findings showed that physical activity such as judo, cardiorespiratory fitness, ball games and physical exercise. Where this method can significantly benefit mental health as well as improving the quality of good sleep for children and adolescents.

KEYWORD: Physical activity, judo, cardiorespiratory fitness, mental health, sleep quality

I. INTRODUCTION

The link between physical activity (PA) and mental health, especially in children and adolescents, has become a growing focus of attention in recent years (Biddle et al, 2019). In recent years, awareness of rising mental health issues among young people has been increasing. This is especially important given how essential these issues are in ensuring a healthy transition as they enter the maturity stage (Inchley et al, 2020). International trends from high-income countries show that mental health problems are on the decline. This deficiency can be observed from the increase in the number of cases diagnosed and treated for mental disorders, especially among adolescent girls (Collishaw 2015, Cosma et al 2020, Bor et al, 2015). In this context, there is a growing concern that adolescent mental health may decline, and today's generation of adolescents has a higher risk of experiencing mental health problems compared to previous generations (Potrebny, 2017). As many as 10-20% of children and adolescents worldwide experience the consequences of mental health problems (Kieling et al, 2011). Mental health disorders affect an estimated 10-20% of the population of children and adolescents worldwide, and are one of the leading causes of disability in those aged 10-24 years (Gore et al, 2011). Mental health problems usually appear more frequently during adolescence (Kessler et al 2007). Often, bullying at school can increase the risk of developing problems such as anxiety, depression, concentration difficulties, hyperactivity, and sleep disorders (Van Wijnen et al, 2010, Erhart et al, 2012, Narang and J. L. Mathew, 2012) (Van Wijnen et al, 2010, Erhart et al, 2012, Narang and J. L. Mathew, 2012) .

PA provides a number of significant benefits to adolescents and has a crucial role to play in promoting their overall physical and emotional well-being (Hallal, 2006). Extensive research has been conducted to examine the use of PA as a method of treating mental health problems in adolescent populations experiencing clinical conditions. Two recent reviews concluded that various PA interventions, especially those involving moderate to high-intensity aerobic exercise, tend to have a positive impact on depression. These results show the potential of PA as a beneficial intervention in addressing mental health problems in adolescents (Bailey et al, 2018). Interventions involving physical activity in school settings have shown positive results in reducing anxiety levels, increasing resilience, improving overall well-being, as well as promoting positive mental health in children and adolescents. These findings further strengthen the argument for encouraging the implementation of physical activity initiatives in school settings (Andermo et al, 2020).

Consistently engaging in moderate to high intensity PA has been shown to have a positive impact on physical and mental health. It is important to note that the benefits of PA often show a dose-response relationship, meaning that the more and higher intensity of PA performed, the greater the benefit. True, the frequency, duration, and intensity of PA are important factors influencing the extent to which improvements in physical and mental health can be achieved. The more frequent, long, and intense physical activity performed, the greater the positive impact on physical and mental health. Various studies, including by

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(Hamer et al 2009, Twisk 2007, Tyson et al 2010) , Studies have shown that PAs that are more regular, with longer duration, and higher intensity tend to produce additional health benefits. In other words, individuals who regularly engage in PA, do so over longer periods of time, and at higher intensities tend to experience improved physical and mental health compared to those who engage in PA at less consistent or lower intensity. The findings emphasize the importance of making regular physical activity, with moderate to high intensity, part of a person's lifestyle. Striving to maintain consistency, longer duration, and higher intensity of physical activity can yield additional benefits for physical and mental health. This is important to consider in order to optimize the positive impact of PA on overall health.

Sleep plays a very important role in the daily routine of adolescents, and unfortunately, the problem of poor sleep quality is common among this population. A number of studies, as shown by (Callender et al 2021, Kong et al 2023, Liu et al 2023, Paterson et al 2021, Rollo et al 2020) . Research conducted in China has reported a mixed prevalence of poor sleep quality among high school students, with rates varying between 8.54% to 41.9%(Zhou et al, 2020, Ren et al, 2021). Poor sleep quality can have a significant impact on children and adolescents. This can lead to problems such as fatigue, anxiety, and depression, and can also negatively impact their learning process and academic performance (Zhang et al, 2021). In addition, poor sleep quality can also affect adolescents' overall quality of life, as it can affect their perception of health and social relationships (Umlauf et al, 2015).

