Original Research

The Indonesian Journal of Public Health
Vol 20 No. 1 April 2025
p- ISSN 1829-7005 e- ISSN 2540-8836

DETERMINANTS OF PHYSICAL ACTIVITY BEHAVIOR IN HIGH SCHOOL ADOLESCENTS IN GRESIK REGENCY

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ABSTRACT

Introduction: Obesity is one of the global problems as declared by the WHO. In Indonesia, obesity is continuously rising over the years with 12.2% in teenagers aged >15. Therefore, physical activity is one of the prevention efforts to reduce obesity to create a healthy and prosperous life in accordance with the SDGs indicators to campaign for a healthy lifestyle and strive to achieve prosperity for the world community. **Aims:** This study aims to analyze the factors of physical activity behavior in high school teenagers in Gresik Regency. **Method:** This study implemented a quantitative approach with the cross-sectional method. The researchers obtained samples for about 360 adolescents with a stratified proportional random sampling technique. The data collection was gathered by completing online questionnaires through Google Forms. The data analysis method employed in this study was the Chi-Square test by observing the relationship in each variable. **Result**: This study's result indicates a relationship between gender, social support, and supportive situations with physical activity behavior. However, the age variable demonstrates no relationship with physical activity behavior. **Conclusion:** Most adolescents in the Senior High Schools of Gresik Regency exhibit moderate physical activity. It means that the majority of respondents have performed physical activity within seven days. Social support, including family support, school support, and peer support, as well as the existence of supportive facilities in the environment around adolescents, can increase physical activity behavior in adolescents.

Keywords: Adolescents, Good Health and Well-Being, Obesity Prevention, Physical Activity, Social Support

INTRODUCTION

Adolescence is a transitory stage in human existence that occurs between childhood and maturity (Santrock, 2003). Adolescents are an age group that is very sensitive toward nutritional health problems because they experience rapid growth and development changes compared to previous age groups (Pertiwi and Niara, 2022). Growth perceptions that are experienced by the adolescents can affect body composition, level of physical activity, body weight, and bone growth (Amrynia and Prameswari, 2022). The current nutrition problems of 15-19 years adolescents are overnutrition or obesity. The problem of obesity is a global problem; it has also been deemed a worldwide pandemic by the World Health Organization (WHO) (Mutia, Jumiyati and Kusdalinah, 2022). Overweight and obesity are some of the leading risk causes of contagious diseases, which are also the leading cause of death in developed and developing countries.

Obesity in Indonesia is continuously increasing every year. This is supported by the Riskesdas data from 2007 to 2018 that

Cite this as: Zari, A.P., Nurmala, I., Sulistyowati, M and Syaiful, D.A, (2025). Determinants of Physical Activity Behavior in High School Adolescents in Gresik Regency. The Indonesian Journal of Public Health, 20(1), 3-14. https://doi.org/10.20473/Ijph.v20i1.2025.3-14

recorded at the age of >18 years, the prevalence of overweight patients with BMI 25.0 to <27.0 increased by 5%, and the majority of obesity with BMI 27.0 rose by 11.3 %. Taking a perspective from the central obesity type, which explains that the abdominal circumference of women is > 80 cm and men is > 90 cm, from 2007 to 2018, the prevalence of central obesity patients aged 15 and up grew by 12.2% (Ministry of Health RI, 2018). The prevalence rate of excess weight in East Java is above the national prevalence rate in adolescents aged 13-18 years (Rachmayani, Kuswari and Melani, 2018).

In Gresik Regency, obesity remains one of the problems of non-communicable diseases. Based on Gresik Regency Health Profile data, obesity cases in 2014-2018 experienced a significant increase of only 4,074 cases in 2014 but increased by 78,871 cases in 2018 (Ministry of Health RI, 2018). In 2020, obesity in Gresik Regency decreased by 12,469 cases (Gresik Health City Office, 2020). However, obesity is still a non-communicable disease of the ten ranks in Gresik Regency; obesity is a non-communicable disease ranked fourth that needs to be prevented and managed because it has continually increased in the previous years.

