

A Dilemma of American Democracy: How to Increase Youth Turnout

A Senior Honors Thesis Submitted to UCSD's Department of Political Science

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Abstract

In recent years, young voters have held the lowest turnout rate in the US electorate, and are often regarded as the least powerful age cohort to dictate election outcomes. However, how young people vote affects not only young eligible voters themselves, but also the entire electorate and the American Democracy. This thesis seeks to explain the reasons behind low youth turnout, account for the gap between young eligible voters' original turnout intentions and their actual turnout rates, and provide solutions to this problem. In particular, the thesis focuses on two potential factors influencing young Americans' voting behavior. First, it assesses the effect of electoral reforms on youth turnout, and second, evaluates the impact of education and political knowledge on youth turnout. As part of the exploration into the latter, the thesis also devises a survey as an issue-voting-based method for young eligible voters to overcome the potential negative influence associated with low level of education and political knowledge. The results from my analyses mainly highlight an alternative factor that affects youth turnout that was previously unexplored: the reinforcement of preexisting candidate preferences of young eligible voters encourages youth turnout. Although it remains unclear why the reinforcement of young eligible voters' candidate preferences improves youth turnout, this thesis offers a possible explanation: reinforcing existing candidate preferences in the survey provides young eligible voters with the rational justifications and thus the confidence necessary to express their preferences towards this candidate, making them more "aware" of their political preferences and thus improving their turnout. This thesis contributes to the growing body of literature on youth turnout by providing novel insight into the reasons behind low youth turnout, proposing a few possible solutions to this problem, and identifying some potential trajectories for future research.

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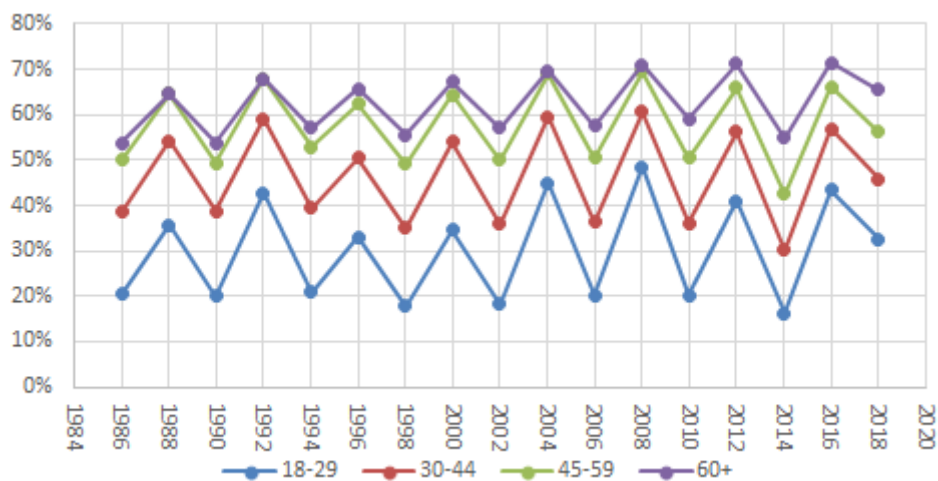
1 Definitions

This paper will touch upon different voting populations. Thus, before moving forward, I would like to define the following terms:

- **Eligible Young Voters** – American voters from age 18-29 who are eligible to vote at presidential elections
- **Young Voters** – American voters from age 18-29 who actually voted at presidential elections
- **Youth Turnout** – The proportion of young voters who have voted among all eligible young voters
- **Eligible Voters** – American voters of all ages who are eligible to vote at presidential elections
- **Voters/All Voters** – American voters of all ages who have voted at presidential elections
- **Youth Vote Share** – The proportion of young voters among all voters

2 Introduction

Figure 1: Presidential Election Turnout by Age Group



Source: United States Election Project Voter Turnout Demographics: Age

In recent years, young voters have held the lowest turnout rate in the US electorate, and are often regarded as the least powerful age cohort to dictate election outcomes. Throughout

the five presidential elections from 2000 to 2016, youth turnout has always been lower than 50%, trailing the three other age groups by a big margin (Age 30-49 cohort had a turnout rate around 60%; Age 50-69 and Age 70+ cohorts turned out at around 70%). Such a striking disparity among age groups is alarming: young voters need to turn out and get their voices heard in order for policy makers in the government to make better decisions that reflects their needs (McDonald, 2016).

