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Physical Activity as an Antidepressant for Psychiatric Hospital Patients

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Abstract

Depression is a serious mental disorder that significantly impacts an individual's quality of life. Physical activity is considered a non-pharmacological program with the potential to alleviate depressive symptoms through biological, psychological, and social mechanisms. This study aims to evaluate the relationship between physical activity levels and depression levels among patients undergoing psychosocial rehabilitation at Marzoeki Mahdi Mental Hospital, Bogor. This research employs a quantitative design with a descriptive-correlational approach. A total of 26 patients diagnosed with major depressive disorder who actively participated in physical activity programs were purposively selected. The instruments used included the Hamilton Rating Scale for Depression (HRSD) and the Q-MOVE (Questionnaire of 24-Hour Movement Behaviors). The analysis results indicated no significant relationship between sleep duration or physical activity levels (sedentary, moderate, vigorous) and depression levels. However, a significant positive correlation was found between moderate and vigorous physical activity. This study concludes that although no direct relationship was found between physical activity and depression, an active behavior pattern still has the potential to support recovery. Further studies with a longitudinal design and larger sample sizes are needed to explore a more accurate causal relationship.

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INTRODUCTION

Depression is not merely a fleeting feeling of sadness, but a serious mental disorder that impairs a person's ability to think clearly, function, and live a meaningful life. With more than 340 million people affected worldwide, depression poses a significant threat to global mental health, transcending age, gender, and background. Without proper treatment, this condition can damage social relationships, decrease productivity, and increase the risk of suicide (Koutedakis et al., 2011). According to the World Health Organization (WHO), depression is characterized by a persistent low mood, loss of interest in pleasurable activities, feelings of guilt, sleep disturbances, reduced appetite and energy, as well as difficulties in concentration (WHO, 2017). Depression is marked by a consistently low mood, dysphoria, motivational impairment, and various other symptoms, including psychomotor and cognitive disturbances (Kandola et al., 2019). Individuals with mental disorders often face negative impacts, such as an increased risk of premature death caused by unhealthy lifestyles and a lack of awareness regarding lifestyle-related health risks (Oeland et al., 2010).

Globally, the disease burden caused by depression has experienced a significant increase. The number of new cases rose from approximately 172 million in 1990 to 258 million cases in 2017, indicating that depression is increasingly becoming an urgent public health issue that requires comprehensive intervention (Q. Liu et al., 2020). In Indonesia, depression is a significant health concern, as reflected in the 2023 Indonesian Community Mental Health Index, which recorded 9,162,886 cases with a prevalence rate of 3.7%. Individuals who are not productive tend to have a higher likelihood of experiencing depressive symptoms (Mustamin et al., 2022; Shalahuddin et al., 2024).

To address the issue of depression, various approaches have been developed, including programs focusing on lifestyle changes such as physical exercise, which has been proven to provide mental health benefits (Pickett et al., 2012). Physical activity serves as a key element in comprehensive rehabilitation strategies, especially when integrated into community-based programs or inpatient services, as it can support functional recovery, improve mental health, and strengthen social and emotional aspects, including among individuals with schizophrenia and other mental disorders (Rosenbaum et al., 2014). Rehabilitation for individuals with depressive disorders is complex, involving diagnostic approaches, pharmacological therapy, and psychosomatic interventions that complement each other. In this context, physical activity emerges as an effective and easily accessible solution, as it not only helps alleviate depressive symptoms through biological and psychological mechanisms but also enhances quality of life, self-motivation, and patient independence in the process of sustainable recovery (Köllner, 2016). In the United Kingdom, national guidelines for the management of Major Depressive Disorder (MDD) clearly state that physical activity has a positive impact on patients with mild depressive symptoms (LAST, 2007). Physical activity refers to any form of body movement, particularly those involving major muscle groups such as the arms and legs, which result in a significant increase in energy expenditure above the resting metabolic rate (Twisk, 2007). The positive psychological effects often experienced after a single session of physical activity, such as walking or structured exercise, make physical exercise a promising program for supporting physical and mental recovery in individuals with mental disorders, and thus it is worth integrating into mental health rehabilitation services (De Page et al., 2018; Schroeder, 2016).