The case of obesity may occur due to the influence of environmental factors such as irregular eating patterns; this is undoubtedly related to lifestyle modifications that approach a sedentary lifestyle (Akbar, 2020). According to (CDC, 2016), obesity may occur due to poor diet, lack of physical activity, irregular sleep, genetic factor, and other diseases or drugs. Obesity in teenagers is caused by a variety of factors, including a lack of physical exercise (Kurdanti *et al.*, 2015). According to (Sudikno *et al.*, 2015)), obesity is 2.55 times more likely in persons who engage in less physical exercise than in people who engage in appropriate physical activity. This evidence is supported by the research of (Widiantini dan Tafal, 2014)), who found that physical activity and the possibility of obesity have a link; the more rigorous the physical exercise, the lower the risk of obesity. Research that measures the risk factors associated with adolescent obesity in Faculty of Sport Science students in Siliwangi University in 2016 resulted that physical activity affects obesity in adolescents, namely respondents with less physical activity are at risk of obesity 6/833 times greater than those with sufficient physical activity (Kosnayani dan Aisyah, 2016).

Physical activity decreases with age, while sedentary lifestyle behavior increases with age, and both have an important impact in teenage weight status (Devis *et al.*, 2017). This is supported by the results published by Ministry of Health RI that the percentage of less activity in the population in Indonesia increased from 26.1% to 33.5% in 2017-2018 (Ministry of Health RI, 2018), Aligned with research findings, it has been identified that adolescents exhibit various activity patterns: approximately 44% are not physically active and less mobile, 42% are moderately active with high screen time, and 14% are highly active but less mobile. For a comparation, Australia has a strong tradition of physical activity and is renowned for its passion for and achievements in sports. Despite this reputation, the country experiences similar concerning patterns of physical inactivity and non-communicable diseases as seen in many other high-income nations (Biddle, 2021)

Therefore, the recommendation of the WHO for physical activity for children is to perform 60 minutes every day. Regular physical activity will benefit the child's physiological and psychological well-being (WHO, 2016). It can reduce Non-Communicable Diseases, particularly obesity. It is in accordance with the

objectives of SDGs indicator number 3, which is a healthy and prosperous life. The SDGs indicator aims to campaign for a healthy lifestyle and strives to achieve prosperity for the world community. Thus, the aim of this research is to observe the determinants that are associated with the physical activity among high school students is Gresik Regency, East Java, Indonesia.

METHODS

This study used a quantitative research approach along with an observational design in which researchers merely make observations without intervening with the studied respondents and analyze the data later. Based on the time, this study implemented cross-sectional methods, namely the observation or collection of data once at a time. This research used an online survey through Google Forms in Gresik District high schools. There are total four high schools in Gresik District, where Gresik District is the highest in obesity rate. Thus, the observed high schools were SMA (Senior High School) Negeri 1 Gresik, SMA (Senior High School) Muhammadiyah 1 Gresik, SMA (Senior High School) NU 1 Gresik, and SMA (Senior High School) NU 2 Gresik. The sampling of this study was acquired by using a stratified proportional random sampling technique, where all respondents had the same opportunity to be respondents in accordance with their proportion. The sample size was obtained using the Slovin formula, which gathered 360 respondents. This research began in June 2021 and was disseminated through WhatsApp, and the form teacher (the teacher who has the responsibility for a particular class in school) of each class in high school. This research ethic has been accepted by The Faculty of Dental Medicine, Universitas Airlangga with ethical clearance number 264 / HRECC.FODM/V / 2021.

