



# The Effect of Social Media-based Pokemon Education on Adolescent Knowledge about Tuberculosis Prevention

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## Abstract

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**BACKGROUND:** Indonesia is in the second rank of the highest cases (TB) in the world. Therefore, tuberculosis prevention strategies are needed, especially for children.

**AIM:** This survey study aims to examine the effect of education using Pokemon based on social media such as Instagram and WhatsApp on students' knowledge about preventing of TB transmission.

**METHODS:** The Pokemon Education develops by first author and validated by second author. The design of this study was a pre-experimental design with one group pre-post-test design. A total of 113 students were selected as sample of this study, but only 104 students attend and complete the questioner during data collection schedule. The research instrument used a Google Form Questionnaire.

**RESULTS:** Data analysis found that age mean of 104 respondents' student was 13.42, meaning that the average age of the respondents was 13–14 years. Data analysis also found that the pre-test mean value of knowledge about TB prevention was 74.42 and mean value of the post-test was 84.81. Paired sample t-test results indicate that there is a significant difference knowledge about TB prevention before and after education ( $p = 0,0001$ ).

**CONCLUSION:** Thus, it can be concluded that education using social media-based Pokemon is effectively to increasing adolescents' knowledge about preventing TB transmission.

## Introduction

Tuberculosis (TB) is an infectious disease that is a leading cause of ill health, one of the top 10 causes of death in the world and the leading cause of death from a single infectious agent (ranked above HIV/AIDS). It is caused by the bacillus *Mycobacterium tuberculosis*, which spread when a person with TB expels the bacteria into the air, for example, coughing. It usually affects the lungs (pulmonary TB) but can also affect other organs (extrapulmonary TB). About a quarter of the world's population is infected with *M. tuberculosis* and, thus, is at risk of developing TB disease (WHO, 2019) [1]. It is estimated that 20 million children are exposed to TB every year, making TB a global disease. Children bear the substantial burden of global TB, with more than one million (aged <15 years) becoming ill each year. Most children who require evaluation for TB disease are not identified by health services, 90% of the 205,000 children estimated to die of TB each year are never diagnosed or treated. TB prevention in this vulnerable population is also neglected and is a global health emergency (Reuter *et al.*, 2020) [2]. TB is still a global concern, where Indonesia is the second country with the highest TB cases in the world after India in 2019 (WHO, 2020) [3]. Data from Global, there are 10 million people in the world

who suffer from TB and 1.2 million people die every year. Indonesia is one of the countries with the highest TB burden in the world with an estimated number of people falling ill due to TB reaching 845,000 with a death rate of 98,000 or equivalent to 11 deaths/h (WHO, 2020) [4].

TB CNR in DKI Jakarta in 2020 was 222/100,000 population, a decrease compared to 2019 which was 379 per 100,000 population. This decline could be due to the focus of health services on handling the COVID-19 pandemic and the disconnected surveillance system. The case detection rate per 100,000 population calculated in 2020 is 49.8%, similar to 2019 (49%), but still far from the standard set by the WHO, which is 70%. New TB cases in the population of children aged 5–14 years in DKI Jakarta Province in 2020. From a total of 2235 TB cases in children, the highest cases were reported in East Jakarta and South Jakarta. This figure decreased dramatically compared to 2019 which was a total of 5331 TB cases in children. There were 419 cases of TB in children in the Central Jakarta area in 2020 (Health Department) DKI Jakarta Province, 2020. Data from the Senen Subdistrict Health Center in the Central Jakarta Region in 2020 obtained 87 cases, with TB in children, there were 34 cases, while, in 2021, there were 94 cases of adult TB and 16 cases of Child TB. SMP Muhammadiyah 3 Jakarta is located in the Central Jakarta area, Jl. Kramat Raya

No. 49. The condition of SMP Muhammadiyah 3 Jakarta is located in a dense location, with an environment that is at risk for exposure to mycobacterium TB bacteria. Data on TB of children in the Kramat area was found to be <5% of children's TB achievement. This is due to the pandemic condition so that people are afraid to go to the Puskesmas for treatment. So far, before the pandemic, there were activities carried out from the Kramat Health Center, namely, measuring weight, height, measuring nutritional status, and giving blood tablets. According to the principal's statement, there were students who were malnourished. No one has provided knowledge about TB to students so far, according to the principal.

