

Thoughts on "Peer Effect" Based on the Review and Evaluation of the Peer Effect

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Abstract

Economists have done a lot of research on the same age effect. As we all know, the same age effect has a strong guiding significance for the formulation of educational policies. What are the results accurately grasp the full effect caused by the same age, with the distinction that should take effect within (endogenous Effects) and related effects (correlated Effects) role, it is to study the effects of age inevitable problems. Previous studies be solved by the use of randomized trials exist peers effect selection (Selection Problems), or artificially created quasi-randomized trials to avoid endogenous problems. Through the summary of the literature, we draw the following three conclusions: First, most researchers in the analysis of the same age effect, assuming that the same age effect is a linear effect, but later found that the linear model of the same age effect is difficult or even impossible to explain In general, the uncertainty of the same age effect also comes from the limitations of the model setting. Secondly, the effect of the same age effect is different in different situations. It is confirmed that the same age effect is the result of self-study. The impact is low or even not significant, but for social behavior (such as crime rate, smoking, etc.)And play a significant role in career choice; third, under different assumptions and different data processing, the conclusions about the same age effect are very obvious, although the same age effect has guiding significance for policy formulation, but now the study is On the issue of the same age effect, it is still impossible to draw a consistent conclusion. How to use the same age effect to improve student achievement and non-cognitive behavior remains the key issue that researchers are constantly exploring.

Keywords

Peer effect; Endogenous effect; Average effect; Policy guidance.

1. INTRODUCTION

The phenomenon of the same age effect is universal and appears in all aspects of society. A large number of topics have been studied to study the effects of peer age on social phenomena such as group crime rates, academic performance, social welfare participation, and obesity rates. Glaeser et al. (1996) found that the existence of the same-age effect partly explains the high and low crime rates in different regions; Harris (2009) further confirms that peers with excellent grades have a positive impact on their own academic performance. Understanding and correctly measuring the effect of the same age effect is of great significance in solving the existing problems of society and guiding policy formulation.

However, measuring the effects of the same age effect is very difficult. Manski(1993) pointed out that there is a certain similarity between the behavioral results of peers because of the following reasons: First, self-selection. Peer people will be attracted to a class by their own similar characteristics with their peers. In a certain school or a certain community, the existence

of self-selection problems makes the separation of peer-age effects full of obstacles. Second, endogenous effects. Endogenous exists because people tend to behave with prevailing social standards consistent, such as the number of peers smoking majority, then the possibility of the individual's own smoking is correspondingly higher, because in the social network In the middle, individuals tend to follow "trends" such as smoking. The phenomenon of adopting the behavior consistent with peers is doped with the role of "imitation effect", which has certain interference with the separation of the same age effect; third, the exogenous effect. Foreign peers raw feature works through social networks, have some impact on their behavior. The exogenous effect mentioned here is the same age effect we need to measure. However, in the empirical analysis, it is quite difficult to accurately determine the magnitude of the exogenous effect. If the self-selection effect exists, it is difficult for researchers to distinguish between social network effects (sum of endogenous and exogenous effects) and self-selective effects. Even if the individual does not have self-selection, the existence of the "imitation effect" hinders the clear separation of endogenous and exogenous effects therefore, in the early research, it is inaccurate to simply return the behavioral results of the same behavior to the average behavioral results of the same age, and the result of the same age effect is inaccurate. There is a big error and even the opposite result.

The design of randomized trials played a key role in the study of accurately estimating the size of the same age effect. When studying the relationship between crime rate and community crime rate (Case & Katz), the separation of peer effects is still a major challenge. However, in the study of Kling et al, by randomly transferring the family to a better environment community and setting up a random experiment, the experimental individual can exclude the interference of self-selection and endogenous effects, and further derive the effect of the same age effect. It was found that moving to a higher quality community reduced the crime rate of adolescent males and improved their behavior. However, although random experiments are an effective way to analyze the same age effect, in reality, it is difficult to achieve the ideal state of random grouping due to the limited data. In the study, more quasi-random experiments were used. For example, Hoxby (2000) used a large sample to collect the differences in the proportion of girls in different classes to study the effect of random distribution of girls in different proportions on class performance and behavior. Sacerdote (2001) and Carrell (2009) examined the existence and significance of the same-age effect by analyzing the random assignment of university roommates; Gould et al. studied the impact of external shocks such as typhoons on family housing, causing individuals to be randomly assigned to a certain The community, and thus the size of the same age effect. In addition to designing random experiments and quasi-random experiments to solve the same age effect, the accurate assumptions of mathematical models are also one of the methods. By controlling a series of related variables, the magnitude of the same age effect coefficient in the model setting can be accurately estimated.

