

# Peer Effect on Students' Performance through an Interpersonal Relationship Perspective

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**Abstract:** *Peer effect refers to the impact that peers have on the learning of a specific person. In this study, we investigated the peer effect in the class through an interpersonal relationship perspective. 195 students of the preschool educational psychology course participated in the study. The data collected consisted of gender, age, grades, familial income, number of professional certifications, temperament types, and the degree centrality of social networks about learning, entertainment, and emotional support. The results showed firstly, that students' number of professional licenses correlated with their degree centrality of learning and leisure linkages; secondly, that their temperament correlated negatively and significantly with their degree centrality of leisure linkage; finally, that the degree centrality of leisure was intermediate between the number of professional licenses and student grades. In conclusion, the peer effect is not as simple as Manski's propositions (1993). It was influenced by the type of interpersonal relationships.*

**Keywords:** *peer relationship, peer effect, performance*

## 1. Introduction

In Everyday life, there are many examples to show that a successful person does not only depend on his efforts but also relies on his relationships. In 1993, Manski reflected on theories about "social norms" (Berkowitz, & Perkins,1986) "conformity" (Asch,1956), or "imitation" in sociological and psychosocial research and considered the situation where an individual presented similar behavior to other members of a group after interacting with other members could come from three diverse effects: Firstly, endogenous effect (or simultaneous effect) represents a situation where a person's behavior varies with the average behavior of the peer group. Secondly, exogenous effects (or contextual effects), including an individual's behavior vary with exogenous characteristics (pre-determined characteristics) that existed before entering the group. Thirdly, the correlation effect refers to an association between the personal characteristics of students in the same peer group. For verification, Manski proposed to use a "linear-in-means" model which measured the average educational outcome of the peers, or a "non-linear model which squared up the exogenous characteristics of group members and correlation effect.

In 2011, Sacerdote showed 7 different non-linear models and concluded that peer effect would be not always positive, sometimes negative, and peer effect would be not only that individual behavior varies with the average behavior of interactive groups, but also an individual would influence peer behaviors. Bramoullé, Djebbari, and Fortin (2009;2020) proposed that in the non-linear model, we needed to identify the peer effects through social networks besides socioeconomic factors and individual characteristics of group members. In addition, Fortin and Boucher (2016) indicated that exogenous effects allowed individuals to enter the group to choose friends, and the endogenous effect was influenced by the social network of the individual in a group, too. However, no one proposed an interpersonal relationship perspective of peer effect. In fact, in academic life, peer relationships were usually affected by students' attraction in the establishment of the relationship process. Students have different linkages for different activities. "The best student" should often be referred to as the one with the highest grade in a class, and does not refer to the students with mean grades in class.

In the present study, we take an interpersonal relationship perspective on peer effect and test the relationship among factors of student attraction, different types of relational ties, and performance in academic life.

## 2. Theoretical background and hypothesis

### 2.1 Factors of interpersonal attraction and the process of making a peer relationship in academic life

In the interpersonal relationship perspective, three foundations are comprised in the process of making a peer relationship: cognitive, affective, and behavioral. In cognitive, it refers to awareness of others' emotions and behaviors as well as of himself. Cognitive is the primary factor and initial step in the interpersonal relationship. Affective merges and forms certain feelings between dyadic people. Action in interpersonal relationships is the key to intimacy.

In 1974, Levinger showed 5 factors that would affect interpersonal attraction: Firstly, familiarity, which is the exposure effect, means that a person should often come another's way, then would be attracted. Secondly, proximity, means people the closer geographically, are the easier to contact and the easier to be attracted to. Proximity is an important factor in interpersonal communication, but it will become less and less effective or even counterproductive over time. Thirdly, similarity, means that when people realize the similarities in each other, they slowly have a sense of intimacy, in which age, gender, personal social background, or attitude. Fourthly, complementarity means that both two people need or either party expects complementarity, it would be attracted. Jackson and Mascaro (2013) indicated that while similarity contributes to interpersonal attraction, sometimes two people whose roles complement each other can also attract each other. Fifthly, personal traits, such as appearance, temperament, or ability, are all responsible for interpersonal attraction. Rice and Dolgin (2002) found teenagers were accepted because they were well-groomed, well-groomed, good-looking, highly sociable, cheerful, outgoing, and energetic. In temperament, he is classified as a Phlegmatic temperament (Chen, 1984).