Adolescence is a transitional phase from childhood to adulthood. This stage of adolescent development is a very important phase of human development in laying the foundation for the importance of maintaining health (WHO, 2021 in Lisum *et al.*, 2021) [5]. China has the third highest number of TB cases in the world, and in recent years, TB outbreaks often occur in China, namely, in schools, the results are obtained, where classmates increase the risk of TB with RR = 3.48, 95% CI = 1.64–7.40) (Pan *et al.*, 2019) [6]. Research result (Ernirita *et al.*, 2020) [7] showed  $p = 0.029$  and OR = 1.33 with 95% CI (0.95–1.639), meaning that children who have a history of household contact have a 1.33 times greater risk of contracting TB compared to children who have a history of close contact. Contact history is an important indicator in the occurrence of TB transmission. School age is the age at which children take education and are actively familiar with their surroundings. At that age, children interact a lot with friends, teachers, and people in the school environment. TB transmission can occur when children interact with other people in the school environment. Therefore, schools as a place for children to gather and interact with other people play an important role in preventing TB transmission. Besides that, it can provide an understanding of TB disease, its signs, and symptoms, how to prevent it and how to detect and treat TB. TB disease can be eradicated early so as to create a strong school in dealing with TB.

Pokemon is an abbreviation that the author made which stands for: Pengobatan TB dengan tepat dan cepat, kenali tanda dan gejala TB pada anak, monitoring, pengobatan TB sampai sembuh (Proper and quick TB treatment, recognizing the signs and symptoms of TB in children, monitoring, and TB treatment to cured). The author's Pokemon material is made in the form of animations, videos, and posters and delivered through social media, namely, Instagram and WhatsApp groups. In the current learning process, there is a tendency for children to learn better if the child's learning environment is created naturally. Children's learning outcomes will be more meaningful when children experience what they learn. The game method can help students feel comfortable when learning and feel happy; then, it becomes easier to invite them to learn. This is in line with the results of a study by Komariyah and Soeparno

(2010) in (Wuryani and Budi, 2016) [8] that learning with games can be accepted in a fun, entertaining, and uplifting way to learn something new. The Pokemon that the researcher is referring to is not a Pokemon (Pocket Monter) but is an extension associated with TB treatment so that children are motivated by displaying a legendary feel. Therefore, one of the appropriate educational strategies for material on life organization systems in class VII SMP Mumadiyah 3 Jakarta is using yellow media such as Pokemon which is displayed in the form of posters, animations, and videos so that it can help increase the activeness of students' cognitive learning outcomes.

Health education is a major aspect of nursing practice and an important part of the nurse's role and function as a nursing educator. Through Pokemon Education based on social media, it can increase students' knowledge. The provision of social media-based health education by nurses is an effort that can be used in a pandemic situation that is in accordance with technological developments and adolescent growth and development. This media can be used as a preventive effort in increasing adolescents' knowledge about preventing TB transmission. Providing health education using audio-visual media can be used as informative media in increasing knowledge about preventing TB transmission, especially at the age of teenagers (Fadilah *et al.*) [9]. Study (Kristina Lisum, Wilhelmus Harry Susilo, 2021) [10], there was a significant increase in knowledge before and after YouTube-based health education was carried out with  $p = 0.000 < (0.05)$ . One of the learning media that can be used in health education is audio-visual media, which is a tool that can be used through hearing and through sight which is a combination of both types of media that can stimulate thoughts, feelings, attention, creativity, and innovation, and provide direct experience to participants, Rusman *et al.*, 2011, in (Bili 2019) [11].