This article is based on a large number of previous studies, and the same in the same. On the one hand, through summarization and induction, the analysis methods of the same age effect and endogenous problems are obtained. On the other hand, through comprehensive comparison, new ideas that are not clear on the road of the same age effect research are explored. This article first compares the differences in model settings in different age-related effects studies. Linear models are a general solution for analyzing age-related effects. However, the lack of theoretical interpretation prompts researchers to explore new nonlinear models to explain practical problems in age-related effects. Secondly, this paper compares and analyzes several common methods for accurately separating the same age effect, and provides a meticulous way of thinking for the study of the same age effect. Finally, this paper draws conclusions based on the combing of the literature, and further explores the guiding role of the research of the same age effect on policy formulation.

2. MODEL SETTING OF THE SAME AGE EFFECT

Manski (2003) pointed out that the research conclusions about the same age effect are based on different prior assumptions and data analysis. When analyzing the problem of the same age effect, the most widely accepted assumption is the linear model hypothesis. This section will first introduce the general case, that is, the linear model setting, and then introduce the more realistic nonlinear model assumption. Although there are various hypotheses for the study of the same age effect, the purpose is to accurately locate the effect of the same age effect.

2.1. Linear Model Assumptions

The influence of the same age effect on one's own behavior is based on the linear model approach, which means that the linearity of self-behavior results depends on the average behavioral results of peers, the average external characteristics of peers and their external characteristics. The model is expressed as follows:

$$Y_i = \alpha + \beta_1 \bar{Y}_{-i} + \gamma_1 X_i + \gamma_2 \bar{X}_{-i} + \varepsilon \quad (1)$$

Y_i Representing their own behavioral outcomes (such as academic performance, crime rate, alcoholism, etc.), \bar{Y}_{-i} representing the average behavioral outcomes of peers, X_i and \bar{X}_{-i} representing their own external characteristics (such as family income, parental education, etc.) and average external characteristics of peers, In this linear model, the self-selection problem mentioned by Manski incorporates the error term ε , and the magnitude of the endogenous and external effects are measured by β_1 and γ_2 separately, but as mentioned before, it is difficult to accurately analyze the coefficients. In order to estimate the model coefficients, the usual methods are: 1) Simplify the model and directly return the behavioral results Y_i to the average external features of the same age \bar{X}_{-i} . In this analysis, the size of the same age effect is exogenous. The sum of the results of the interaction between the effect and the endogenous effect; 2) The hypothesis that the endogenous effect γ_2 is 0 , the external characteristics of the same age X_{-i} as the instrumental variable of the average behavior \bar{Y}_{-i} , and thus the estimated size β_1 ; 3) the method of instrumental variables, often in research it is assumed that the influence of a friend's friend on himself is indirectly through a friend \bar{Y}_{-i} , so the friend's friend's line can be used. As the result of the tool variable of self-friend behavior, the purpose of separating the endogenous effect can be preliminarily achieved; 4) setting up a random experiment, the fitting part of the random experiment eliminates the endogeneity problem, and compares the difference between the control group and the experimental group by comparison. The size and the significance of the same age are obtained.

We know that the consistency of peers and their behavior is the result of endogenous and exogenous interactions. In addition to the above-mentioned four methods to analyze the size of the same age effect in the linear model, the researchers can further analyze the same age effect in social networks. Existence and the extent of its impact, such as the assumption that there is a team of only two people, the model is set as follows:

$$\begin{aligned} a) \quad y_{1g} &= \theta_0 + \theta_1 x_{1g} + \theta_2 y_{2g} + \theta_3 x_{2g} + u_{1g} \\ b) \quad y_{2g} &= \theta_0 + \theta_1 x_{2g} + \theta_2 y_{1g} + \theta_3 x_{1g} + u_{2g} \end{aligned} \quad (2)$$

y_{1g} indicates the score of student1, x_{1g} indicating the personal characteristics of student1, and g indicates the common group to which 1 and 2 belong. The coefficient θ_1 called the exogenous age effect and θ_2 is called the endogenous age effect. By random (i.e., randomly

paired 1 and 2), then μ_{1g} is not relevant with x_{2g} , similarly μ_{2g} is also not relevant with x_{1g} . It can be reasonably hypothesized that μ_{1g} is irrelevant with x_{1g} , that is it fully controls the individual characteristics μ_{2g} is irrelevant with x_{2g} . But the relevance between μ_{1g} and y_{2g} is still uncertain, specifically as follows:

