

Meta-Analysis: Effect of Bullying on the Risk of Suicide in Adolescents

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Received: 19 January, 2023; Accepted: 24 February, 2023; Available online: 16 March, 2023

ABSTRACT

Background: Mental health disorders are among the most important public health problems globally. Bullying affects the lives of many children and young people. Studies in high-income countries have reported an association between bullying and suicidal behavior among school adolescents. For example, studies in various parts of the United States found that students who were bullied were significantly more likely to experience suicidal ideation, planning, and suicide attempts. This study aims to determine the effect of bullying on the risk of suicide in adolescents

Subjects and Method: The meta-analysis was carried out according to the PRISMA flow chart and the PICO model. Q: Adolescent, I: Bullying, C: Not bullying, O: Risk of suicide. Search for articles in this study through databases that include PubMed, Google Scholar, Science Direct and Scopus. With keywords including: "bullying" AND "suicide" AND "adolescent". A full paper article with a cross-sectional study, the research subjects were adolescents, the relationship size used was the adjusted odds ratio, the research outcome was suicide risk. Analysis done with RevMan 5.3

Results: A total of 11 articles with a cross sectional design from Israel, China, Vietnam, Tanzania, Canada, the United States, Iran and South Korea totaling 124,728 research samples. The results showed that adolescents who were bullied had a risk of suicide 2.70 times compared to those who did not experience bullying (aOR=2.70; 95% CI=1.88 to 3.87; p<0.001).

Conclusion: Bullying can increase the risk of suicide in adolescents.

Keywords: bullying, suicide, adolescent.

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Cite this as:

Aprilia SD, Prasetya H, Murti B (2023). Meta-Analysis: Effect of Bullying on the Risk of Suicide in Adolescents. *J Matern Child Health*. 08(02): 138-147. <https://doi.org/10.26911/thejmch.2023.08.-02.01>.



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BACKGROUND

Mental health disorders are among the most important public health problems globally. Estimates of the global burden of disease place mental illness in the top three states in terms of disability. The mental health of adolescents and young people themselves is

an important issue because it has the potential to affect their adult lives and that of the next generation. Mental health problems faced by adolescents will interfere with the way they think, feel and act. Mental health disorders can also lead to family conflicts, substance abuse, violence or

bullying and eating disorders and sometimes suicide (Nguyen et al., 2013). Studies in high-income countries have reported an association between bullying and suicidal behavior among school adolescents. For example, studies in various parts of the United States found that students who were bullied were significantly more likely to experience suicidal ideation, planning, and suicide attempts (Shayo and Lawala, 2019)

Bullying affects the lives of many children and young people. The Health Behavior in School-Aged Children (HBSC) survey covering a representative sample of 44 countries denounced that 12% of boys and 10% of girls were victims of traditional bullying in 2014 (Benatov et al, 2021)

Bullying itself is defined as an aggressive act that intentionally harms repetitive behavior and involves an imbalance of power between the perpetrator and the person affected. Bullying can be physical, verbal, relational, and cyber (Barzilay et al., 2017).

Suicide is one of the three leading causes of death in young people worldwide. Suicidal ideation and attempts have potentially serious consequences, including substantial psychological effects, increased risk of repeated suicide attempts, and death (Barzilay et al., 2017).

Suicide is a significant public health problem worldwide. Suicide is the second leading cause of death for Canadian youth aged 10-24. Every year, an average of 294 young people die by suicide (Kanyinga et al, 2014). One of the factors that has been shown to predict suicidal ideas or thoughts and behavior is bullying (Eze et al., 2021).

