

# The Effect of Education on Voter Turnout and Its Mechanism

A Thesis

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## THE EFFECT OF EDUCATION ON VOTER TURNOUT AND ITS MECHANISM

## The Effect of Education on Voter Turnout and Its Mechanism

**Abstract**

This thesis aims to analyze the effect of education on voting behavior and its mechanism in the United States. In the United States, people who are willing to vote must register to vote with their local governments before the election. The voting rate among people who completed the procedure is higher than in other G7 countries, but the voting rate among holders of voting rights is much lower than in other countries. To gain insight to address the problem, this study estimates the effect of education on voting using the data of ANES in 2020. To deal with the endogeneity of education, my study estimates the effect of education on intermediate variables and voter turnout with Instrumental Variable (IV) Methods. The main literature of my study (Jackson, 1995) estimated them with Probit regression, not dealing with the endogeneity of education. In my study, the years of schooling of respondent's spouse is used as an IV. Our results show that years of schooling are effective to accelerate the people's voting behavior. In addition, years of schooling have positive effects on intermediate variables: civic duty, internal political efficacy, and registration status. Also, some intermediate variables, civic duty, internal political efficacy, and registration status are substantially positively correlated with voting. Furthermore, there are some differences in estimation results between races. The effect of education on voting is not statistically significant among Black / African American, Asian American, Native American, and Latinx / Hispanic while White people and islanders have the statistically significant positive effect.

### 要旨

本研究の目的は、アメリカにおける教育が投票行動に及ぼす影響とそのメカニズムを分析することである。本研究では 1995 年の Jackson の先行研究をベースとし、2020 年の ANES のデータを用いて教育と投票行動の関係性を明らかにしようとしている研究である。本研究では、配偶者の教育年数を操作変数とした操作変数法を用いて、教育と投票行動の関係性とその間に存在する中間変数の分析を行った。これにより、プロビット分析を使用した Jackson の先行研究では行われていない、教育の内生性に対処した分析に成功した。さらに、人種ごとの分析結果を比較することで、Jackson の先行研究にはない人種という観点からの教育効果の検証も同時に達成している。今回の分析結果より、アメリカにおいては教育年数が投票行動を促進させることが明らかになった。また、市民としての義務、政治的効力、政治への意識、投票者登録の有無に定義される中間変数も教育から正の影響を受け、投票行動に正の影響を与えることが判明した。さらに白人間において有意であった教育と投票行動の関係が、黒人間では有意に観測できないなど、教育が投票行動にもたらす効果が人種によって異なることも分析結果より新たに判明した。

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## 1. Introduction

From the early study of Merriam and Gosnell (1924) to recent studies, so much researches have pointed out the year of schooling climbs with turnout rates. Researchers have been trying to find out whether education is the strongest demographic variable with the result of turnout or not. Wolfinger and Rosenstone (1980) studied the relationship between socioeconomic status (SES<sup>1</sup>) and voting behavior by separating SES into education and income. They found that education has stronger effect to these behaviors than income. Wolfinger and Rosenstone (1980) also mentioned education cultivates people's two abilities, the capacity of understanding complex subjects and civic responsibility, thus they raise the probability of voting by learning about politics easier and reduce the difficulty of voting.

In addition, for example, some researchers have studied the contribution of education:

A stable and democratic society is impossible without a minimum degree of literacy and knowledge on the part of most citizens and without widespread acceptance of some common set of values. Education can contribute to both. In consequence, the gain from education of a child accrues not only to the child or to his parents but also to other members of the society. (Friedman, 1962, p. 75)

The types of research clarifying the relationship between education and turnout varies from analyzing voter's basic characteristics such as education level, sex, occupation, and age (Powell, 1986), to voter's responsibility and detailed belief for social

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<sup>1</sup> SES (Socioeconomic status) is the total measure of individual working experience, economic access, and social position in relation to others.

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issue in their country. The purpose this thesis is to analyze (1) the effect of education on voting behavior, (2) hidden factors existing between educational background and voting participation based on the previous research by Jackson, R. A. (Jackson, 1995), using data of ANES (American National Election Studies<sup>2</sup>) in 2020. Jackson (1995) used five intermediate variables which have a positive effect for voting in his paper. My study uses the same intermediate variables and estimate their effects with the data of 2020. Estimating the effect of education on turnout and intermediate variables contribute to accelerate political participation more.

### 1.1 Background Information and Statement of the Problem

Since the field of political study had started, many researches are conducted from the viewpoint of the relationship between education and turnout all over the world. Most research states that there is a positive correlation between educational background and the act of participating elections.

In addition to the study of basic relationship between education and turnout, researchers examined the mechanism of the relationship between education and voter turnout. Jackson (1995) argued five of the most prominent explanations, education instills a sense of civic duty, education increases sense of political efficacy, education makes registration easier, and education enhances political sophistication or awareness. Gutmann (1999, p. 49) also wrote, “education, in a great measure, forms the moral character of citizens, and moral character along with laws and institutions forms the basis of democratic government.” To accelerate the understanding for politics and the

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<sup>2</sup> ANES (American National Election Studies) is the organization’s name. They hold large-scale survey every national election from 1948.

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participation for election among younger generation, clarifying relationship between education and turnout is one of the most effective ways.

### **1.2 Significance of the Study**

This paper analyzes the relationship between education and voter turnout. Also, this paper tries to uncover positive and negative effects of variables on the motivation to vote using the same framework as Jackson (1995). My study makes it clear whether Jackson's framework would fit with the time. Also, the estimation technique that my study uses is instrumental variable methods which expects to deal with the problem of endogeneity of education. There is little previous research trying to solve the problem of the endogeneity. For example, Jackson (1995) estimated the effect of education on turnout by using Probit regression which did not deal with endogeneity. Solving the issue of endogeneity, my study will hold huge significance of study compared to previous research. Furthermore, I add several results separated by races. As far as I can find, there is no previous research to discuss the relationship between education and turnout with race. Therefore, results of estimation including racial aspects also greatly contributes to the literature.

In both fields of economics of education and political science, it is suggested that education is closely related to turnout. The history of these studies is long, one of the oldest studies mainly describing the relationship between education and political science is the paper of Merriam & Gosnell (1924). It discusses conceivable factors of non-voting. In their paper, they introduced reasons for non-voting. One is that some people think they should not vote because they generally lack education, so they cannot understand what politicians are doing. Merriam & Gosnell (1924) conclude that educational background

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is one of the factors of people's non-voting.

In addition, Campbell (1960) says that the higher educated people tend to gather sources of political information and have an awareness of politics. A lot of studies have proved the universality of the effect, new types of studies came out, the finding of intermediate factor between education and turnout. Jackson (1995) tried to clarify these intermediate factors using five variables, civic duty, political efficacy, registration status, and political awareness. He analyzes relationships between education and these five factors, five factors and voting turnout. This paper analyzes the relationship between education and turnout in the United States following the method used by Jackson (1995) using the most recent data and controlling for the endogeneity of education. His research was written about thirty years ago, so reanalyzing with the recent data contributes to reveal reliability of Jackson's method. Furthermore, our study may develop his estimation method which suits the current times. The developed method helps policymakers to increase the turnout rate of national election, considering the aspect of the education and civic consciousness.

### **1.3 Research Question and Hypothesis**

This study mainly has three research questions. The first one is if there is a causal relationship between education and voting turnout. The second one is what kind of intermediate factors are existing between the relationship of education and turnout. The third one is whether there are any differences of estimation results by race. The hypotheses for these questions are that the causal relationship between education and turnout exists and intermediate factors of social emotions, such as civic duty, political efficacy, and political awareness strongly affects voting behavior. Furthermore, education

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has another power to grow these social emotions. In other words, people who received higher education have stronger feelings as citizens and actively participate in politics. Also, Black / African American people will receive the effect of education on turnout compared to other races.

### **1.4 Structure of the Thesis**

This proposal consists of 10 chapters. The first chapter argues the background information and statement of the issue, the significance of the study, and research questions and hypotheses. The second chapter reviews previous literature of estimating the relationship between education and turnout by its estimation methods. The third chapter describes the data used in the study. The fourth chapter discusses the conceptual model of education and turnout. The fifth chapter explains the background and educational system of the United States. The sixth chapter examines two estimation techniques using in the study. The seventh chapter shows the descriptive statistics. The eighth chapter sorts out findings of statistical analyzes. The ninth chapter discusses what I found from the result. The tenth chapter concludes this whole study and has a suggestion for policy and future studies.

## **2. Literature Review**

This chapter introduces some literature on the content of the calculus of voting and components of explanation for people's turnout from the differential viewpoint of behavioral science and public choice theory, two main schools in the field of political science.

Riker and Ordeshook (1968) estimated the theory of the calculus of voting. In

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the paper, the behavior of turnout was explained as a mathematical expression that was thought difficult to analyze. The theory dealt with fundamental explanations in the public choice group. It estimates people's voting action if the result of the formula becomes greater than zero. In other words, if the result becomes less than zero, it is not reasonable for electorates to vote for someone. It is constituted by the voter's differential benefit, the probability of the voter's benefit by turnout, the long-term benefit of voting, and the cost of voting behavior.

In the field of behavioral science, turnout is explained by the intensity of five political engagements (Campbell, 1960). It consists of an interest in the campaign, concern over the election outcome, a sense of political efficacy, a sense of civic duty, and divergent cases. The report estimates people's political behavior by fifth factors. From the theory of Campbell, Jackson (1995) developed the study by estimating the relationship between education and turnout. According to Jackson, previous research about the relationship between education and turnout mainly mentioned that education has a good effect on turnout. However, he also indicates there are few researches which unveil the detailed mechanism of the reason why highly educated people tend to participate in voting compared to others. From this viewpoint, Jackson approached to be clear the relationship by using five variables possible to affect education and turnout. Variables, political awareness, civic duty, political efficacy, and registration status are estimated using the national survey data.