Previous studies have had several significant methodological limitations, including small sample sizes and recruitment methods relying on brochures, media advertisements, and letters sent to doctors and mental health facilities, which may introduce selection bias. In addition, there were inaccuracies in the diagnosis of depression, relatively short program durations (approximately six weeks), the absence of standardized physical exercise programs, and limited documentation of exercise program implementation (Blumenthal et al., 2015). Based on this background, the present study aims to evaluate the effect of physical activity on depressive symptoms in patients at a mental hospital, using the Hamilton Rating Scale for Depression (HRSD) and the Q-MOVE (Questionnaire of 24-Hour Movement Behaviors) as the primary measurement instruments.

The innovation of this study lies in the combined use of the Hamilton Rating Scale for Depression (HRSD) and the Questionnaire of 24-Hour Movement Behaviors (Q-MOVE) as multidimensional assessment tools to comprehensively analyze the relationship between physical activity and depressive symptoms. Furthermore, conducting the study in an inpatient psychiatric hospital setting expands the contextual application of physical activity programs, which have predominantly been implemented in community-based

environments. This contributes to enhancing external validity and supports the structured integration of such programs into psychiatric rehabilitation services.

METHODS

This study is a quantitative observational research with a descriptive correlational approach, designed and reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross-sectional studies. The aim of this study is to evaluate the level of depression in patients at a mental hospital who have participated in a physical activity program, as well as to assess the relationship between physical activity and depressive symptoms using the Hamilton Rating Scale for Depression (HRSD) and the Validation of the 24-Hour Movement Behaviors Questionnaire (Q-MOVE).

This study was conducted on patients participating in the psychosocial rehabilitation (daycare) program at Marzoeki Mahdi Mental Hospital, Bogor. The rehabilitation activities were carried out in a structured manner on weekdays, involving various activities such as Morning Meetings, Hand Hygiene, Brain Gym, psychoeducation, LKS-RK classes, vocational training, art activities, sports, angklung practice, as well as internal and external coordination. These activities took place from morning to afternoon, covering morning and afternoon sessions from Monday to Friday.

The sampling technique was conducted purposively at the beginning of March 2025 over a period of 1 to 2 weeks.

The research subjects were patients at the hospital who regularly participated in the physical activity (daycare) program for a period of 1 to 3 years. The sample criteria included patients diagnosed with Major Depressive Disorder (MDD), aged between 20 and 45 years, and actively participating in structured physical activities. The total sample size in this study was 26 individuals, consisting of 19 males and 7 females. Data collection was conducted in March 2025.

The dependent variable in this study is the level of depression, measured using the 17-item version of the Hamilton Rating Scale for Depression (HRSD). The HRSD assessment was conducted by professional medical personnel after the patients had completed the physical activity program. The Hamilton Rating Scale for Depression is a widely used clinical assessment tool for measuring the severity of depression. The scale consists of 17 items that assess depressed mood, feelings of guilt, suicidal thoughts, sleep disturbances (early, middle, and late insomnia), loss of interest and energy, psychomotor retardation, agitation, psychological and somatic anxiety, gastrointestinal somatic symptoms, general somatic symptoms, sexual dysfunction, hypochondriasis, weight loss, and insight into the illness. Structurally, the HAM-D17 measures five key aspects of depression: (1) affective mood, (2) sleep disturbances, (3) somatic symptoms, (4) psychomotor and cognitive functioning, and (5) physical impairment. This instrument is typically administered through structured interviews by trained professionals, and the total score reflects the severity of depression (Miller et al., 1985). The instrument demonstrates good convergent validity ($r = 0.60–0.80$), high inter-rater reliability (kappa = 0.82–0.90), and adequate internal consistency ($\alpha = 0.70–0.79$). Given these characteristics, the HAM-D17 is considered a valid and reliable tool for assessing depressive symptoms in both clinical practice and research. All participants in this study had been clinically diagnosed with Major Depressive Disorder (MDD) by a psychiatrist based on established diagnostic criteria. No additional confounding factors, such as medication status or comorbidities, were statistically controlled in this study.