The 1b 1a is substituted into available:

$$\begin{aligned} y_{1g} &= \theta_0 + \theta_1 x_{1g} + \theta_2 (\theta_0 + \theta_1 x_{2g} + \theta_2 y_{1g} + \theta_3 x_{1g} + u_{2g}) + \theta_3 x_{2g} + u_{1g} \\ \Rightarrow y_{1g} &= \frac{\theta_0 + \theta_2 \theta_0}{(1 - \theta_2^2)} + \frac{(\theta_1 + \theta_2 \theta_3)}{(1 - \theta_2^2)} x_{1g} + \frac{(\theta_2 \theta_1 + \theta_3)}{(1 - \theta_2^2)} x_{2g} + \frac{\theta_2 u_{2g} + u_{1g}}{(1 - \theta_2^2)} \\ \Rightarrow y_{1g} &= \alpha + \beta x_{1g} + \gamma x_{2g} + v_{1g} \end{aligned} \quad (3)$$

The simplified α, β, γ obtained in the form of the estimation equation for the equation estimation can be identified, but not the inverse solution equation (2) is $\theta_0, \theta_1, \theta_2, \theta_3$. First, a simplified equation can not estimate an estimated endogenous effect, Secondly, comparing Equation (2) and Equation (3) exogenous effect variable coefficient before $\frac{(\theta_2 \theta_1 + \theta_3)}{(1 - \theta_2^2)} > \theta_3$ can be

found, described simplified equation estimated exogenous effect is magnified. Although there are certain defects in the analysis of the same age effect in this social network scenario, the simplified equation of equation (3) provides us with a new idea. Since θ_1 must not be 0, once it is estimated that γ is not 0, it means that there must be the same age effect. Even if it is impossible to know whether its source is endogenous or exogenous.

2.2. Nonlinear Model Setting Assumptions

The main advantage of the linear model in its simplicity and ease of analysis of the model, but is assumed linear model drawbacks are obvious: It is the same age as the only model to explain the effect of having no strong representative convincing weak. This has led researchers to think about other models to explain age-related effects. Among them, the nonlinear model is a new theory. Hoxby and Weingarth(2005) found that the role of peers has a certain nonlinearity: changes in the characteristics of peers may only have a positive effect on some groups, while the other part has a weak or even no substantial effect. They introduced their peers at different ability levels the ability to map the proportion of the size of the percentage distribution of capacity in itself in setting the model in cross-multiplication entry, the size of the effect of age is not obtained then the linear model single factor, by cross-multiplying can get 100 Ge pay multiplied by item, and draw the corresponding range of coefficients, which reflects the effect of non-linearity of the same age. Carrell et al.'s study of the US Air Force found that high-capacity peers have a significant positive effect on low-capacity students, while moderate-capacity students have a significantly lower level of influence. However, in the quasi-randomized experimental study of natural disasters as external shocks, Imberman et al. concluded that the high-powered peers had a greater effect on high-powered students, while the low-capacity students did not. Significant effect. The non-linearity of peer-to-age utility has been continually proven in later studies, and its complement to linear models has further reinforced the complexity and diversity of age-related effects.

3. DETERMINATION OF THE EFFECT OF THE AGE

3.1. Exogenous Shock

The decisions made by individuals in selecting classes, schools or communities, work environments, etc., are not random. If the parent will take the initiative to choose a high-

reputation school for the child, the class with good student quality will usually be accompanied by a teacher with strong teaching ability. Therefore, when measuring the same age effect, it is difficult to avoid interference from internal factors such as self-selection. A large number of studies have found that children living in high crime rate communities are also more likely to make behaviors that are not conducive to society, but which part of their peers' influence on themselves comes from causality, which part depends on interaction, and how to distinguish endogenous and exogenous effects are a major problem in the analysis of the same-age effect; similarly, when studying the effect of obesity rates on peers in their peers, the study found that individuals with a large number of obese among friends were also more likely to be overweight. However, the seemingly close relationship between the two may be due to the causal effect of peers, or it may be because individuals who are obese tend to make friends with obese people. This interaction has a certain endogenous amplification effect. In order to accurately measure the same age effect, the key step is how to find a completely exogenous impact, and the impact can guarantee the randomness of the characteristics of the same age group to some extent, so as to ensure the size of the same age effect coefficient is derived from causal effect.

The study shows that the most representative of the analysis of exogenous shocks is the random migration of population caused by policies or natural disasters. The random migration includes two situations, one is the impact of the immigrant population on the current residents, and the other is the impact of the immigration population on the residents living in the immigrant area. Due to the implementation of policies and the occurrence of natural disasters, they are completely exogenous features, because this same whether the distribution is random or move those features are immigrants, groups, allowing a more accurate estimation of the size of the effect of the same age.