In 2000s, some researchers have started estimating unobservable characteristics of citizens that have a possibility of affecting the result. They considered these unobservable characteristics exist in the relationship between education and citizenship and tried to find them by using several estimation methods. Pelkonen (2010) estimated

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the impact of education on voter turnout by using the compulsory education reform carried out in Norway during 1959 to 1972. The compulsory education in Norway was increased from seven to nine years by the reform. It legislated in 1959, but local governments were given the liberty to launch for procuring requirements such as new teachers and facilities. Pelkonen focused on the time lag transferring educational system and estimated the effect of education on voter turnout by using instrumental variable method. In the study, there are few positive relationships between education and turnout in Norway. It contributes to represent those institutional changes that are possible to use as a source of identification for the impact of education on voting behavior. According to the study of Kam and Palmer (2008), the new viewpoint of educational effect for political behavior was advocated by the method of propensity-score matching. They focused on the established theory that higher education has a positive impact for student's political participation and verify it. To estimate, they used propensity-score matching. In the first place, the propensity score is "an estimate of each observation's likelihood of having received the treatment" (Kam and Palmer, 2008). They separate people who graduate high schools into two groups, treatment and control. They analyze treatment group (people attending college) by a logistic regression. According to the study, they concluded there are few effects of attending higher education on political participation. They mentioned that receiving higher education is just a proxy of preadult experiences and influences and it does not mean to accelerate political participation.

The one of the literatures which uses instrumental variable (IV) method is Angrist and Krueger (1991). They improved the efficiency of the estimates between education and wage by the concept of quarter of birth. They focused on the difference between children who are born early in the calendar and later in the calendar is almost



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one year and hypothesized it has an impact on educational outputs. They separated one year into four quarters, I (January-March), II (April-June), III (July-September), and IV (October-December) and estimated seasonal effect on education. They used the following 2SLS model:

$$E_i = X_i \pi + \sum_c Y_{tc} \varepsilon_c + \sum_c \sum_j Y_{tc} Q_{tj} \theta_{tj} + \varepsilon_c \quad [1]$$

$$\ln W_i = X_i \beta + \sum_c Y_{tc} \varepsilon_c + p E_i + \varepsilon \quad [2]$$

where  $E_i$  is the education of the individual have received,  $X_i$  is a vector of covariates,  $Q_j$  is a dummy variable indicating whether the individual was born in quarter  $j$  ( $j = 1, 2, 3$ ), and  $Y_c$  is a dummy variable indicating whether the individual was born in year  $c$  ( $c = 1$  to  $10$ ), and  $W_i$  is the weekly wage. The coefficient  $p$  is the return to education. From the result of estimation [2] and [3], he concluded that students who attend school longer because of compulsory schooling laws earn higher wages in their future life. Also, the quarter of birth has a small effect on the student's level of educational outcome. In addition, when estimating relationship between education and wage, the quarter of birth has a remarkable similarity as an instrument for education. In addition, Dee (2004) estimates the relationship between education and turnout with the instrumental variable of distance from respondent's house to the nearest college. The paper concluded the year of schooling affects the quality of consciousness for citizenship which is defined as a frequency of buying a newspaper. The paper also concluded the quality of education positively affects the turnout rate and support for freedom of speech.

Although there is some literature which uses IV represented by Angrist & Krueger (1991) and Dee (2004), there is little literature using spouse's highest education as an instrumental variable for the estimation of the relationship between education and turnout. Also, there are few literatures to estimate the effect of intermediate variables with

IV. Therefore, my study contributes to update findings by estimating with IV.

This study uses instrumental variable method to control the endogeneity of education. Instrumental variable of this study is the highest education of respondent's spouse received. Trostel, Walker, and Woolley (2002) stated that spouse's education is a valid instrument for an instrumental variable. This variable is based on the idea that the years of education for both husbands and wives is likely to be positively linked. People with similar educational backgrounds are more inclined to form relationships. Then, they are likely to have shared experiences or common interests. This hypothesis is called assortative mating. Therefore, the highest education of respondent's spouse has a close relationship to the respondent's highest education and is suitable as instrumental variable.

### **3. Data**

#### **3.1 About American National Election Studies**

The data this study uses was retrieved from the survey of American National Election Studies (ANES). ANES creates nationally representative data every national election held in the United States since 1942. It includes the contents of voting, public opinion, and political participation (ANES, n.d.). In The time series survey held in 2020, 5,441 answers of the survey secured before election and 4,779 answers after the election. In the same survey held in 2016, 4,270 answers were secured as pre-election and 3,648 answers were secured as post-election. These surveys are carried by methods of CASI

(Computer-Assisted Self Interview<sup>3</sup>) and CAPI (Computer-Assisted Personal Interview<sup>4</sup>) and samples are collected from all U.S. eligible voters as cross-sectional data. The survey held in 2020, about 520 pages of the questionnaire consist of mainly two types. Some question items are basic information of interviewees such as age, sex, race, marital status, income, residence, working status, religion, and educational background. Others are interviewee's personal beliefs and opinions for current political issues facing United States. These questions are revised every year following trends and public opinions. In 2020, new questions are added related to issues of sexual minorities and gun control based on the growing momentum of LGBTQ and mass shooting.

The reason why the study chose to use ANES data is because it has quite variety of questions asking about not only respondent's basic information but also their personal beliefs and creeds. The survey includes exhaustive questions about respondent's detailed current life situation. Researchers can get their personal information like race, sex, income, residence, and working status easily. In addition, various questions asking about respondent's consciousness for voting and politics makes easier to produce original indexes or scales which quantify these psychological aspects. The study includes these psychological aspects in the estimation.

### **3.2 Variables Used as Dependent / Independent Variables**

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<sup>3</sup> CASI (Computer-Assisted Self Interview) is the mode of interview. Interviewees answer the survey using own computer. It expected to limit interviewer's response bias when gathering sensitive information.

<sup>4</sup> CAPI (Computer-Assisted Personal Interview) is the mode of interview. Investigators gather and record answers using computer by face-to-face interview. It expected to control skipping and check integrity.

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This section describes variables in the ANES dataset which are used in the study<sup>5</sup>.

Table 1 shows all variables of the study retrieved from ANES 2020 dataset. According to that, dependent variable is the respondent's voting status for the latest election.

Independent variables consist of respondent's detailed information, educational background, race, residence, and other information. One of the most important independent variables of the study is educational background. For example, there are two questions asking about respondent's highest education (*education*) (*spouse\_education*). I made an original index of years of schooling based on the survey. Questions are "What is the highest level of school you have completed or the highest degree you have received?" and "What is the highest level of school your spouse has completed or the highest degree you have received?" (ANES, n.d.). The choices are divided into 17. Answers 1 to 8 are for people who graduate secondary school. If they drop out of secondary school, they can choose the choice of schooling year they have taken at that time. Answers 9 is for people who graduate high school or pass equivalent test such as GED<sup>6</sup>. It can recode the year of schooling as 12 years. Answers 10 to 12 are for people who went to college. If they drop out, they can choose answer 10. Also, answers 11 and 12 are separated by college programs, occupational/vocational or academic program. Respondents who choose 11 or 12 are assigned 14 years of schooling. Answers 13 to 16 are related to university or graduate school and differ from received degree. 13 is bachelor's degree and recode the year of schooling as 16 years. Also, 14 is master's degree such as MBA and recode the year of schooling as 18 years. Similar to 13 and 14, answer 16 is doctor's degree such as

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<sup>5</sup> How the variables here are used in the study will be explained in Chapter 6.

<sup>6</sup> GED (General Educational Development) is the name of official test. It signifies to have the same knowledge as traditional high school graduate.

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PhD and EdD and recode the year of schooling as 21 years. Answer 15, professional school degree is a little bit different from others. Professional school degree is represented as MD (Medical Degree). In the United States, students who wish to become a doctor have to medical school for 4 years after graduating university. Thus, respondent's year of schooling who choose answer 15 will count 20 years.

Race variables are for White people (*white*), Black / African American (*black*), Native American (*native*), Asian American (*asian*), Native Hawaiian or another Pacific Islander (*islander*), and Latinx / Hispanic (*hispanic*) (See Table 1 for the details of the race variables). Residence variables describes respondent's residential status. It contains the year after voting registration at that place (*closing*), years of living in community (*stability*), and whether the residence falls into the category of south part of the United States (*south*). I used the definition of southern United States from the United States Census Bureau (2011). The organization defined 17 states (Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia, and District of Columbia) as southern United States. Other variables related to respondent's personal information are consisted of respondent's gender (*sex*), marital status (*marriage*), age (*age*), family income per a year (*income*), working hour per a week (*workhour*), the number of children which respondents have (*children*), frequency of attending religions services (*religion*), and importance of being to own identity (*identity*) (see Table 1 for the details of control variables).