Suicide as we know is a major public health problem in the world and accounts for about 6% of all deaths at a young age. There are four components of suicidal behavior, namely suicidal ideation, suicidal plans, suicidal attempts, and suicide self). Furthermore, bullying, violent behavior, and

psychiatric conditions are known as risk factors for suicidal behavior among adolescents. Approximately 90% of children and young adults in the world live with low and middle incomes, contributing 75% of deaths due to suicide occur in the country of Tanzania (Shayo and Lawala, 2019). Data from the Youth Risk Behavior Survey (YRBS) shows that suicidal ideas and plans have increased significantly among US youth since 2009 (Kreski et al., 2021). In China, nearly 2 million people attempt suicide and about 12.5% of them commit suicide annually. Furthermore, suicide has become the leading cause of death among young Chinese adults. Significant evidence shows that the presence of suicidal ideation (SI), namely thoughts and plans to end one's life and suicidal attempts (SA), namely involvement in potentially self-injurious behavior that does not result in death is the most risk. important factor for suicide. According to a population-based study, the prevalence of SI and SA among Chinese adolescents is 23 and 4%, respectively. In response to the high prevalence, researchers in China have identified risk factors for SI and AS, which range from psychopathology to interpersonal difficulties, such as bullying or bullying (Peng et al., 2020). Various studies have been conducted to see the effect of bullying on the risk of suicide in adolescents. Further analysis is needed to reach a conclusive conclusion.

Therefore, researchers are interested in further examining the effect of bullying on the risk of suicide in adolescents. Researchers used a systematic approach to relevant studies by conducting a meta-analysis to clearly identify the magnitude of the influence of bullying on the risk of suicide in adolescents.

SUBJECTS AND METHOD

1. Study Design

This study is a systematic review and meta-analysis. Article search using databases, including Google Scholar, Pubmed, Science Direct and Scopus. The keywords used in the database search were "bullying" AND "suicide" AND "adolescent".

2. Steps in Conducting Meta-Analysis

The meta-analysis was carried out through five steps, as follows:

- a) Define research questions in the PICO format (Population, Intervention, Comparison, Outcome).
- b) Search for primary review articles from various electronic databases such as Google Scholar, PubMed, Cochrane, Scopus and Science Direct as well as non-electronics.
- c) Conduct screening and critical appraisal of the main review articles.
- d) Perform data extraction and synthesis of effect estimates into RevMan 5.3.
- e) Interpreting and making conclusions.

3. Inclusion Criteria

In this study, the inclusion criteria were full text articles which were observational studies, original articles in English, using a cross-sectional study design, research subjects were adolescents aged 10-24 years. Articles with the year of publication 2012-2022.

4. Exclusion Criteria

Exclusion criteria in this study were articles published before 2012, articles that did not use English and Indonesian, as well as previous research using meta-analysis.

5. Study Variables

The independent variable is Bullying and the dependent variable is Suicide Risk.

6. Definisi Operasional

Bullying is intentional and aggressive behavior that is carried out repeatedly and is based on an imbalance of power between the perpetrator and the victim.

Suicide risk is a person's intentional thoughts and ideas about ending his own life. There are four components of suicidal behavior, namely suicidal ideation, suicidal plans, suicidal attempts, and suicide (suicide).

7. Study Instrument

This study is guided by the PRISMA flow diagram and assessment of the quality of research articles using critical appraisal tools cross sectional published by CEBM University of Oxford (CEBM, 2014).

7. Data Analysis

Data analysis was performed using the Review Manager application (RevMan 5.3). The results of data analysis are in the form of effect sizes and research heterogeneity. The results of systematic review and meta-analysis of data processing are presented in forest plots and funnel plots.

RESULTS

The process of searching for articles through a database based on the PRISMA diagram can be seen in Figure 1. The initial search process in the database yielded 2394 results, then through the process of removing duplicate articles as many as 798 articles with a filter of 148 articles that met the requirements for further full text reviews. The 11 articles that met the quality assessment were included in the quantitative synthesis using meta-analysis. It can be seen in Figure 2 that research articles originate from the Asian continent, including (Israel, China, Vietnam, Iran, South Korea), the American continent, among others (Canada, United States), and 1 from the African continent, namely from Tanzania.

