Bullying and Students Achievement: 
Trend Analysis of PISA 2012-2015 Results

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Abstract. This article presents trends in the level of bullying by connecting to understanding Mathematics, Reading and Science. This study aims to see how the bullying trends in 2012 to 2015 influence the trend of student achievement in Mathematics, Reading and Science from student perspective about school. There are 54 countries presented to this article, which is based on the 2012 and 2015 data of PISA. The results show that in the years 2012 to 2015, Indonesia was in the second rank, as a country that experienced a downgrade of 4.03 points. Of the three subjects, a few years ago increased between 2012 and 2015. Of the 54 countries, 42% indicated that bullying behavior in schools also decreased academic achievement.

Keywords: bullying, student achievement.
INTRODUCTION
Bullying is not a new word because this behavior often occurs and becomes an issue that has never been resolved. Bullying occurs in both developing and developed countries. This action is considered a form of violence that is common in schools. Various studies indicated that bullying makes schools become an unsafe places for students and it contributes in the belief that some schools are become not safe anymore (Maliki et al., 2009., in Al-Raqqad, Al-Bourini, Al Talahin, & Aranki, 2017). Shahria et al. (2015 in Al-Raqqad et al., 2017) report that bullying is considered a serious problem in academic settings in all parts of the world. They found that bullying had a negative impact on academic performance. Alison (2016, in Al-Raqqad et al., 2017) states that bullying is considered a global problem that affects the emotional, social, and physical well-being of school-age children throughout the world.

Many researchers find that there is a strong relationship between bullying and academic achievement. Because students lose concentration when they attend class. Nadine (2014., in Al-Raqqad et al., 2017) investigates the effect of intimidation on students' ability to succeed academically. Nadine found that students who were intimidated were afraid to go to school because they felt they were not safe. Therefore they cannot concentrate so that it has a negative impact on their academic success. Ammermueller (2012., in Al-Raqqad et al., 2017) found that bullying has a significant negative impact on the performance of students in schools now and in the future. Konishi et al. (2010., in Al-Raqqad et al., 2017) assert that interpersonal relations in the school environment affect academic achievement. Roman and Murillo (2011., in Al-Raqqad, 2017) assert that students who have been physically or verbally abused become less productive. Likewise according to Glew et al. (2005., in Al-Raqqad et al., 2017) he reported that bullying can prevent concentration and subsequent academic achievement because victims of bullying lose interest in learning and experience a decline in academic value because their attention is disrupted while studying.

From the overall research above, it is in line with the research conducted by Mario Piacentini (Oecd, 2017) based on the 2015 PISA data entitled "How much of the Problem is Bullying at School?". His results report that on average in all OECD countries, 4% of students reported that they were beaten or encouraged and 8% reported that they are victims of bad rumors spread at school at least several times every month. Students in schools where bullying is more common, performs worse than students in schools where the level of bullying is less frequent. Bullying will be more common in schools, where students report a poor climate of discipline and have a negative relationship with the teacher. So this research influenced by Mario Piacentini studies.

METHOD
This research was conducted by processing PISA data in 2012 and 2015. There were 54 countries analyzed in this study, because in these 54 countries students continued to fill out questionnaires for students well-being and assessments in all three fields of science (mathematics, science and reading).

Because this study wanted to see trends from 2012 to 2015, the results of the bullying trend were obtained from six questionnaire items for students well-being. To maintain accurate trend overtime, the variables used are statements which administered on both years. Indicators are new the excluded from the analysis. So it only processes data from the six items of subjective well-being.

This research can still be regarded as a study of bullying because, according to Quiroz (2006 in Al-Raqqad et al., 2017) the form of bullying is not only about physical bullying but can also refer to psychological bullying such as rejection from the group and also bullying in social relations that is like preventing some individuals from exercising certain activities or reject their friendship or spreading rumors about other. Because the theory makes researchers more convinced that the six items used can be associated with bullying.

The six items are: (1) I feel like an outsider (or left out of things) at school, (2) I make friends easily at school, (3) I feel like I belong at school, (4) I feel awkward and out of place in my school, (5) other students seem to like me, (6) I feel lonely at school.

Data processing is doing by factor analysis on the six items then looking at the difference value from 2015 and 2012. After that it was compared with the difference values in students achievement of 2015-2012.
RESULT AND DISCUSSION

![Figure 1](image)

It is a graph that results from analysis factor of the questionnaire students well-being.

Based on figure 1, the more graphs moving towards the right means the country is experiencing an increase in bullying in schools. Conversely, if the graph moves to the left, it states that the bullying treatment in that country has decreased. If seen from the percentage of 54 countries, 70% of countries experience an increase in bullying in schools. 28% of countries experience a decline in the level of bullying in schools. Then there are a number of countries such as Belgium, Finland and Thailand which have experienced a very low rate of bullying which is just under 1%.