Low youth turnout creates a misrepresentation of young voters and their political opinions. Elections are considered to be the most intrinsic element of American democracy that citizens use to exercise their right to vote and hold elected officials accountable. It allows the mass population to differentiate a wide range of candidate options available to them and decide on a candidate most closely represents their preferences on the important issues that affect them and their communities at the polls. If fewer eligible young voters choose to turn out, the actual voting population will be misrepresentative of the actual population. The lower youth turnout would be, the more likely that the election result is not an outcome preferred by young voters (Tucker, 2004). An unpopular elected official against the interests of young voters could lead to a misrepresentation of young voters and their political ideologies. Some reforms and policies that young voters are in favor of could be inevitably turned down by an undesirable candidate who does not effectively represent the needs of young Americans.

Furthermore, low youth vote share could lead to a general reduction of democratic accountability. In a world which campaign promises are often not credible, elections function as an accountability mechanism for citizens to discipline politicians: either reward or punish the politicians for enacting policies in accordance to voters' preferences or in their own self-interests (Besley, 2006). Thus, a well-functioned accountability mechanism is believed to provide incentives for governments to work in the best interests of citizens. The accountability mechanism will become more effective if all eligible voters turnout at higher rates, and since young voters are currently voting at particularly low rates, they currently present the most serious obstacle to achieve democratic accountability. A healthy democracy should represents everyone and hold all politicians accountable.

Finally, boosting youth turnout could potentially turn eligible young voters from habitual non-voters into habitual voters. Habits are response dispositions that are activated automatically by the context cues that co-occurred with responses during past performance (Neal, Wood and Quinn, 2006). At an individual level, a voter's voting record speaks for one's voting habits, and is therefore one of the most reliable indicators of one's future voting behaviors. Studies have shown that most citizens are habitual voters or habitual non-voters as they display inertia (Plutzer, 2002). Most eligible young voters start their political lives as habitual non-voters, but they vary in how long it takes to develop into habitual voters (Plutzer, 2002). On one hand, various forms of civic learning in early years, such as family influence, civics education, and volunteering activities, have overtime helped young voters to develop a sense of civic duty and cultivate a habit of voting at presidential elections. On the other hand, civic engagement opportunities, such as campaigns, often target voters with turnout messages depending on the frequency of their own past turnout behavior and continue to reinforce habitual voting in their later lives (Aldrich, Montgomery and Wood, 2011). Therefore, prompting young voters to turn out at elections is likely going to turn them into long-term habitual voters who always participate in voting later on in their lives, forming a positive feedback loop that helps maintain a healthy representative democracy.

Proper representation of young eligible voters, an assurance of democratic accountability in the electoral mechanism, and a formation of good voting habits for young eligible voters are crucial to the current and future turnout rates at US presidential elections and the functionality of American democracy. Therefore, to ensure that the elected officials are able to interpret and serve the needs of the people to set the policies and shape the opportunities for a common future of the United States, it is important for us to consider possibilities to broaden youth turnout at presidential elections. Building off of existing literature, this paper theorizes that electoral reforms, level of education, and level of political knowledge are three contributing factors that affect youth turnout. Each of them is projected to have a positive relationship with youth turnout. Furthermore, this thesis also conjectures that the negative impact brought by low level of education and political knowledge could be potentially mitigated by providing

accessible, electronic voting information in a form of survey.

This thesis employs a range of methods, collects and utilizes several datasets, and undertakes numerous analyses in order to explore the reasons behind low youth turnout, accounts for the gap between young eligible voters' original turnout intentions and their actual turnout rates, and provides solutions to the problems associated with low youth turnout. First, it starts with adopting the methodology of Holbein and Hillygus (2020) and assessing the relationship between the implementation of electoral reforms and youth turnout from 2012 to 2020 for 50 states and the District of Columbia, using Difference-in-Differences with two-way fixed effects by state and year. A novel dataset that covers all the independent variables – the new implementations of electoral reforms from 2012 to 2020 by state and year – has been compiled for this analysis.