Compared with the occurrence of natural disasters, the external shocks caused by policy changes are more common in research. In the study of Billing et al., the research background was that three years ago, the national education system banned schools from recruiting students according to ethnicity. The implementation of this policy caused a huge reorganization of the school's ethnic composition, which also allowed researchers to analyze. The impact of changes in the proportion of minority students in the school on student achievement. Preliminary results found that the proportion of ethnic minority students in school every 10% student scores dropped about 0.02 standard deviations, and found that non-minority student achievement with the increase of the proportion of ethnic minority students decreases, for this part of the group, its The effects tend to be consistent with the average effect, and for minority students, even if the proportion of minority students in their learning environment increases, their performance is affected, showing that the same age effect is completely different in different groups; Angrist et al. Studying the impact of students moving from other regions to Brooklyn on the current Brooklyn community, the proportion of different classes in different schools in different years is randomly changing. The study found that the immigration of foreign populations to local students' academic performance no effect, but for African-American students to move into foreign population on their academic performance had a significant negative effect: the proportion of foreign population every 5% increase in African-American student achievement fell 0.3 standard deviations. This also shows that although the same age effect is zero, for some subgroups, the same age effect is strong and significant; when examining the impact of exogenous policies, the implementation of the MTO experiment is the focus of researchers in recent years. hot spot. Under the MTO experiment, the families in the experimental group had housing policy subsidies, which were randomly assigned to new communities with better community environments, while the control families did not enjoy preferential policies and still lived in communities with poor living conditions and low neighbors. The study found that the experimental group moved into the new community, the crime rate of girls was significantly reduced and the crime rate of boys was not obvious. In

addition, the exogenous impact of natural disasters is also one of the ideas for setting quasi-random experiments. In the Imberman et al study, due to the hurricane disaster, the affected students were assigned to different schools resulting in different proportions of students affected by different schools. The study found that the affected students to move into a whole group of former students did not affect academic groups, but the percentage distribution by introducing their own academic performance and the percentage distribution of the affected student achievement pay multiplied by the term, found that for good academic performance of students, the affected student achievement proportion of poor in every 10% of their grades fell 0.17 standard deviations, and if students move into good scores, the percentage of students that move into each increased by 10% of the original into good performance student achievement is rising 0.09 standard deviations.

3.2. Random Assignment of Roommates

A large number of researchers use the special situation randomly assigned by university roommates or classmates to analyze the same age effect. Although this situation is not universal, its obvious advantage is that the random assignment of roommates or classmates can make the researchers clearly locate the possibility. A group of peers who have a significant impact on their behavior. From the perspective of the more intimate groups (such as roommates, classmates) to examine the same-age effect, we find that the same-age effect is not only affecting academic performance, but also has more behaviors, ideological cognition, career choices, etc. Significant effect.

Carrell, who help analyze large Air Force West Point a to study the effects of age newborn special group. The reason why this group is special is because they are ideal random experimental groups. First of all, the newly added large a newborn are randomly assigned to the respective units, and their daily activities more focused in their squad, there is little in close contact with other units; secondly with a large contingent of students The same period is also the same class, which means that other members of the same team are intimately connected with themselves. If there is the same age effect, the result should be significant. The study found units in the same age who graduated from high school grade distribution for each increase of 1 standard deviation, own large a result of the increased 0.05%. In addition to affecting professional performance, the physical quality of peers has a significant impact on the level of their own sports performance, and Carrell found that the higher the proportion of peers who like cheating, the greater the possibility of cheating, which shows the same age The effect is also reflected in behavior. Duncan et al found that people who have drinking habits, if they live with people who also drink alcohol, are more likely to drink alcohol in the university themselves, and are more prone to alcoholism; Boisjoly et al.'s research shows that peers are aware of individuals. There is also a certain impact. Whites living with black groups are more likely to participate in social activities that call for racial equality. They are more likely to make friends with people of other races than with groups of the same ethnicity.

Although the results of randomized roommates or classmates are not completely consistent, but through the preliminary summary of previous studies, we found the following conclusions: 1) University students' academic performance does not affect their academic performance. In the aspect of academic performance, the same age effect is not significant; 2) the assumption of the linear model usually leads to the conclusion that the average effect of peers is zero, but once the model hypothesis is relaxed and more nonlinear models are considered, It will be found that there are obvious same-age effects; 3) The same influences of their peers are their own behaviors (such as alcoholism, smoking, physical fitness, ethnic cognition, etc.). In these respects, the measured age-related effects are more significant.