### 2.2 The linkages among students in academic life

Since there are many activities for students in school. Students form different groups with different peers and play different roles (Bavelas, 1948). Someone can be a leader; others can be a follower. Sometimes, they talk about learning; at other periods they talk about hobbies, leisure, or emotional support. They do different activities with the same peer or with different peers.

Grosser, Lopez-Kidwell, & Labianca (2010) studied gossip in organizational life. They considered that within organizations, it existed instrumental ties, which arise in the course of fulfilling appointed work functions (e.g., Zagenczyk, et al., 2008), and expressive ties, which contain a socioemotional component (Lincoln & Miller, 1979). For them, an individual would engage in gossip based on the individual's dyadic relational ties. When exchanging sensitive gossip with a trusted partner, the gossipier can be reasonably assured that the partner will respect requests to keep the source anonymous or not to repeat it if so desired. In other words, belonging to trust, people have different types of ties in a group.

In 2004, Qiu used the cohesion of students to distinguish students' peer ties into three types: "Solidarity", "group-I separated", and "conformist". "Solidarity" student lacks initiative relationship in a group, and he stays away from his peers and does alone. "Group-I separated" refers to someone who interacts closely, but is separated from the group and has common values, e.g., ethnic, vocational, or life values. A conformist is someone who has a high commitment to the group and maintains a good relationship in the group. Therefore, "group-I separated", and "conformist" students can be affected by their peers, but "Solidarity" students are less affected by their peers than "group-I separated", and "conformist" students. For Freeman (1979), the "Solidarity" students could have a low degree centrality, and the "conformist" students can have a higher degree centrality. "Solidarity" students can get less information in school than group-I separated", and "conformist" students. They should have lower grades than the "group-I separated", and "conformist" students.

### 2.3 Peer effect in interpersonal relationship perspective

For Manski (1993), the peer effect comes from students' characteristics before entering the group, interactions with the members of the school, and school resources. The members of the school have an equal effect on each other, but, according to the interpersonal relationship perspective, due to the attraction and first impression, each student in a school cannot have an equal chance to make peer relationships and interact with each other.

*Hypothesis 1: the factors of student's attraction could affect their index of degree centrality in class.*

The “conformist” students have a higher index of degree centrality than “group-I separated” students. The “solidarity students have the lowest. Students who have a higher index of degree centrality would have higher grades.

*Hypothesis 2: Students who have a higher index of degree centrality would have higher grades in class.*

Since students have different activities and then have different ties in academic life. They could receive different information and then have different effects on their grades. Learning ties could affect students’ grades, but their emotional support ties could not influence student’s grades.

*Hypothesis 3: students’ different ties could have different influences on their grades.*

In 2018, Li and Qiu found that students' socioeconomic status affected their grades. Shadrina and colleagues (2019) showed that a student's temperament affects a student's grade, therefore, students’ characteristics affect their grades. The students’ socioeconomic status and temperament types are the factors of students’ attraction.

*Hypothesis 4: the factors of student’s attraction could affect their grades.*

### **3. Methodology**

#### **3.1 Sample et setting**

195 students of the “Preschool Educational Psychology” course at Guangdong Business and Technology University participated in this study. Students learned with the same teacher. Since preschool educational psychology is a course in the first semester of the first grade, the students did not know each other before this course.

#### **3.2 Data Collection and Measures**

The data collected consisted of gender, age, familial income, number of professional certificates, grades, temperament types, and peer relationships in the class.

Students' gender, age, familial income, and professional certifications were collected during the first class, while the student temperament type was collected during the last class.