Previous research has shown that among adolescents, engaging in high levels of PA is associated with improved sleep or sleep recovery (C. Lang et al, 2013, Kalak et al, 2012). Similarly, there is a positive relationship found between increased PA and improved psychological functioning, which in turn can generate a decrease in depressive symptoms (Rothon et al, 2010, Johnson et al, 2008). Higher PA levels have been linked to improved quality of life, as shown in studies (Anokye et al, 2012, Gopinath et al, 2012). In addition, there have been studies showing that higher PA levels have a relationship with lower stress levels (Moljord et al, 2011, S. Park 2014). Furthermore, individuals who have increased PA tend to show more positive attitudes towards themselves and life in general, as seen in the study (M. Gerber et al, 2012, S. Brand et al, 2017).

Given the importance of PA to sleep quality and adolescent mental health, a comprehensive literature review is needed to understand the role of PA in influencing the mental health and quality of life of children and adolescents. This literature review aims to provide accurate, up-to-date information on the role of PA and sleep quality as a solution for children and adolescents with mental health disorders. In this literature review, our focus will be on the evidence on the role of physical activity and sleep quality as solutions for child and adolescent mental health. We will also discuss the use of appropriate physical activity methods and good sleep patterns as measures to help improve children's mental health.

II. METHOD

In this study, the databases used were PubMed and Scopus, in searching for literature the keywords used include:

1. Physical Activity AND Adolescents AND Depression and Anxiety
2. Physical Activity AND Adolescents AND PTSD
3. Physical Activity AND Adolescents AND ADHD
4. Physical Activity AND Adolescents AND Eating Disorders
5. Physical Activity AND Adolescents AND Bipolar
6. Physical Activity AND Adolescents AND Sleep Quality

Table 1. Inclusion and elusion criteria

Inclusion criteria	elusion criteria
Studies examining the relationship between exercise and mental health for children and adolescents, and exercise for sleep quality and adolescents, used experimental methods.	Studies that do not meet the inclusion criteria, studies using populations of older adults or pregnant women, studies conducted under 2018, and studies that are not available in English.

Studies examining the relationship between exercise training and mental health for children and adolescents, studies that did not meet the inclusion criteria of studies using adult populations or pregnant women, studies published before 2018, and studies not available in English.

Studies identified through search strategies and through the study selection process are conducted using search databases such as PubMed and Scopus. The studies found through such searches are then taken and incorporated into reference management software, such as Mendeley. Of the studies identified, the initial step is to evaluate the title and abstract to

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determine if the study meets the inclusion criteria. The remaining articles were then further scrutinized using a critical appraisal of the paper.

III. RESULT AND DISCUSSION

Table 2. Literature review

Author and Year	Article Tittle	Interven si	Journal Tittle	Result
Depression and Anxiety				
(Philipp ot et al. 2022)	Impact of physical exercise on depression and anxiety in adolescent inpatients: A randomized controlled trial	Physical Exercise	Journal of Affective Disorders	A linear mixed model with the F-test revealed a significant interaction in favor of physical exercise in reducing the mean depression score (HADS-D) by 3.8 points [95% (CI), range 1.8 to 5.7], compared to the mean reduction score of 0.7 [95% (CI), range -0.7 to 2.0]
ADHD				
(Ludyga et al. 2022)	Behavioral and neurocognitive effects of judo training on working memory capacity in children with ADHD: A randomized controlled trial	Judo	NeuroImage	When compared to the control group, the group undergoing judo training showed better results in Change Detection scores and showed a less favorable increase in CDA scores when load was high after the intervention, when considering pretest scores (and other factors). Meanwhile, no significant difference was found between the two groups in MABC-2 scores.
PTSD				
(Pengpid 2019)	High physical activity is associated with post-traumatic stress disorder among individuals aged 15 years and older in South Africa	Physical Activity	South African Journal of Psychiatry	In general structural equation modeling, the overall trauma event had a direct and indirect positive effect on PTSD, with high PA levels being a mediating factor.
Eating Disorders				
(Harrison et al. 2022)	Physical activity and disordered eating behaviours: Are Caribbean adolescents at risk?	Physical Activity	International Journal of Psychology	Adolescents who exercised for a longer duration had a greater chance of having an increased EAT-26 score (at least 1 hour-OR = 2.04; 95% CI = 1.03, 4.06; p = 0.042), while higher frequency of exercise among men (3–5 days per week) protected against DEBA (OR 0.38; 95% CI = 0.16, 0.88; p = 0.025).
Bipolar				
(Popel et al. 2021)	Clinical and neuroimaging correlates of cardiorespiratory fitness in adolescents with bipolar disorder	cardiorespiratory fitness	Bipolar Disorders	In multivariable analyses, there is a significant primary influence of diagnosis (HC>BD; P = 0.03) and sex (M > F; P < 0.001) to strength. Significant predictors of strength in bipolar disorder (BD) included male sex (P = 0.02) and physical activity level (PA) (P = 0.002), but not depressive symptoms (P = 0.29). A significant diagnosis was found with the interaction effect of cardiorespiratory fitness (CRF) in the frontal, parietal, and occipital cortical regions.
Quality Of Sleep				
(Rosa et al. 2021)	Effect of Different Sports Practice on Sleep Quality and Quality of Life in Children and Adolescents: Randomized Clinical Trial	Judo And Ball Games	Sports Medicine	Judo (P = 0.032) and ball games (P = 0.005) contributed to improving the sleep quality of the participants.

