

Investigating Bullying Factors in Adolescents

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Introduction

Bullying is a pervasive problem that negatively affects the wellbeing of students in many aspects of their lives. The 2019 National Center for Educational Statistics estimates that 1 out of 5 kids is bullied. Additionally, according to results from the CDC's Youth Risk Behavior Surveillance System survey, 5.4 million kids stay at home at any given day in fear of being bullied. Thus, it is critical to better understand which factors are associated with bullying. This will allow for the creation of more targeted bullying prevention programs and support systems.

Project Aims

1. Identify which factors are associated with an adolescent being cyberbullied/bullied in-person, which will allow us to identify bullying risk factors that can be prevented or alleviated in adolescents.
2. Understand which factors are associated with physical attack severity levels in bullying, to identify risk factors of being physically attacked for adolescents.
3. Build a classification model to accurately predict whether an adolescent was bullied based on various factors, which can assist with predicting bullying in other student populations.

Dataset

The dataset contains survey responses from the Global School-Based Student Health Survey (GSHS), a school-based, self-administered questionnaire that asks about an adolescent's demographics, family, and social factors related to bullying. The survey was conducted in Argentina in 2018, with 56,981 student participants. After cleaning the data, there were 32,938 observations and twenty variables.

Results

Q1: Which factors are associated with an adolescent being bullied in person?

We ran a predictive model (a logistic regression model) to see which factors predict whether or not an adolescent is bullied in person. In-person bullying is a binary variable: 0 means not bullied, and 1 means bullied. After running the model, five factors significantly predicted an adolescent being bullied in person.

Figure 1: Associations Between Occurrence of In-Person Bullying and Other Factors

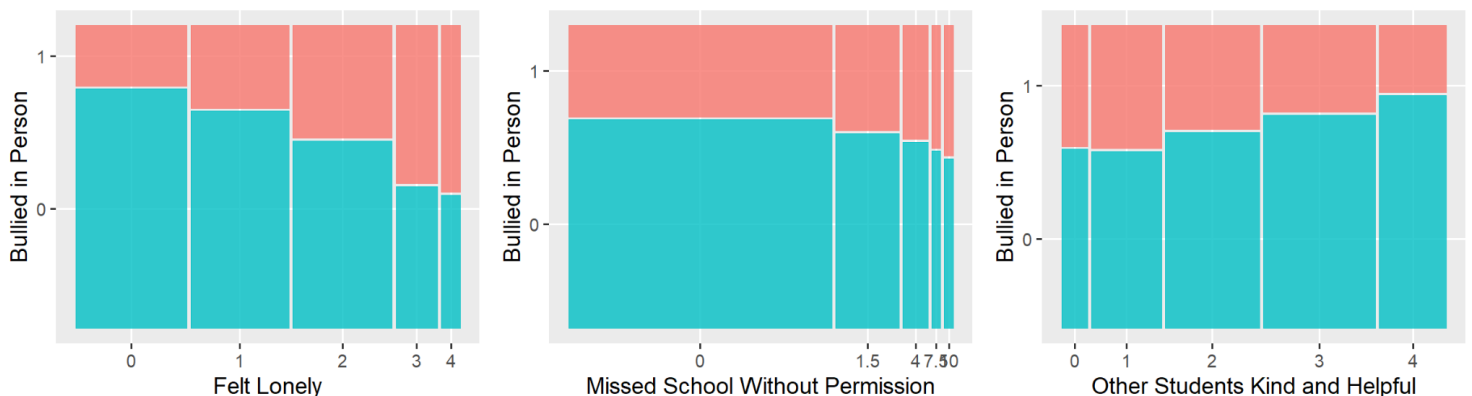


Fig 1: Mosaic plots for three out of the five significant predictors for an adolescent being bullied in person

- **Age:** For every level increase in age, the odds of an adolescent being more likely to be bullied in person becomes smaller by 0.94 times, holding constant all other variables.
- **Felt Lonely:** For every level increase in how lonely an adolescent feels, the odds of being more likely to be bullied in person becomes larger by 1.51 times, holding constant all other variables.