Table 1

*Explanation of Variables Based on ANES Data Used in This Study*

Name of Variables	The Way to Make the Variables
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Dependent Variables		
	vote	Whether the respondent voted or not (voted=1, never voted=0)
Independent Variables		
(1) Educational background		
	education	The highest education respondents have received (less than 1 <sup>st</sup> grade=0, 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> or 4 <sup>th</sup> grade=2, 5 <sup>th</sup> or 6 <sup>th</sup> grade=6, 7 <sup>th</sup> or 8 <sup>th</sup> grade=8, 9 <sup>th</sup> grade=9, 10 <sup>th</sup> grade=10, 11 <sup>th</sup> grade=11, 12 <sup>th</sup> grade no diploma=12, high school diploma or equivalent=12, some college but no degree=13, associate degree in college: occupational/vocational program=14, associate degree in college: academic program=14, bachelor's degree=16, master's degree=18, professional school degree=20, doctorate degree=21)
	spouse_education	The highest education respondent's spouse have received (less than 1 <sup>st</sup> grade=0, 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> or 4 <sup>th</sup> grade=2, 5 <sup>th</sup> or 6 <sup>th</sup> grade=6, 7 <sup>th</sup> or 8 <sup>th</sup> grade=8, 9 <sup>th</sup> grade=9, 10 <sup>th</sup> grade=10, 11 <sup>th</sup> grade=11, 12 <sup>th</sup> grade no diploma=12, high school diploma or equivalent=12, some college but no degree=13, associate degree in college: occupational/vocational program=14, associate degree in college: academic program=14, bachelor's degree=16, master's degree=18, professional school degree=20, doctorate degree=21)
(2) Race		
	white	Respondents who recognize themselves as white people (white=1, African American=0, native=0, Asian=0, islander=0)
	black	Respondents who recognize themselves as African American (white=0, African American=1, native=0, Asian=0, islander=0)
	native	Respondents who recognize themselves as American Indian or Alaska Native (white=0, Black / African American=0, native=1, Asian=0, islander=0)
	asian	Respondents who recognize themselves as Asian (white=0, African American=0, native=0, Asian=1, islander=0)
	islander	Respondents who recognize themselves as Native Hawaiian or another Pacific Islander (white=0, African American=0, native=0, Asian=0, islander=1)
(3) Residence		
	closing	How long has respondents been registered at location

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(4) Others	stability	Years of living in community
	south	Respondent's registered location
	sex	Respondent's gender (male=1, female=0)
	marriage	Respondent's marital status (married: spouse present=1, married: spouse absent=1, widowed=0, divorced=0, separated=0, never married=0)
	age	Respondent's age
	income	Respondent's income of all members of the family during the past 12 months before taxes
	working	Respondent's working hour per a week last 12 months
	children	The number of children which respondents have
	religion	How often attend religions services (every week=4, almost every week=3, once or twice a month=2, a few times a year=1, never=0)
	identity	How important is being to your identity (extremely important=4, very important=3, moderately important=2, a little important=1, not at all important=0)

*Note.* The table here is made by the author based on the information from ANES (n.d.).

#### 4. Model / Conceptual Framework

According to Riker and Ordeshook (1968), the calculus of voting which predicts political behavior includes some different factors. In the field of public choice theory, lots of studies and research have been using the model of voting. The calculus of voting is:

$$R = (BP) - C + D [3]$$

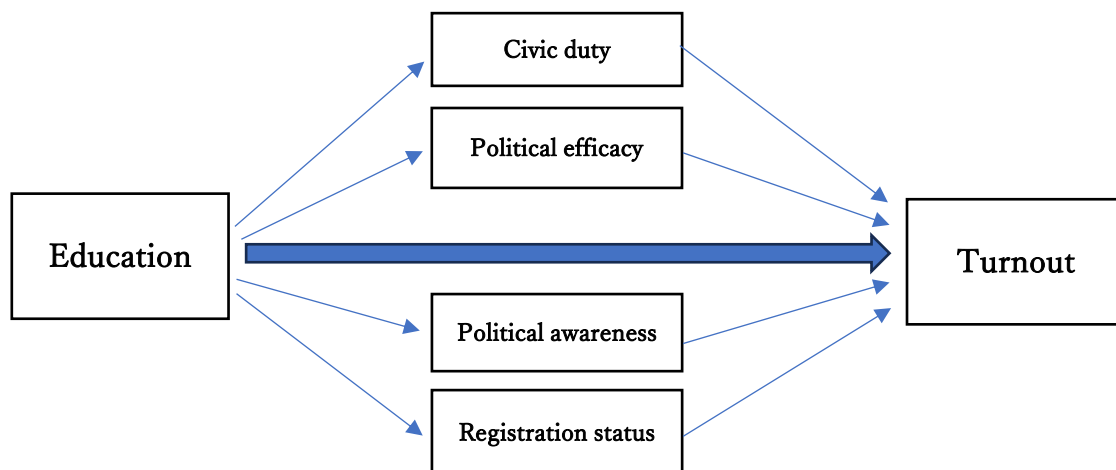
where R is the reward that an individual voter receives from his act of voting, B is the differential benefit that an individual voter receives from the success, P is the probability that the citizen will bring about the benefit by voting, and C is the cost to the individual of the act of voting. The factor of education is not included directly in the calculus of voting; however, Rosenstone and Wolfinger's study (1980) estimated that more education helps to reduce the difficulty and cost of participating in politics, which applies to C, the

cost to the individual of the act of voting.

In addition, Figure 1 is the conceptual framework of my analysis. Jackson (1995) used the framework to estimate the effect of education on voting turnout and four intermediate variables: civic duty, political efficacy, political awareness, and registration status. My study uses the same framework as Jackson (1995) and compares the estimation results.

Figure 1

*Conceptual Framework of this Analysis*



Note. The figure 1 is made by the author based on the information from Jackson (1995)

## 5. Context of the Country and Education Sector

This chapter explains the general status of economy, society, and educational sector in the United States. Table 1 represents the basic economic and social data in the United States. The total population is about 300 million and population growth rate is 0.4%. It can be said that the population is slightly increasing. From the aspect of economy, annual GDP growth rate is 2.1% and GDP per capita is about 60,000. Moreover, only



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0.2% of people live under \$2.15 a day. It seems like the United States is one of the wealthiest countries in the world and there are few absolute poverties in the country. In addition, the primary completion rate is 101%, so that every child would receive education.

According to the NCES<sup>7</sup> (n.d.), The United States has mainly three structures of its educational system. The first one is elementary (or primary) education. It contains kindergartens, nursery schools, and elementary school. Elementary school is compulsory education and it starts when children grow up to 6 years old. The second one is secondary education. The part applies to compulsory education too and continues to 17 years old. It contains 4-year high schools, middle schools, junior high schools, and senior high schools. It is because the structure of elementary and secondary education differs from states to states. The majority of the educational system is 6-3-3, but it has many varieties by state, 8-4, 6-6, and 4-4-4. Students who finish these elementary and secondary education finally receive high school diplomas. Furthermore, the third and last part of educational structure is postsecondary education. It can be separated into undergraduate programs, community colleges, vocational/technical institutions, master's degree studies, doctor's degree studies, and other professional schools.

Figure 2 is the annual graph of gross primary school enrollment rate in the United States. Referring to that, the rate has been keeping about 100% since 1980. In addition, according to Figure 3, the gross secondary school enrollment rate keeps at a high level for a long time. Those three data represent that elementary and secondary education are already penetrated into society in the United States. Last but not least, in the United States,

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<sup>7</sup> National Center for Education Statistics is the organization's name. They collect and analyze educational data in the United States and other nations.

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receiving higher education is also common among citizens. According to Figure 3, the gross tertiary<sup>8</sup> enrollment rate has been increasing. Compared to 1973, the enrollment rate increased by 1.5 times in 30 years. It can be suggested from Figure 4 that people can take higher education in along with spreading lower education such as primary and secondary education. However, recently the expenditure for the educational sector has decreased compared to 50 years ago. In addition, Figure 5 represents gender differences of tertiary school enrollment rate. According to the data, for females, the gross enrollment rate has rapidly been increasing since the 1970s. The rate was only 42% in 1973 and it became 102% in 2020. Despite its multiplying, the male's enrollment rate has not been increasing compared to female data. Also, periods that exceed the number of female's enrollment rate are just from 1973 to 1978. It shows the recent progress for women's social advancement. It becomes easier for women to get higher education with social development in the United States. Figure 6 is the graph of educational expenditure as a percentage of GNI<sup>9</sup>. The latest percentage is 4.4%, three fifth of the rate in 1973. It means that governmental expenditure on the education sector is decreasing even though the number of people who receive compulsory and higher education in the United States.

Figure 7 is the graph of voting rate among G7 countries, the United States, Germany, France, UK, Italy, and Japan. All countries except Japan adopt a system of voting registration. According to Figure 6, the voting rate among people who registered is higher than other G7 countries. However, the voting rate among holders of voting rights is much lower than other G7 countries.

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<sup>8</sup> Tertiary (education) means higher education than secondary education including university, college, and vocational/technical institution.

<sup>9</sup> Gross National Income (GNI) is a total amount of money that the country's people and businesses earned.

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One of the most prominent problems facing the United States is Ethnic-racial socialization and racial discrimination. In the United States, the revision of racial discrimination has been rising for a long time such as Black Lives Matter. Paradoxically, there is still racism, discrimination, and racial inequality. Some researchers indicate that racism and discrimination exist in the field of education. Wang et al. (2020) analyzed the impact of parental socialization on their children's academic success. The study meta-analyzed 37 researches about the relationship between ethnic-racial socialization and academic outcome. It separates results by moderators, the measurement of socialization, development period, race/ethnicity, and academic outcome. The study concluded there is a positive relationship between ethnic-racial socialization and academic outcomes. However, the relationship may change by the student's characteristics and placed environment such as ethnic groups, developmental age of socialization, and special academic outcome. Moreover, from aspects of ethnicity and race, students of Black / African American receive the strongest effect of the relationship between socialization and academic outcome. In addition, it has the strongest effect for secondary school and university students. In short, the ethnic-racial socialization has an effect on children's academic outcome and it differs by race. Black people tend to be affected by ethnic-racial socialization more strongly than other ethnic groups. Also, separated by the developmental period, secondary and university students get the strongest effect.