3.3. Hidden "Random Variables"

Even if there is no ideal exogenous shock in reality (the impact of policies or natural disasters), we can find some hidden "random variables" through careful analysis of the research subjects, the most representative of which are different class girls. Random variation in proportion. The reason why the proportion of female students is an exogenous variable in the study of the same age effect is that girls usually have better academic performance during school and have fewer violations than boys. Therefore, to some extent, random variations in gender ratios (sometimes racial proportions) can be used as random variables for the external characteristics of peers. Hoxby study found that if the proportion of girls in the class increased by 10% of Chinese male and female students throughout the class average has risen by about 0.04points. Lavy and others found in the Israeli school girls per share increased by 1 than0%, the proportion of boys through college high school population rose 0.5% increase in the proportion of college girls ;Anderson further found that primary school classes in the same The number of students with more students in the table is significantly higher than that of the students who are basically male at the same table. The students who are all girls at the same table have an average higher than the average score of 0.2standard deviations..

3.4. Artificially Constructing "Random Variables"

In the study of the same age effect, not all of them have obvious exogenous shocks or hidden "random variables" in the study population. Sometimes it is necessary to artificially construct "random variables. Although we can never achieve the ideal state of randomly assigned groups, it is more common in the study to artificially add an external factor to obtain experimental and control groups, comparative analysis, Further explore the size of the same age effect. However, although this method has certain merits, it may be different from the expected result in the final experimental analysis results. The reason is that the artificially constructed social network circle is not completely in accordance with our expectations.

As early Carrell study and others, in order to improve the distribution of the poor performance in that part of student achievement, the researchers artificially the US Air Force Academy (United States Air Force Academy, USAFA) newly enrolled big a newborn conduct placement, which half of the students in the control group enters, into the control group of students then random placement; the other half of the students into the experimental group, first in accordance with the expected GPA results into high, medium and low three groups, and then further based on the packet forming two Types of classes, one is bimodal squadron, which is a good student combination, and the other is homogeneous squadron, which is a medium-sized student. The experimental expectation is that the bimodal experiment group has a positive effect on students with poor grades, and their academic performance will be significantly improved under the influence of excellent peers. However, the study found that the conclusion is the opposite. The results of this part of the students who did not improve well did not improve, but decreased. The possible hypothesis made by this researcher is that in reality, low-capacity student groups are more likely to form network relationships with each other.High-capacity and low-capacity student network relationships are segmented, which means that the same-age effect is not in accordance with us. The envisaged channel has a role, and to some extent it also shows that the study of age-related effects is challenging, and the endogenous existence makes the results often unexpected, which partly explains the related age-related effects in the field of education. Uncertainty in policy making.

4. CONCLUSION

The influence of peers on students' own academic performance has led to close attention of politicians. Through a comprehensive comparative analysis of a large number of previous

studies, we found that in primary education research, based on the linear model hypothesis, nearly half of the studies found that peers had a moderate or even significant impact on their academic performance, while the other half found the same age effect. The size is almost zero. However, if the assumption of the linear model is relaxed, the coefficient values of the same age effect are significantly higher and more significant. As in the study by Imberman et al., the average effect of the victim on local students was not observed, and in the robustness analysis, by introducing the percentage of the distribution of the scores of the self and the percentage of the distribution of the scores of the newly moved victims, The effect of the same age effect is very obvious. In addition, we found that peers have a greater influence on their social behavior and other non-cognitive behavior than their impact on academic performance. The more people with the same age in the university, the higher the likelihood that the boys will drink alcohol themselves; the better the physical fitness of the friends, the higher the probability that they will participate in sports activities. Although the same-age effect appears more or less in all aspects of social phenomena, due to the endogenous problems that are difficult to overcome, it is difficult to reach a consensus conclusion about the nature of the same-age effect. Researchers often design experiments to measure the magnitude of the same age effect and even the direction does not coincide with the prior prediction. In order to improve the professional performance of students with poor grades in the class, Carrell et al. randomly combine students with good grades, and believe that students with poor grades will have higher scores under the influence of their peers. However, the final experimental results show that students with low abilities have not improved their grades, but their performance has declined. The complexity of the same age effect and the inevitable endogeneity have caused certain obstacles to the corresponding policy formulation. How to play the role of peer age in the field of education is still one of the next directions worth exploring.

In general, although the results of the same age effect are somewhat diverse, it is indisputable that peers have a significant impact on their behavior. In the study of the same age effect, how to overcome the endogenous problem is the challenge we have to face, causing people to use different methods to find the impact of exogenous random variables. Based on previous studies, we should further explore the correct model assumptions, accurately locate the size of exogenous peer-age effects, and play an active role in guiding policy formulation.

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