Real Data Analysis Critique

Hanyang Peng, Yanqing Gui, Sarah Adilijiang

Adolescents in Peer Groups Make More Prudent Decisions When a Slightly Older Adult Is Present

1 Paper Summary

1.1 Background

Adolescents make more reckless decisions when with peers than when alone, which poses a challenge for organizations that place adolescents in situations in which risky and myopic decision making is problematic.

Little is known about how the presence of nonfamilial adults affects decision making in groups of adolescents. Also notably absent from the literature is studied in which the presence of adults has been experimentally manipulated to determine whether the presence of an adult leads to a reduction in risk-taking behavior.

1.2 Main Questions Asked

The paper mainly asked whether the effect of peers on adolescents' decision making is mitigated by the presence of a slightly older adult. In the two practical experiments, this main question is divided into two sub-questions:

(1) Does the presence of an adult reduce peers' influence on risk-taking behavior?
(2) Does the presence of an adult reduce peers' influence on preference for immediate rewards?

To answer these questions, the authors test the following hypotheses:

(1) The presence of a somewhat older adult mitigates the peer effect on adolescents' risk-taking behavior.
(2) This mitigation is explained by attenuation of the impact of peers on adolescents' preference for immediate rewards.

1.3 Participants of Experiments

The volunteers in this research between the ages of 18 and 22 were recruited from local colleges and the general Philadelphia, Pennsylvania, community. Subjects were also recruited through the subject pool of Temple University's introductory psychology course.

The subjects are tested in two phases. In the first phase, they tested subjects in solo and peer-group conditions. In the second phase, they tested subjects in the adult-present condition. 91% of the target subjects were current college students, and their mean age was 19.74 years. 61% were White, 9% were Black or African American, 20% were Asian or Pacific Islander, 6% were Latino, and 4% were of other or mixed races. The three conditions (solo, peer-group, adult-present) did not differ on any demographic variables for the target subjects.

1.4 Methods

1. They used the Stoplight game to measure risk-taking behavior. Subjects decide to stop or go through the intersections (32 intersections in all) to reach the end of the track as quickly as possible. They computed a risk-taking score for each subject as the proportion of the 32 intersections at which the brakes were not applied. Then they fitted linear regression models to Stoplight risk-taking index using the maximum likelihood estimation method in Mplus to estimate the effects of social context (solo, peer-group, or adult-present condition) on risk-taking behavior.

2. They used a delay discounting task to measure preference for immediate versus delayed rewards. The task generated six indifference points (one for each delay interval), and computed the average indifference point and the discount rate for each individual. They first conducted a repeated measures analysis of variance (ANOVA) to test whether the typical delay-discounting pattern was observed across the entire sample. Then they also fitted regression models using the maximum likelihood estimation method in Mplus to estimate the effects of social context on average indifference point and on the discount rate.

1.5 Conclusion

Adolescents took more risks and expressed a stronger preference for immediate rewards when they were grouped with 3 same-age peers than when they were alone. When 1 adolescent was replaced by someone slightly older, however, adolescents' decision making and reward processing resembled that seen when adolescents were tested alone. Adding a young adult to a work team of adolescents may improve group decision making.

(1) In Stoplight game, the results indicate that the presence of peers increases risk-taking behavior among late adolescents, but when a slightly older adult is introduced in a peer setting, their risk-taking behavior is similar to that observed when they are tested alone.
(2) In delay discounting task, for both indifference point and discount rate, subjects who were observed by 3 same-age peers exhibited a stronger preference for more immediate rewards than did those who performed the task alone. When an older adult replaced 1 member of the peer group, however, the presence of peers no longer intensified target subjects' tendency to find smaller immediate rewards more attractive than larger delayed ones.

2 Discussion

2.1 Multiple Comparisons and Replicability

(1) Explicit issues of multiple comparisons

There are explicit issues of multiple comparisons when the author fits linear regression models with 2 dummy variables of social context (peer-group and adult-present conditions while the solo condition is the reference level), 11 dummy variables of confederate's identity (another one as the reference level), and the interactions between these 11 confederate's dummy variables and adult-present dummy variable. The author believes that this model allows him not only to account for any variability due to the use of different confederates but also to test whether any observed relations between any adult-present condition and task outcome were made by a particular confederate. Unfortunately, this ambitious plan may lead to a severe problem of multiple comparisons, which he might have failed to realize. Moreover, for the delay-discounting task, the author also includes the same dummy variables and the interaction terms, which may also lead to the same problem that is again ignored by the paper. To solve this problem, it may be better to set the confederate's dummy variables as the random effect rather than the fixed effect in the model to reduce the degrees of freedom used by the model.

On the other hand, the comparisons between the three social conditions (solo, peer-group, adult-present) is also a multiple testing issue. It's better to choose the appropriate alpha value for each test so that the global type I error is controlled.

(2) Implicit issues of multiple comparisons

For the delay-discounting task, the author applied "repeated" measures analysis of variance to test typical delay-discounting patterns between three groups (solo, peer-group, adult-present). However, there are six delay intervals and three groups, which means he will conduct multiple comparisons implicitly. He fails to tackle this issue in the following analysis.

(3) A hypothesis that was not tested, which is equally plausible to the one that was tested

We would hypothesize that the systemically differences in parental education of the targets between each group lead to the difference in the experimental results. In fact, the targets in the solo group and the adult-present group have higher parental education levels (15.09 and 15.10) compared with the parental education level (14.81) of the targets in the peer group. Thus, we could state that risk-taking behavior among peer-group was caused by lower parental education levels of the targets in this group. Because of the higher and similar parental education levels among the solo group and adult-present group, they had lower and similar rates of risk-taking behaviors. In fact, this assumption sounds more reasonable compared with the assumption in the paper since higher education level

generally leads to more prudent behavior in our life. Failing to test this hypothesis eclipsed the findings in the paper.

(4) Are there many “degrees of freedom” in the choices made for the analysis, such as which subjects to exclude, how to partition variables into categories, which variables to control for, etc? Were these chosen in advance or as part of the analysis?

Ten targets are excluded from the analyses because their data were incomplete. This exclusion is reasonable and necessary. For the six delay intervals and indifference points, the script of partitions was predetermined so there is no evidence of data manipulation. In a word, most choices of the research design were chosen in advance, which verifies the validity of the research.

2.2 Validity of the Statistical Analyses

(1) Representativeness of the population

The participants between the ages of 18 and 22 were recruited from local colleges and the general Philadelphia, Pennsylvania, community. They were also recruited through the subject pool of Temple University’s introductory psychology course. Besides, all the confederates are graduate students. Thus, we think young adults may not be representative. Moreover, there are many undergraduate students in this research, their average education years are more than 14 years. However, they may be more prudent than other adolescents who have lower education levels. Therefore, we also argue that the subjects are not representative.

(2) Possible confounding variables

As mentioned in the above part (1), the education level may be a potential confounding variable. On the other hand, we noticed that the race (defined as the percentage of While people in Table 1) of the three conditions are actually not very similar with each other. There are 60% White in target of solo condition, 54% White in target of pee-group condition, and 69% White in target of adult-present condition. Comparing with the experiments’ results, it is possible that the higher percentage of White students as the targets will decrease the risk-taking behavior.

(3) Issues of study design

They used a delay discounting task to measure preference for immediate versus delayed rewards after the Stoplight game. This may not reflect the subjects’ true preference. Subjects’ preference may be affected by the performance in the previous task. For example, if a subject was reckless and crashed a lot in the Stoplight game, he may rethink his behavior and became more cautious.