Table 2

*Basic Information of the United States*

	Value
Population, total	333,287,557
Population growth (annual %)	0.4

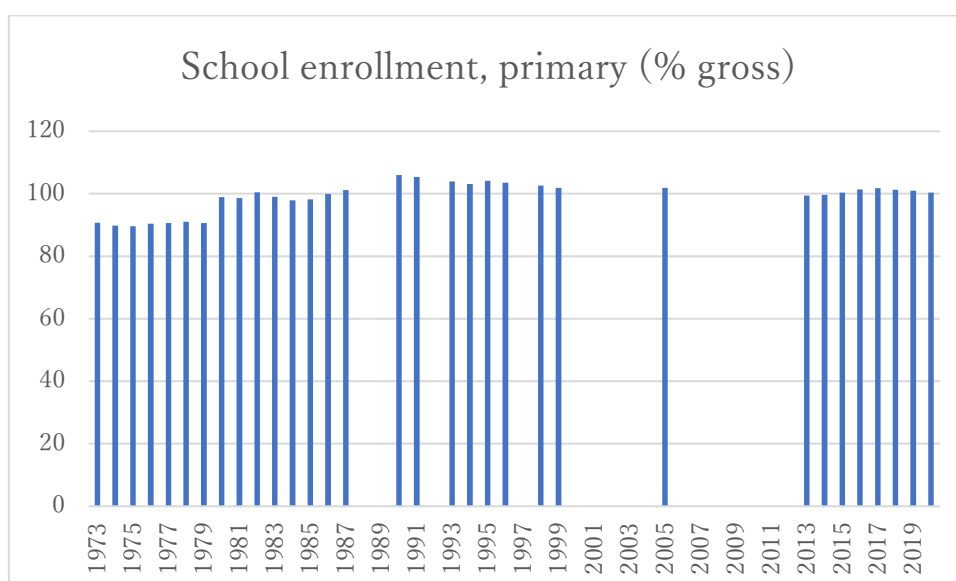
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GDP per capita (constant US\$)	62,866.7
GDP growth (annual %)	2.1
Poverty headcount ratio at \$2.15 a day (2017 PPP) (% of population)	0.2
Primary completion rate, total (% of relevant age group)	101
Government expenditure on education, total	12.6
Unemployment, total (% of total labor force) (modeled ILO estimate)	3.6

Note. Table 1 is made by author based on the data from World Bank (n.d.). Poverty headcount ratio at \$2.15 a day is the data in 2021. Primary completion rate and Government expenditure on education are the data in 2020.

Figure 2

*Primary School Enrollment Rate, 1973-2020.*

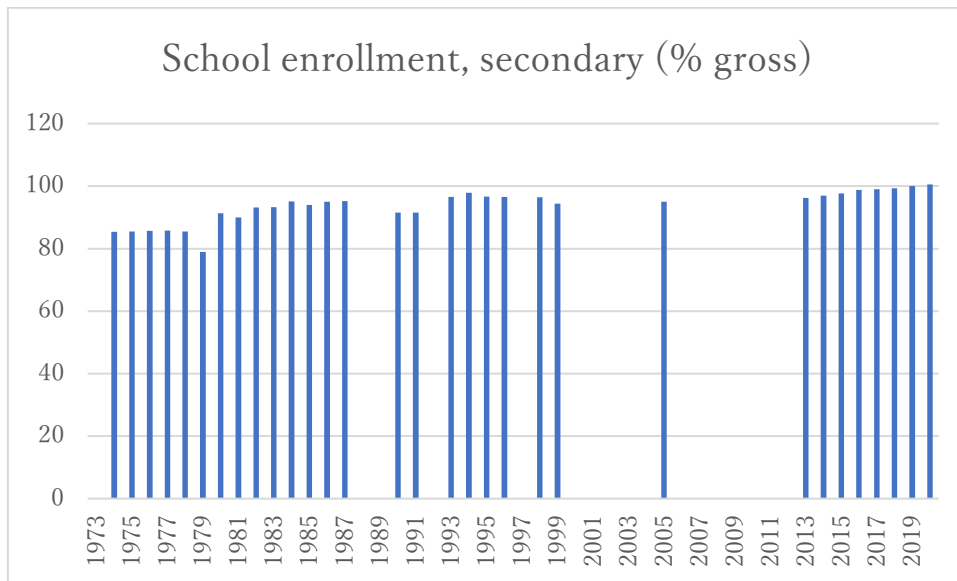


Note. The figure is made by author based on the data from World Bank (n.d.).

Figure 3

*Secondary School Enrollment Rate, 1973-2020.*

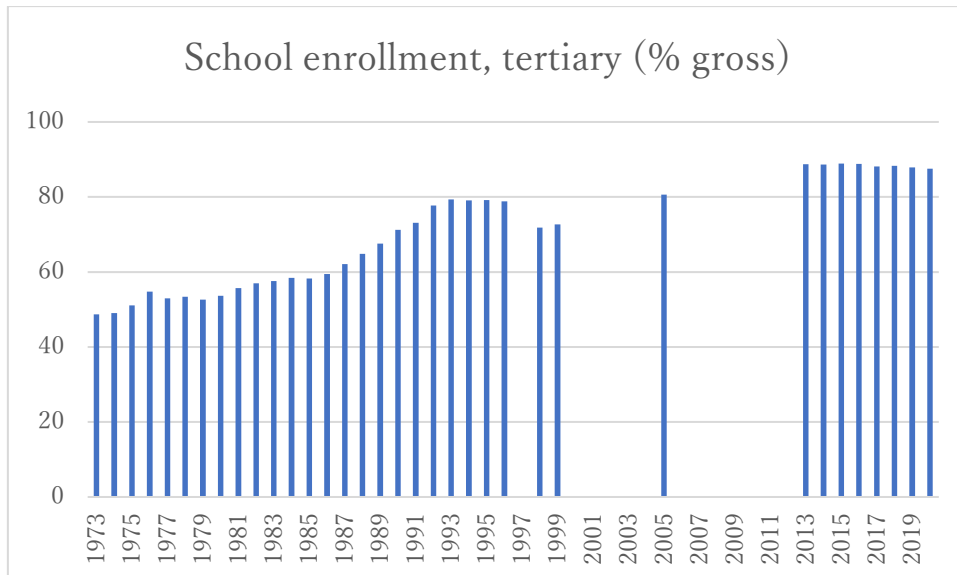
## THE EFFECT OF EDUCATION ON VOTER TURNOUT AND ITS MECHANISM



Note. The figure is made by author based on the data from World Bank (n.d.).

Figure 4

*Tertiary School Enrollment Rate, 1973-2020.*

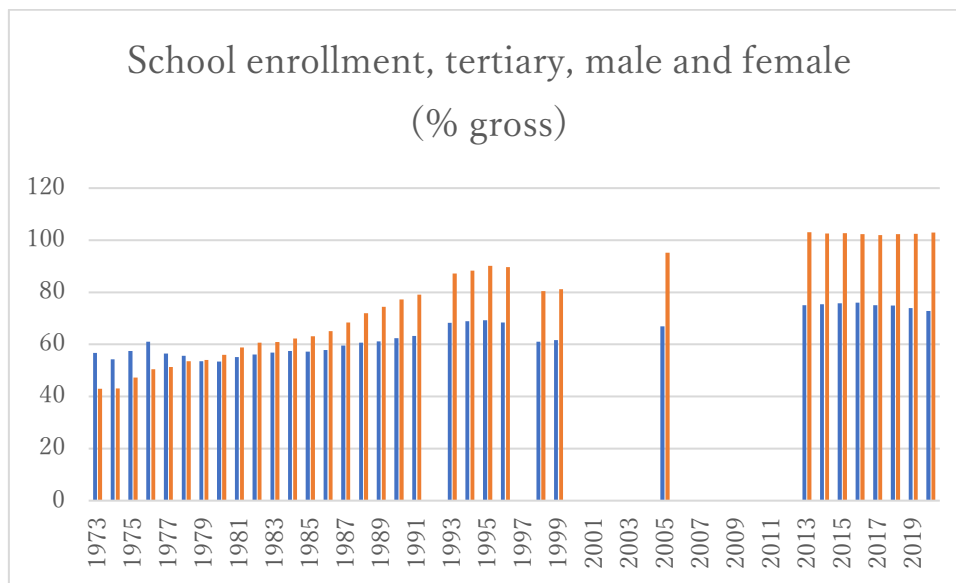


Note. The figure is made by author based on the data from World Bank (n.d.).

Figure 5

*Tertiary School Enrollment Rate, male (blue) and female (orange), 1973-2020.*

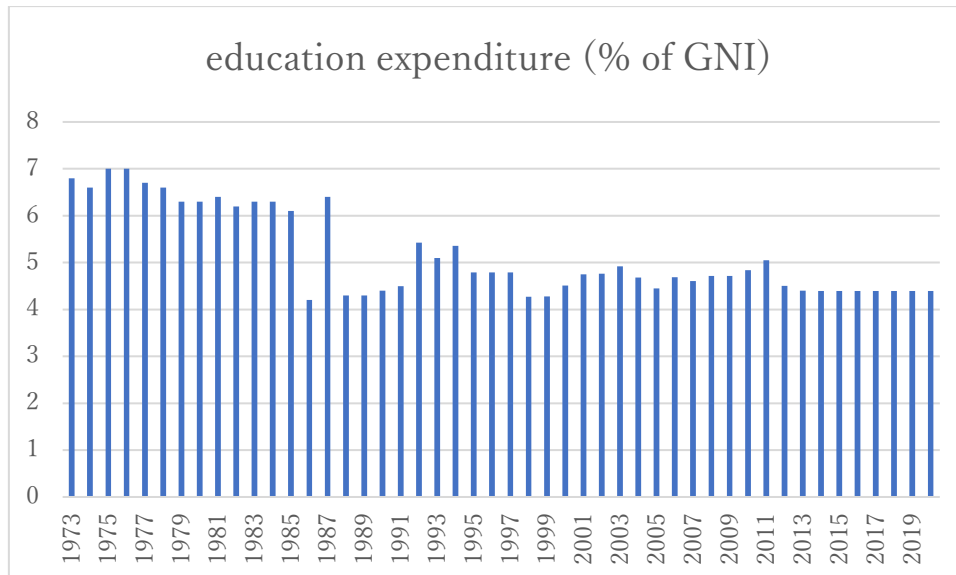
## THE EFFECT OF EDUCATION ON VOTER TURNOUT AND ITS MECHANISM



Note. The figure is made by author based on the data from World Bank (n.d.).

