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# ANALYSIS OF PATTERNS, DIFFERENCES AND RELATIONSHIPS BETWEEN MENTAL HEALTH INFORMATION SEARCH AND PHSICAL ACTIVITY INFORMATION IN INDONESIA

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#### Abstract

The high cases of mortality and mental disorders during the COVID-19 pandemic have led to a phenomenon of health information-seeking behavior as an effort to maintain quality of life. This study aims to examine the patterns, differences, and relationships between searches for mental health information and physical activity information in Indonesia over the past 85 months (January 2018-January 2025). A cross-sectional study design with descriptive statistical tests, Kruskal-Wallis, and Spearman rank correlation was applied to analyze Google Relative Search Volume (RSV) data from various search terms in the categories of mental health (stress, anxiety, depression) and physical activity (running, weight training, boxing, camping). The results indicate that public interest in mental health information and physical activity information has increased based on the average RSV during the COVID-19 pandemic, except for boxing information. The Kruskal-Wallis test revealed significant differences in RSV between the search terms tested (p<0.05), with 'anxiety' (rank sum=36503) and 'stress' (rank sum=35288) being the most popular search terms over the past 85 months. Meanwhile, the Spearman rank test showed a significant positive correlation (p<0.05) between all mental health-related search terms (stress, anxiety, and depression) and the search term 'running' with a moderate correlation, as well as 'weight training' with a moderate to strong correlation. This study contributes to understanding the high public interest in mental health issues, which is connected to the search for information on running and weight training as potential therapies practiced by the public.

Keywords: COVID-19, Mental health information, Physical activity information

#### **INTRODUCTION**

The cumulative global death toll due to the Coronavirus Diseases 2019 (COVID-19) pandemic is reported to be around 7 million people as of May 2023 (Elflein, 2024). In the same report, the death toll from COVID-19 in Indonesia reached more than 160 thousand people, and became the highest number among countries in the Southeast Asian region. The massive number of COVID-19 cases also has implications for an increase in the prevalence of anxiety and depression globally by 25% (WHO, 2022). Meanwhile, the prevalence of anxiety (26.7%) in the



same year was more experienced by Indonesian adolescents compared to depressive disorders (5.3%) (I-NAMHS, 2022). The high mortality rate and prevalence of mental disorders have encouraged people to seek health information as an effort to maintain quality of life during the pandemic. Moreover, the search for health information accessed digitally is diverse, ranging from alternative medicine (Rokhmah et al., 2021), vaccination and self-care (Nihar & Kattari, 2024), to the type of physical activity is also explored (Furkan et al., 2021; Kutlay et al., 2022). This shows an increase in health literacy in the community, where one of the perceptions built is that exercise is an effective way to increase the body's immunity.

The official end of the COVID-19 pandemic in Indonesia has added to the perception of how people interpret physical activity. Not only as an effort to maintain a healthy body, but physical activity is also a channel to express individual feelings. This behavior can be seen from the rise of posts on social media, especially TikTok, where users share moments of exercise with sad captions and mellow soundtracks accompanied by relevant hashtags (such as; #sadlari and #sadgym). This phenomenon shows that participation in physical activity provides greater freedom in expressing the emotions felt (Lupu & Özcan, 2014). Physical activity that many people do is now also a way to share more personal feelings in a more general format, and can be accessed until it is replicated by a wide audience and then trending on the virtual network. The trending of this phenomenon is an expansion of the search for health information, especially the mental aspect.

Mental health information-seeking behaviors have been investigated by several researchers with varying study characteristics. The research of freshmen (2021) with a statistical descriptive design focused on the investigation on the source of information and mental consultation of students (411 respondents) during the COVID-19 pandemic. Meanwhile, Pearson's analysis in the study of Ma'sya & Handayani (2022) tested the correlation of health information search with mental problems in 100 samples in sub-district units. Meanwhile, Spearman's analysis in the research of Syafitri et al. (2021) involved a broader sample size (526 people from 17 provinces) to measure the relationship between Clean and Healthy Living Behaviors (PHBS) and COVID-19 information seeking and mental health. The known research gap lies in the amount of data observed and the non-expansion of the search for information on physical activity as a research variable. The extent to which seeking information about mental health can be correlated with seeking information about activity has also not been reported. Therefore, this study was conducted with the aim of measuring the difference and correlation of public interest in mental health information with physical activity information reviewed from *Google Relative Search Volume*. Visualization of search subterm data patterns (subterms) was also studied.