- **Missed School Without Permission:** For every level increase in frequency of an adolescent missing school without permission, the odds of being more likely to be bullied in person becomes larger by 1.05 times, holding constant all other variables.
- **Other Students' Kindness and Helpfulness:** For every level increase in how much an adolescent finds other students to be kind and helpful, the odds of being more likely to be bullied in person becomes smaller by 0.85 times, holding constant all other variables.
- **Parents Understanding of Problems:** For every level increase in how much an adolescent feels their parents understand their problems, the odds of being more likely to be bullied in person becomes smaller by 0.98 times, holding constant all other variables.

Q2: Which factors are associated with the severity of physical attacks in bullying?

We also ran another predictive model (ordinal logistic regression model) to see which factors predict the severity of physical attacks in bullying. For physical attack severity, there are three different levels: "Low" if the adolescent was physically attacked 0 or 1 times, "Medium" if the adolescent was physically attacked 2 to 7 times, or "High" if the adolescent was physically attacked 8 or more times. After running the model, four factors significantly predicted the severity of physical attacks in bullying:

Figure 2: Associations between Physical Attack Severity Levels and Other Factors

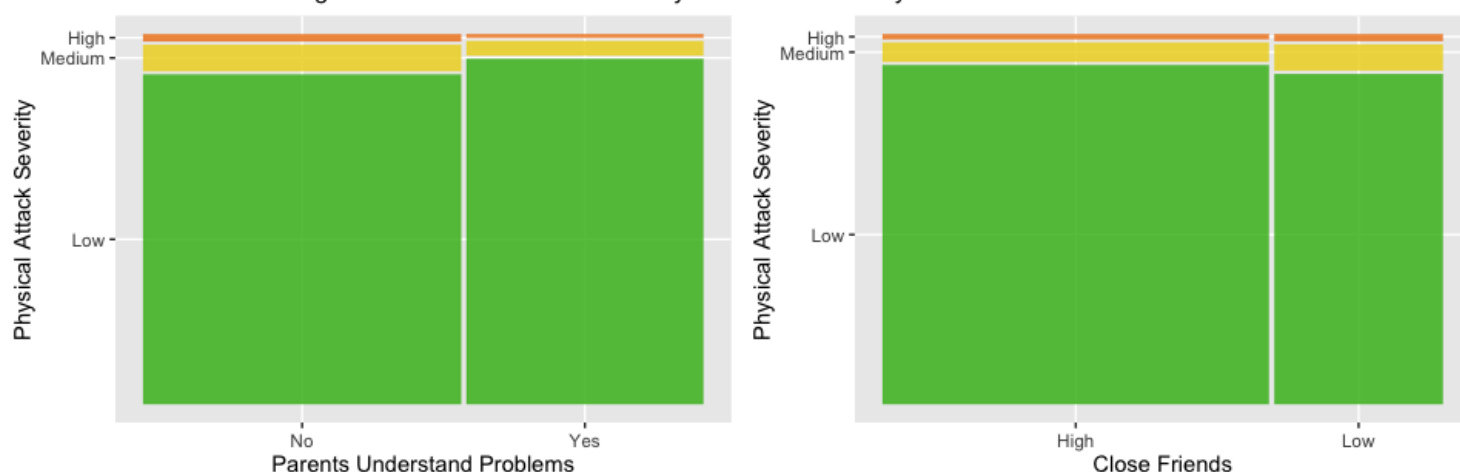


Fig 2: Mosaic plots for two out of the four significant predictors for severity of physical attacks in bullying

- **Sex:** For male adolescents, the odds of being more likely to be physically attacked is 1.42 times that of female adolescents, holding constant all other variables.
- **Other Students' Kindness and Helpfulness:** For students who identified other students as not being kind and helpful, the odds of being more likely to be physically attacked is 1.43 times that of students who identified other students as being kind and helpful, holding constant all other variables.
- **Parents Understanding of Problems:** For students whose parents do not understand their problems, the odds of being more likely to be physically attacked is 1.83 times that of students whose parents do understand their problems, holding constant all other variables.
- **Close Friends:** For students who do not have many close friends, the odds of being more likely to be physically attacked is 1.29 times that of students who have many close friends, holding constant all other variables.

Q3: Can we predict whether an adolescent is bullied or not, using a classification model?