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The results of the quality assessment of the cross-sectional study on the effect of bullying on the risk of suicide in adolescents (Table 1).

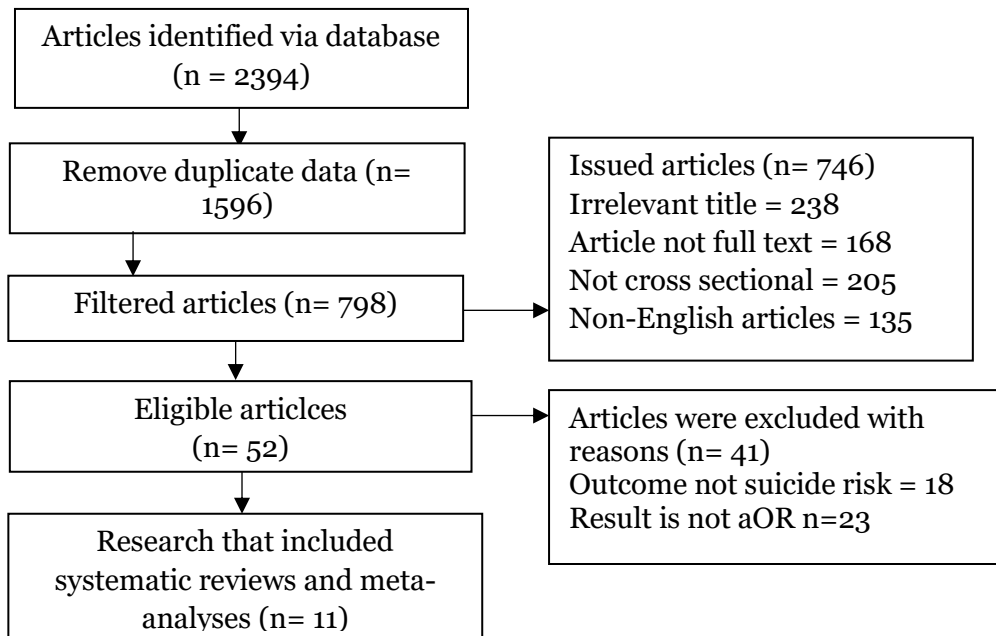


Figure 2. Map of the study area on the effect of bullying on the risk of suicide in adolescents



Figure 2. Map of research locations on the effect of bullying on the risk of suicide in adolescents

After assessing the quality of the research, a number of 11 articles were obtained with a cross-sectional study design which will be used as a source of meta-analysis of the effect of bullying on the risk of suicide in adolescents. The article was then extracted and summarized according to the research PICO (Table 2).

Based on Table 3, the description of primary research on the effect of bullying on the risk of suicide in adolescents was conducted through a meta-analysis of 11 articles

with various research locations, namely from Israel, China, Vietnam, Tanzania, Canada, the United States, Iran and South Korea. Similarities were found in this study, namely the cross-sectional research design, the research subjects were adolescents, the intervention experienced bullying and the comparison did not experience bullying. In this study there were also differences in the number of samples, the smallest was 1.116, and the highest was 73.074.

Table 1. The results of the quality assessment of the cross-sectional study on the effect of bullying on the risk of suicide in adolescents

	Questions Criteria												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Barzilay et al. (2017)	1	1	1	1	1	1	1	1	1	1	0	1	11
Peng C et al. (2020)	1	1	1	1	1	1	1	1	1	1	1	1	12
Nguyen et al. (2013)	1	1	1	1	1	1	0	1	1	1	1	1	11
Shayo et al. (2019)	1	1	1	1	1	1	1	1	1	1	1	1	12
Kanyinga et al. (2014)	1	1	1	1	1	1	1	1	1	1	1	1	12
Benatov et al., (2021)	1	1	1	1	1	1	1	1	1	1	1	1	12
Hong et al. (2016)	1	1	1	1	1	1	1	1	1	1	1	1	12
Kreski et al. (2021)	1	1	1	1	1	1	1	1	1	1	1	1	12
Ziaei et al. (2017)	1	1	1	1	1	1	1	1	1	1	1	1	12
Kim et al. (2015)	1	1	1	1	1	1	1	1	1	1	1	1	12
Peng Z et al. (2019)	1	1	1	1	1	1	1	1	1	1	1	1	12