#### **METHODOLOGY**

This study is classified as a quantitative type with a cross-sectional design that characterizes analyzing data from a population at a certain time (Wang & Cheng, 2020). The population source of the data is secondary using *Relative Search Volume* (RSV) obtained from *Google Trends* (GT). RSV data reflects public search interest on a score scale of 0–100. GT is accessed on January 19, 2024 to retrieve RSV monthly data from the January 2018 to January 2025 time series (consisting of 85 months including; 2018 [1st to 12th month], 2019 [13th to 24th month], 2020 [25th to 36th month], 2021 [37th to 48th month], 2022 [49th to 60th month], 2023 [61st to 72nd month], 2024 [73rd to 84th month], and 2025 [85th month]).

Search *terms are* organized into two categories, each of which contains the following subterms: 1). Physical activity (running, weight training, boxing, and camping) and 2). Mental health problems (stress, anxiety, and depression). All search term data was obtained from GT (https://trends.google.com/trends/) with settings including Indonesia as a country, *custom range*: 1/1/2018–1/1/2025, *all category*, and *web search*. The use of subterms in the physical activity category is determined through the TikTok search engine search process as a reference. This social media was chosen because TikTok users in Indonesia are 157.6 million people as of July 2024, and it is the highest number of users compared to other countries (Ceci, 2024).

In addition, the existence of a filter feature on the search engine on TiTok makes it easier to search for relevant physical activities. The search on the TikTok search engine was first conducted on January 08, 2025 using the query "sports sad". The filters on the TikTok search engine are set starting from sort by "relevance", video categories "all", and date posted "last 6 months". The results of physical activities that appeared and were carried out by netizens with a background of sadness include; running, weight training, boxing, and camping. The search term "camping" is added based on algorithmic recommendations and most of the content is relevant after review. The restriction of these four physical activities is for the sake of efficiency alone. Meanwhile, the subterm "stress" was added as a research variable, because stress is the most common mental problem in Indonesians according to the Asia Care Survey 2024 (Manulife, 2024). The data of each subterm collected from GT is coded and tabulated in Microsoft Excel and then transferred and analyzed using Stata version 17. The three data analyses applied in this study include statistical descriptive analysis, comparative test (Kruskal-Wallis), and correlational test (Spearman rank).



#### **RESULTS**

# Analysis of RSV Patterns of Mental Problems and RSV Physical Activity

The results of the entire search term graph pattern are visualized in figure 1. Results in the first phase (months 1–26) showed that the term 'stress' was more searched for with an average RSV of 67.92 points and a range of minimum-maximums ranging from 51–100 points. Meanwhile, 'camping' is a more searched term in the physical activity category with an average RSV of 60.73 points with a range of 32–93 points. The next largest RSV average was followed by the search terms 'depression' (58.80 points) and 'anxiety' (52.92 points) with an RSV range of 41–100 points and 30–77 points, respectively. After the term 'camping', the next largest RSV point average was boxing (47.5) with a range of 39–83 points, running (24.5) with a range of 15–32 points, and weight training (10) with a range of 4–18 points. Moreover, a score of 100 on the terms 'stress' (16th month) and 'depression' (22nd month) indicates that the peak of interest in seeking information on mental problems occurred before the COVID-19 pandemic.

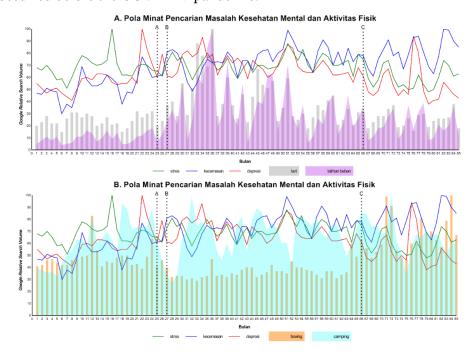


Figure 1. Mental Problem RSV and Physical Activity RSV chart.

The subterm of mental problems is compared to (A) the subterms 'running' and 'weight training'; (B) the subterms 'boxing' and 'camping'. Letter A, January 30, 2020: WHO declares COVID-19 a Public Health Emergency of World Concern [PHEIC]; B, 2 March 2020: First case of COVID-19 reported in Indonesia; C, June 21, 2023: The official determination of the end of the COVID-19 pandemic status in Indonesia. In the second phase (months 27–65) there was a dramatic increase in average RSV compared to the first phase, except for the term 'boxing' (36.61) with a



range of 29–60 points. The order of the largest to smallest RSV averages starts from the term anxiety (75.67) with a range of 49–99 points, stress (71.82) with a range of 58–88 points, depression (70.35) with a range of 56–93 points, camping (66.89) with a range of 27–99 points, running (42.05) with a range of 18–100 points, weight training (35.92) with a range of 5–100 points. Scores of 100 on the terms 'running' and 'weight training' peaked in the same month (36th). Meanwhile, the results in the third phase (months 66–85) showed a decrease in the average search for subterm RSV, except for the term anxiety (80.55) with a range of points ranging from 61–100, and boxing (66.15) with a range of 46–100 points. The average decrease in RSV in the third phase was in the form of searches with the terms 'camping' (66.45) with a range of 34–100 points, 'stress' (59.95) with a range of 48–75 points, 'depression' (53.35) with a range of 8–94 points, 'running' (25.9) with a range of 16–38, and 'weight training' (21.25) with a range of 8–39 points. The results of the overall phase show 'anxiety' as a search term for information that is more searched based on the increase in the average value of RSV from the beginning to the end.

