

Meta-Analysis: Bullying's Effects on Anxiety and Depression in Adolescents

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ABSTRACT

Background: Bullying is a major problem worldwide. Bullying itself is defined as a condition in the form of negative and repetitive behavior, carried out by a person or group of people, the treatment is carried out deliberately and intensely with the aim of hurting physically and mentally. This study aimed to analyze and estimate the magnitude of the influence of bullying on anxiety and depression in adolescents.

Subjects and Method: The meta-analysis was performed according to the flow of the PRISMA diagram and the PICO model. P: Adolescents, I: Bullying, C: No bullying, O: Anxiety and depression. The search for articles in this study is through databases that include PubMed, Google Scholar, Science Direct and Scopus. With keywords including: "bullying" AND "anxiety" AND "depression" AND "adolescent". Full paper article with cross-sectional study, the subject of the study was adolescents, the measure of the relationship used was adjusted Odds Ratio, the outcome of the study was anxiety and depression. Analysis was done with Revman 5.3.

Results: There were 10 articles with cross-sectional designs from the United States, Africa, China, Saudi Arabia, Malaysia, and Australia with a total of 282,799 research samples. A meta-analysis of 10 cross-sectional studies concluded that adolescents who experienced bullying had a 1.98 times greater risk of anxiety than those without bullying (aOR = 1.98; CI 95% = 1.54 to 2.53; A meta-analysis of 8 cross-sectional studies concluded that adolescents who experienced bullying had a 1.85 times greater risk of depression compared to no bullying (aOR = 1.85; CI 95% = 1.37 to 2.50; p < 0.001).

Conclusion: Bullying increases the risk of anxiety and depression in adolescents.

Keywords: bullying, anxiety, depression, adolescents.

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BACKGROUND

Bullying is an act that uses force to hurt a person or group of people, either verbally, physically, or psychologically so that the victim feels depressed, traumatized, and helpless (Tumon, 2014). According to the

context, bullying behavior can occur in various places, including educational or school environments, workplaces, homes, neighborhood neighborhoods, places to play, and others. This type of bullying is physical, related to physical violence in the

form of slapping, punching and spitting on the victim, second, relational bullying of a group that emerges in isolation, neglects a person and is alienated from the environment. The Organization for Economic Cooperation and Development (OECD) states that in 2021 there were 42,540 confirmed cases of bullying globally and there were 2,790 cases of bullying in Asia. There are 40 countries where there are reported cases of bullying, one of which is Indonesia which ranks first in the position of bullying cases in ASEAN as much as 84% (Tumon, 2014).

Adolescence is a transition period from children to adulthood which includes mental, emotional, and physical maturity. This age group is a human resource, and is the most important component in National Development, so there needs to be special attention to this age group. This is because adolescents are the future leaders who will continue the development and ideals of the nation (Agus-tiono, 2014).

Early adolescents are more focused on body shape and size and the presence of strong influence from peers. Late adolescence is characterized by the final preparation to enter the role of an adult, the existence of a stronger will to be accepted in a certain group and adults. Middle adolescents appear to be in search of self-identity, develop behaviors and learn to control impulses and make decisions related to school and work that will be their goals, including needing peers (Bulu et al., 2019).

Bullying includes predominantly aggressive behavior and causes irritation or pressure. Aggressive actions either physically or verbally can cause psychological, physical and emotional symptoms. The long-term negative impact of bullying behavior includes depression, anxiety, and low self-esteem (Marela et al., 2017). This study aimed to analyze previous primary

studies in assessing the influence of bullying on depression and depression in adolescents.

SUBJECTS AND METHOD

1. Study Design

The meta-analysis was carried out with the flow of PRISMA diagrams using PubMed, Google Scholar, Science Direct and Sco pus databases. With keywords including "bullying" AND "anxiety" AND "depression" AND "adolescent".

2. Step of Meta-Analysis

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

- 1) Formulate research questions in the PICO, including: P= Adolescents; I= Bullying; C= No bullying; O= Anxiety and depression.
- 2) Search for primary study articles from various electronic and non-electronic databases.
- 3) Conduct screening and critical assessment of primary research articles.
- 4) Perform data extraction and synthesize effect estimates into RevMan 5.3.
- 5) Interpret and conclude the results.

3. Inclusion Criteria

Full paper article with cross-sectional study, the subject of the study was adolescents, the measure of the relationship used was adjusted Odds Ratio, the outcome of the study was anxiety and depression.

