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The Associations Between Social Media Use with Eating Behavior, Physical Activity, and Nutrition Status among Adolescents in DKI Jakarta

Hubungan Pola Penggunaan Media Sosial dengan Perilaku Makan, Aktivitas Fisik, dan Status Gizi pada Remaja di DKI Jakarta

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ABSTRACT

Background: Increased adolescent social media use can lead to lower physical activity. In addition, the growth of marketing of unhealthy foods and drinks is inevitable. In short, excessive social media use may negatively impact nutrition problems, eating behavior, and physical activities.
Objectives: This study aimed to determine the relationship between patterns of social media use and nutrition status, eating behavior, and physical activity among adolescents in DKI Jakarta.
Methods: The study was cross-sectional and involved 187 students from public high schools in Jakarta. Data was collected using the Food Frequency Questionnaire (FFQ), the International Physical Activity Questionnaire (IPAQ), the use of social media questionnaire, and an anthropometric assessment to measure body mass index for age. The statistical analysis used was the chi-square test.
Results: No significant association were found between the frequency and duration of social media use and nutrition status. The type of exposure to social media content does not show a significant relationship with nutrition status, eating behavior, and physical activity. However, there were significant associations between frequency (p=0.022) and duration (p=0.003) of social media use and eating behavior. Likewise, there was a significant relationship between frequency (p=0.021) and duration (p=0.005) of social media use with physical activity.
Conclusions: Duration and frequency of social media use are associated with riskier eating patterns and lower adolescent physical activity. Therefore, nutrition education in adolescents should also include topics on social media use.

INTRODUCTION

Due to the growth of the internet, social media has become one of the most widely used technological advances in Indonesia[1]. Based on a survey conducted by the Indonesian Internet Service Providers Association (2022), social media is the most accessed content, with 89.15% of all internet users visiting social media pages[2]. Most social media users are individuals aged 14-25 named "Digital Natives"[3]. Hence, social media has become an integral part of the daily life of the younger generation, which may, in turn, affect the individual's behavior.

One of the impacts of social media use is nutrition. It could affect the nutrition status of its users because it can modify the pattern of physical activity and eating behavior. This behavior is especially true in adolescents, a vulnerable age group for the problem of overnutrition, which includes overweight and obesity. Based on data from the World Health Organization, the global prevalence of adolescents who are obese was 6.8% in 2016. The obesity prevalence is higher compared to only 4.9% in 2010 and 2.9% in 2000[4]. Indonesia is no exception from this global increase in the prevalence of overnutrition among adolescents. The prevalence is especially high in urban areas, such as Jakarta. Based on Basic Health Research data in 2018, in DKI Jakarta Province, the prevalence of overnutrition (BMI-for-age) in adolescents aged 13-15 years was 15.14% overweight and 10.01% obese. Meanwhile, in adolescents aged 16-18 years, 12.76% were reported overweight and 8.29% obese[5].

The main hypothesis is overnutrition in this age group happened due to changes in diet and physical activity that are influenced by patterns of myriads of things, one of those factors is the pattern of their social media use. This shift is not only associated with the use

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of social media but also the content accessed, which offers a "hype and trendy" description of the Western lifestyle, especially fast food. The Western diet, on average, contains high energy, high sugar, fat, and salt, and is low in fibre, and it comes from consuming fast food, ultra-processed foods, and drinks[6]. On the other hand, adolescents can use social media for 2-3 hours and even more daily, leading to low physical activity and reducing their energy use[7]. Simultaneously, changes in eating habits and physical activity will contribute to changes in nutrition status.

Research by Wijaya in 2019 on individuals aged 18-25 years regarding eating behavior showed that 38.8% of respondents access culinary content on social media to find references about food and places to eat, 63.9% of respondents are easily influenced by culinary content both by pictures and videos, and 54.6% of respondents will place food orders when viewing content on social media. The study also highlighted a significant positive correlation (r=0.294) (p=0.002) between the intensity of smartphone use and eating behavior[8]. In addition to affecting eating behavior, social media usage patterns can also affect physical activity. Increased social media use is often parallel to sedentary behavior. Waluyo et al. 2019 found that among junior high school students, the relationship between social media use and physical activity showed a non-significant and weak correlation (r=0.005) (p=0.928)[9].