# Analysis of the Difference in the Popularity of Information Search

The results of the Kruskal Wallis test showed a significant difference in RSV (search volume) between the search terms tested (p-value=0.0001). Rank sum results reflecting search volume also show that the search terms 'anxiety'[36503] and 'stress'[35288] dominated the search popularity of information searches over the past 85 months (see table 1). While the search term 'boxing' [20276]; 'run' [12057,5]; and 'weight training'[8737,5] had lower search popularity.

Table 1. Information search popularity ranking

Search term	Obs	Rank sum
boxing	85	20276.00
camping	85	33130.00
depresi	85	31318.00
anxiety	85	36503.00
run	85	12057.50
weight Training	85	8737.50
stress	85	35288.00

#### **Correlation Analysis Between Information Category Searches**

The results of the Spearman test showed that all search terms in the mental health category (stress, anxiety, and depression) had a significant positive correlation with the search terms 'moderate running' and 'weight training' moderately vigorously (see table 2). Meanwhile, other results showed no correlation between the search term 'anxiety' and the search term 'boxing'. However, there was a significant negative correlation between the search terms 'stress' and 'depression' (mental health category) and the search term 'boxing' in a moderately strong way. Meanwhile, the search term 'depression' produced a significantly weaker positive correlation with



'camping' searches. But the results of the search terms 'stress' and 'anxiety' and the search for 'camping' showed no correlation.

Table 2. Correlation between the term Mental Health and physical activity

Search term	run	Weight training	boxing	camping
stress	0.4112***	0.3649***	-0.3432**	-0.0148
anxiety	0.3155**	0.5949***	-0.0195	-0.0247
depression	0.4985***	0.5027***	-0.539***	0.246*
*p<0.05	**n<0.01	***n<0.001		

#### DISCUSSION

The results of the univariate analysis show that the peak point of the search for mental health information with the terms 'stress' and 'depression' occurred before the pandemic in Indonesia (first phase), precisely in 2018. The results in this study have relevance to the 2018 Basic Health Research report which recorded the number of people  $\geq 15$  years old who suffer from depression is around 706 thousand people (Ministry of Health of the Republic of Indonesia, 2019). The high number of cases of depression in 2018 is considered to be a signal that encourages people to engage in information seeking behavior on this topic. Even so, the average search volume for all terms in each category in the first phase is actually relatively low compared to the search volume in the second phase (except *boxing*).

In the second phase (months 27-65), the results of this study showed that the average search volume (RSV) in most terms in each category has increased dramatically (except boxing) since the COVID-19 case was first detected in Indonesia. The high search for information in the mental health category, especially the search term 'anxiety' is relevant to what was reported by the World Health Organization (WHO, 2022) where the prevalence of anxiety globally experienced a massive increase of 25% during the COVID-19 pandemic. Meanwhile, on a national scale in the same year, the prevalence of anxiety in adolescents aged 14–17 years reached 27.2% (I-NAMHS, 2022). The surge in information searches on all terms of mental sub-categories (especially anxiety) and most search terms on the sub-category of physical activity, indicate that the COVID-19 pandemic is perceived as a health threat that has encouraged people's behavior to obtain information about mental health and physical activity in efforts to maintain health during the pandemic in Indonesia. This phenomenon is in line with the research of Link et al. (2021) which explains that online health information searches are encouraged for individuals who have health threats.

The results in this study also reveal the high search for information on physical activity with the term 'camping' during the pandemic phase. This phenomenon becomes rational when the pandemic situation has caused the enactment of *the lockdown* policy which is *followed up* by



netizens' calls with #dirumahaja hashtags on various social media. As a result, limited mobility and public activities outside the home trigger the saturation felt by the community, who react to the search for information on *outdoor activities* such as *camping*. Searching for camping information can be an alternative choice as an outdoor activity that the public wants to do by considering the improved air quality during the COVID-19 pandemic. This was revealed by Saha et al. (2022) and Talukdar et al. (2024) that the COVID-19 pandemic has positive implications for reducing air pollutant levels.