The independent variables are individual characteristics (gender and age), social support, and supportive situation. Age data were categorized into two groups (early adolescents ranging from 12-16 years old and late adolescents ranging from 17 – 25 years old). Social support was categorized into three groups, (social support from family, friends, and school). The supportive situation for this research is determined by whether there is access to facilities and infrastructure in the surrounding area. The dependent variable is behavioral physical activity. The questionnaire in this study used the International Physical Activity Questionnaire for Adolescents (PAQ-A) which was used to measure physical activity performed by adolescents in the last seven days (Kowalski *et al.*, 2004). The scoring details, are explained as follows:

Light: 1 – 2.3

Medium: 2.4 – 3.7

Heavy: 3.8 – 5

Social support has been examined using the self-administered social support questionnaire that was developed by the researchers. The response scale statement was on eight questions and one question to identify students who performed unusual activities in the previous week. The measuring scale used to assess the answers in the questionnaire was a Likert scale test, with the scoring details as follows:

Family Support

Low: < 14

High: ≥14

Friends Support

Low: < 12

High: ≥12

School Support

Low: < 15

High: ≥15

Supportive Situation

Low: < 11

High: ≥11

This research was tested using Statistical Package for the Social Sciences (SPSS) software ver. 25.0 and used two types of data analysis: bivariate analysis was conducted to description of each variable using frequency and percentage and univariate analysis was conducted to statistically test the analysis of the relationship. Chi-Square method was utilized to determine the influence between the determinant variables of physical activity behavior (gender, age, social support and supportive situation) and physical activity behavior in Gresik.

RESULTS

Analysis of Respondent Characteristics

Table 1. Characteristics of Respondents

Characteristics	Total (n)	Percentage (%)
Origin of the school		
SMA Negeri 1 Gresik	128	35.6
SMA Muh 1 Gresik	66	18.3
SMA NU 1 Gresik	103	28.6
SMA NU 2 Gresik	63	17.5
Total	360	100.0
Gender		
Male	111	30.8
Female	249	69.2
Total	360	100.0
Grade		
10	74	20.6
11	138	38.3
12	148	41.1
Total	360	100.00
Age		
Early Adolescence (12-16 years old)	172	47.8
Late Adolescence (17-25 years old)	188	52.2
Total	360	100.0

Respondents in this study were students in the District of Gresik. The observed high schools in the District of Gresik were SMA Negeri 1 Gresik, SMA Muhammadiyah 1 Gresik, SMA NU 1 Gresik, and SMA NU 2 Gresik. Based on the survey results, it is found that respondents in SMA Negeri 1 Gresik is 35.6%, SMA Muhammadiyah 1 Gresik is 18.3%, SMA NU 1 Gresik is 28.6%, and SMA NU 2 Gresik is 17.5%. Then, based on the class, most respondents are in 12th Grade or equal to 41.1%. Then, the 11th Grade is 38.3%, and the 10th Grade is 20.6% of the respondents.

According to Table 1, the bulk of responders are in their late adolescence (17-

25), which is 52.2%. Meanwhile, 47.8% belong to the early category (12-16 years old). Based on Table 1, most participants are female, amounting to 69.2%. This is because the number of female respondents in each school is higher than male students.

Table 2. Determinants Distribution of Physical Activity

Determinants	Total (n)	Percentage (%)
Social Support (Family)		
High	197	54.7
Low	163	45.3
Total	360	100.0
Social Support (Friends)		
High	186	51.7
Low	174	48.3
Total	360	100.0
Social Support (School)		
High	196	54.4
Low	164	45.6
Total	360	100.0
Supportive Situation		
High	262	72.7
Low	98	27.3
Total	360	100.0

The social support in this study included family, friends, and school supports. Table 2 reveals that some respondents gain support from their families through information, solicitation, concern, willingness, and appreciation in conducting physical activity behavior, which belongs to the high category of 54.7%. Then the friends' support mentioned by some respondents is in the form of information, solicitation, concern, willingness, and appreciation in performing physical activity behavior, amounting to 51,7%. Support from schools is also found as one of the high categories of 54.4%. In that perspective, social support ranging from support from family, friends, and school is demonstrated in the high category. Then, from observing the supportive situation variables, most teenagers obtain the facilities and infrastructure in the surrounding environment and have utilized the facilities and infrastructure.