Figure 6

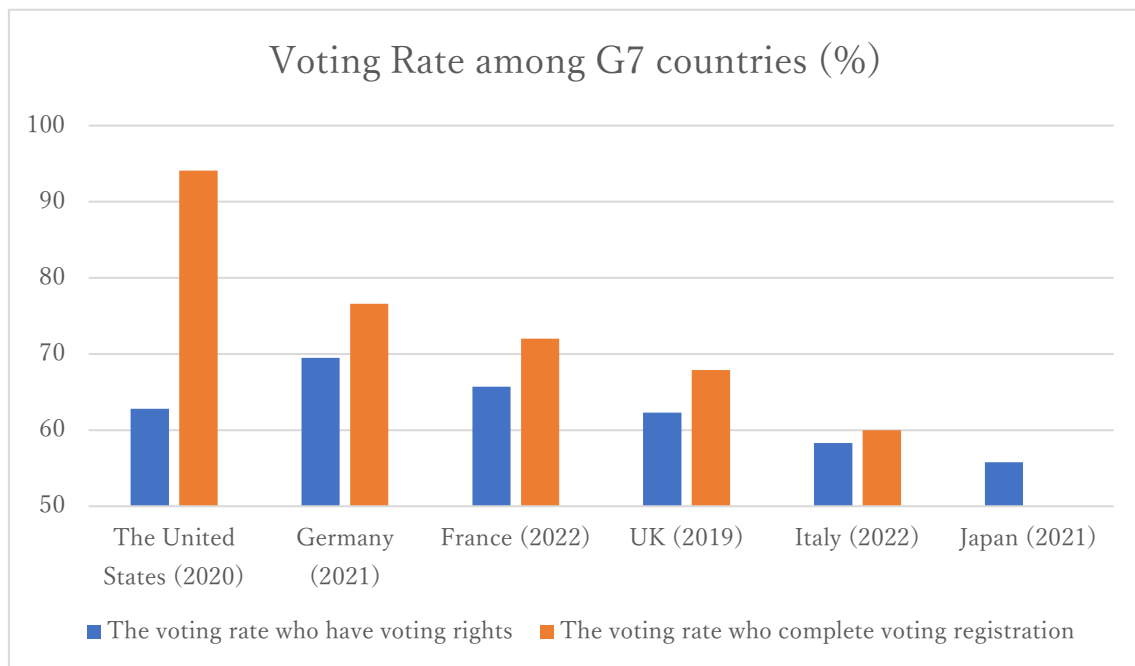
*Educational Expenditure (% of GNI), 1973-2020.*



Note. The figure is made by author based on the data from World Bank (n.d.).

Figure 7

*Voting Rate in the United States, 2019, 2020, 2021, 2022.*



Note. The figure is made by author based on the data from DeSilver (2022).

## 6. Estimation Techniques

### 6.1 Index of the Political Awareness, Civic Duty, Political Efficacy, and Registration

In the estimation, there are five specific dependent variables (or intermediate variables) that represent voter's consciousness for politics, political awareness, civic duty, internal and external political efficacy, and voting registration. These indexes consist of the respondent's several answers according to the well-known measurements Rosenstone and Hansen (1993) made. Rosenstone and Hansen (1993) evaluate these five variables as prominent. For example, for the sense of civic duty, they used the 5-leveled answer of a question: "If a person doesn't care how an election comes out then that person shouldn't vote in it". They quantified the sense of civic duty by 5-point scale from the answer. As well as the civic duty scale, internal political efficacy scale is constructed by several answers. According to Niemi, Craig, and Mattei (1991), they produced an index by following four questions from 1988 ANES survey: "I consider myself to be well qualified

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to participate in politics”, “I feel that I have a pretty good understanding of the important political issues facing our country”, “I feel that I could do as good a job in public office as most other people”, and “I think that I am better informed about politics and government than most people”. By using these four questions, they created 17-point scale of internal efficacy.

However, as mentioned above, contents of ANES survey are revised every year following trends and public opinion. Thus, there are few questions which are exactly the same as the former survey. Having said that, I recreated these indexes based on the data from 2020 ANES survey. For civic duty scale, I recreated the index that makes visible the thoughts for voting. It is constructed by two questions. The first one is: “How strongly do you feel that voting is a duty?” with three choices: very strongly, moderately strongly, or a little strongly. The second one is “For you personally, is voting mainly a duty, mainly a choice, or neither a duty nor a choice?”. Therefore, civic duty index of my study is 4-point scale. For internal efficacy, I made a 5-point scale index. It is constructed by one question, “I feel that I have a pretty good understanding of the important political issues facing our country” with five choices. Similar to this, I also recreated a 10-point scale external efficacy index. There are two questions; the first question is “People like me don’t have any say about what the government does” with five choices; the second question is “I don’t think public officials care much what people like me think” with five choices. Finally, the index of political awareness is made by two questions; “How interested would you say you are in politics? Are you [very interested, somewhat interested, not very interested, or not at all interested]?” with four choices, and “Some people don’t pay much attention to political campaigns. How about you? Would you say that you have been [very much interested, somewhat interested or not much interested/



not much interested, somewhat interested or very much interested] in the political campaigns so far this year?” with three choices. The index of political awareness has a 7-point scale. For voting registration, I used the same question and made a 2-point scale of registration index (or a dummy variable). There is just one question for the index, “Are you registered to vote at this address, registered at a different address, or not currently registered?”

## 6.2 Ordinary Least Squares

Referring to Jackson (1995), there are mainly two types of models, to estimate the relationship between education and turnout, and five intermediate variables, political awareness, civic duty, external/internal political efficacy, and registration status. For the first step of analyzing intermediate variables excepting registration status, it can be used the ordinary least squares (OLS) as follows:

$$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon \quad [4]$$

[4] estimates the impact of education on these civic variables considered as five of the most prominent explanations of voting behavior. Hence, Y is the five variables, political awareness, civic duty, internal/external political efficacy, and registration status.  $X_1$  is the highest education respondents have ever received before,  $X_2$  to  $X_n$  are control variables, and  $\varepsilon$  is an error term. To provide adequate control, Jackson (1995) introduced several measures of respondent’s characteristics as control variables. They are income, age, race, gender, marital status, residential stability, partisan intensity, and region of residence.

## 6.3 Probit Regression

For the estimation of the impact of education for voting behavior, Jackson (1995)

used probit model. As Franklin (2004) noted it cannot use OLS regression when the dependent variable is a dichotomous variable, showing whether the respondent voted or not, Therefore, the estimation can be biased if we use OLS. Therefore, based on his study, the following estimation formula is used:

$$\text{Probit } [Y = \varphi (\alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon)] \text{ [5]}$$

where Y is the respondent's latest voting behavior,  $X_1$  is the highest education respondents have ever received before,  $X_2$  to  $X_n$  are control variables, and  $\varepsilon$  is an error term. In addition, one of the five intermediate variables, registration status is also a dichotomous variable. Therefore, estimation of the intermediate variable, registration status is the same as [5]. The formula consists of the respondent's latest voting behavior as Y, the highest education respondents have ever received before as  $X_1$ ,  $X_2$  to  $X_n$  are control variables, and  $\varepsilon$  is an error term. To provide adequate control, Jackson (1995) introduced several measures of respondent's characteristics the same as other intermediate variables, such as income, age, race, gender, marital status, residential stability, partisan intensity, and region of residence.

#### 6.4 Instrumental Variable Methods

According to Khandker, Koolwal and Samad (2010), the equation using instrumental variables would be estimated as follows. The first-stage regression is:

$$T_i = \gamma Z_i + \phi X_i + u_i \text{ [6]}$$

where  $T_i$  is a variable that indicates how much the respondent has been treated or not, which means the highest education achieved in this study.  $Z_i$  is an instrumental variable to isolate the treatment variable from other unobserved characteristics which affects the result.  $X_i$  is control variables of other respondent's characteristics, and  $u_i$  is an error term.

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The second-stage regression is:

$$Y_i = \alpha X_i + \beta T_i + \varepsilon_i [7]$$

where IV estimates  $\beta$  which is the outcome of  $T_i$ . As it is mentioned above,  $T_i$  is a variable that indicates how much the respondent has been treated or not, which means the highest education,  $X_i$  is control variables of other respondent's characteristics, and  $u_i$  is an error term. Fundamentally, the same control variables are used in two regression formulas. Furthermore,  $Z_i$ , IV should fulfill two conditions as follows:

1.  $Z_i$  correlated with  $T_i$ :  $\text{cov}(Z, T) \neq 0$
2.  $Z_i$  uncorrelated with  $\varepsilon$  :  $\text{cov}(Z, \varepsilon) = 0$

In addition, I also estimate the influence of education by race: black, white, native, asian, islander, and hispanic. The previous research by Jackson (1995) did not estimate the effect of education for different racial groups separately. Therefore, the estimation by race in my study adds unique perspectives to the literature.

### 7. Descriptive Statics

Table 2 shows descriptive statistics of people in the United States. According to Table 2, the average for respondent's year of schooling is about 11 years. Also, the average of year of schooling for respondent's spouse is about 8 years. In addition, from racial aspects, the percentage of respondents who answered the own identity as White (*white*) is bigger than other races, such as Black / African American (*black*), American Indian (*native*), Asian American (*asian*), Native Hawaiian or another Pacific Islander (*islander*), and Latinx / Hispanic (*hispanic*). Moreover, indices which I made have several characteristics according to Table 2. The mean value of index of how much

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people think voting is a duty for citizens (*duty*) shows that more than half consider voting is a duty. The same thing could apply to other indices, internal efficacy (*int\_efficacy*), external efficacy (*ext\_efficacy*), political awareness (*awareness*), and voting registration status (*registered*). Especially registration status, the mean value is about 0.9. It is natural that people who seek voting need the registration before election. Other control variables, for example, the average of working hour per a week (*workhour*) 26. The average of gender dummy variable (*sex*) is 0.45. It shows the survey has few unbalances of gender ratio. Also, the average of marriage dummy variable (*marriage*) is 0.52 which shows about half of respondents have married. In addition, the average of family income (*income*) is about 28,000 USD. The average of region dummy variable (*south*) is 0.28 which means the survey has more people living in the north than people living in south. The number of children aged 0 to 17 (*children*) ranges from 1 to 4 people, but no or 1 child is on average. The average of years which respondents registered at present location (*closing*) is 2.05. In addition, the average of year which respondents living in the present community (*stability*) widely ranges from 0 to 40 years.