Considering the ingrained importance of social media use and the potential impact of excessive use on nutrition status among adolescents and the high prevalence of overweight and obesity among adolescents in Jakarta province, this study aimed to analyze the associations between the pattern of social media use with eating behavior, physical activity, and nutrition status among adolescents in Jakarta province.

METHODS

This study was an analytic observational study with a cross-sectional design. The sampling technique used was stratified random sampling. The total sample for this study was 187 high school students randomly selected from 2 public high schools in Jakarta province. The sample size calculation used 2.0 software; the minimum sample size was multiplied by two, and 10% was added to anticipate dropout. The inclusion criteria were as follows: age ranged 16-18 years old, currently studying at SMAN 9 Jakarta and SMAN 53 Jakarta, residing in DKI Jakarta, having an active social media account minimum one account, able to communicate well, received permission from homeroom teacher and willing to become research respondents. The exclusion criteria were adolescents who refused to participate or did not complete the questionnaire.

Anthropometry was measured using a weight scale and *microtoise* to calculate the Body Mass Index (BMI). The measurements were conducted by researchers and trained enumerators who were nutrition students. Social media usage patterns were identified using a questionnaire containing frequency, duration, and content exposure (culinary and physical activity content). The researchers focused on health-conscious content regarding food and physical activity for exposure. This exposure includes content related to healthy food preparation and access and content that encourages physical activity, such as fitness-related content. The questionnaire was modified from Artadini's research in 2022[10]. For this questionnaire, validity and reliability tests were conducted on 30 respondents at SMAN 51 Jakarta.

Data on eating behavior and physical activity level were collected using the Food Frequency Questionnaire (FFQ) and International Physical Activity Questionnaire (IPAQ). The Food Frequency Questionnaire (FFQ) was adapted from Amelia's research in 2022[11], while the International Physical Activity Questionnaire (IPAQ) short form was adapted from HSE research in 2002[12]. Food Frequency Questionnaire (FFQ) contains staple foods, animal source food, vegetables, fruit, and "risky foods" (sweet, salty, oily). International Physical Activity Questionnaire (IPAQ) results were categorized into light, medium and heavy according to METs calculations[12].

The research entitled "The Relationship between Social Media Use Patterns with Eating Behavior and Physical Activity in Adolescents in Jakarta Province" was carried out with research ethics approval issued by the National Development University "Veteran" Health Research Ethics Commission Jakarta with number 124/V/2023/KEPK.

RESULTS AND DISCUSSION

Results presented in Table 1 showed that most respondents were aged 16-17 years, with proportions of 41.7% and 40.6%, respectively; this age is the late adolescent phase. The gender distribution was relatively balanced, but the number of male adolescents was slightly higher at 50.8% of the total respondents. As for the nutrition status, most respondents had normal nutrition status (64.7%). However, there were also about 10% of adolescents with undernutrition and almost 25% of adolescents with overnutrition and obesity.

Table 1. Distribution of respondent characteristics (2023)

Characteristics	Frequency	%
Age		
16 years old	78	41.7
17 years old	76	40.6
18 years old	33	17.6
Gender		
Male	95	50.8
Female	92	49.2
School		
SMAN 9 Jakarta	102	54.5
SMAN 53 Jakarta	85	45.5

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Characteristics	Frequency	%
Class		
X (10th grade)	62	33.2
XI (11th grade)	125	66.8
Nutrition status		
Undernutrition	20	10.7
Normal	121	64.7
Overweight	23	12.3
Obese	23	12.3

The overview of the social media use pattern in Table 2 shows that most respondents (64.2%) use social media with a high frequency of more than four times/day but with a short duration of 1-3 hours/day, 106 respondents (56.7%). Regarding content accessed, most respondents were exposed to various kinds of culinary content (54%) and physical activity content (60.4%). More than half (54%) had good eating practices for eating behaviour and physical activity, and 46% had moderate physical activity.