Second, it proceeds to discuss the impact of education and political knowledge on youth turnout, and devise an experiment to evaluate whether the negative impact brought by low level of education and political knowledge can be mitigated through an issue-voting- and priority-based survey distributed to young eligible voters. In order to conduct the survey and analyze the survey data, this study also generated two more datasets. In one new dataset, the policy positions of the selected 2020 presidential primary candidate on 10 issues featured in the survey are recorded and quantified. This candidate position dataset maps a respondent to one or multiple candidates based on the respondent's political ideologies, and outputs a recommended candidate (candidates) to the respondents during the survey. For the other dataset, the survey responses are processed, compiled, and analyzed via various statistical techniques, including Two-sample T-Tests, Kolmogorov–Smirnov Tests, and Ordinary Least-Square Regressions. The findings have further explored the extent of the influence of education and political knowledge on youth turnout, discussed whether such influence could be minimized, and identified underlying factors that influence youth turnout.

The results from these analyses revealed three key findings. First, these results show that electoral reforms are statistically insignificant factors for youth turnout after 2012. However,

due to data limitations, these results should be interpreted with caution and do not necessarily indicate that there is no relationship between these electoral reforms and youth turnout. Second, the results provide further evidence for the positive relationship between educational attainment and youth turnout. This is consistent with the results from earlier research in the field. Last but not least, the results highlight another, and perhaps a more important finding: a statistically significant positive relationship between respondents' likelihood to vote for the their recommended candidate and their likelihood to vote. This result has suggested that young eligible voters are not receptive to the candidate recommendation from the survey. If the candidate recommendation at the end of the survey is identical to their preferred candidates, it would serve as a positive reinforcement of young eligible voters' original candidate choice, and encourages them to turnout at a higher rate. This thesis offers a possible explanation for the positive relationship between respondents' likelihood to vote for the their recommended candidate and their likelihood to vote: perhaps the reinforcement of their candidate preferences provides young eligible voters with the rational justifications and thus the confidence necessary to express their preferences towards this candidate, making them more "aware" of their political preferences and candidate preferences, and thus improving their turnout. Therefore, this thesis conjectures that political awareness of young eligible voters can be an alternative factor that affects youth turnout.

This thesis contributes to the growing body of literature on youth turnout by providing a novel insight into the reasons behind low youth turnout and proposing a few potential solutions to this problem, including the implementation of electoral reforms and the provision of accessible, electronic voting information. This thesis has also identified two general directions of future research: First, studies should focus on properly identifying the relationship between electoral reforms and youth turnout, if relevant data becomes available. Second, future research can further explore the effect of reinforcement of young eligible voters' candidate preferences on youth turnout.

The remainder of this paper is structured as follows: Section 3 involves a discussion of relevant existing literature on youth turnout. Section 4 presents the theoretical mechanisms and

the hypotheses, and also offers explanations for some alternative mechanisms. Sections 5 and 6 outline the research design and provide details of the data and methods used in this study. Sections 7 and 8 summarize the results and present a discussion of the findings and potential directions for future research.

3 Existing Literature

Various studies reveal that young voters do intend to vote, yet there exists a gap between original turnout intentions and actual turnout of young voters (ANES, 2016, Herrick and Pryor, 2020, Holbein and Hillygus, 2020). Existing literature has suggested that effective electoral reforms could be a stimulus to bridge the gap between original turnout intentions and actual turnout, which increases youth turnout (Holbein and Hillygus, 2020). Moreover, level of education (Sondheimer and Green, 2010) and level of political knowledge (Campbell et al., 1980) impact youth turnout and contribute to the formation of the gap between turnout intentions and actual turnout of young voters.

3.1 Physical Cost of Voting

Physical costs of voting, such as schedule conflicts and transportation costs, might be ascribed to a complicated and confusing set of registration and election rules that differ by state. Although it could also be the case that young voters move more often and thus have to deal with the confusion of different systems across states more often than older voters, proper electoral reforms could potentially streamline, simplify and modernize the current registration and election process, and thus lower the physical cost of voting for young voters in time and effort. As early as the American Civil War Era when absentee voting was introduced, states have always been proposing and adapting to new electoral reform rules, including no-excuse absentee voting, preregistration, online registration, election-day registration (EDR), same-day registration (SDR), and early voting.