In providing health education, media is needed to convey information. Social media is a concise and attractive medium that makes it easier to convey the knowledge that will be given, includes various ideas, ideas and content in virtual communities, and is able to present and translate new ways of communication with technology that is completely different from traditional media Yaumi, 2018, in (Dewi *et al.*, 2021) [12]. Line is one of the social media that is widely used especially by teenagers. At present, there are 220 million users who are members of line applications worldwide and in Indonesia alone, there are 90 million users who are active users (Experts, 2018). Social media is one of the developments of the internet. Having a high-quality camera on a smartphone makes many people have fun with new activities. Types of social media commonly used include Facebook, Twitter, Path, and Instagram (Prihatiningsih, 2017) [13].

The results of interviews with school principals confirmed that online learning activities using mobile

phones and laptops during the pandemic caused boredom among students. Therefore, variations of learning media must be done. Hopefully, the education provided will increase students' insight, especially regarding TB. It is interesting and important to examine how social media-based Pokemon education affects knowledge about TB prevention in junior high school students.

## Methodology

This study is a quantitative study with a pre-experimental design and a one group pre-post-test design without a case-control. The purposive sampling used for total 113 from the 7<sup>th</sup> grade students of SMP 3 Muhammadiyah Jakarta, who were present at the time of the study as many as 104 people with total sampling technique. In data collection, the researchers conducted a survey with research instruments using a questionnaire in the Google form which was carried out on August 20–August 30, 2021. The subject of this research must meet the criteria; male and female students, and under 15 years old. The instrument consists of 15 questions, related to TB control in children and knowledge of the use of social media. The questionnaire has been tested for validity and reliability to 20 respondents, using the Pearson Product Moment correlation to analysis between items with a total score in one variable, and measurements obtained a significance level ( $\alpha$ ) = 0.05. The data analysis used SPSS 22.0 software. Based on the results of the reliability test, the value was 0.972. The results are declared reliable because  $>0.6$ . The steps in conducting the intervention are; Educational media that have been prepared in the form of posters, videos, and animations with Pokemon background nuances. Pokemon Educational media develops by first author and was validate by second author. Before they are being given information education, students are evaluated by pre-test using Google form, after that education is given through Instagram and WhatsApp, with questions that arise from students. After 10 days of re-evaluation with the post-test, the results of this study were analyzed using the paired sample t-test.

## Results and Discussion

Based on the results of the study, the data on the characteristics of the respondents were found in Table 1.

**Table 1: Distribution of average age of students at SMP Muhammadiyah 3 Jakarta**

Variable	Mean	SD	Maximum	Minimum
Age	13.42	0.972	16	12

The average age of students is 13 years –14 years, the youngest age is 12 years and the oldest is 16 years. The most dominant age range is 13 years.

The average knowledge of students before Pokemon education activities based on social media was 74.42 and the average knowledge after Pokemon education activities was 84.81. There was a significant difference in the average knowledge of students before and after Pokemon education was conducted ( $p = 0.0001$ ). The ability of participants in Pokemon education was done by providing posters, animations, and videos on social media, namely, Instagram and WhatsApp groups. For 10 days, Pokemon education was given to the students, then an evaluation was carried out.

Table 2 shows p value, which is 0.0001, it can be concluded that  $p = 0.000 < (0.05)$ , so there is an effect of the level of knowledge after giving Pokemon educational media to knowledge about TB prevention based on social media in junior high school students. Age is one of the factors that can describe a person's maturity, both physical, psychological, and social maturity. Age will affect a person's mindset, so that as a person age, the more experience and information, he has so that later it will affect a person's attitudes and behavior. At the adolescent stage, there is a cognitive development, the development of advanced reasoning skills, and the ability to think logically. Where the ability of adolescents is able to think abstractly and has the ability to think metacognitively to allow a person to think about his feelings, and develop a thought so that he can be accepted by other individuals (Chulani and Gordon, 2014) [14]. In line with research, results (Lisum *et al.*, 2021) [10] showed that the frequency of respondents based on age is mostly 15–16 years old by 163 people (98,8%). The increase in a person's age will affect the way a person processes information into knowledge. Teenagers try to develop a high curiosity about information so that they can form their own knowledge. Adolescents also develop a risky behavior such as smoking. Whereas according to PMK RI No. 67 (2016) regarding TB control, smoking behavior is twice as risky for TB (Menteri Kesehatan, 2017) [15]. The results showed that the majority of the sexes were women, generally women were more concerned about health than men. This research is in line with research (Lisum *et al.*, 2021) [10], the number of female respondents was 105 people (63.6%), while the male respondents were 60 people (36.4%).