Physical Activity Behavior

Table 3. Distribution of Physical Activity Behavior in Adolescents

Physical Activity Behavior	Frequency	Percentage (%)
Heavy	13	2.2%
Moderate	195	55.3%

Light	152	42.5%
Total	360	100.0%

According to the results, Table 3 presents that the majority, or approximately 195 respondents, demonstrate physical activity behavior with a moderate category. Most respondents have conducted active physical activity in their spare time as much as 3-4 times a week, resulting in 2.2% of respondents with the heavy physical activity behavior category and 42.5% of respondents with the light category.

Determinants Related to Physical Activity Behavior

Table 4. Determinants Related to Physical Activity Behavior

Variable	Light	Moderate	Heavy	*P-Value*
	n (%)	n (%)	n (%)	
Gender				
Female	112 (45.1)	135 (54.4)	1(0.5)	0.004
Male	40 (36.1)	60 (54.0)	11 (9.9)	
Age				
Early Adolescents (12-16)	65 (37.8)	98 (57.0)	9 (5.2)	0.091
Late Adolescents (17-25)	87 (46.3)	97 (51.6)	4 (2.1)	
Social Support (Family)				
Low	81 (49.7)	78 (47.8)	4 (2.5)	0.000
High	71 (36.0)	117 (59.4)	9 (4.6)	
Social Support (Friends)				
Low	96 (55.1)	74 (42.5)	4 (2.3)	0.000
High	56 (30.1)	121 (65.0)	9 (4.9)	
Social Support (School)				
Low	85 (51.8)	75 (45.7)	4 (2.4)	0.000
High	67 (34.2)	120 (61.2)	9 (4.6)	
Supportive Situation				
Low	68 (69.3)	26 (26.6)	4 (4.1)	0.000
High	84 (32.0)	169 (64.5)	9 (3.5)	

DISCUSSION

The Relationship of Gender with Physical Activity Behavior

This study reveals a relationship between sex and physical activity behavior (p value = 0.000). The results of this study demonstrate that male respondents engaged in more strenuous physical activity than females. The study's results deliver that female light physical activity was more widely practiced than male. The findings are reinforced by a study conducted by Faradika (2019) who believes there is a major correlation between exercise and gender since women prefer passive workouts to males. The data are supported by the research results that stated 95% of women experience decreased physical activity during adolescence (Micklesfield *et al.,* 2021). After all, they are consistently sedentary and have a higher waist circumference than men who are consistently more active in physical activity; thus, they own a narrower waist circumference. Sedentary and inactive behavior in women tends to increase during adolescence. This finding is supported by numerous researches that show females have

much lower physical exercise habits. Women's physical activity levels are significantly lower. This pattern is reflected in the worldwide score of exercise habits, where the women have a substantially lower proportion of physical activity habits than males. (Fuentealba-Urra *et al.,* 2022). However, broadly speaking, male and female respondents demonstrate moderate physical activity levels. Based on this study, some male respondents performed more strenuous physical activity because teenage boys in Gresik exercised through heavy physical activities, for instance, football, badminton, and fast cycling. Hence, this study conveyed evidence regarding a correlation between gender and the physical activity behavior of adolescents in Gresik.

Correlation between Age with Physical Activity Behavior

This study's results demonstrate no correlation between age and physical activity behavior (0.091 > 0.05). As a result, it is argued that age has no relation to physical activity. This is reinforced by the study run by (Shi, Lien and Kumar, 2006), which found that, because the degree of physical activity done does not correspond to the provided age, age is not substantially connected with physical activity. It can be concluded that the change in age does not affect the behavior change. However, the results of this study considerably differed by gender. Gender and age are one of the strongest demographics toward physical activity. Age cannot define exercising in teenagers during the covid-19 pandemic. During the pandemic alone, overall exercise undertaken by teenagers was comparable. Most respondents were involved in online classes, and there was no difference between younger and older ages in adolescents' physical activity level. Hence, an Australian study found that community sport participation dropped by 27% in 2020 compared to 2019, with the most significant decrease seen among children aged 4–9 years. Specifically, participation among 4-year-olds fell by 69%, among 5–9 year olds by 38%, and among 10–14 year olds by 18%. The decline was more pronounced among females than male (Eime, Harvey and Charity, 2024)

Correlation between Family Support with Physical Activity Behavior

Family is an essential element in providing support because teenagers live with families. Based on the study's results, family support is situated in the high category of 54.7%. The formation and layout of the family are visible to be the most organized and favorable to well and increased developmental changes during the teenage-hood (Bélanger-Gravel A, Gauvin L, Lagarde F, 2015). According to other studies, family members prefer to encourage their children to participate in physical exercise by providing transportation and equipment, which can lead to differences in the overall individual model (Lisboa *et al.*, 2021).