Table 3

*Descriptive Statics*

	Observation	Mean	S.D.	Min	Max
<i>vote</i>	8,280	0.728382	0.444821	0	1
<i>sex</i>	8,280	0.454469	0.497953	0	1
<i>marriage</i>	8,280	0.521981	0.499547	0	1
<i>children</i>	8,280	0.5332126	1.313558	0	4

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<i>education</i>	8,280	7.316908	3.63354	0	21
<i>spouse_educ</i>	8,280	4.128986	4.19791	0	21
<i>workhour</i>	8,280	26.16957	21.30816	0	150
<i>white</i>	5,963	0.916546	1.028835	0	1
<i>black</i>	726	0.284058	1.088759	0	1
<i>native</i>	762	0.288406	1.089612	0	1
<i>asian</i>	271	0.230676	1.076796	0	1
<i>islander</i>	172	0.21715	1.073321	0	1
<i>hispanic</i>	762	0.092029	0.2890843	0	1
<i>religion</i>	8,280	1.700362	1.968639	0	5
<i>closing</i>	8,280	2.054831	1.277865	0	3
<i>stability</i>	8,280	18.31993	14.52136	0	40
<i>identity</i>	8,280	2.753623	1.430408	0	5
<i>income</i>	8,280	10.99758	7.635161	0	22
<i>south</i>	8,280	0.288527	0.453105	0	1
<i>duty</i>	8,280	2.725242	1.208334	0	4
<i>int_efficacy</i>	8,280	3.321256	1.318083	0	5
<i>ext_efficacy</i>	8,280	6.404589	2.948743	0	10
<i>awareness</i>	8,280	4.341787	1.347146	0	7
<i>registered</i>	8,280	0.9120773	0.2831996	0	1

*Note.* The table here is made by the author based on the information from ANES (2020).

Mean means average, S.D. means standard deviation, Min means the minimum value, and Max means the maximum value.

## 8. Findings

This chapter starts with an explanation of the results on the relationship between education and voting turnout as estimated by OLS, probit regression, and IV. In Table 4, the results of IV show the causal relationships. The coefficients of years of schooling of all OLS, probit regression, and IV estimations were statistically significant at the 1% level. For the IV estimates, if the year of schooling (*education*) increases by one year, the probability of voting (*vote*) increases by 6.1% points. The effect of education on voting turnout gets greater after controlling for the endogeneity of education. In addition, the coefficients of intermediate variables are positive and statistically significant; showing that they greatly affect people's voting behavior. In the IV estimation, if the index of civic duty for voting (*duty*) increases by one point, the probability of voting (*vote*) increases by 12.1% points. The IV result shows that if the index of internal efficacy (*int\_efficacy*) increases by one point, the probability of voting (*vote*) increases by 31.7% points. Furthermore, if the index of external efficacy (*ext\_efficacy*) increases by one point, the probability of voting (*vote*) increases by 7.4% points. If the index of political awareness (*awareness*) increases by one point, the probability of voting (*vote*) increases by 10.5% points. Finally, if the index of voting registration status (*registered*) increases by one point, the probability of voting (*vote*) increases by 119.4% points. Interestingly, all of the OLS, probit regression, and IV results fulfill statistical significance at 1% level for the coefficients of the intermediate variables<sup>10</sup>.

Table 5 shows the estimation results of the relationship between education and

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<sup>10</sup> Results are similar in IV estimation by gender estimated by IV regression. They are introduced in Table A2 in Appendix

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five intermediate variables in comparison with results from Jackson (1995)<sup>11</sup>. To compare with the previous study, I estimated the relationship with the same control variables, but my estimation uses IV. According to Table 5, if the year of schooling (*education*) increases by one year, the index of civic duty for voting (*duty*) increases by 6.5% points. Also, if the year of schooling (*education*) increases by one year, the index of internal efficacy (*int\_efficacy*) increases by 6.8% points. Additionally, if the year of schooling (*education*) increases by one year, the index of external efficacy (*ext\_efficacy*) decreases by 3.7% points. Moreover, if the year of schooling (*education*) increases by one year, the index of political awareness (*awareness*) decreases by 4.1% points. Last but not least, if the year of schooling (*education*) increases by one year, the index of voting registration status (*registered*) increases by 8.1% points. All of the intermediate variables except external efficacy fulfill statistical significance at 5% level. All intermediate variables of Jackson (1995) were statistical significance at 5% level and the effect was positive.

In addition, Table 6 shows the estimation results on the influence of education on voting and intermediate variables separated by races. Regarding the effect of education on voting behavior, the coefficient of education for White people is 8.9% points, about 0.4% points more than the one in the general estimation including all races. Also, only White people and islander have the coefficients of education with statistical significance. Moreover, people of Black / African American and Native American have greater effects of civic duty on voting behavior to other races. The coefficients of education for Black / African American and Native American are 24.8% points and 23.2% points respectively. They are about twice as large as the one for all races and 2.5 times as large as the one for White people. In addition, the effect of registration on voting behavior is different by race.

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<sup>11</sup> The table includes all control variables is introduced in Table A1 in appendix.

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The coefficient of registration for Black / African American is about 176.6% points, which is bigger than the one for all races and White people by about 60% points. (See Table 6 for the details of each result)

Table 7 shows the estimation results using IV on the effect of years of schooling on five intermediate variables. It shows some differentiation between respondent's races. The effect of education on civic duty among Asian American is about 19.9% points which is more than twice as large as the one for all races. The statistically significant negative effect of education on political awareness is estimated among White people with statistical significance. Similar to political awareness, the negative effect of education on external efficacy is observed among White people; additional years of schooling decreases external efficacy by 8.2% points. However, in spite of external efficacy, Native American receive more effect of education on internal efficacy about 9.7% points. Furthermore, I found that Black / African American shows little influence of education on voting registration, Native American has the coefficient of education on voting registration about 5% larger than the one for all races (See Table 7 for the details of each result). The p values from the Durbin-Wu-Hausman chi-sq tests are under 0.01 in all IV estimations. It indicates that my estimation rejects the exogeneity. In addition, there is no 0.00 of Wald test of exogeneity. Therefore, it also indicates that my estimation rejects the null hypothesis of no endogeneity.

Table 4

*The Effect of Education on Voting Estimated by OLS, Probit, and IV*

	(1)	(2)	(3)
	OLS	Marginal effects	Marginal effects



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		(Probit)	(IV Probit)
education	0.0114*** (0.0012)	0.0101*** (0.0019)	0.0613*** (0.0219)
duty	0.0274*** (0.00339)	0.2811*** (0.0152)	0.122*** (0.0162)
int_efficacy	0.0987*** (0.00386)	0.7563*** (0.0182)	0.3426*** (0.0210)
ext_efficacy	0.0225*** (0.00172)	0.0177*** (0.00785)	0.0863*** (0.00807)
awareness	0.0309*** (0.00348)	0.2773*** (0.0162)	0.132*** (0.0162)
registered	0.3932*** (0.0253)	0.268*** (0.0988)	1.195*** (0.105)
sex	-0.025*** (0.00776)	-0.0216*** (0.0358)	-0.0933*** (0.0360)
age	-0.0061 (0.00467)	-0.0055 (0.0215)	-0.0288 (0.0215)
workhour	0.00005 (0.000191)	-0.0003 (0.000889)	-0.00103 (0.00101)
marriage	0.0297* (0.0115)	0.0313* (0.0503)	0.128*** (0.0387)
children	-0.0064** (0.00337)	-0.052* (0.0151)	-0.0238 (0.0151)
religion	0.0035* (0.00337)	0.0036* (0.0151)	0.0157* (0.0151)

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	(0.00199)	(0.00948)	(0.00948)
income	0.0048***	0.00435***	0.0185***
	(0.0006)	(0.0006)	(0.0096)
south	-0.027***	-0.024***	-0.102**
	(0.00881)	(0.0396)	(0.0400)
closing	0.0262***	0.0222***	0.0961***
	(0.00580)	(0.0233)	(0.0235)
stability	-0.0012	0.0004	0.00102
	(0.000303)	(0.00135)	(0.00143)
identity	0.0029	0.0033	0.0207
	(0.00281)	(0.0131)	(0.0134)
black	-0.0612***	-0.0558***	-0.230***
	(0.0160)	(0.0646)	(0.0670)
native	-0.0625***	-0.0537***	-0.217***
	(0.0156)	(0.0615)	(0.0647)
asian	-0.0076	-0.0016	-0.0373
	(0.0208)	(0.0948)	(0.0962)
islander	-0.0262	-0.0197	-0.0902
	(0.0277)	(0.123)	(0.122)
Constant	-0.463***	-3.671***	-3.801***
	(0.0241)	(0.119)	(0.135)
Observations	8,280	8,280	8,280
R-squared	0.3896		
Wald test of exogeneity (corr			0.71

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= 0)

*Note.* Robust standard errors are in parentheses. \*, \*\*, and \*\*\* signify statistical significance at the 10, 5, and 1 percent level, respectively. Marginal effects are values which use averaged across explanatory variables other than the focal independent variable.

Table 5

*The Effect of Education on Five Intermediate Variables with the Comparison of Jackson (1995) and My Study Using IV*

	(1)	(2)	(3)	(4)	(5)
	duty	int_efficacy	ext_efficacy	awareness	registered
					(marginal effects, IV probit)
Education (1995)	0.083**	0.095**	0.071**	0.557**	0.227**
	(5.55)	(10.32)	(7.39)	(19.07)	(9.10)
Education (2020)	0.065**	0.0686***	-0.0371	-0.0412***	0.0815***
	(0. 01186)	(0.00409)	(0.00919)	(0.00412)	(0.000574)
Constant	0.568***	0.680***	0.567***	0.499***	0.494***
	(0.00771)	(0.0276)	(0.00848)	(0.0273)	(0.0506)
Observations	8,280	8,280	8,280	8,280	8,280
R-squared	0.0896	0.0209	0.0148	0.0746	0.5833
Durbin-Wu-	0.0016	0.0017	0.0079	0.0038	0.8 (Wald test of
Hausman chi-sq test					exogeneity; corr
(p-value)					= 0)

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*Note.* t values are in parentheses for 1995 and standard errors in parentheses for 2020. \*, \*\*, and \*\*\* signify statistical significance at the 10, 5, and 1 percent level, respectively. Marginal effects are values which use averaged across explanatory variables other than the focal independent variable. Durbin-Wu-Hausman chi-sq test (p-value) shows the result of the test to determine whether endogenous regressors in the model are in fact exogenous.