As for peer relationships, it was measured in mid-November. Social metrics were used in the collection of student relationships in the classes. Students were asked three questions following, "When you are doing your homework currently, with whom do you discuss it?" "Currently, when you go to the diner(lunch) or relax, with whom you are in your class?" "At present, when you need emotional support, with whom do you talk about your feelings in class?" These three questions are based on learning, entertainment, and emotional ties. Compared with “with whom do you take lunch (or dinner) or relax” and "with whom to talk your feelings", students require more trust in the situation "with whom to talk your feelings" than others, which transmits probably some negative information. Students had to give us peers’ names so that we could measure the number of peers in different kinds of relational ties with the time and make sure if the student and the peer appointed lived together or not.

Students’ temperament types were assessed with the adult temperament self-report scale compiled by Chen (1984). There were 60 items in total, which were classified according to four temperament types: blood, phlegmatic, melancholic, and choleric temperament. All items were scored on a 5-point from +2 (total agreement) to -2 (total disagreement). There are 13 types. The student's temperament was an exogenous characteristic before entering the class because temperament is innate and stable.

#### **3.3 Data Analysis**

We used UCIENT to calculate the value of the degree centrality index of each student. To apply the UCIENT software, we converted the student's interpersonal relationships in the class into a "0" and "1" matrix diagram in Excel.

When we got the data about the degree centrality index of each student, we would use the Pearson correlation coefficient and multiple regression to analyze students' interpersonal attractive characteristics, the degree centrality of different relational ties, and the “Preschool Educational Psychology” grade.

4. The results

4.1 Descriptive statistics

In Table 1, there was a significantly low positive correlation between the number of professional certifications and the degree centrality of learning ties ( $r=.27, p<.01$ ) and entertainment ties ( $r=.19, p<.01$ ). The degree centrality of entertainment ties had a significantly low negative correlation with temperament type ( $r=-.19, p<.01$ ) and a significant positive correlation with gender ( $r=.24, p<.01$ ). Student's grade had a significantly low positive correlation with the number of professional certification ( $r=.16, p<.05$ ), degree centrality of learning tie ( $r=.17, p<.01$ ), and degree centrality of the entertainment tie ( $r=.17, p<.01$ ). However, student's grade was not significantly correlated with his familial income, and temperament type.

Table 1: Means, Standard Deviations, and Intercorrelations Among Study Variables.

| variables                                  | M     | SD   | correlations |        |       |        |       |       |       |      |      |  |
|--|-------|------|--------------|--------|-------|--------|-------|-------|-------|------|------|--|
|  |       |      | 1            | 2      | 3     | 4      | 5     | 6     | 7     | 8    | 9    |  |
| 1. age                                     | 21.90 | 1.30 | 1.00         |        |       |        |       |       |       |      |      |  |
| 2. gender                                  | 1.96  | 0.20 | 0.06         | 1.00   |       |        |       |       |       |      |      |  |
| 3. familial income                         | 2.21  | 1.23 | -0.05        | 0.04   | 1.00  |        |       |       |       |      |      |  |
| 4. Temperament type                        | 3.31  | 2.41 | 0.08         | -.25** | -0.01 | 1.00   |       |       |       |      |      |  |
| 5. Professional certifications             | 2.15  | 1.52 | -0.09        | -0.01  | 0.07  | -0.06  | 1.00  |       |       |      |      |  |
| 6. Degree centrality of learning ties      | 7.55  | 3.32 | 0.01         | 0.11   | -0.03 | 0.00   | .27** | 1.00  |       |      |      |  |
| 7. Degree centrality of entertainment ties | 6.83  | 3.43 | 0.04         | .24**  | 0.05  | -.19** | .19** | .49** | 1.00  |      |      |  |
| 8. degree centrality of emotional ties     | 4.93  | 3.25 | -0.14        | 0.05   | 0.03  | -0.03  | 0.09  | .34** | .52** | 1.00 |      |  |
| 9. grades                                  | 84.42 | 4.39 | .13          | .10    | -.00  | .13    | .16*  | .17*  | .17*  | .01  | 1.00 |  |