4. Exclusion Criteria

Statistical results reported in bivariate analysis, articles published in languages other than English.

5. Operational Definition of Variables

Bullying is uncomfortable behavior either verbally, physically, or socially in the real world and cyberspace that makes a person feel uncomfortable, hurt, and depressed either individually or in groups.

Anxiety is an emotional-on-condition characterized by physiological alertness,

uncomfortable feelings, and an apprehensive feeling that something bad is about to happen.

Depression is a mental disorder that is generally characterized by feelings of deplorable, loss of interest or pleasure, decreased energy, feelings of guilt or low self-esteem, difficulty sleeping or reduced appetite, feelings of fatigue and lack of concentration.

6. Instruments

The assessment instrument used the Critical Appraisal Cross-Sectional Study for Meta-analysis Research published by the Master of Public Health, Sebelas Maret University of Surakarta (2023).

7. Data analysis

The articles in this study were collected according to the PRISMA diagram flow and analyzed using the Review Manager 5.3 application. The analysis was carried out by

calculating the effect and the value of heterogeneity consistency (I^2) from the selected research results.

RESULTS

The process of searching for articles to be synthesized and the process of reviewing and selecting articles using the PRISMA Flow Diagram are presented in Figure 1. The initial search process resulted in 2,291 articles. After removing articles duplication, 1,411 articles were generated, subsequently, after the process of eliminating article duplication, the next step was to check the relevance of the title and the study design used to generate 161 articles. After checking articles according to inclusion criteria and exclusion criteria, 10 articles were obtained.

Figure 2 showed the observed 16 study articles that come from the Africa, America, Europe, and Asia continents.

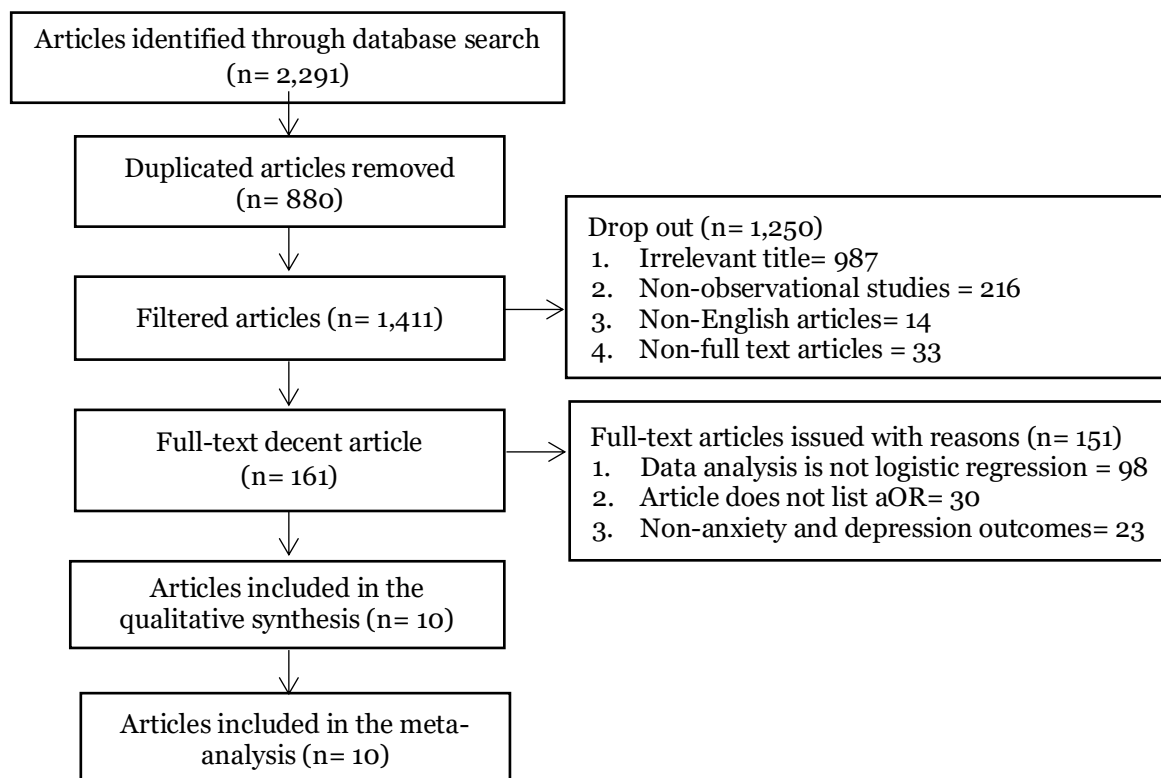


Figure 1. PRISMA Flow diagrams



Figure 2. Research distribution map on the influence of bullying against anxiety and depression

Table 1. Results of quality assessment of cross-sectional studies on the effect of bullying on anxiety and depression.