The independent variable in this study is the level of physical activity, measured using the Q-MOVE (Questionnaire of 24-Hour Movement Behaviors), a survey questionnaire developed to assess the distribution of daily behaviors related to physical activity, sedentary behavior, and sleep within a 24-hour period (Rodrigues et al., 2024). The instrument consists of several items requiring participants to report the duration of behaviors such as nighttime sleep, moderate to vigorous physical activity, and time spent sitting or lying down while awake. The assessment process was conducted through structured interviews and direct observation by trained medical personnel. All participants were assessed using a uniform method, as this study did not employ a comparison group. The Q-MOVE has demonstrated good content validity and reliability in measuring daily movement behaviors, making it a relevant instrument for assessing physical activity in this study.

All study participants received detailed explanations regarding the objectives, benefits, and procedures of the study and provided written informed consent to participate voluntarily, in accordance with the ethical principles outlined in the Declaration of Helsinki (1964) (GANDEVIA & TOVELL, 1964). To minimize potential

selection bias, participants were selected based on clear and consistent inclusion criteria. Data collection was conducted uniformly through structured interviews and observations by trained medical personnel to reduce the risk of measurement and interviewer bias. This study also ensured strict adherence to data confidentiality and participant privacy protection. All data were used exclusively for scientific purposes and were not shared with third parties without the participants' written consent.

The sample size in this study was determined purposively based on specific inclusion criteria, namely patients diagnosed with Major Depressive Disorder (MDD), aged between 20 and 45 years, who had actively participated in structured physical activity programs for a duration of 1 to 3 years within the psychosocial rehabilitation (daycare) unit at Marzoeki Mahdi Mental Hospital, Bogor. A total of 26 participants met these criteria. The selection of this group was based on clinical considerations to evaluate the effectiveness of physical activity in the rehabilitation context for patients with depression, without the inclusion of a comparison group. The quantitative variables analyzed included depression scores (HRSD), sleep duration, and the duration of physical activity categorized as sedentary, moderate, and vigorous, as measured by the Q-MOVE instrument. All data were analyzed descriptively to determine means, standard deviations, and category distributions, as well as using Spearman's non-parametric correlation to examine the relationships between variables, as the normality test results indicated that the data were not normally distributed. All analytical procedures were conducted using standard statistical software to ensure the accuracy and reliability of quantitative data processing.

RESULTS AND DISCUSSION

Table 1. Description of table

Variabel	Category	N	%
Gender	Male	19	73%
	Female	7	27%
Age	20-30	14	54%
	>30	12	46%
Depression Level	Mild	15	58%
	Moderate	2	8%
	Virgorous	9	34%

Table 1 shows that the majority of respondents were male (73%) and within the age range of 20–30 years (54%). In terms of depression severity, most participants experienced mild depression (58%), followed by severe depression (34%), and moderate depression (8%).

This study involved 26 participants whose data were measured based on variables including sleep duration, physical activity levels (sedentary, moderate, and vigorous), and depression levels. Descriptive analysis showed that the participants' average sleep duration was 972.88 minutes per day (SD = 157.98). The average time spent in sedentary activity was 911.15 minutes (SD = 400.82), in moderate-intensity physical activitywas 321.15 minutes (SD = 232.26), and in vigorous-intensity physical activity was 170.19 minutes (SD = 144.32). Meanwhile, the mean depression score was 13.23 (SD = 9.44).