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Mental Illness Cluster

Depression and Anxiety

There are many cohort studies or randomized controlled trials (RCTs) that show that participation in physical activity or an appropriate exercise program is associated with a reduction in depressive symptoms among adults and adolescents (Bailey et al. 2018; Carter et al. 2016; Oberste et al. 2020; Radovic, Gordon, and Melvin 2017; Wegner et al. 2020). Previous research with RCT design also showed a positive impact of physical activity on depressive symptoms in outpatient adolescents (Carter et al. 2015). This is also evidenced by the research conducted (Philippot et al. 2022) The use of adjunct therapy in the form of structured physical exercise integrated into the inpatient care of adolescent psychiatry has brought positive results in reducing their depressive symptoms, this shows its effectiveness in treating hospitalized and depressed adolescent patients.

ADHD

(Ludyga et al. 2022) A 12-week judo training program for children with ADHD showed potential to improve working memory capacity. This positive impact can be observed in behavioral and neurocognitive aspects. Judo training improves children's ability to store more information in visuospatial working memory and also increases efficiency in the associated maintenance process, which is reflected in the CDA index. With these results, it shows that physical activities, especially judo, can give positive results to adolescents with ADHD

PTSD

(Peltzer and Pengpid 2019) The study found that in a national community in South Africa, after considering relevant confounding factors, there was a significant association between high levels of psychological distress (PA) and overall symptoms of post-traumatic stress disorder (PTSD), symptoms associated with repetition of traumatic experiences (PTSD symptom criteria), and symptoms associated with attempts to avoid traumatic experiences (PTSD avoidance symptom criteria).

Eating Disorders

(Harrison et al. 2022) Our findings make an important contribution in this area by clarifying the role of exercise duration and frequency in relation to disordered eating behavior in middle-income countries. The results showed that adolescent boys who participated in exercise with a higher frequency tended to have a lower risk for eating disorders. However, longer exercise duration appears to be associated with an increased likelihood of disordered eating behaviors among both sexes.

Bipolar

Decreased levels of cardiorespiratory fitness (CRF) appear to occur in adolescents with bipolar disorder (BD), especially in women, and are mostly related to depressive symptoms as well as lack of physical activity. In addition, decreased CRF is also associated with changes in brain structure in different regions. Therefore, studies that attempt to increase CRF levels in an effort to reduce psychiatric symptoms in adolescents with BD are rational and reasoned (Harrison et al. 2022).

Sleep Quality

Participation in judo ($P = 0.032$) and ball games ($P = 0.005$) has been shown to play a role in improving participants' sleep quality levels. When we considered values in various aspects of quality of life, playing judo and playing ball markedly improved perceptions about participants' health and physical activity levels, with average increases of 6.9 (8.3%) and 8.91 (12.2%) points, respectively. In addition, this also had a positive impact on the sense of autonomy, where there was an average increase of 5.81 (7.3%) and 5.00 (6.9%) points. In terms of social support from friends and the environment, playing judo and ball games has shown significant improvement, with an average increase of 2.83 (3.8%) and 12.00 (15.9%) points. In addition, provocation and intimidation also showed a significant decrease, with an average decrease of 10.21 (18.1%) and 2.14 (4.1%) points (Rosa et al. 2021).

Thus, playing judo and ball games not only positively impacted participants' sleep quality, but also affected various aspects of their quality of life, including health, autonomy, social support, and the reduction of negative experiences such as provocation and bullying.

IV. CONCLUSION

Growing evidence supports the use of physical activity and exercise in reducing mental disorders and improving sleep quality. From several reviews obtained then it can be concluded that sports or physical exercise can have a positive impact on people with mental health and can improve the quality of sleep of children and adolescents. However, mental health workers should use their clinical judgment when considering interventions in exercise for their patients and include

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