Primary Study	Criteria													Total
	1			2		3		4	5	6		7		
	a	b	c	d	a	b	a			b	a		b	
Tan et al. (2019)	2	2	2	2	2	1	2	2	1	2	2	2	2	24
Reisert et al. (2023)	2	2	2	2	2	1	2	2	1	2	2	2	2	24
Hoertel et al. (2012)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Liu et al. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Ford et al. (2017)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
AlBuhairan et al. (2017)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Fang et al. (2022)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Wilson et al. (2012)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Chen et al. (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Islam et al. (2020)	2	2	2	2	2	1	2	2	1	2	2	2	2	24

Table 1 showed quality assessment result of articles with a cross-sectional study included in meta-analysis.

Description of the question criteria:

1. Formulation of research questions in PICO acronym:
 - a. What is the population in the study primary is the same as the population in PICO meta-analysis?
 - b. What is the operational definition of intervention (intervention), namely the status of exposure (exposed) in primary studies is the same as that definition intended in meta-analysis?
 - c. What is the comparison (comparison), namely status not exposed (unexposed) is used Primary studies are the same as that definition intended in meta-analysis?
 - d. What is the outcome variable being studied? in primary studies is the same as that definition intended in meta-analysis?
2. method for selecting research subjects:
 - a. Descriptive cross-sectional study (prevalence): Is the sample randomly selected?

- b. Analytical cross-sectional study: Are samples randomly or purposively selected?
3. Methods for measuring comparisons (intervention) and outcome variables:
 - a. Are both exposure or intervention and outcome variables measured with the same instruments in all primary studies?
 - b. If variables are measured on a categorical scale, are the cut-offs used the same across primary studies?
4. Bias of the design:
 - a. How much is the response rate?
 - b. Is non-response related to outcomes?
5. Methods to control confounding:
 - a. Is there any confusion in the results or conclusions of the primary study?
 - b. Have primary study researchers used appropriate methods to control the effects of confusion?
6. Method of statistical analysis:
 - a. In the cross-sectional study, is multivariate analysis performed?
 - b. Multivariate analysis includes multiple linear regression analysis, multiple logistic regression analysis, Cox regression analysis.
7. Is there a conflict of interest with the research sponsor?

Description of scoring:

0= No; 1= Hesitate; 2= Yes.

Table 2 describes a summary of primary research on the effect of bullying on anxiety and depression with a cross-sectional design, a meta-analysis was carried out on 10 articles originating from the country of Malaysia, United States, China, Australia, Saudi Arabia, and Africa.

Table 2. Description of the primary studies the effect of bullying on anxiety and depression (cross-sectional study).

Author (years)	Country	Sample	P	I	C	O
Tan et al. (2019)	Malaysia	27,458	Students (ages 13-17)	Bullying	No Bullying	Anxiety, Depression
Reisert et al. (2023)	United States	42,716	Children (ages 6-17)	Bullying	No Bullying	Anxiety, Depression
Hoertel et al. (2012)	United States	43,093	Students (ages 18)	Bullying	No Bullying	Anxiety, Depression
Liu et al. (2020)	China	5,926	Students (ages 10-18)	Bullying	No Bullying	Anxiety, Depression
Ford et al. (2017)	Australia	3,537	Teenagers (ages 14-15)	Bullying	No Bullying	Anxiety, Depression
AlBuhairan et al. (2017)	Saudi Arabia	9,073	Students (ages 15-18)	Bullying and physical violence	No Bullying and physical violence	Anxiety, Depression
Fang et al. (2022)	China	4,624	Students (ages 12)	Bullying and physical violence	No Bullying and physical violence	Anxiety
Wilson et al. (2012)	Africa	1,427	Teenagers (ages 11-17)	Bullying	No Bullying	Anxiety, Depression
Chen et al. (2023)	China	7,047	Teenagers (ages 10-19)	Bullying	No Bullying	Anxiety
Islam et al. (2020)	Australia	2,166	Students (ages 12-17)	Bullying	No Bullying	Anxiety, Depression

a. The effect of bullying on anxiety in adolescents

Table 3 showed the effect sizes of the primary studies used in the meta-analysis about the effect of bullying on anxiety in

adolescents, with largest adjusted odd ratio (aOR) conducted by Fang et al. (2022) is 3.02, and the lowest aOR conducted by Wilson et al. (2012) is 1.10.

