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Correlation between Physical Activity and Happiness: A Cross-Sectional Study in Medan

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ABSTRACT

Introduction: Physical activity contributes to mental well-being by stimulating neurotransmitters associated with pleasure and positive mood. Understanding this relationship within specific populations is important for promoting community health. **Objective:** This study aimed to evaluate the correlation between physical activity and happiness among residents of Medan, Indonesia. **Methods:** This cross-sectional study was conducted in Medan from May to November 2021 and involved 260 participants. Physical activity was assessed using the International Physical Activity Questionnaire, while happiness and affect were measured using the Oxford Happiness Questionnaire and the Positive and Negative Affect Scale. Data were analyzed using Spearman's rank correlation test. **Results:** Overall physical activity was positively correlated with happiness ($r = 0.132$; $p = 0.034$) and positive affect ($r = 0.214$; $p = 0.001$). Vigorous physical activity showed positive correlations with happiness ($r = 0.185$; $p = 0.003$) and positive affect ($r = 0.244$; $p = 0.001$). Walking was also positively correlated with happiness ($r = 0.132$; $p = 0.034$) and positive affect ($r = 0.214$; $p = 0.001$). Moderate physical activity was not correlated with happiness ($r = –0.017$; $p > 0.05$) or positive affect ($r = 0.065$; $p > 0.05$). No correlation was found between physical activity and negative affect. **Conclusions:** Physical activity is positively correlated with happiness among residents of Medan.

Keywords: happiness, negative affect, physical activity, positive affect

1. Introduction

Happiness is a positive emotional state [1, 2] that is one of the basic needs of human life [3]. There are three components in happiness such as feelings (affective well-being), meaning of life (eudaimonic well-being), and life satisfaction (evaluative well-being) [4, 5]. Happiness includes subjective perceptions that fluctuate [2]. Happiness is influenced by many factors, including education, income, family and social relationships, genetics, marital status, physical activity, and health [5].

Happiness is an important indicator of overall physical and mental well-being. Its relationship with health is influenced by daily lifestyle habits such as levels of physical activity and dietary patterns, as well as underlying biological processes. Physical activity contributes positively to health by reducing the risk of sedentary-related conditions, including metabolic syndrome and obesity. Furthermore, regular physical activity has been shown to lower the risk of several diseases, such as colon, endometrial, breast, and lung cancers, as well as psychological disorders, including anxiety and depression [5, 10].

Besides having great health benefits, physical activity is also correlated with happiness [11]. There is a

reciprocal relationship between physical activity and happiness. Physiologically, physical activity can increase the secretion of dopamine, serotonin, and noradrenaline, which play a role in regulating the perception of positive emotions in the brain [12]. Feelings of happiness after doing activities can be stored as memory in the brain, triggering the emergence of intrinsic motivation and forming routine habits of being active [11, 13].

Previous research has consistently shown a positive relationship between physical activity and happiness [14]. Moderate and vigorous intensity physical activity has been associated with greater levels of happiness [15, 17], and engaging in leisure-time physical activity for health or fitness reasons has also been linked to improved well-being [18]. Building on this evidence, the present study aims to examine the correlation between physical activity and happiness among residents of Medan City. Medan was selected as the study location because it represents a diverse urban community with varying lifestyle patterns, levels of physical activity, and socioeconomic backgrounds. These characteristics provide a relevant context for examining how physical activity contributes to subjective well-being in an urban Indonesian population.

2. Methods

This observational analytic study employed a cross-sectional design with consecutive sampling. The minimum required sample size was 260 participants, all of whom were Medan residents aged 18–40 years with no history of mental disorders. Data were collected online using self-administered questionnaires. Eligible individuals who met the inclusion criteria were invited to participate until the required sample size was achieved. Inclusion criteria were being 18–40 years old, residing in Medan, and providing informed consent. Individuals diagnosed with mental disorders or those who submitted incomplete questionnaires were excluded.

The happiness was analysed using the Oxford Happiness Questionnaire (OHQ) (Hills & Argyle, 2002) [19]. This questionnaire consists of 29 question items. An example of the item used is "I feel that life is very useful". There are six scales for the respondents' answer: (1) strongly disagree; (2) disagree; (3) slightly disagree; (4) somewhat agree; (5) agree; (6) strongly agree. The happiness score is interpreted based on the Stephen Wright range method: the higher the score, the higher the level of happiness. Based on the scores, happiness was categorized into unhappy (1-2), less happy (2-3), neutral (3-4), relatively happy (4), happy (4-5), very happy (5-6), and happiest (6) [20]. This OHQ questionnaire had been translated into Bahasa in a previous study, and the translated version was further tested for validity and reliability in our study population [21].