Spearman's correlation analysis was conducted to evaluate the relationships between these variables. The results indicated that there was no significant relationship between sleep duration and depression levels ($\rho = -0.12$, $p = 0.558$). This correlation was weakly negative, suggesting that an increase in sleep duration tended to be associated with a decrease in depression levels; however, the relationship was neither strong nor statistically significant.

Similarly, no significant relationship was found between sedentary activity and depression levels ($\rho = 0.04$, $p = 0.851$). The correlations between moderate physical activity and depression levels ($\rho = -0.13$, $p = 0.531$) and between vigorous physical activity and depression levels ($\rho = -0.02$, $p = 0.907$) were also not statistically significant.

However, a significant positive correlation was found between moderate and vigorous physical activity ($\rho = 0.577$, $p = 0.002$), indicating that individuals who engaged more frequently in moderate-intensity physical activity also tended to participate in vigorous-intensity activities. This correlation was classified as moderate to strong and was statistically significant at the 99% confidence level.

Table 2. Correlation results between physical activity and depression

Variabel	N	Mean	SD	1	2	3	4	5
sleep	26	972,88	157,976	1				
sedentary	26	911,15	400,822	0,07	1			
moderate	26	321,15	232,260	-0,308	0,039	1		
vigorous	26	170,19	144,322	-0,18	0,333	.577**	1	
depression	26	13,23	9,437	-0,12	0,039	-0,129	-0,024	1

The analysis results indicate a significant relationship between several fitness-related variables and depression levels. Sleep showed a

moderate negative correlation with depression (r = -0.530), suggesting that shorter sleep duration tends to be associated with higher depressive symptoms (Pandi-Perumal et al., 2020). The positive correlation between sedentary time and depression (r = 0.438) indicates that the longer an individual remains inactive, the higher the tendency to experience depression (Huang et al., 2020).

Moderate-intensity physical activity demonstrated a negative correlation with depression (r = -0.358), supporting previous findings that moderate physical activity may play a protective role against psychological disorders (Y. Liu et al., 2023). Conversely, vigorous-intensity physical activity showed a weak negative correlation (r = -0.183), suggesting that its psychological benefits may be less optimal compared to moderate-intensity activity (Kandola et al., 2020).

Overall, the findings of this study indicate that there is no significant relationship between sleep duration or physical activity levels and depression scores. However, the strong association between moderate and vigorous physical activity indicates the presence of a consistent active behavior pattern among participants. In addition to the primary analysis assessing the relationship between physical activity and depression levels, this study also explored the correlations between different types of physical activities, particularly between moderate- and vigorous-intensity activities. The results showed a significant positive correlation between the two ($\rho = 0.577$; $p = 0.002$), indicating that participants who frequently engaged in moderate-intensity physical activities also tended to engage in vigorous-intensity activities. This finding reflects a consistent active behavior pattern among the participants, although it was not directly correlated with depression scores.

This additional analysis provides valuable insight into the potential internal relationships among movement behavior variables, which could serve as a foundation for developing progressive and sustainable physical activity programs to support the recovery of patients with depression.

This study aimed to explore the relationship between physical activity and depressive symptoms in inpatient mental hospital patients using a correlational design. The main findings indicated that there were no statistically significant relationships between sleep duration or levels of physical activity—including sedentary behavior, moderate-intensity, and vigorous-intensity activities—and depression scores as measured by the Hamilton Rating Scale for Depression (HRSD). However, a significant positive correlation was found between moderate- and vigorous-intensity physical activities, suggesting a consistent behavioral pattern among individuals who engage in physical activity at varying intensity levels.

The observed reduction in depression levels among participants in this study is presumed to have been influenced by their engagement in physical activities that occurred both prior to and during the data collection period. Observations indicated that most participants were physically active within the 24 hours preceding the completion of the questionnaires, which may have contributed to their relatively low depression scores. These findings are consistent with meta-analyses demonstrating the effectiveness of physical activity, particularly aerobic exercise, in reducing depressive symptoms in both clinical and non-clinical populations (Schuch et al., 2018; White et al., 2017).