The results of the rank sum in the Kruskal-Wallis analysis also show that the term 'camping' has become the most popular search for information in the physical activity category over the last 85 months (three phases or 2018–2025). The increasing public interest in information on 'camping' activities needs to be a concern for the local government and outdoor tourism managers who facilitate 'camping' in order to promote optimal services for consumers. Meanwhile, the peak position of the popularity of the search term in the mental category is dominated by the term 'anxiety'. The popularity of searches with the term 'anxiety' is also strongly supported from figure 1 which shows an upward trend from 2018 to 2025. The increase in the search for anxiety information is predicted to be carried out by most netizens from the zilenial (Gen Z) circle. This prediction is based on previous studies that reveal that searching for mental health information in Generation Z often involves the use of the internet (Jalilian et al., 2021; Ma'sya & Handayani, 2022; Maba, 2021). This is in line with Muthmainnah (2024) who explained that the majority of gen Z tend to search for health information through the internet, social media, while the millennial generation (gen Y) tends to seek information from doctors or by word of mouth.

The behavior of seeking health information is strongly driven by the urgent need for individuals who experience health problems (Siswanta, 2015), including mental problems in it. The practicality of searching for information online provides an initial understanding of the health problems that the individual may be experiencing. However, an in-depth understanding and accurate diagnosis must still go through procedures from relevant experts/professionals such as doctors and/or psychiatrists. At least, the health information tracking initiative is sought to increase health literacy (awareness), as well as as a tool to obtain information that can be used as a potential alternative solution for individuals experiencing health problems. This is replicated from the findings of this study in a correlational test between the term information seeking in the mental health category and the physical activity category.

The results of Spearman's test in this study showed that all search terms in the mental health category (stress, anxiety, and depression) had a significant positive correlation with the search terms 'running' and 'weight training'. These results indicate that the high search for information on



mental health problems also increases the volume of searches for information about 'running' and 'weight training' exercises. This means that people who are looking for mental health information also tend to look for information on 'running' and 'weight training' sports as potential therapies to overcome the mental problems they are experiencing. These findings have relevance to a number of literature that links a reduction in symptoms of mental disorders (anxiety, depression, and stress) through physical activity (Alfaqih et al., 2024; Singh, 2023; Zhou et al., 2023).

A significant positive relationship condition was also seen between the search for information on the term 'camping' and the term 'depression,' even though the strength was relatively weak. This means that there is a weak potential for people who are interested in making camping as an alternative in relieving the symptoms of depression felt. Camping activities that are usually carried out in green open spaces can be used as forest therapy in reducing symptoms of depression (Shin et al., 2011; Yeon et al., 2021). Furthermore, the correlation results of searching for camping information and depression information need to be a reminder for camping tour managers to continue to increase attention and concern for visitors who are at risk of depression. Of course, it's actually difficult to be sure whether every visitor who comes is a person who has a depressive problem or not. Therefore, it is highly recommended that the ban on solo camping be enforced, especially if activities are carried out in an outdoor environment such as mountains. This is solely to improve the safety and security of visitors who have depression by involving supervision from their peers.

Another result revealed in this study is that there is a significant negative correlation between searching for 'stress' and 'depression' information with 'boxing' information. Which means that the high search for 'stress' and 'depression' information actually decreases people's interest in looking for 'boxing' information, and vice versa. This indicates that people do not use boxing as a potential therapy in relieving stress and depression. Compared to running and weight training, boxing often requires more complex technical skills through intense training programs. As Mahlangu et al. (2024) focuses his research on visual skills in boxing which require several components including depth perception, ease of accommodation, saccadic eye movements, hand-eye coordination, peripheral awareness, speed, reaction time to visual memory.

### **CONCLUSION**

this study has shown the trends and interest of Indonesians in information (search terms) related to mental health and physical activity (apart from boxing), which saw an average rise in RSV during the COVID-19 pandemic as a situation that puts people's health at risk. The Kruskal-Wallis test findings then revealed a significant difference in RSV across all of the search terms



examined (p<0.05), with the most popular searches for information over the previous 85 months being "anxiety" (rank sum=36503) and "stress" (rank sum=35288). All search terms in the mental health category (stress, anxiety, and depression) had a significant positive correlation (p<0.05) with the search term "running" at a moderate correlation level, and with "weight training" at a moderate to strong correlation level, according to the Spearman rank test results. Despite its weak strength, the search word "camping" and the search term "depression" also have a favourable correlation. In order to improve the quality of each person's mental health, policymakers are crucial in promoting physical activity, running, and weight training. This paper's weaknesses include its exclusive reliance on secondary data sources for statistical analysis.

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