The mood and emotion were analysed using the Positive and Negative Scale (PANAS) [22]. This short-scale consists of 20 items, with 10 items measuring positive affect (eg, excited, inspired) and 10 items measuring negative affect (eg, annoyed, afraid). Each item was rated using a Likert scale of 1: almost never, 2: rarely, 3: sometimes. 4: often, 5: almost all the time. The PANAS scale assesses the respondent's positive and negative affect in the past week. This PANAS scale has also been translated into Bahasa according to a previous study and also had good validity and reliability [23]. The physical activity was analysed using the International Physical Activity Questionnaire short form (IPAQ short version) [24]. The question items in the short version of the IPAQ have been structured and provide separate scores for walking, moderate-intensity activities, and vigorous-intensity activities. The MET-minutes/week calculation is used to determine the amount of energy expended in a week. The levels of physical activity are grouped into three categories: high, medium, or low according to the criteria for each category. Based on the total MET, individuals can be classified into less active ($0 \leq$METs<600), moderate-active ($600 \leq$ METs<3000), and very active (>3000 METs) [25]. There are several studies that have used the IPAQ to measure the level of physical activity [26, 28]. The Spearman rank correlation test was used to analyse the correlation between physical activity and happiness. This study was approved by the Research Ethics Committee of Universitas Sumatera Utara (Ethical Clearance No. 87, Date: August 31^{st,} 2021).

3. Results

The study included respondents aged 21 years (33.8%), mostly female (74.2%), and students (90.8%). Most reported moderate (53.8%), high (26.9%), or low (19.2%) levels of physical activity. As the data were ordinal and subgroup analyses were not performed, results are presented for the overall sample. Respondents were recruited from various subdistricts in Medan, providing geographic diversity despite the predominance of female students. The majority of respondents in this study were happy (51.9%), very happy (12.7%), relatively happy (0.4%), neutral (30.4%), less happy (4.2%), and unhappy (0.4%) (Table 1). Compared to previous studies, the level of physical activity in Medan residents found in this study was higher than the level of physical activity of office workers in Jakarta, with 59% of respondents being less active or in the low category.[29] This difference may also be due to the fact that 19% of respondents in the Abadini and Wuryaningsih study in 2018, who did not perform any physical activity at all (METs score = 0), were still

analysed, while in this study, they were excluded during data processing. Another possibility can also be due to the fact that the majority of subjects in this study were young adults and students.

Table 1. The characteristics of the respondents

Characteristics		n	(%)
Age (years old)			
-	18 – 20	139	53.5
-	21 – 23	107	41.1
-	24 – 26	11	4.2
-	28 – 35	3	1.2
Sex			
-	Male	67	25.8
-	Female	193	74.2
Education level			
-	Undergraduate	86	33.1
-	High school	174	66.9
Profession			
-	Medical doctor	1	0.4
-	Private employee	12	4.6
-	Students	236	90.8
-	Entrepreneur	2	0.8
-	Others	9	3.5
Regions			
-	Medan Amplas	17	6.5
-	Medan Area	9	3.5
-	Medan Barat	7	2.7
-	Medan Baru	26	10.0
-	Medan Deli	18	6.9
-	Medan Denai	19	7.3
-	Medan Helvetia	10	3.8
-	Medan Johor	18	6.9
-	Medan Kota	17	6.5
-	Medan Labuhan	2	0.8
-	Medan Maimun	1	0.4
-	Medan Marelan	11	4.2
-	Medan Perjuangan	13	5.0
-	Medan Petisah	2	0.8
-	Medan Polonia	1	0.4
-	Medan Selayang	22	8.5
-	Medan Sunggal	16	6.2
-	Medan Tembung	35	13.5
-	Medan Timur	6	2.3
-	Medan Tuntungan	10	3.8
Income			
-	No income	232	89.2
-	Less than IDR 1.800.000	11	4.2
-	IDR 1.800.001 - 3.000.000	9	3.5
-	IDR 3.000.001 - 4.800.000	6	2.3
-	More than IDR 7.200.000	2	0.8
Level of physical activity			
-	Low	50	19.2

Characteristics		n	(%)
-	Moderate	140	53.8
-	High	70	26.9
Level of happiness			
-	Not happy	1	0.4
-	Less happy	11	4.2
-	Neutral	79	30.4
-	Relatively happy	1	0.4
-	Happy	135	51.9
-	Very happy	33	12.7

This study found the average of physical activity in the community was 2695.72 MET-minutes/week. Physical activity levels ranged from 28 to 43,225 MET-minutes/week, with a mean of 2,695.72 ± 3,785.19 MET-minutes/week. The average of heavy physical activity was 749.82 MET-minutes/week, moderate physical activity was 1437.02 MET-minutes/week, and walking was 542.98 MET-minutes/week. The average score of happiness was 4.23. The lowest score of happiness was 1.48, and the highest score was 5.76. The average value of positive affect was 36.34, while the average value of negative affect was 30.41 (Table 2).