The aforementioned social support in this study is the reinforcement of the participants'' family related to physical activity. In this research, the support given to the participants' family is in the form of information, instrumental, appreciation, emotion, and also social network support. Positive family support includes family support, such as father, mother, sister, and brother, which may affect adolescent physical activity. This study's results state a relation between family support and physical activity behavior with a p value of 0.027 < 0.05. Observed from the number of respondents who received high-intensity of family support, they tend to perform a high frequency of physical activity behavior.

This is related with studies by

(Mendonça *et al.,* 2014), showing that, in general, positive and persistent family support is consistently connected to physical activity in teenagers. Teenagers who undergo extensive social support from their fathers and mothers are more likely to include themselves in physical exercise (Yao dan Rhodes, 2015). It is emphasized that parental social support is essential for adolescents to behave effectively during adolescence (Mendonça *et al.,* 2014). This was elaborated by the fact that the family—especially the parents—is the most significant source of support since they instill values and impart skills that help teenagers form critical attitudes and behaviors toward physical exercise (Edwardson and Gorely, 2010).

According to the findings of this survey, the majority of respondents' family support is by providing information to respondents, providing facilities, inviting respondents to conduct physical activity, and giving awards in the form of praise to teenagers during their physical activity. However, family support in reinforcing to maintain respondents' physical activity has yet to be significantly provided to parents. Because teenagers live with and imitate their parents' patterns and habits, this reinforcement is one of the variables that might increase the behavior of physical activity in adolescents in order to maintain their physical activity. Thus, parents must energize their adolescents to maintain physical activity.

Correlation between Peer Support with Physical Activity Behavior

Friends are an essential element in providing support. Based on the study's results, it is found that peer support is in the high category, approximately 51.7%. Research demonstrates that peer support positively affects one's behavior, assisting a person to exercise more (Ramchand R, Ahluwalia SC, Xenakis L, Apaydin E, Raaen L, 2017). It is considered more personal support, of which any of it given among peers is represented through informal conditions, such as reminding each other and sharing experiences. Practically, these are frequently performed among close friends or partners.
Social support in this study is the support of friends of respondents related to physical activity. Throughout the study, there are several supports that were given by the respondent's family, for instance, instrumental, information, emotional, appreciation, and social network supports. The presence of this positive support from friends can affect physical activity in adolescents. In accordance with this study itself, there is a link between friend support and physical exercise behavior (p value 0.000 < 0.05). This is consistent with previous study where there is a relationship between peer support and healthy behavior in students (Monica, 2018). Moreover, having peers who regularly conduct physical activity will influence a person's physical activity (Downward and Rasciute, 2016). The influence of peers who regularly perform physical activity has a more substantial influence on a person's healthy behavior than habits or previous behavior. Other research has found that high levels of perceived support from peers are strongly associated to greater levels of physical exercise (Pedro Silva, Michael Sousa, Carla Sa´, 2014).

Most of participants' peer support is to provide reinforcement to respondents and also lend facilities to respondents, such as rackets to play and bicycles for cycling when respondents gather. In addition, the support of friends supplied to respondents is through the frequency of peers inviting respondents to conduct physical activity. However, the lack of peer support for adolescents is about the support of appreciation in the form of praise presented

by their peers to respondents. The support of friends in inviting and providing reinforcement to respondents is a factor strengthening the behavior of physical activity in adolescents continuing to perform physical activity. Suppose adolescents are invited to conduct physical activity by their friends and given reinforcement to maintain it. In that case, they tend to act according to their friends because their friends also affect physical activity in adolescents.

