The Influence of Peer Effect in Sports Behavior Among Youth Students

Group: Honglin Zheng, Zhilin Zhai, Yining Liang
HUDK 4050: Core Methods in Educational Data Mining
Professor: Lucas Liu

Introduction

- Motivations influence a person’s behavior in physical activity.
- Peer Effect
- Figure out:
  - To what degree does peer effect influences people’s physical activity behaviors?
  - Youth Students
  - Methods:
    - social networking analysis, Clustering, and Linear Regression Model in Python
- Hypothesis: There is a positive correlation between the peer effect and the youth students' sports behaviors.

Introduction

The Definition of 'Peer Effect':

Students can influence each other and educate themselves by their peers; Peer effect exist when a person's behavior is affected by his or her peers.

- **Shining Light model :**

  Positive externality of 'peer effect' that a few students with outstanding performance in class could positively enhance peers' performance by inspiring all students to increase their achievement

  Lazear, E. P. Educational production. (2001). The Quarterly Journal of Introduction to Economics, *16(3)*, 777-803.

  Hoxby, C.M. (2002). The Power of Peers: How Does the Makeup of a Classroom Influence Achievement? (Research). *Education Next, 2*, 57.

- **Bad Apple Model :**

  Negative externality of 'peer effect' that students with poor academic outcomes might negatively influences the academic performance of peers

  Lazear, E. P. Educational production. (2001). The Quarterly Journal of Introduction to Economics, *16(3)*, 777-803.

  Zimmerman, D.J. (2003). Peer Effects in Academic Outcomes: Evidence from a Natural Experiment. *Review of Economics and Statistics, 85*, 9-23.

Literature Review

Correlation between ‘peer effect’ and students’ physical activities.

- Jago, R., Brockman, R., Fox, K. R., Cartwright, K., Page, A. S., & Thompson, J. L. (2009). Friendship groups and physical activity: qualitative findings on how physical activity is initiated and maintained among 10-11 year old children. *The international journal of behavioral nutrition and physical activity*, *6*, 4. https://doi.org/10.1186/1479-5868-6-4

- Ali, M. M., Amialchuk, A., & Heiland, F. W. (2011). Weight-related behavior among adolescents: the role of peer effects. *PloS one*, *6*(6), e21179. https://doi.org/10.1371/journal.pone.0021179

- Stearns, J. A., Godley, J., Veugelers, P. J., Ekwaru, J. P., Bastian, K., Wu, B., & Spence, J. C. (2018). Associations of friendship and children's physical activity during and outside of school: A social network study. *SSM - population health*, *7*, 008–8. https://doi.org/10.1016/j.ssmph.2018.10.008

Study design

Participants: adolescents in grades 7-9 at a same school

Sample size: 100 students

Assess at two time spots:

1. in the first week of a new semester
2. in the last week of the semester

Independent variable

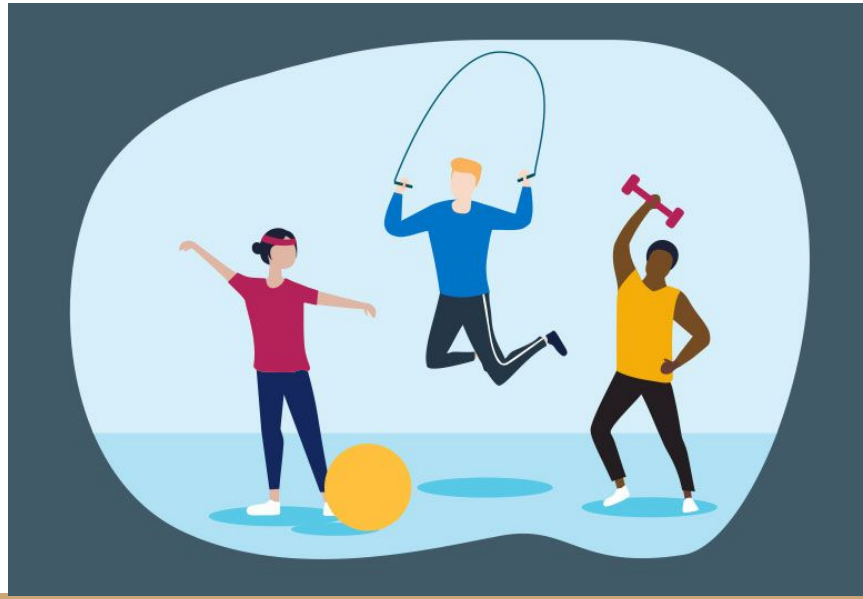
Peer (friend) relationship

- All students name up friends in this school, evaluate the friendship quality in the scale of 1-5;
- Only count if nominate twice (remain the relationship for a semester);
- Assess before and after the semester;
- This variable has directions.

Dependent variable

Physical activity

- “How many hours do you spend on playing sports or doing exercise in a typical week?”
- Assess after the semester



Control variables

1. shared environmental influences(assess before the semester)

- ❏ “How many hours do the parents/guardians play sports or do exercise in a typical week?”
- ❏ “Do you have access to public recreational facilities in your neighborhood?”

2. Physical activity (assess before the semester)

Data analysis-step 1

1. Build a directed adjacency matrix based on the friendship with the average friendship quality as weight. If student *i* named student *j* as a friend, with a friendship quality mean *q*; then the *i*,*j* entry in the matrix will be a *q*.
2. Use Python to implement the social network analysis:
    a. Calculate the density, centrality to explore the overall characteristics of friendship at school. Delete isolated nodes (missing data).
    b. Detect communities(groups).
3. Implement ANOVA to find any between-group differences in physical activities.

Data analysis-step 2

1. Calculate the average physical activity of an individual's nominated friends.

2. Use Python to implement a linear regression analysis:

$$Y = \boldsymbol{\beta}_1 \ x_1 + \boldsymbol{\beta}_2 x_2 + \boldsymbol{\varepsilon}$$

➔ *Y: physical activity;*
➔ x_1 *: friends' average physical activity;*
➔ x_2 *: control variables*
➔ $\boldsymbol{\varepsilon}$ *:error*

Hypothesis

In social networking analysis: the main effect of group is significant, which means that there is between-group difference for the physical activities.

In linear regression analysis: in the regression model, friends' average physical activity can predict an individual's physical activity after controlling for the pre-test physical activity and family factors.


thank
you