Table 2. Overview of social media use, eating behavior, and physical activity

Variable	Frequency	%
Frequency		
Low (1-4 times/day)	67	35.8
High (>4 times/day)	120	64.2
Duration		
Low (1-3 hours/day)	106	56.7
High (>3 hours/day)	81	43.3
Content exposure (culinary content)		
Exposed	101	54
Not exposed	86	46
Content exposure (physical activity content)		
Exposed	113	60.4
Not exposed	74	39.6
Eating behavior		
Good	102	54.5
Bad	85	45.5
Physical activity		
Light	28	15
Moderate	86	46
Severe	73	39

Bivariate analysis in Table 3 showed a significant association between the frequency of social media use and eating behaviour (p-value=0.022), where adolescents with a higher frequency of social media use tended to have worse eating habits. More than half (51.7%) of respondents with a high frequency of social media use or accessing social media at least four times per day have poor eating behavior. On the other hand, the majority (65.7%) of respondents with a lower frequency of social media use tended to have good eating behavior. In addition, there was also a significant association between the duration of social media use and eating behavior (p-value=0.003). The majority, 58% of respondents with a longer duration of social media use or accessing social media at least 3 hours or more per day, have poor eating behaviour. While respondents with a low duration of social media use, the majority (64.2%) had good eating behaviour. This fact may relate to increased social media use limiting a person's time to access, prepare, and utilize healthier food.

This finding is in line with Amelia's research in 2022, which mentioned a significant relationship between the frequency of using Instagram social media and eating an unbalanced diet (p-value=0.046) and a significant relationship between the duration of using Instagram social media with eating an unbalanced diet (p-value=0.026)[11]. Research on adolescents aged 13-15 years in Kendal also showed similar results, namely a significant relationship between the duration of electronic device use and less healthy diet with a p-value of 0.014. Duration of screen time is an external factor that affects a person's behavior or diet. This factor happens because there are advertisements and promotions on smartphones or social media regarding culinary, most of which have been influenced by the latest lifestyles, such as risky foods that contain high sugar, salt, and fat[13].

Table 3. Associations between frequency and duration of social media use, eating behavior, and physical activity

Variable	Frequency of Social Media Use				*p-value*	Duration of Social Media Use				*p-value*
	High		Low			High		Low		
	n	%	n	%		n	%	n	%	
Eating behavior										

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Bad	62	51.7	23	34.3		47	58	38	35.8	
Good	58	48.3	44	65.7	0.022	34	42	68	64.2	0.003
Total	120	100	67	100		81	100	106	100	
Physical activity										
Light	24	20	4	6		20	24.7	8	7.5	
Moderate	55	45.8	31	46.3	0.021	34	42	52	49.1	0.005
Severe	41	34.2	32	47.8		27	33.3	46	43.4	
Total	120	100	67	100		81	100	106	100	

The relationship between the frequency of social media use and physical activity was significant (p-value=0.021). Adolescents with low frequency of social media use tend to have moderate to high physical activity, with proportions of 46.3% and 47.8%, respectively. At the same time, 20% of adolescents with a high frequency of social media use had low physical activity compared to only 6% in the group with a low frequency of social media use. In addition, there was also a significant relationship between the duration of social media use and physical activity (p-value=0.005; $p < 0.05$). Respondents with low duration of social media use tended to have moderate (49.1%) and heavy (43.4%) physical activity. Of adolescents with a high duration of social media use, almost 25% had low physical activity compared to only 7.5% of adolescents with low physical activity in the group with a low duration of social media use.

Research conducted on high school students in Surabaya also showed a significant relationship between the intensity of social media use and exercise habits (p-value=0.000), where a higher intensity of social media use was associated with worse exercise habits[14]. These results, however, contrast with the research conducted on adolescents aged 13-15 years in Kendal. The study showed no significant relationship between social media use and physical activity (p-value=0.928). The difference in research results can be caused by external factors such as social support that varies from individual to individual[9]. The conflicting results lead to another discussion: Is social media use always harmful? Social media use is often associated with a sedentary lifestyle. The increasing use of social media, both in terms of frequency and duration, provides a shorter time for physical activities[15]. There is an interesting finding regarding the associations between social media use and physical activity among adolescents in the US. The study highlighted that among physically active students, frequent social media use was associated with a higher likelihood of vigorous daily exercise (ME 50.1%, 95% CI 49.2%-51.0%). Frequent social media use among sedentary students was associated with a lower likelihood of vigorous daily exercise (ME 15.8%, 95% CI 15.1%-16.4%)[16]. This data showed that the problem might be something other than social media use per se, but how can social media be used optimally to support adolescent health? Therefore, we observed the content accessed regarding food and physical activity, where we focused on exposure to health-conscious content regarding food and physical activity.