Table 6

*The Effect of Education on Voting Separated by Races Estimated by IV*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Marginal effect (all races)	black	white	native	asian	islander	hispanic
education	0.0613*** (0.0219)	0.0083 (0.0942)	0.0664*** (0.0234)	0.0426 (0.0419)	0.0554 (0.0881)	0.276*** (0.0580)	0.0426 (0.0419)
duty	0.122*** (0.0162)	0.248*** (0.0571)	0.0965*** (0.0197)	0.232*** (0.0475)	0.132 (0.0865)	-0.0843 (0.0930)	0.232*** (0.0475)
int_ efficacy	0.3426*** (0.0210)	0.3174*** (0.0687)	0.1125*** (0.0270)	0.378*** (0.0592)	0.414*** (0.109)	0.0853 (0.140)	0.378*** (0.0592)
ext_ efficacy	0.0863*** (0.00807)	0.0625** (0.0244)	0.0823*** (0.00995)	0.0770*** (0.0247)	0.0575 (0.0490)	0.169*** (0.0613)	0.0770*** (0.0247)
awareness	0.132*** (0.0162)	0.0269 (0.0589)	0.156*** (0.0196)	-0.0180 (0.0492)	0.284*** (0.0878)	0.0588 (0.0968)	-0.0180 (0.0492)
registered	1.195***	1.766***	1.164***	1.310***	1.489***	-0.689	1.310***

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	(0.105)	(0.309)	(0.138)	(0.252)	(0.548)	(0.692)	(0.252)
Constant	-3.801***	-3.867***	-3.985***	-3.301***	-3.938***	-3.725***	-3.301***
	(0.135)	(0.609)	(0.170)	(0.348)	(0.878)	(0.976)	(0.348)
Observations	8,280	726	5,963	762	271	172	762
Wald test of exogeneity	0.71	0.05	0.49	0.95	0.83	2.73	0.95
(corr = 0)							

*Note.* Robust standard errors are in parentheses. \*, \*\*, and \*\*\* signify statistical significance at the 10, 5, and 1 percent level, respectively. Marginal effects are values which use averaged across explanatory variables other than the focal independent variable.

Table 7

*The Effect of Years of Schooling on Five Intermediate Variables Estimated by IV*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Marginal	black	white	native	asian	islander	hispanic
	effects						
duty	0.065**	0.0373***	0.0691***	0.0296***	0.1998***	0.1404	0.0373
	(0.01186)	(0.0121)	(0.00436)	(0.0114)	(0.0213)	(0.0276)	(0.0114)
int_efficacy	0.0686***	0.1125	0.0684***	0.0973**	0.0308	-0.009	0.0973**
	(0.00409)	(0.0146)	(0.00477)	(0.0142)	(0.0258)	(0.0310)	(0.0142)
ext_efficacy	-0.0371	0.0909	-0.0827**	-0.1051	0.1316	-0.2636	-0.1051
	(0.00919)	(0.0319)	(0.0108)	(0.0312)	(0.0557)	(0.0700)	(0.0312)
awareness	-0.0412***	-0.0677	-0.0544***	0.0351	-0.0345	-0.1449	0.0351
	(0.00412)	(0.0122)	(0.00498)	(0.0133)	(0.0241)	(0.0316)	(0.0133)

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registered	0.0815***	-0.0205	0.0609*	0.0987**	0.2146***	0.1537	0.1416***
(IV probit)	(0.000574)	(0.00209)	(0.000620)	(0.00215)	(0.00357)	(0.00414)	(0.00215)
Constant	0.568***	0.680***	0.567***	0.499***	0.494***	0.401***	0.499***
	(0.00771)	(0.0276)	(0.00848)	(0.0273)	(0.0506)	(0.0530)	(0.0273)
Observations	8,280	726	5,963	762	284	172	762
R-squared	0.582	0.447	0.611	0.653	0.687	0.780	0.653

*Note.* Robust standard errors are in parentheses. \*, \*\*, and \*\*\* signify statistical significance at the 10, 5, and 1 percent level, respectively. Marginal effects are values which use averaged across explanatory variables other than the focal independent variable.

## 9. Discussion

According to Chapter 8, it is obvious that education has the causal relationship with voter's turnout behavior; if the year of schooling increases, the probability of voting also increases. The IV estimate shows that an additional year of schooling increases the probability of voting by 6.1% points (See Table 4 for the details of each result). The coefficient of education is about 5% points bigger than coefficients estimated by OLS and probit regression. This maybe because my study uses IV which deals with endogeneity of education. In addition, all five intermediate variables which I used are positively correlated with the probability of voting (See Table 4 for the details of each result). These findings are almost the same as the previous study (Jackson, 1995) that I retrieved from.

However, looking at the effect of five intermediate variables, the coefficient of education was negative or statistically insignificant. The effect of education on other intermediate variables are smaller than the one of Jackson's (1995) previous study (See

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Table 5 for the details of each effect). The result shows education has a negative effect on political awareness and external efficacy. Especially, the relationship between education and external efficacy is proved with statistically significance. There are few studies that shows the negative effects of education in previous researches. This could be because I used instrumental variable methods to control for the endogeneity of education. Another reason could be measurement error. According to Milligan, Moretti, and Oreopoulos (2004), self-reported surveys have to consider about the possibility of respondent's misreporting. They point out that more educated individuals are tend to over-reporting because of their feelings of stigma. Therefore, Milligan, Moretti, and Oreopoulos (2004) created misreporting dummy variable to deal with the issue of self-reporting survey and showed that misreporting and their estimation results were statistically uncorrelated. My estimation has any consideration of bias caused by respondent's misreporting, so that results of negativity and statistically insignificance differ from previous studies may be affected by misreporting.

In addition, the effects of education on some intermediate variables in my study are smaller than the ones of the previous study. Compared to results of Jackson (1995), the effect of education on civic duty (*duty*) is smaller, by about 1.8% points. The effect of education on internal efficacy (*int\_efficacy*) is also smaller, by about 2.7% points. Furthermore, the effect of education on voting registration (*registered*) decreases by 14.6% points. However, it needs to be kept in mind that it is hard to make a simple comparison between my study and Jackson's (1995) study without consideration for the difference in the way to make an index.

In Chapter 8, my study also reveals the effect on voting turnout has some differences between races (See Table 6 for the details of each result). Most interestingly,

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the effect of education on voting turnout with statistical significance could not be observed except White people and islanders. People of Black / African American, Native American, Asian American, and Hispanic have less influence of education on turnout than White people and islanders. In addition, the effect of political awareness on turnout among Black / African American is also statistically insignificant. It means the rise of awareness for politics and voting not a must increase voting rate among Black / African American. The difference of estimation results between races may be caused by the gap of receiving higher education between races. According to Bureau, U. C. (2022), the percentage of White people who have a bachelor's or higher degree is 41.9% for the non-Hispanic White population although the percentage of Black / African American who have a bachelor's or higher degree is 28.1% for their population. The racial gap of receiving higher education is one of the possible reasons to make the difference of the effect of education on voting turnout.

However, we also need to consider the possible influence of racial dispersion of data. According to Figure 8, the data separated by respondent's race possibly has some racial dispersion. Among all respondents, the share of Black / African American in the sample is 8.8%, White people 72.0%, Native American 9.2%, Asian American 3.3%, islander 2.1%, and Latinx / Hispanic 9.2%. Figure 9 is the race of ratio who had a voting registration according to Bureau U. C. (2021). The census data shows that Black / African American occupied about 12.7%, 72.4% of white people, 3.7% of Asian American, and 9.7% of Latinx / Hispanic. Although the census data does not have minority races, the percentage of Black / African American is different from the sample I used by about 4%. These dispersions possibly cause some bias for the result of my study. For example, the IV regressions estimating the effect of education on voting by race have some statistical



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insignificance in specific races, Black / African American, Native American, Asian American, and Latinx / Hispanic. If the ratio of respondents of these races increases, it may have different values or the same result with statistical significance. Therefore, I need to consider the potential impact the dispersion may cause.

Figure 8

*The ratio of respondent's race. The figure is made by author retrieved from ANES (n.d.).*