\*:  $p<.05$ ; \*\*:  $p<.001$

4.2 Hypothesis Testing

4.2.1 The Correlations between the factors of students' attraction and their grades

After multiple regression analysis, the factors of students' attractions significantly correlated with their grades ( $F=3.44, p<.01$ ), and  $R^2$  was equal to 8.4%. Within the factors of students' attraction, there was only the Beta-value of temperament type (beta =.294,  $T= 2.347, p<.05$ ) and number of professional certifications (beta =.526,  $T= 2.599, p<.01$ ) significant positively. Our hypothesis was partially verified.

4.2.2 The correlations between students' degree centrality of different ties and their grades

After sample linear regression analysis, students' grades correlated significantly with their degree centrality of learning ties ( $F=5.638, p<.05$ ) and entertainment ties ( $F=5.427, p<.05$ ), but not with that of emotional ties ( $F=0.009, NS$ ). The Beta-value of learning ties was significant (beta =.225,  $T= 2.273, p<.05$ ), and  $R^2$  was equal to 2.3%. The Beta-value of entertainment ties (beta =.294,  $T= 2.347, p<.05$ ) was significant and  $R^2$  was equal to 2.7%.

4.2.3 The correlations between the factors of students' attraction and the degree centrality of different ties

Table 2: Results of simple linear regression between the factors of students' attraction, and the degree centrality of different ties

|                                       | Learning ties   |         | Entertainment ties |         | emotional ties  |        |
|---------------------------------------|-----------------|---------|--------------------|---------|-----------------|--------|
|                                       | Beta( $\beta$ ) | T       | Beta( $\beta$ )    | T       | Beta( $\beta$ ) | T      |
| intercept                             | 1.159           | .258    | -3.380             | -.735   | 10.030          | 2.196* |
| Ages                                  | .080            | .449    | .136               | .745    | -.329           | -1.815 |
| Gender                                | 1.867           | 1.571   | 3.510              | 2.885** | .916            | .758   |
| Familial income                       | -.145           | -.779   | .088               | .460    | .036            | .189   |
| Temperament type                      | .009            | .097    | -.217              | -2.264* | -.039           | -.406  |
| Number of professional certifications | .602            | 3.978** | .417               | 2.687** | .166            | 1.075  |
| $R^2$                                 | .089            |         | .121               |         | .030            |        |
| $\Delta R^2$                          | .056            |         | .098               |         | .004            |        |
| F                                     | 3.703*          |         | 5.223*             |         | 1.17            |        |

\*:  $p<.05$ ; \*\*:  $p<.001$

In Table 2, after the multiple regression, the correlation between the factors of students' attraction

and the degree centrality of learning ties was significant ( $F=3.703, p<.001$ ), the beta-value of the number of professional certifications was significant and positive ( $beta =.602, T= 3.978, p< .01$ ). The adjusted R-squared decreased to 5.6%. The degree centrality of entertainment ties had a significant correlation with the factors of interpersonal attraction ( $F= 5.223, p<.005$ ). The beta-value of gender and the number of professional certifications were significant and positive ( $\beta =3.510, T=2.885, p<.001; \beta =.417, T=2.687, p<.001$ ) with the degree centrality of entertainment ties, but the beta value of student's temperament types was negative and significant with degree centrality of entertainment ties ( $\beta =-.217, T=-2.264, p<.05$ ). The adjusted R-squared decreased to 9.8%.