Correlation between School Support and Physical Activity Behavior

The school has been identified as a central institution for promoting physical activity among youth. Respondents' school support for physical exercise is referred to as social support. Positive school support includes teacher support, which can affect adolescent physical activity. According to the findings of this study, the 0.000 < 0.05 p-value explained the link between school support and physical activity behavior. Observed from the number of respondents who received high-intensity of school support, they tend to perform a high frequency of physical activity behavior.

The school provides assistance in the form of social involvement (Babey *et al.*, 2015). Thus, feeling supported at school is connected with a greater level of physical activity among teenagers, implying that improved sentiments of school support may aid physical activity promotion among adolescents. This is in line with other research that psychologically, the condition of facilities and infrastructure in schools that are adequate and qualified would motivate students to conduct physical activity because the availability of facilities and infrastructure would facilitate the learning process to provide more opportunities to students. Thus, facilities and infrastructure are determining factors for success in performing physical activities (Sabar, Rizal and Juhanis, 2019). According to the findings of this survey, the majority of respondents' school assistance is to offer reinforcement and knowledge. In addition, school support given to respondents is to elicit praise to respondents during their physical activity and also provide facilities within the school environment. However, the lack of school support given to adolescents is about the support of social networks in the form of school invitations to maintain their physical activities. School invitations are needed to organize physical activities during the covid-19 pandemic so that teenagers continually maintain the activities.

Correlation of Supportive Situations with Physical Activity Behavior

In this study, the supportive situation is facilities, distance, and environmental influences that assist adolescents in physical activity. The presence of this positive support of the condition may affect physical activity in adolescents. The fact has been proven by p-value of 0.000 < 0.05 in this research project, which indicated a link between encouraging environments and physical activity behavior. There is a strong link between physical activity and the sports facilities at the house or in the neighboring area, where respondents who own sports facilities at home and their surrounding environment tend to perform more active physical activity compared to respondents who do not have sports facilities at home and the surrounding environment (Farradika *et al.,* 2019). Furthermore, the fact is also reinforced by research that stated one of the physical environmental factors consistently positively associated with physical activity is the availability of facilities such as the location for a particular activity, e.g., baseball field, gym within access to physical activity (Williams *et al.,* 2010),. Most teenagers in SMA Kabupaten Gresik have been supported in distance, facilities, and the

environment so that they can do active physical activity. The majority of teenagers in Gresik Regency have utilized the existing facilities and infrastructure in the surrounding environment. Teenagers in Gresik Regency agree with close distances when administering physical activities, such as gyms for fitness, going to the gym, running, and cycling. The scenario favoring the people who participated in this survey is already at a high level.

CONCLUSION

This study concluded that 16 year-old teenagers and females dominated the characteristics of adolescents in this study. The majority of physical activity behavior of adolescents is at moderate intensity with a frequency of 3-4 times within the latest week. That is, respondents are pretty active in physical activity. The project revealed a relationship between gender, social support, also supportive situations with p-value <0.05. However, for the age variable with p-value > 0.05, it showed that no relationship was found between age and physical activity behavior. Physical activity is essential, specifically for teenagers. For this reason, it is necessary to initiate preventive efforts for adolescents, for instance, by maintaining physical activity in the long term in order to prevent obesity from early childhood.

REFRENCES

Akbar, H. (2020) 'Pemberian Edukasi Mengenai Obesitas pada Remaja di Madrasah Aliyah Negeri 1 Indramayu', *Community Engagement and Emergence Journal (CEEJ)*, 2(1), pp. 1–6. Available at: https://doi.org/10.37385/ceej.v2i1.123.

Amrynia, S.U. and Prameswari, G.N. (2022) 'Hubungan Pola Makan, Sedentary Lifestyle, dan Durasi Tidur dengan Kejadian Gizi Lebih Pada Remaja (Studi Kasus di SMA Negeri 1 Demak)', *Indonesian Journal of Public Health and Nutrition*, 2(1), pp. 112–121.