Table 3. aOR and 95% CI data the effect of bullying on anxiety in adolescents.

(Author, year)	aOR	95% CI	
		Lower Limit	Upper Limit
Tan et al. (2019)	1.59	1.40	1.81
Reisert et al. (2023)	3.41	2.06	5.65
Hoertel et al. (2012)	1.39	1.19	1.63
Liu et al. (2020)	4.90	2.72	8.84
Ford et al. (2017)	1.50	0.60	2.30
AlBuhairan et al. (2017)	2.89	1.69	3.30
Fang et al. (2022)	3.02	2.46	3.71
Wilson et al. (2012)	1.10	0.76	1.58
Chen et al. (2023)	1.65	1.27	2.13
Islam et al. (2020)	1.45	0.99	2.11

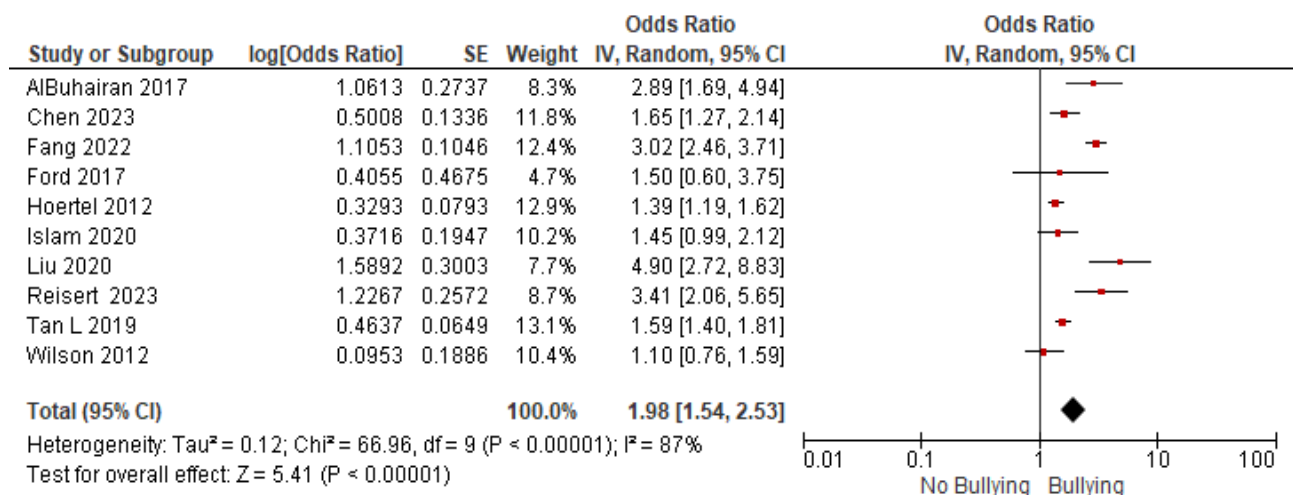


Figure 3. Forest plot on the effect of bullying on anxiety in adolescents

Figure 3 shows the possible effect of bullying on anxiety. Adolescents who experienced bullying had a risk of experiencing anxiety 1.98 times compared to adolescents who did not experience bullying, and the effect was statistically significant (aOR = 1.98; CI 95% = 1.54 to 2.53; $p < 0.001$).

The forest plot also showed heterogeneous effect estimates ($I^2 = 87\%$; $p < 0.001$). Thus, the calculation of the average effect effect using the random effect model approach.

Figure 4 shows a more or less balanced distribution of effects on the right and left sides of the average vertical line, so it does not indicate publication bias.