However, the absence of significant relationships in the correlation analysis may be explained by contextual factors, such as the structured nature of physical activity within the psychiatric setting, which may reduce participants' sense of autonomy and intrinsic motivation—factors that play a crucial role in the psychological benefits of exercise (Pickett et al., 2012).

In line with (Kandola et al., 2019), the relationship between physical activity and depression is likely mediated by complex biological, psychological, and social mechanisms. It is highly probable that the type, intensity, and perceived autonomy in performing physical activities play crucial roles in determining whether these activities have a meaningful positive impact on mental health. Additionally, the relatively small sample size (n = 26) and the cross-sectional design of this study limit the ability to detect more subtle associations and preclude causal inferences.

Another reasonable explanation is the heterogeneity of depressive symptoms and the variability in individual responses to physical activity programs. As suggested by (Blumenthal et al., 2015), inconsistencies in previous research findings may be attributable to the short duration of intervention programs, the absence of standardized protocols, and variations in measurement instruments. Therefore, future studies with larger sample sizes and longitudinal designs are essential to capture temporal dynamics and potential causal relationships between physical activity and depression in clinical settings.

Interestingly, the significant correlation be-

tween moderate- and vigorous-intensity physical activities indicates that physically active individuals tend to engage in various forms of movement across different intensity levels. This supports the notion that structured, multi-phase physical activity programs may offer substantial benefits, particularly if designed to gradually increase participants' activity intensity, which may, in turn, improve adherence and positive psychological outcomes (Kujala, 2018).

Considering these findings, and consistent with previous research (Peluso & Guerra de Andrade, 2005), it can be concluded that while physical activity is widely recommended as a non-pharmacological approach to managing depression, its effectiveness cannot be generalized without careful consideration of context, implementation methods, and participant characteristics.

This study has several strengths, including the high relevance of the topic within the context of mental health, the use of valid and reliable instruments (HRSD and Q-MOVE), and its implementation in a structured psychosocial rehabilitation setting, which supports external validity. The selection of statistical tests appropriate to the data distribution also demonstrates methodological rigor.

However, this study also presents several limitations, such as the small sample size, the absence of a control group, and the cross-sectional design, which restricts causal inferences. Additionally, variations in the intensity of physical activity were not analyzed in depth, and participants' motivation for engaging in physical activity was not measured. These limitations should be considered for future research, which would benefit from longitudinal designs and larger sample sizes.

The findings of this study also face limitations in terms of generalizability, given the specific characteristics of the sample and the relatively small number of participants. This study involved patients diagnosed with Major Depressive Disorder who were engaged in a structured psychosocial rehabilitation program at a single mental hospital, within the age range of 20 to 45 years, and who actively participated in physical activities. Therefore, the findings are most applicable to similar institutional settings, particularly psychiatric care environments with structured physical activity programs (Zschucke et al., 2013). Applying these results to the general population, outpatient settings, or individuals from non-clinical backgrounds requires caution, as differences in environmental conditions, internal motivation, and social support may influence the effectiveness of such programs. Additionally, the absence of a comparison group and the cross-sectional design limit the causal inference and external validity of this study. To improve generalizability, future research with longitudinal approaches, larger sample sizes, and more heterogeneous participant populations is strongly recommended.

CONCLUSION

This study demonstrated that there were no statistically significant relationships between sleep duration or levels of physical activity and depression levels among psychiatric rehabilitation patients. However, the findings revealed a significant positive correlation between moderate- and vigorous-intensity physical activities, indicating a consistent active behavioral pattern among participants. This supports the assumption that physical activity may contribute to the recovery of patients with depression, although its effectiveness is highly dependent on the implementation context, the type and intensity of the activity, and voluntary participation. Further research employing longitudinal designs with larger and more diverse participant groups is strongly recommended to strengthen the empirical evidence and clarify the causal relationship between physical activity and depressive symptoms in clinical rehabilitation settings.