Table 2. The levels of physical activity and happiness among the respondents

Variables	Mean	Range	SD
Physical activity (MET-minutes/week)	2695.72	28-43225	3785.19
Heavy activity	749.82	0-36120	2509.62
Moderate activity	1437.02	0-11760	1936.57
Walking	542.98	0-11088	1250.60
Happiness	4.23	1.48-5.76	0.67
Positive affect	36.36	21-50	5.61
Negative affect	30.41	12-49	6.87

This study found there was a low positive correlation between the total physical activity and happiness (r=0.132; p=0.034), strenuous physical activity and happiness (r=0.185; p=0.003), and walking with happiness (r=0.132; p=0.034). However, there was no correlation between moderate activity and happiness (r=-0.017; p>0.05) (Table 3). This finding is consistent with several previous studies that also found a significant relationship between physical activity and happiness [14, 25, 28, 30, 32]. The previous study also found a significant relationship between strenuous physical activity, walking, and happiness, but not between moderate physical activity and happiness [32]. The previous study that was conducted on first-year medical students in Cyprus also found a positive correlation between strenuous physical activity and happiness, but no correlation between total physical activity, moderate physical activity, or walking with happiness [28].

Table 3. The correlation between physical activity and happiness, positive affect, and negative affect

Variables	Happiness (r value)	Positive affect (r value)	Negative affect (r value)
Strenuous activity	0.185**	0.244**	-0.091
Moderate activity	-0.017	0.065	0.029
Walking	0.132*	0.214**	-0.033
Total physical activity	0.132*	0.214**	-0.089

*p < 0.05; **p < 0.01

This study found there was a positive correlation between total physical activity and positive affect (r=0.214; p=0.001), a positive correlation between strenuous physical activity and positive affect (r=0.244; p=0.000), and a positive correlation between walking and positive affect (r=0.214; p=0.001) (Table 3). These findings are strengthened by the study conducted by Schutte et al. in [33] that found the higher affective response was associated with the more frequent frequency of regular exercise, and the relationship was also influenced by

genetic factors. Another study conducted by Chen et al. in [34] with an experimental design also found a relationship between physical activity and positive affect.

4. Discussion

This study found no correlation between total physical activity, moderate physical activity, or walking and negative affect (Table 3). These findings differ from the study by Zhang et al. [35], which reported a relationship between physical activity and subjective well-being, including happiness, positive affect, negative affect, and life satisfaction among 723 university students in Beijing. Specifically, moderate-intensity physical activity was positively associated with happiness and positive affect and negatively associated with negative affect, whereas walking showed no association with any affective measures [35].

The discrepancy between these results and previous findings may be explained by several factors. Happiness and negative affect are influenced by stress levels [36, 37], social relationships [38], personality traits, optimism [39], work type, residential location [36], culture, and genetics [40]. Physical activity is known to increase the secretion of monoamines such as dopamine, serotonin, and noradrenaline [41, 44], which contribute to positive mood and feelings of happiness [45]. In addition, physical activity can raise blood beta-endorphin levels, which indirectly enhances dopamine release and further promotes positive affect [46, 47].

This study has several limitations that may contribute to the observed discrepancies. First, the data were ordinal, and subgroup analyses were not conducted, so results are presented for the overall sample. Second, the sample predominantly consisted of female students, which limits generalizability to the broader Medan population. Third, other unmeasured factors affecting affective states, such as lifestyle, psychological stress, and social support, were not controlled for in this study. Future research should aim for more diverse and balanced samples and consider additional factors influencing affective outcomes.

5. Conclusion

This study concluded that there was a low positive correlation between physical activity and happiness, and a positive correlation between physical activity and positive affect among the residents of Medan city. These findings highlight the potential benefits of promoting physical activity to enhance well-being in this population. Future research should aim to include more diverse and balanced samples, consider additional factors influencing affective states, and explore the effects of different types and intensities of physical activity on emotional health.

6. Data Availability Statement

The original contributions presented in the study are included in the article/supplementary material; further inquiries can be directed to the corresponding author.

7. Ethical Statement

This study was approved by the Research Ethics Committee of Universitas Sumatera Utara (Ethical Clearance No.: 89/KEP/USU/2021, Date: August 31st, 2021).

8. Author Contributions

All authors contributed to the design and implementation of the research, data analysis, and finalizing the manuscript.

9. Funding

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11. Conflict of Interest

The authors declare no conflict of interest.

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