Question description:

- 1) Does the study address clearly focused questions/problems?
- 2) Is the research method (research design) appropriate for answer the research question?
- 3) Was the subject selection method clearly explained?
- 4) Does the sampling method cause no bias (selection)?
- 5) Do the research samples taken represent those appointed?
- 6) Is the sample size based on pre-study considerations?

- 7) Was a satisfactory response rate achieved?
- 8) Is the research instrument valid and reliable?
- 9) Was statistical significance assessed?
- 10) Are confidence intervals given for the main results?
- 11) Have confounding factors been taken into account?
- 12) Do the results apply to your research?

Description of the answer score:

- 0 = No
 1 = Yes

2. Summary of primary study articles with each PICO (n=124,728)

Author (Year)	Country	Sample	P	I	C	O
Barzilay et al. (2017)	Israel	11,110	Teenagers aged 14 years	Experiencing bullying	Not experiencing bullying	Suicide
Peng et al. (2020)	China	4,241	Teenagers aged 11-18 years.	Experiencing bullying	Not experiencing bullying	Suicide
Nguyen et al. (2013)	Vietnam	1,116	Teenagers aged 13-16 years	Experiencing bullying	Not experiencing bullying	Suicide
Shayo et al. (2019)	Tanzania	3,793	Teenagers aged 13-17 years	Experiencing bullying	Not experiencing bullying	Suicide
Kanyinga et al. (2014)	Kanada	2,999	Teenagers aged 11-20 years	Experiencing bullying	Not experiencing bullying	Suicide
Benatov et al. (2021)	Israel	2,150	Teenagers aged 13-20 years	Experiencing bullying	Not experiencing bullying	Suicide
Hong et al. (2016)	China	20,511	Teenagers aged 16-18 years	Experiencing bullying	Not experiencing bullying	Suicide
Kreski et al. (2021)	The USA	73,074	Teenagers aged 10-19 years	Experiencing bullying	Not experiencing bullying	Suicide
Ziaei et al. (2017)	Iran	1,517	Teenagers aged 15-17 years	Experiencing bullying	Not experiencing bullying	Suicide
Kim et al. (2015)	South Korean	1,570	Teenagers aged 13-14 years	Experiencing bullying	Not experiencing bullying	Suicide
Peng Z et al. (2019)	China	2,647	Teenagers aged 13-14 years	Experiencing bullying	Not experiencing bullying	Suicide

Table 3. Adjusted Odds Ratio (aOR) the effect of bullying on suicide risk

Author (Year)	aOR	CI 95%	
		Lower Limit	Upper Limit
Barzilay et al. (2017)	2.20	2.07	2.34
Peng C et al. (2020)	4.04	2.34	6.97
Nguyen et al. (2013)	4.44	2.93	6.73
Shayo et al. (2019)	1.90	1.50	2.41
Kanyinga et al. (2014)	2.16	1.43	3.26
Benatov et al. (2021)	2.97	1.66	5.31
Hong et al. (2016)	2.74	2.29	3.28
Kreski et al. (2021)	5.83	5.37	6.33
Ziaei et al (2017)	1.43	0.81	2.52
Kim et al (2015)	1.29	0.91	1.83
Peng Z et al (2019)	3.90	2.30	6.61

a. Forest Plot

The forest plot in Figure 3 shows that there is an effect of bullying on the incidence of suicide risk in adolescents, and this effect is statistically significant. Adolescents who experienced bullying had a risk of committing suicide 2.70 times compared to those who did not experience bullying (aOR= 2.70; 95% CI=1.88 to 3.87; p<0.001).