REFERENCES

Blumenthal, J. A., Babyak, M. A., Moore, K. A., Craighead, W. E., Herman, S., Khatri, P., Waugh, R., Napolitano, M. A., & Forman, L. M. (2015). Effects of Exercise Training on Older Patients With Major Depression. 159.

De Page, L., Mercenier, S., & Titeca, P. (2018). Assessing psychopathy in forensic schizophrenia spectrum disorders: Validating the Comprehensive Assessment of the Psychopathic Personality-Institutional Rating Scale (CAPP-IRS). Psychiatry Research, 265(March), 303–308. https://doi.org/10.1016/j.psychres.2018.05.019

Gandevia, B., & Tovell, A. (1964). Declaration of Helsinki. The Medical Journal of Australia, 2(1), 320–321. https://doi.org/10.5694/j.1326-5377.1964.tb115781.x

Huang, Y., Li, L., Gan, Y., Wang, C., Jiang, H., Cao, S., & Lu, Z. (2020). Sedentary behaviors and risk of depression: a meta-analysis of prospective studies. Translational Psychiatry, 10(1). https://doi.org/10.1038/s41398-020-0715-z

Kandola, A., Ashdown-Franks, G., Hendrikse, J., Sabiston, C. M., & Stubbs, B. (2019). Physical activity and depression: Towards under-

standing the antidepressant mechanisms of physical activity. Neuroscience and Biobehavioral Reviews, 107, 525–539. https://doi.org/10.1016/j.neubiorev.2019.09.040

Kandola, A., Lewis, G., Osborn, D. P. J., Stubbs, B., & Hayes, J. F. (2020). Depressive symptoms and objectively measured physical activity and sedentary behaviour throughout adolescence: a prospective cohort study. The Lancet Psychiatry, 7(3), 262–271. https://doi.org/10.1016/S2215-0366(20)30034-1

Köllner, V. (2016). Rehabilitation bei depressiven Störungen. Rehabilitation (Germany), 55(6), 395–410. https://doi.org/10.1055/s-0042-118307

Koutedakis, Y., Dinas, P. C., & Flouris, A. D. (2011). Effects of exercise and physical activity on depression. Irish Journal of Medical Science, 180(2), 319–325. https://doi.org/10.1007/s11845-010-0633-9

Kujala, U. M. (2018). Is physical activity a cause of longevity? It is not as straightforward as some would believe. A critical analysis. British Journal of Sports Medicine, 52(14), 914–918. https://doi.org/10.1136/bjsports-2017-098639

LAST. (2007). Foundations , Promises and Uncertainties of Personalized Medicine Address Correspondence to : Medicine, 15–21. https://doi.org/10.1002/MSJ

Liu, Q., He, H., Yang, J., Feng, X., Zhao, F., & Lyu, J. (2020). Changes in the global burden of depression from 1990 to 2017: Findings from the Global Burden of Disease study. Journal of Psychiatric Research, 126(June), 134–140. https://doi.org/10.1016/j.jpsychires.2019.08.002

Liu, Y., Lin, H., Zhang, H., Zhang, X., & Yin, S. (2023). Correlation analysis between physical activity and depressive tendencies among occupational groups: an isotemporal substitution approach. BMC Public Health, 23(1), 2241. https://doi.org/10.1186/s12889-023-17134-0

Miller, I. W., Bishop, S., Norman, W. H., & Maddever, H. (1985). The modified Hamilton rating scale for depression: Reliability and validity. Psychiatry Research, 14(2), 131–142. https://doi.org/10.1016/0165-1781(85)90057-5

Mustamin, W., Santoso, B., & Sajidin, S. (2022). Indonesian Workers' Mental Health Protection: An Urgency? Journal of Judicial Review, 24(2), 273. https://doi.org/10.37253/jjr.v24i2.7231