**Table 2: Average knowledge of middle school students before and after pokemon education**

Category	Mean	SD	SE	p value	N
Pre-test	74.42	13.059	1.28	0.0001	104
Post-test	84.81	13.509	1.33		

Adolescents are an important subpopulation with relatively high notification rates, requiring specialized youth-friendly interventions to reduce stigma, discrimination, and risk behaviors, to diagnose



and manage HIV coinfection, and to meet educational needs. The prevalence of smoking among those who aged 15 years. Smoking is a strong risk factor for TB disease at the individual level (WHO, 2021) [5]. The results of this study showed the effect of Pokemon education after 10 days of intervention with audiovisual media, namely, animation, posters, and videos based on social media on students' knowledge. This study is in accordance with the theory that health education conducted individually or in groups is very important, because TB is related to knowledge as well as attitudes and behavior so that with health education awareness, TB transmission can be prevented.

This study proves that social media-based Pokemon education can increase knowledge about TB prevention among junior high school students in Jakarta. The level of knowledge is one of the risk factors for TB and a factor influencing TB prevention. Knowledge is the basis for taking action to prevent and treat TB. Ignorance of adolescents will hinder attitudes and actions toward the prevention and eradication of pulmonary TB disease (Mutia *et al.*, 2013) in (Lisum, *et al.*, 2021) [10]. Adolescents who have knowledge of TB prevention will maintain a clean and healthy lifestyle. Because the TB problem is still high related to knowledge and behavior; therefore, it is important to carry out health education with the aim of increasing awareness, willingness, and role in TB control. There are several educational media that can be given as one of TB prevention efforts such as online media.

In this study, the authors used Instagram and WhatsApp group. Online media are types of internet-based media that are popularly used, because online media are informational technology that are able to connect throughout the world, thus allowing information from various types and forms of information to be used together, especially in the current pandemic situation. This can help students to get various information.

Researchers argue that the presence of one of the risk factors that cause TB, namely, lack of knowledge, makes the spread of TB increase, so there needs to be an effective effort to prevent TB, one of which is through online media such as Instagram and WhatsApp group. WhatsApp (WA) is most dominantly used at this time. WA has been used by community leaders to communicate in conveying messages to their targets, so currently, although they are still communicating face-to-face or directly (Face-to-face). The notification or information conveyed in the message is more effective and is a satisfaction in itself because using WA makes the target receives the information faster.

Social media are online platforms to communicate and interact remotely without being limited by space and time. One of the social media used by everyone is Instagram.

Pokemon social media-based TB prevention education can be carried out using various forms including animated videos, posters, and discussions

through social media Instagram, and WhatsApp groups. Instagram activities are named Pokemonfortb accounts, with 11 posts. The response was very positive in educational activities and was able to open up insight into the problem of TB, through questions submitted by students. Audiovisual is an interesting media which stimulates the senses of hearing and sight and can be played over and over again.

In line with research, Agianto *et al.*, 2020 [16] showed that Instagram users among teenagers have influences on their lifestyle and ethics. There are changes that lead to a better direction and some that lead to a bad direction. These changes occur due to an urge from oneself to do something as a result of seeing a post on Instagram.

This study confirms that Pokemon education based on social media, namely, Instagram, can increase students' knowledge, especially TB prevention. It is because the appropriate and interesting educational strategies in life organization system material to the student with posters, videos, and animations with Pokemon nuances so that it can help increase the activeness of cognitive learning outcomes. These social media such as Instagram are sources of learning for teenagers on the internet and will be one step ahead when starting learning in the classroom, and Instagram is a learning medium that is interesting and not boring like reading books, thereby increasing students' interest and motivation to learn. Result of this study related to the study conducted by Erma Novitasari *et al.*, (2013) in (Wuryani and Budi, 2016) [8] that the use of media is interesting and in accordance with student characteristics so that it can motivate students to learn. This is because the world of children is a world of play full of spontaneity and fun.