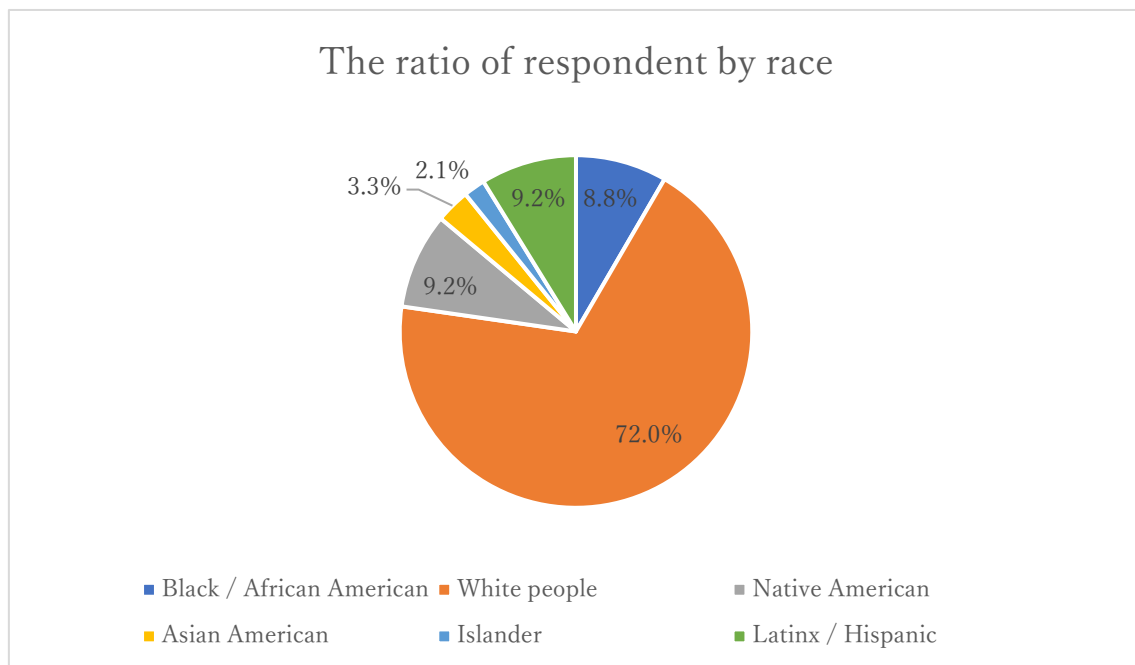
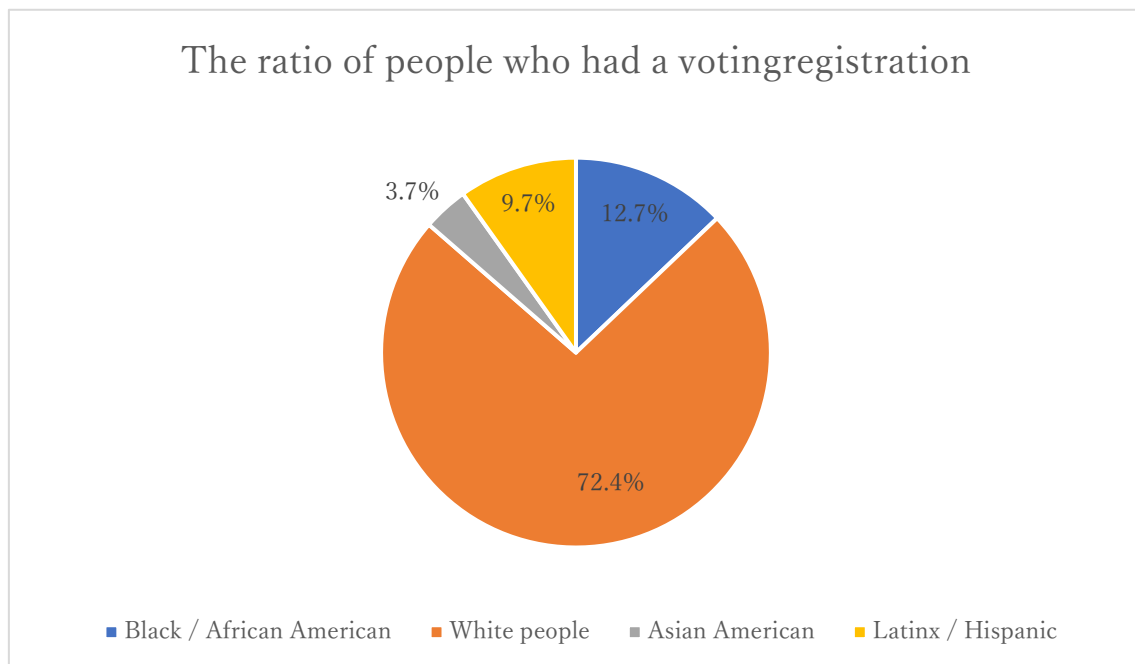


Figure 9

*The ratio of people who had a voting registration. The figure is made by author retrieved from Bureau U. C. (2021).*



## 10. Conclusion

This study tries to unveil the effect of education on turnout in the United States. It uses the data from the survey of American National Election Studies (ANES) in 2020. Also, it estimates the effect by using respondent's highest education as independent variable and the latest voting behavior as dependent variable. To deal with the issue of endogeneity of education, the instrumental variable method is used for estimation. From the result of estimation, there is a causal relationship between education and voting turnout. In addition, five intermediate variables, civic duty, political efficacy, political awareness, and registration status affect voting behavior. Moreover, the relationship has some differences between races. In these perspectives, this study has originality and contribution.

The results of this study suggest several policy suggestions to improve turnout rate. The first one is to invest more in higher education to encourage more people to receive higher education. The study proved the positive causal relationship between years

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of schooling and turnout regardless of contents of education and types of school. Also, my estimations showed education also affects some intermediate variables, civic duty, internal / external efficacy, political awareness, and voting registration, considered as furthering voting behavior more with statistical significance. I showed that education has some positive influence not only voting behavior, but also political consciousness accelerating turnout. Therefore, governments must make the way to increase the rate of higher education enrollment. The second one is to establish original educational curriculums of politics or turnouts along with the difference of race. I found that there are some racial differentiations among the results of educational effect (See Table 5 for the details of each result). For example, if governments prepare curriculums growing feelings of “voting is a duty, not choice” among students of Black / African American and Native American, it will be one effective way for them to accelerate turnouts, because the effect of consciousness as voting is a duty on voting behavior among Black / African American and Native American is stronger than other races. Considering racial differentiation preparing several curricula could be an efficient way to improve political behaviors including turnout for different races.

The future studies can analyze the causal relationship between other educational inputs and turnout. Education cannot be described only by years of schooling. In my study, there is still room for considering more detailed educational inputs such as facilities, achievements, and quality of teachers. Also, resolving racial dispersion of respondent's race is another issue for future studies. We may need to use data which has few racial dispersions. Future studies need to use racially equal surveys or make a specific model which decreases the potential impact of racial dispersion. In addition, studies also have to include the consideration of misreporting. The issue always happens when studies use

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the survey type of self-reporting. Milligan, Moretti, and Oreopoulos (2004) analyzes the reason of misreporting about voting behavior. They argued the feeling of embarrassment may cause misreporting. People who hadn't voted feel embarrassment for their political behavior and take untruthful response to get rid of the feeling. The ANES data of 2020 does not have any variable which can control misreporting. It needs to estimate and show the accuracy of results using such as misreporting dummy variables. Moreover, there is still room to reconsider about instrumental variables. This study uses the highest education of respondent's spouse as instrumental variable. However, some previous research use different instrumental variables when they estimate the relationship between education and turnout.

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### Appendix

Table A1

*The Effect of Education on Intermediate Variables with Control Variables which used in my IV regression*

	(1) duty	(2) int_efficacy	(3) ext_efficacy	(4) awareness	(5) registered
education	0.065** (0.01186)	0.0686*** (0.00409)	-0.0371 (0.00919)	-0.0412*** (0.00412)	0.0815*** (0.000574)
sex	0.0383 (0.0259)	0.102*** (0.0294)	0.0357 (0.0660)	0.123*** (0.0292)	-0.00522 (0.00412)
age	0.0456*** (0.0166)	-0.146*** (0.0188)	-0.340*** (0.0422)	-0.0840*** (0.0187)	0.00177 (0.00263)
marriage	0.0951*** (0.0268)	-0.0164 (0.0304)	-0.0137 (0.0682)	0.0786*** (0.0302)	-0.00388 (0.00426)
stability	-0.00131 (0.000938)	0.00108 (0.00106)	0.00731*** (0.00239)	0.00303*** (0.00106)	-0.00304*** (0.000149)
closing	0.176*** (0.0109)	0.0244** (0.0123)	0.00847 (0.0277)	0.0919*** (0.0123)	0.174*** (0.00173)
identity	0.117*** (0.00903)	0.0403*** (0.0102)	-0.0408* (0.0230)	0.0959*** (0.0102)	0.00311** (0.00144)
south	0.0186 (0.0284)	-0.0289 (0.0322)	-0.145** (0.0723)	0.127*** (0.0320)	0.00697 (0.00452)
black	0.219*** (0.0466)	0.0843 (0.0529)	-0.128 (0.119)	-0.536*** (0.0525)	0.0157** (0.00741)

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Constant	1.706*** (0.0517)	2.816*** (0.0587)	6.396*** (0.132)	3.638*** (0.0583)	0.559*** (0.00822)
Observations	8,280	8,280	8,280	8,280	8,280
R-squared	0.096	0.021	0.015	0.075	0.583

Note. Robust standard errors are in parentheses. \*, \*\*, and \*\*\* signify statistical significance at the 10, 5, and 1 percent level, respectively. Marginal effects are values which use averaged across explanatory variables other than the focal independent variable.

Table A2

*The Effect of Education on Voting Turnout by Gender Estimated by IV Regression*

	(1) Marginal effect (IV Probit, male)	(2) Marginal effect (IV Probit, female)
education	0.0586** (0.0283)	0.0773** (0.0308)
duty	0.116*** (0.0237)	0.125*** (0.0217)
int_efficacy	0.326*** (0.0294)	0.346*** (0.0283)
ext_efficacy	0.103*** (0.0120)	0.0761*** (0.0112)
awareness	0.119*** (0.0237)	0.150*** (0.0218)
registered	1.213*** (0.142)	1.152*** (0.144)
age	0.0103 (0.0332)	-0.0578** (0.0283)
workhour	-0.00205 (0.00136)	-0.00262* (0.00155)
marriage	0.00487 (0.0577)	0.129** (0.0519)



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children	-0.00154 (0.0259)	-0.0480*** (0.0185)
stability	-0.00340 (0.00221)	0.00442** (0.00189)
closing	0.150*** (0.0326)	0.0641** (0.0314)
identity	0.0350* (0.0204)	0.00351 (0.0180)
religion	0.0224 (0.0148)	0.0110 (0.0125)
income	0.0199*** (0.00546)	0.0178*** (0.00580)
south	-0.125** (0.0600)	-0.112** (0.0533)
Constant	-3.943*** (0.210)	-3.900*** (0.175)
Observations	3,763	4,517
Wald test of exogeneity (corr = 0)	0.06	0.88

*Note.* Robust standard errors are in parentheses. \*, \*\*, and \*\*\* signify statistical significance at the 10, 5, and 1 percent level, respectively. Marginal effects are values which use averaged across explanatory variables other than the focal independent variable.