Oeland, A. M., Laessoe, U., Olesen, A. V., & Munk-Jørgensen, P. (2010). Impact of exercise on patients with depression and anxiety. Nordic Journal of Psychiatry, 64(3), 210–217. https://doi.org/10.3109/08039480903511373

Pandi-Perumal, S. R., Monti, J. M., Burman, D., Karthikeyan, R., BaHammam, A. S., Spence, D. W., Brown, G. M., & Narashimhan, M. (2020). Clarifying the role of sleep in depression: A narrative review. Psychiatry Research, 291, 113239. https://doi.org/10.1016/j.psychres.2020.113239

Peluso, M. A. M., & Guerra de Andrade, L. H. S. (2005). Physical activity and mental health: the association between exercise and mood. Clinics (São Paulo, Brazil), 60(1), 61–70. https://doi.org/10.1590/S1807-59322005000100012

Pickett, K., Yardley, L., & Kendrick, T. (2012). Physical activity and depression: A multiple mediation analysis. Mental Health and Physical Activity, 5(2), 125–134. https://doi.org/10.1016/j.mhpa.2012.10.001

Rodrigues, B., Júdice, P. B., Marques, A., Carraça, E. V., Lopes, L., Sousa-Sá, E., Encantado, J., Videira-Silva, A., Cliff, D. P., Mendes, R., & Santos, R. (2024). 24-hour Movement Questionnaire (QMov24h) for adults: development process and measurement properties. The International Journal of Behavioral Nutrition and Physical Activity, 21(1), 116. https://doi.org/10.1186/s12966-024-01667-7

Rosenbaum, S., Tiedemann, A., Sherrington, C., Curtis, J., & Ward, P. B. (2014). Physical activity interventions for people with mental illness: A systematic review and meta-analysis. Journal of Clinical Psychiatry, 75(9), 964–974. https://doi.org/10.4088/JCP.13r08765

Schroeder, S. A. (2016). Smoking cessation should be an integral part of serious mental illness treatment. World Psychiatry, 15(2), 175–176. https://doi.org/10.1002/wps.20332

Schuch, F. B., Vancampfort, D., Firth, J., Rosenbaum, S., Ward, P. B., Silva, E. S., Hallgren, M., De Leon, A. P., Dunn, A. L., Deslandes, A. C., Fleck, M. P., Carvalho, A. F., & Stubbs, B. (2018). Physical activity and incident depression: A meta-analysis of prospective cohort studies. American Journal of Psychiatry, 175(7), 631–648. https://doi.org/10.1176/appi.ajp.2018.17111194

Shalahuddin, I., Rosidin, U., Purnama, D., Sumarni, N., & Witdiawati, W. (2024). Pendidikan dan Promosi Kesehatan Mengenai Kesehatan Mental pada Siswa Kelas XII SMAN 1 Pangandaran. Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM), 7(5), 2134–2146. https://doi.org/10.33024/jkpm.v7i5.14290

Twisk, J. W. R. (2007). Physical Activity and Health. Paediatric Exercise Physiology: Advances in Sport and Exercise Science Series, 2001, 325–346. https://doi.org/10.1016/B978-0-443-10260-8.50019-9

White, R. L., Babic, M. J., Parker, P. D., Lubans, D. R., Astell-Burt, T., & Lonsdale, C. (2017). Domain-Specific Physical Activity and Mental Health: A Meta-analysis. American Journal of Preventive Medicine, 52(5), 653–666. https://doi.org/10.1016/j.amepre.2016.12.008

WHO. (2017). Depressive disorder (depression). https://www.who.int/news-room/fact-sheets/detail/depression

Zschucke, E., Gaudlitz, K., & Ströhle, A. (2013). Exercise and physical activity in mental disorders: Clinical and experimental evidence. Journal of Preventive Medicine and Public Health, 46(SUPPL.1), 12–21. https://doi.org/10.3961/jpmph.2013.46.S.S12.