**4.2.4 The correlations among the factors of students' attraction, degree centrality of different ties in class, and their grades**

In Table 3, the correlation among the factors of students' attraction, degree centrality of learning ties in class, and their grades was significant ( $F=3.331, p<.001$ ).  $R^2$  was equal to 9.6%. Within the factors of students' attraction and degree centrality of learning ties, there was only the beta-value of temperament significant and positive ( $\beta =.292, T=2.346, p<.05$ ). The correlation among the factors of students' interpersonal attraction, degree centrality of entertainment ties in class, and their grades was significant ( $F=3.580, p<.001$ ).  $R^2$  was equal to 10.3%. Within the factors of students' interpersonal attraction and degree centrality of entertainment ties, there were the beta-value of temperament type ( $\beta =.334, T=2.658, p<.01$ ), number of professional certifications ( $\beta =.448, T=2.188, p<.05$ ), and degree centrality of entertainment ( $\beta =.188, T=1.996, p<.05$ ) significant and positive. The correlation among the factors of students' interpersonal attraction, degree centrality of emotional ties in class, and their grades was significant ( $F=2.859, p<.05$ ).  $R^2$  was equal to 8.4%. Within the factors of students' interpersonal attraction and degree centrality of emotional ties, there were the beta-value of temperament type ( $\beta =.294, T=2.344, p<.05$ ), and the number of professional certifications ( $\beta =.524, T=2.573, p<.05$ ), significant and positive, but degree centrality of entertainment no significant ( $\beta =.014, T=.145, NS$ ).

Table 3: The results of the correlation among the factors of students' attraction, degree centrality of different linkages in class, and their grades

|   | The grades of preschool educational psychology |        |                 |          |                 |        |
|---|--|--------|-----------------|----------|-----------------|--------|
|   | Beta( $\beta$ )                                | T      | Beta( $\beta$ ) | T        | Beta( $\beta$ ) | T      |
| intercept                               | 66.459   | 11.113 | 67.277          | 11.275** | 66.501          | 10.907 |
| Age                                     | .434   | 1.830  | .421            | 1.780    | .451            | 1.874  |
| Gender                                  | 2.776  | 1.742  | 2.408           | 1.494    | 3.056           | 1.915  |
| Familial income                         | -.036  | -.147  | -.076           | -.306    | -.060           | -.239  |
| Temperament type                        | .292   | 2.346* | .334            | 2.658**  | .294            | 2.344* |
| Number of professional certifications   | .432   | 2.057  | .448            | 2.188*   | .524            | 2.573* |
| Degree centrality of learning ties      | .157   | 1.619  |                 |          |                 |        |
| Degree centrality of entertainment ties |  |        | .188            | 1.996*   |                 |        |
| Degree centrality of emotional ties     |  |        |                 |          | .014            | .145   |
| $R^2$                                   | .096   |        | .103            |          | .084            |        |
| $\Delta R^2$                            | .067   |        | .074            |          | .054            |        |
| F                                       | 3.331**  |        | 3.580**         |          | 2.859*          |        |

\*: $p<.05$ ; \*\*: $p<.001$

To Combine the above results, Students' degree centrality of entertainment ties was intermediate between students' grades and their number of professional certifications. Within the factors of students' attraction, the number of professional certifications affected students' degree centrality of learning ties; the gender, temperament type, and number of professional certifications affected students' degree centrality of entertainment ties. However, students' degree centrality of entertainment ties was not affected by any factors of students' attraction. In the preschool educational psychology course, the majority of students were girls. The girls were often the center of entertainment. Students' knowledge and skills of preschool education affect their learning ties and entertainment in class. The temperament type affects only their entertainment ties. Students who belonged to the Sanguine and the Choleric would be the center of entertainment ties. Students' degree centrality of learning ties correlated significantly with their preschool educational psychology grades.

**5. Conclusions**

The peer effect is not as simple as Manski's propositions. Some exogenous characteristics can

impact peer relations in academic life, but others cannot. Students' entertainment ties are the mediator between the exogenous characteristics and the grades, but learning ties are not. Students with a higher index of degrees centrality of learning and entertainment ties would have better grades, but students who had a higher index of degrees centrality of emotional ties did not. Manski's peer effect could not take an interpersonal relationship perspective into account.

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