The results of this study also in line with behavioral theory in general that individuals are more likely to intend to follow a health action if they believe that the behavior will lead to certain outcomes that they value, and if they feel that they have the resources and opportunities necessary to perform the behavior. (Norman and Conner, 2016) [17]. In this study, improving health status through Pokemon education is carried out by schools and is relevant to the opinion of Burkert *et al.* (2015) [18] that the use of a positive health concept allows the achievement of better health status differentiation by obtaining the right steps as part of health promotion health promotion in the workplace.

The importance of the use of social media in health promotion has long been recognized by many parties, especially when referring to the data in 2020 alone there are about 6.1 billion smartphone users and is a potential in the development of digital epidemiological methods and strategies to support the monitoring and surveillance of infectious diseases or even can be used in understanding attitudes and concerns about infectious diseases. The concept of digital epidemiology generally consists of the idea that the health of a

population can be assessed through a digital footprint. One example is that many people suffer from flu every year and many of them search for relevant information on the internet and share their health problems with others online (Denecke and Atique, 2016) [19]. Based on this, the development of Pokemon Education, meaning TB treatment correctly and quickly, which means that by obediently taking medication for the period recommended by the doctor, is a TB prevention education platform that can increase knowledge and awareness, especially the younger generation about TB disease. Therefore, education using Pokemon has the potential for monitoring TB treatment activities according to the principles of TB education in Indonesia, namely, find TB and treat until healed, provide moral support by inviting TB sufferers to seek treatment until they are completely healed, not discriminate against TB patients, and implement behavior clean and healthy living so that TB-free Indonesia 2050 can be achieved. Thus, the use of Pokemon-based social media in this study can also increase the ability of various parties to communicate risks and crises due to a disease in several ways: (1) Collaboratively and participatory, and thereby increase awareness of the situation, (2) decentralization, information can delivered quickly, and (3) can be traced geographically and even enables crisis monitoring. This is also in line with the results of a study by Denecke and Atique (2016) [19] that there is no special system needed in social media-based health crisis communication and the use of existing social media tools such as social networks (e.g., Facebook) or microblogging systems is sufficient for crisis communication. This study also in line with study conducted by Sarkar, Le GM, Lyles, Ramo, Linos, and Bibbins-Domingo (2018) [20] found that social media more effective to target cancer prevention in young adult. Even Gamification can also be used in health education, and even when used in groups of people with face-to-face interactions can encourage the intrinsic human need to compete (Bamidis *et al.*, 2016) [21] and the results of many studies show that games and gamification have an effect on health and well-being should be considered as an important component of health education.

## Conclusion

Based on the results of this study, there was a significant difference in the average value of students' knowledge about TB prevention before and after Pokemon education. This shows that there is a significant effect of Pokemon education on the level of knowledge after providing Pokemon social media-based education to junior high school students in Jakarta. The use of social media in a variety of content, both images, text, animation, and video as

a medium and approach to health promotion is much more attractive, especially among teenagers. Although Pokemon Education using social media is effective in increasing students' knowledge, this research has several limitations. These limitations include that the population and samples of each group (experimental and control) are small in number. In addition, Pokemon content has not been evaluated by professionals, and the scope of this research only focuses on one junior high school. Further research by other researchers needs to develop a health education kit involving various fields and professions. Another interesting research to continue is the explanation of several variables related to knowledge about TB prevention and treatment.

## Authors' Contributions

This work was conducted in collaboration with all authors. Author ER develops Pokemon Education and AF was validated. ER and AF were planned, structured, wrote, revised, and rechecked the manuscript thoroughly. EW improved the draft copy and revise and improve the manuscript thoroughly. All authors ER, AF, and EW reviewed carefully and approved the final version of the manuscript.

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