Lastly, we performed classification analysis to create a predictive model, a classification tree, that can predict whether an adolescent is bullied or not. Bullied means an adolescent experienced either cyberbullying, bullying at school, or bullying outside of school. The purpose of the tree is to create a model that maps out a series of decisions that lead to the ultimate decision of the category (bullied or not bullied) of an individual.

Figure 3: Classification Tree for Predicting Occurrence of Bullying

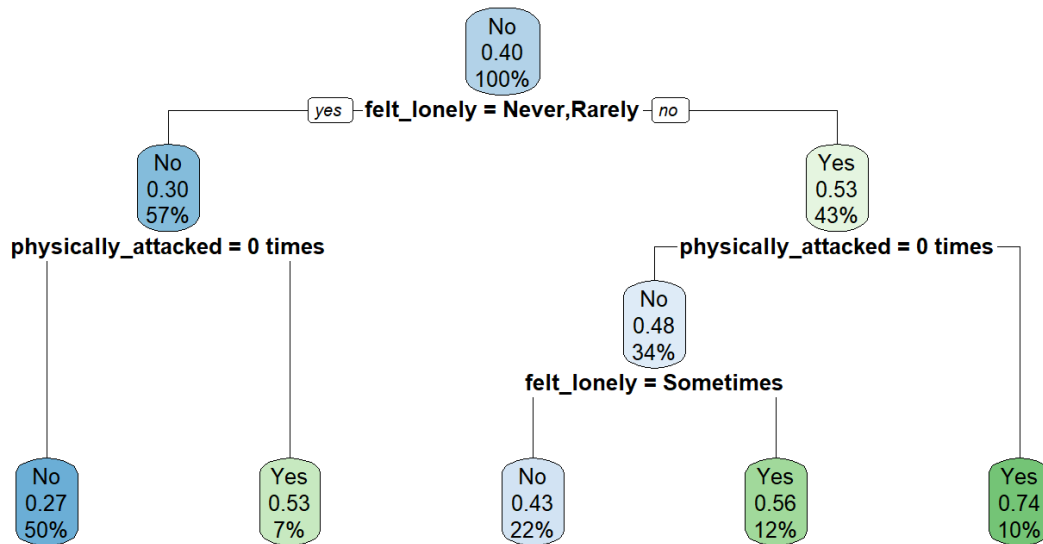


Fig 3: For an adolescent who never or rarely felt lonely and was never physically attacked, using the classification tree, we would predict that they were not bullied.

- The classification model we generated predicts whether an adolescent is bullied or not using information about how often they felt lonely and whether or not they were ever physically attacked.
- The estimated true error rate of the tree is 34.1%. This is the proportion of mistakes the model made on the testing set (new data the model has never seen before), and is a 6.5% improvement from the error rate if we were to just guess that all students were not bullied.

Limitations

Since the data was only collected from adolescents from Argentina, our models and results are not generalizable to adolescents from other countries and cultures. Another limitation is that the logistic regression model and ordinal logistic regression model have low predictive power, based on model diagnostics. A third limitation is that our analyses suggest correlations, but not causal relationships, between the various factors and bullying. Lastly, in recoding the data for logistic regression analysis, we converted categories of data into singular integers, i.e. "3 or more friends" to 3. As a result, our models are built from data that capture less information than the original data, so we must be cautious in interpreting the models as entirely accurate and generalizable.

Conclusion & Recommendations

From the logistic regression model, we found that adolescents who are younger, more lonely, or miss school without permission more frequently, perceive other students as less kind and helpful, and feel less understanding from parents are more likely to be bullied in person. From the ordinal logistic regression model, we found that adolescents who are male, perceive other students as less kind and helpful, have parents who do not understand their problems, or have a less close friends, are more likely to be physically attacked in bullying. Lastly, we built a classification model with an accuracy rate of 65.8%, which can predict whether an adolescent is bullied or not using information about physical attacks and loneliness.

We recommend that schools provide more social support and community building for adolescents to reduce loneliness and increase peer bonding, in the form of peer support groups or more extracurricular activities and clubs. Schools should also work to foster inclusive classroom environments through having community guidelines in classrooms and providing accessible mental health and counseling resources. This will allow all students, regardless of background or appearance, to feel safe enough to report bullying instances. At home, parents should seek to spend more time with their children and work to understand their problems. Thus, they can act as a support system their adolescent can turn to when suffering from bullying problems.