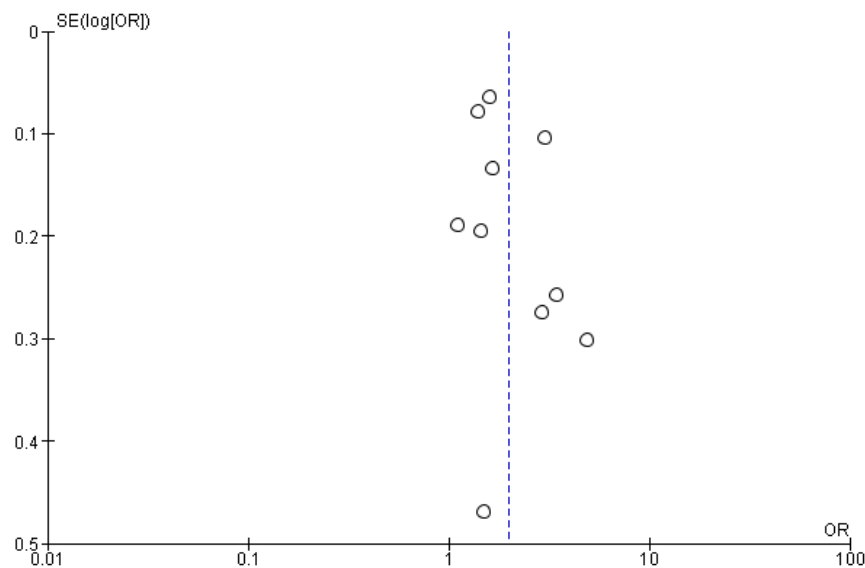


Figure 4. Funnel plot on the effect of bullying on anxiety in adolescents

b. The effect of bullying on depression in adolescents

Table 4 showed the effect sizes of the primary studies used in the meta-analysis about the effect of bullying on depression in

adolescents, with largest adjusted odd ratio conducted by Reisert et al. (2023) is 3.45, and the lowest aOR conducted by Hoertel et al. (2012) is 1.31.

Table 4. aOR and 95% CI data the effect of bullying on depression in adolescents

(Author, year)	aOR	95% CI	
		Lower Limit	Upper Limit
Tan et al. (2019)	1.28	1.10	1.49
Reisert et al. (2023)	3.45	1.74	6.81
Hoertel et al. (2012)	1.31	1.12	1.54
Liu et al . (2020)	1.52	1.17	1.98
Ford et al. (2017)	2.20	0.70	3.80
AlBuhairan et al. (2017)	2.66	2.39	2.95
Wilson et al. (2012)	1.63	1.27	2.09
Islam et al. (2020)	2.56	1.59	4.12

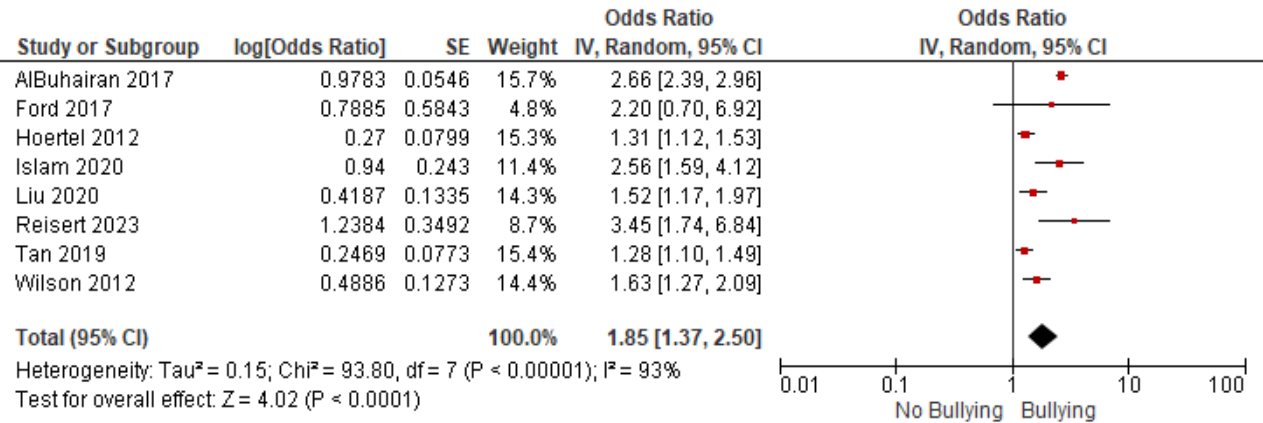


Figure 5. Forest plot the effect of bullying on depression in adolescents

Figure 5 shows the possible effect of bullying on depression. Adolescents who experienced bullying had a 1.85-fold risk of depression compared to no bullying, and the effect was statistically significant (aOR = 1.85; 95% CI= 1.37 to 2.50; $p < 0.001$). The

forest plot shows a somewhat heterogeneous effect estimate heterogeneity ($I^2 = 93\%$; $p < 0.001$). Thus, the average calculation of the effect estimate uses the random effect model approach.