Table 4. Associations between Culinary Content Exposure, Eating Behavior, Physical Activity Content, and Physical Activity

Eating Behavior	**Culinary Content Exposure**				***p-value***
	Exposed		**Not Exposed**		
	n	**%**	**n**	**%**	
Bad	50	49.5	35	40.7	**0.228**
Good	51	50.5	51	59.3	
Total	101	100	85	100	
Physical Activity	**Physical Activity Content Exposure**				***p-value***
	Exposed		**Not Exposed**		
	n	**%**	**n**	**%**	
Light	13	11.5	15	20.3	**0.157**
Moderate	51	45.1	35	47.3	
Severe	49	43.4	24	32.4	
Total	113	100	74	100	

This study found that the relationship between health-conscious culinary content exposure and eating behavior was insignificant (p-value=0.228). This relationship can occur because exposure to content on social media must be applied to an action in real life so that exposure to culinary content can impact the eating behavior of someone exposed to healthy content. However, its impact may be indirect and easily measured. Such exposures are expected to affect a person's eating habits. Content shared by friends and influencers is highly likely to influence their followers to buy and consume food and drinks shared on social media. However, exposure to content may not directly affect a person's eating habits. Not everyone who likes culinary content can be influenced and change their diet for the better or the worse. Our findings provide added insight that the influence of frequency and duration of exposure is greater on eating behavior and possibly nutrition status when compared to the influence of the type of content presented or exposed. Like its relationship with eating behavior, the association between exposure to physical activity content and actual level of physical activity obtained a nonsignificant result (p-value=0.157).

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Table 5. Associations between frequency and duration of social media use and nutrition status

Variable	Nutrition Status										*p-value*
	Undernutrition		Normal		Overweight		Obese		Total		
	n	%	n	%	n	%	n	%	N	%	
Frequency of Social Media Use											
High	14	7.5	76	40.6	17	9.1	13	7	120	100	
Low	6	3.2	45	24.1	6	3.2	10	5.3	67	100	0.588
Total	20	10.7	121	64.7	23	12.3	23	12.3	187	100	
Duration of Social Media Use											
High	10	5.3	48	25.7	13	7	10	5.3	81	100	
Low	10	5.3	73	39	10	5.3	13	7	106	100	0.448
Total	20	10.7	121	64.7	23	12.3	23	12.3	187	100	

This study attempts to answer important questions on the roles of social media use in adolescents' food habits and physical activity, especially in urban settings. It offers insight into how the frequency and duration of social media use are more determining than the exposure to certain content. However, in a more targeted evaluation, there is evidence of promising results for social media use in improving healthy behavior among its users. For example, in the Indonesian context, using social media platforms to reduce sugar, salt, and fat consumption among young females in urban areas showed that such an approach is effective[17]. A mixed method study in the UK during the COVID-19 pandemic also showed positive results regarding using social media to inform their audience on health messages related to physical activity, healthy diet, and quality of life[18]. Therefore, public health campaigns should not disregard social media as an important platform; on the contrary, they should invest more in making health-related content highly available, visible, and accessible to balance the unhealthy content distributed. In addition, social media or online literacy should also be an important skill to develop among adolescents to choose "healthy" content wisely for their well-being.

CONCLUSIONS

This study found a significant relationship between the frequency and duration of social media use and eating behavior, where adolescents with higher frequency and longer duration tend to have worse eating habits (p=0.022 and p=0.003, respectively). Likewise, the association between the frequency and duration of social media use with physical activity was also statistically significant, where adolescents with higher frequency and longer duration of social media use tend to have more moderate physical activity (p=0.021 and p=0.005, respectively). However, we found no significant correlation between the pattern of social media use and BMI (p > 0.05). In addition, we also found that exposure to health-conscious culinary and physical activity topics did not show significant associations with eating habits and physical activity among study participants (p > 0.05). These results offer insight into how frequency and duration of social media use are more determining for eating behavior and physical activity among adolescents than exposure to certain health-conscious contents. However, in a more targeted evaluation, there is evidence of promising results for social media use in improving healthy behavior among its users. Therefore, public health campaigns should not disregard social media as an important platform; on the contrary, they should invest more in making health-related content highly available, visible, and accessible to balance the unhealthy content distributed. In addition, wise social media use among adolescents should also be an important skill to develop to choose content that benefits their health.

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