The forest plot also showed high heterogeneity of effect estimates between studies

(I²= 98%; p<0.001). Thus, the calculation of the average effect estimate is carried out by using the random effect model.

b. Funnel plot

The funnel plot in Figure 4 shows a symmetrical distribution of effect estimates to the right and left of the estimated mean vertical line. Thus, the funnel plot does not indicate publication bias.

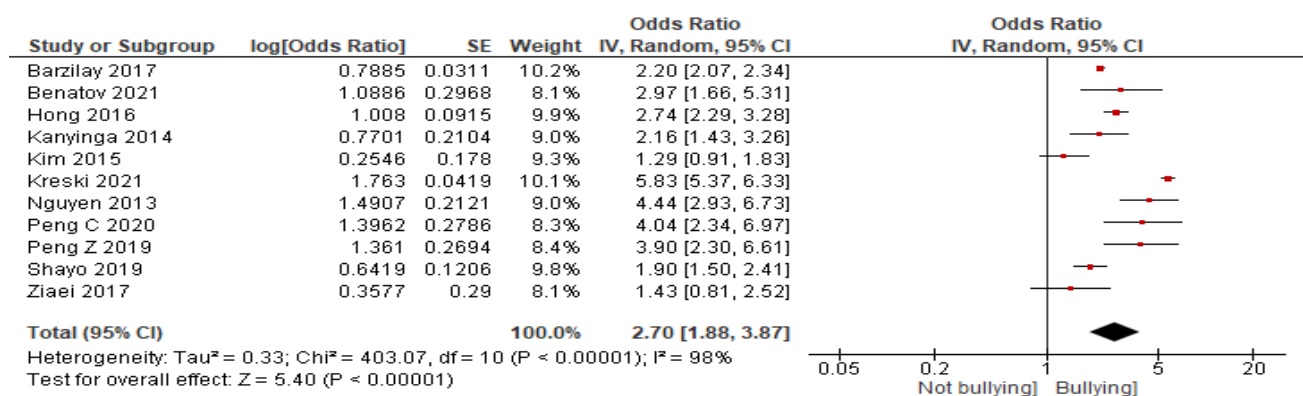


Figure 3. Forest plot of the effect of bullying on the risk of suicide in adolescents

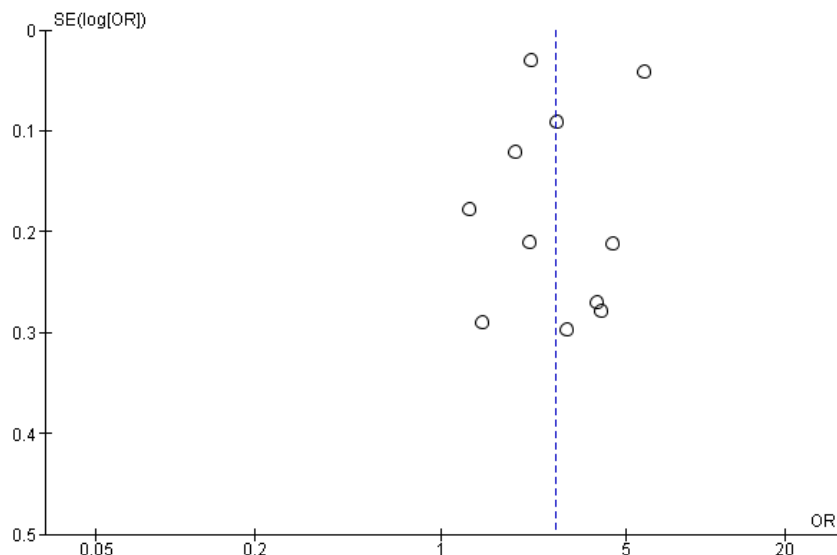


Figure 4. Funnel plot of the effect of bullying on the risk of suicide in adolescent

This research is a systematic review and meta-analysis that examines the relationship between bullying and suicide risk in adolescents. This systematic review and

meta-analysis research uses research that controls for confounding factors which can be seen from the inclusion requirements of

the study, namely using multivariate analysis and the statistical results reported are the adjusted Odd Ratio (aOR).