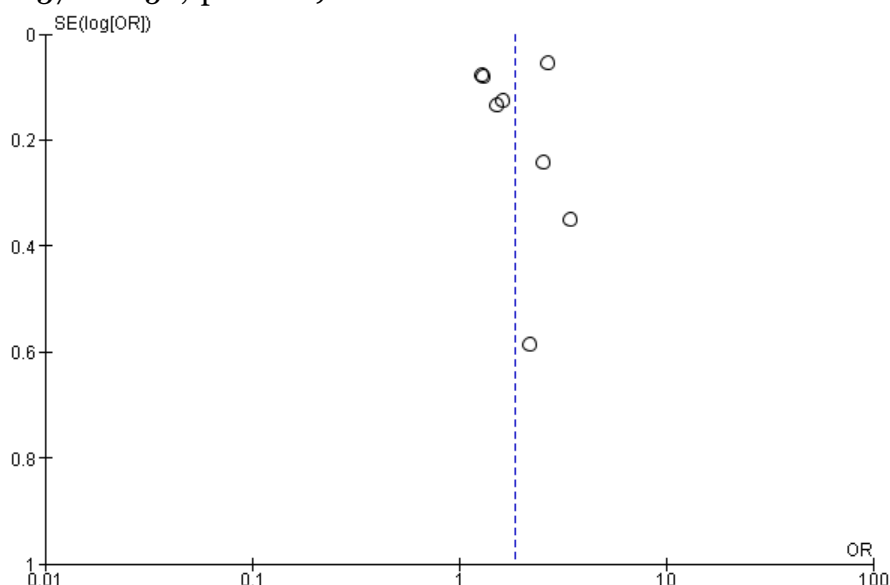


Figure 6. Funnel plot the effect of bullying on depression in adolescents

Figure 6 shows the funnel plot the effect of bullying on depression in adolescents, the funnel plot estimated distribution of the study effect more to the right than to the left of the average vertical line of the estimate, the funnel plot show a publication bias because the distribution of the effect is skewed to the right of the average vertical line, on the same side as the location of the star shape (diamond) average effect (over estimate).

DISCUSSION

1. The Effect of Bullying on Anxiety in Adolescents

Bullying increases anxiety in adolescents, this result fits the hypothesis. According to Wilson et al. (2012) found that bullying occurred among middle-income adolescents in sub-Saharan Africa, which resulted in adolescents who experienced bullying

reporting anxiety (aOR= 1.63; 95% CI= 1.27 to 2.09), and experiencing depression (aOR= 1.85; 95% CI= 1.30 to 2.61).

This is supported by the research of Thomas et al. (2015) which reported a high prevalence of the four forms of bullying in the form of ridicule, rumor spread (17.9%), social exclusion (14.3%) and physical threats or violence (10.7%). Being a victim is independently associated with much higher levels of psychological distress and decreased levels of emotional well-being for all forms of oppression. In particular, social exclusion has a strong relationship with mental health. Teens who experience frequent bullying report higher psychological distress and decreased emotional well-being.

2. The Effect of Bullying on Depression in Adolescents

A total of 8 cross-sectional studies came from the United States, Africa, China, Saudi Arabia, Malaysia, and Australia. The sample size is 135,732. This meta-analysis concluded that there was an effect of bullying on depression. In a meta-analysis study conducted by Ford et al. (2017), adolescents who experience bullying have a significant increase in the risk of depression, anxiety, self-harm, and suicidal thoughts.

Research conducted by Reisert et al. (2023) found that children with chronic conditions have a higher risk of involvement in bullying. Children with depression are six times more likely to be victims of bullying.

AUTHOR CONTRIBUTION

Amin Nur Hanida plays the role of a researcher who chooses topics, searches and summarizes research data. Bhisma Murti and Didik Gunawan Tamtomo analyzed data and reviewed research documents.

FUNDING AND SPONSORSHIP

This study is self-funded.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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