Indonesia ranks second as a country experiencing a decline in the level of bullying in schools during 2012 to 2015, which amounted to 4.03 points. It was slightly different from Romania which ranked first in the decline in the level of bullying, which amounted to 4.08 points.

Whereas from all countries, Turkey experienced the greatest increase in bullying experienced by students in the school environment. In the first item regarding feeling alienated in school, Turkey experienced a 4.6 point increase seen in 2015 getting 72.5 points while in 2012 67.9 points. The second item regarding the ease of getting friends also increased by 5.01 points (in 2015 = 72.9, in 2012 = 67.9). The third item related to feeling is part of the school, Turkey has increased 5.07 points with a value of 73.11 in 2015 and 68.11 in 2012. The fourth item regarding awkwardness in school reports of students also increased by 4.99 points (2015 = 72.79 and 2012 = 67.8 points). For the fifth item regarding feelings of being liked by friends in school, Turkey also experienced an increase of 4.2 points (2015 = 73.13 and 2012 = 68.93). Finally for items related to students' feelings of loneliness in schools, Turkey also experienced an increase of 4.59 points (2015 = 72.22 and 2012 = 67.63).

For the second item, third and fifth, the bigger points reported, the more they are not in accordance with the item statement. The opposite occurs for the first, fourth and sixth items, the greater the points reported, the respondents agree with the statement stated on the item.

Comparing the Difference in Math Scores with The Level of Bullying Behavior of Students in School

The results of the analysis on the mathematical achievement trend indicate that, there is a tendency for countries experiencing an increase in bullying, in fact the mathematical achievement value decreases. Seen in Figure 2 that the most of the 22 countries occupy the quadrant. Whereas there were only 14 countries that experienced an increase in achievement of mathematical values even though the level of bullying at school was high. On quadrant, with the decline in the level of bullying which has increased the achievement of mathematical values only occupied by three countries, namely Indonesia, Qatar and Greece. There were 11 countries that experienced a decrease in bullying but also experienced a decline in mathematical values. The remaining three countries experienced increased bullying behavior but did not experience an increase in mathematics achievement.

This is in line with previous research conducted by Kibriya (2015) (in Oliveira, Menezes, Irfii, & Oliveira, 2017). Shows the negative impact of bullying on mathematical scores and in the study found that there was a greater influence for girls.
Figure 2. It is a graph that is obtained from the results of the analysis of the difference between mathematical values and the level of bullying between 2015 and 2012.

Compare the Level of Bullying in Schools with the Achievement of Student Reading Levels

Based on the third graph obtained $R^2$ of 0.0126 or 1.26% the variation in the value of reading is influenced by the high level of bullying. The results of the analysis on reading achievement trends show the tendency of countries experiencing increased bullying behavior, their achievements in terms of reading have decreased. There are 23 countries that occupy the quadrant. Whereas there are 16 countries that occupy quadrants with increasing bullying behavior but also increase the value of reading. Then there are 10 countries that have decreased in both cases, both the level of bullying behavior and the achievement of reading levels. Only 5 countries experienced a decrease in the level of bullying behavior, but the level of reading was increasing, one of them being Indonesia.

Figure 3. It is a graph obtained from the analysis of the difference between the value of reading and the level of bullying between 2015 and 2012.

Comparing the Level of Bullying in Schools with Student Achievement of Science Scores

Based on the fourth graph, it shows the $R^2$ value of 0.068 or 6.8%, the variation in the value of science is influenced by the high level of bullying. The results of the analysis on the trend of science achievements show the tendency of countries experiencing an increase in bullying behavior in schools, their achievements in the value of science also decreased, namely there were 26 countries. Whereas for countries that experience an increase in science achievements with the level of bullying which also increases only experienced by 13 countries. For countries experiencing a decline in
the level of bullying with the increase in the value of science achievement, it was only experienced by 3 countries, one of them being Indonesia. The remaining 12 countries occupy quadrants with a decrease in both of these.

CONCLUSION

From the overall data, Indonesia experienced a decline at the bully level, which meant that students had a good impression of the school environment. While the achievement of reading values in Indonesia did not experience a large increase, only increasing by 1 point. The value of science has increased by 21 points and the mathematics score has increased by 11 points.

In general, based on the results of the analysis of the achievement trends in mathematics, reading and science shows that the tendency of countries that experience an increase in bullying behavior turns out that their achievements in all three subjects have decreased. Based on some previous studies it was found that socio-emotional skills can help students overcome bullying. Thus, a program to combat the practice of bullying can be done by improving the school climate. Increase the comfort of all students at school. There needs to be a large contribution from the school, fellow students, teachers and all school employees. Parents also need to play an active role in paying attention to every condition experienced by children in school. So that it can encourage students to increase their academic potential.

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