Babey, S.H. *et al.* (2015) 'Neighborhood, family and individual characteristics related to adolescent park-based physical activity', *Preventive Medicine*, 76, pp. 31–36. Available at: https://doi.org/https://doi.org/10.1016/j.ypmed.2015.04.001.

Bélanger-Gravel A, Gauvin L, Lagarde F, L.M. (2015) 'Correlates and moderators of physical activity in parent-tween dyads: a socio-ecological perspective', *Public Health*, Sep;129(9), pp. 1218–23. Available at: https://doi.org/10.1016/j.puhe.2015.05.019.

Biddle, S.J.H. (2021) 'Physical activity research in Australia: A view from exercise psychology and behavioural medicine', *Asian Journal of Sport and Exercise Psychology*, 1(1), pp. 12–20. Available at: https://doi.org/10.1016/j.ajsep.2021.03.006.

CDC (2016) 'Centers of Disease Controls and Prevention'.

Devis, J. *et al.* (2017) 'Longitudinal changes in physical activity, sedentary behavior and body mass index in adolescence: Migrations towards different weight cluster', *PLoS ONE*, 12(6), pp. 1–15. Available at: https://doi.org/10.1371/journal.pone.0179502.

Downward, P. and Rasciute, S. (2016) '"No man is an island entire of itself." The hidden effect of peers on physical activity: John Donne, Meditation XVII', *Social Science & Medicine*,

169, pp. 149–156. Available at: https://doi.org/https://doi.org/10.1016/j.socscimed.2016.09.038.

Edwardson, C.L. and Gorely, T. (2010) 'Parental influences on different types and intensities of physical activity in youth: A systematic review', *Psychology of Sport and Exercise*, 11(6), pp. 522–535. Available at: https://doi.org/https://doi.org/10.1016/j.psychsport.2010.05.001.

Eime, R., Harvey, J. and Charity, M. (2024) 'Australian sport and physical activity behaviours pre, during and post-COVID-19', *BMC Public Health*, 24(1). Available at: https://doi.org/10.1186/s12889-024-18245-y.

Farradika, Y. *et al.* (2019) 'Perilaku Aktivitas Fisik dan Determinannya pada Mahasiswa Fakultas Ilmu - Ilmu Kesehatan Universitas Muhammadiyah Prof. Dr. Hamka', *ARKESMAS (Arsip Kesehatan Masyarakat)*, 4(1), pp. 134–142. Available at: https://doi.org/10.22236/arkesmas.v4i1.3548.

Fuentealba-Urra, S. *et al.* (2022) 'Physical activity habits and their relationship with sociodemographic factors in Chilean adolescents', *Frontiers in Psychology*, 13(August), pp. 1–11. Available at: https://doi.org/10.3389/fpsyg.2022.915314.

Kosnayani, A.S. and Aisyah, I.S. (2016) 'Faktor Risiko Yang Berhubungan Dengan Obesitas Remaja', *Siliwangi*, 2(2), p. 128.

Kowalski, K.C. *et al.* (2004) 'The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) Manual', (August).

Kurdanti, W. *et al.* (2015) 'Faktor-Faktor yang Mempengaruhi Kejadian Obesitas Pada Remaja', *Jurnal Gizi Klinik Indonesia*, 11(4), pp. 179–190.

Lisboa, T. *et al.* (2021) 'Social support from family and friends for physical activity in adolescence: Analysis with structural equation modeling', *Cadernos de Saude Publica*, 37(1). Available at: https://doi.org/10.1590/0102-311X00196819.

Mendonça, G. *et al.* (2014) 'Physical activity and social support in adolescents: A systematic review', *Health Education Research*, 29(5), pp. 822–839. Available at: https://doi.org/10.1093/her/cyu017.

Micklesfield, L.K. *et al.* (2021) 'Adolescent physical activity, sedentary behavior and sleep in relation to body composition at age 18 years in urban South Africa, Birth-to-Twenty+ Cohort', *BMC Pediatrics*, 21(1), pp. 1–14. Available at: https://doi.org/10.1186/s12887-020-02451-9.