The combined results of the relationship between bullying and the risk of suicide in adolescents were processed using the RevMan 5.3 application, while the results of the systematic review and meta-analysis of this study were presented in the form of forest plots and funnel plots.

The results of a meta-analysis of cross-sectional studies showed that adolescents who experienced bullying had a 2.70 times the risk of suicide compared to those who did not experience bullying (aOR=2.70; 95% CI=1.88 to 3.87; $p < 0.001$).

This research is reinforced by Hertz's research (2013), that there is a strong relationship between bullying and the risk of suicide in adolescents by three to five times compared to those who are not victims of bullying. Depression, anxiety, self-esteem, self-reported health problems, school absences, leaving school due to illness, grades were significantly associated with student involvement in both traditional and cyber bullying.

Another research that is in line is from (Holt et al., 2015) which states that there is a strong relationship between suicide and victims of bullying and acts of bullying, namely 2 to 4 times. Previous research has shown that youth or adolescents who are victims and perpetrators of bullying often report higher levels of negative health such as depression, anxiety and other mental health compared to youth who are part of a neutral group.

Previous research stated that bullying, both physical and cyber bullying, is related to substance use, violent behavior, unsafe sexual behavior, and suicidal behavior. Research on adolescents in America found bullying as a substantial environmental stress that can increase the risk of adolescent

suicide. Most of the theoretical and empirical evidence supports the relationship between bullying and youth suicide. Bullying in adolescence has been identified as occurring in different forms, with different prevalence rates for different forms of bullying. There are four bullying behaviors, namely physical bullying such as assault, verbal bullying such as threats or insults, relational bullying such as exclusion or spreading rumors, and cyber bullying such as aggressive texts or social network posts (Litwiller, 2013).

Previous findings from longitudinal and cross-sectional studies have shown that each type of bullying can increase the risk that adolescents who are bullied experience suicidal thoughts and behavior. The experience of bullying in childhood and adolescence is an important thing to study because research has shown childhood bullying can predict adult suicide attempts as well as suicide deaths at the age of 25 years (Litwiller, 2013).

In the context of interpersonal suicide theory, victims of bullying will represent the environment that causes a failed sense of belonging, feelings of burden, and ultimately suicidal ideation. Victims of bullying have been shown to be associated with low self-esteem, anxiety, and depression. Adolescent victims of bullying who are accustomed to physical violence and psychological pain associated with suicidal behavior then develop suicidal desires and abilities (Litwiller, 2013).

Previous research stated that bullying is a stressful life event that often occurs among adolescents which is followed by a negative coping style that will result in depressive symptoms and the risk of suicide which are closely related to each other (Duan, 2020).

Research from Eze (2019) also states that there is a positive relationship between bullying victims and the strongest intention

to commit suicide in adolescents who have low social support, compared to those who have moderate or high social support.

Therefore, it takes the role of schools, parents, and sometimes legal entities to deal with cases of youth bullying which have a particularly negative impact on mental health such as anxiety, depression, suicidal ideation to suicidal behavior (Rettew, 2015)

AUTHOR CONTRIBUTION

Sholikha Dela Aprilia is the principal researcher who selects topics, searches for and collects research data. Hanung Prasetya and Bhisma Murti played a role in analyzing the study document review data.

FUNDING AND SPONSORSHIP

This study is self-funded.

CONFLICT OF INTERESTS

There is no conflict of interest in this study.

ACKNOWLEDGMENT

The researcher would like to thank the database providers Google Scholar, PubMed, SpringerLink, Scopus and Science Direct.

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