Ministry of Health RI(2018) Basic Health Research 2018.Indonesia Ministry of Health.

Monica (2018) *Hubungan Antara Dukungan Teman Sebaya Dan Perilaku Sehat Pada Mahasiswa*.

Mutia, A., Jumiyati, J. and Kusdalinah, K. (2022) 'Pola Makan Dan Aktivitas Fisik Terhadap Kejadian Obesitas Remaja Pada Masa Pandemi Covid-19', *Journal of Nutrition College*, 11(1), pp. 26–34. Available at: https://doi.org/10.14710/jnc.v11i1.32070.

Pedro Silva, Michael Sousa, Carla Sa´, J.R. and J.M. (2014) 'Physical activity in high school during "free-time" periods', *European Physical*

Education Review, 17(1), pp. 3–17. Available at: https://doi.org/10.1177/13....Article.

Pertiwi, Y. and Niara, S.I. (2022) 'Pencegahan Obesitas pada Remaja Melalui Intervensi Promosi Kesehatan: Studi Literatur', *Jurnal Ilmiah Kesehatan Masyarakat : Media Komunikasi Komunitas Kesehatan Masyarakat*, 14(2), pp. 96–104. Available at: https://doi.org/10.52022/jikm.v14i2.278.

Rachmayani, S.A., Kuswari, M. and Melani, V. (2018) 'Hubungan Asupan Zat Gizi dan Status Gizi Remaja Putri di SMK Ciawi Bogor', *Indonesian Journal of Human Nutrition*, 5(2), pp. 125–130. Available at: https://doi.org/10.21776/ub.ijhn.2018.005.02.6.

Ramchand R, Ahluwalia SC, Xenakis L, Apaydin E, Raaen L, G.G. (2017) 'A systematic review of peer-supported interventions for health promotion and disease prevention', *Prev Med*, 101, pp. 156–170. Available at: https://doi.org/10.1016/j.ypmed.2017.06.008.

Sabar, M.S., Rizal, A. and Juhanis (2019) 'Survei Sarana Dan Prasarana Olahraga Terhadap Efektifitas Pembelajaran Penjas Di SMA Negeri 1 Pangkep', *Fakultas Ilmu Keolahragaan, Universitas Negeri Makasar* [Preprint].

Santrock, J.W. (2003) *Adolescense. Perkembangan Remaja*. Edisi Keen. Edited by Erlangga. Jakarta.

Shi, Z., Lien, N. and Kumar, B.N. (2006) 'Physical activity and associated socio-demographic factors among school adolescents in Jiangsu Province, China', *Preventive Medicine*, 43(3), pp. 218–21. Available at: https://doi.org/10.1016/j.ypmed.2006.04.017.

Sudikno *et al.* (2015) 'FAKTOR RISIKO OVERWEIGHT DAN OBESE PADA ORANG DEWASA DI INDONESIA (Analisis Data Riset Kesehatan Dasar 2013) Risk Factors of Overweight and Obese in Indonesian Adults (Analysis Data of Basic Health Research 2013)', *Gizi Indonesia*, 38(2), pp. 91–104.

WHO (2016) *WHO Guidelines on physical activity and sedentary behaviour*, *Routledge Handbook of Youth Sport*.

Widiantini, W. and Tafal, Z. (2014) 'Aktivitas Fisik, Stres, dan Obesitas pada Pegawai Negeri Sipil', *Kesmas: National Public Health Journal*, (4), p. 325. Available at: https://doi.org/10.21109/kesmas.v0i0.374.

Williams, B. *et al.* (2010) 'Low exercise among children with asthma: A culture of over protection? A qualitative study of experiences and beliefs', *British Journal of General Practice*, 60(577), pp. 319–326. Available at: https://doi.org/10.3399/bjgp10X515070.

Yao, C.A. and Rhodes, R.E. (2015) *Parental correlates in child and adolescent physical activity: A meta-analysis*, *International Journal of Behavioral Nutrition and Physical Activity*. Available at: https://doi.org/10.1186/s12966-015-0163-y.