Holbein and Hillygus (2020) utilized data from the Current Population Survey (CPS) from 2000 to 2012 and discussed extensively the effect of these electoral reforms on youth. The two

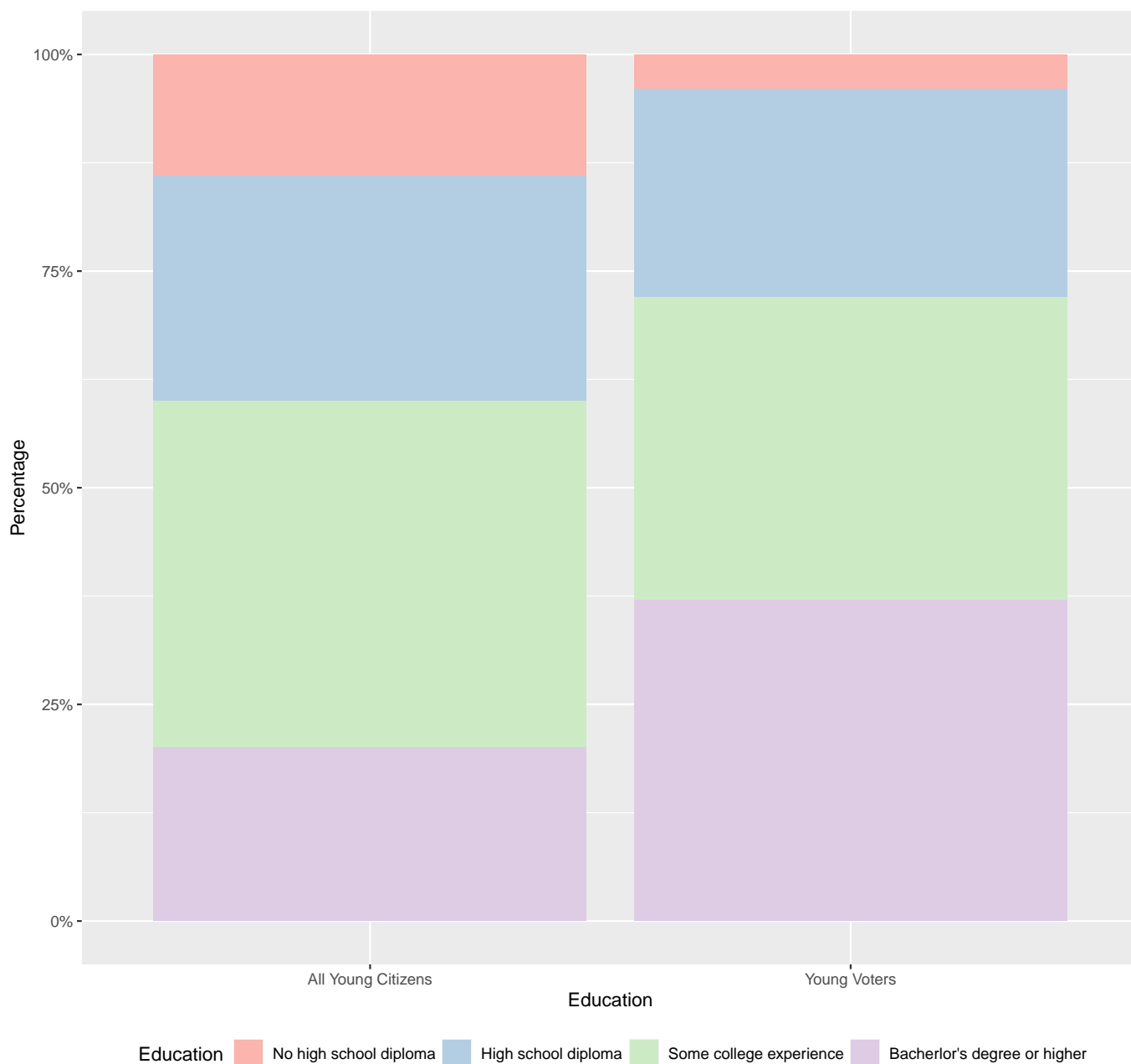
authors constructed two composite scales of the six reforms and performed a Difference-in-Differences analysis to explore the effect of electoral reforms collectively. They discovered that preregistration, online registration, and same-day registration are effective electoral reforms to boost youth turnout for a sizable subset of young voters, while no-excuse absentee voting was not likely to have a meaningful effect on young voters. Moreover, though EDR had a consistently positive effect on youth turnout, the most popular reform – Early Voting — was actually associated with lower youth turnout when it was implemented by itself.

3.2 Cognitive Benefit of Voting

While facing the physical cost of voting, voters also obtain cognitive benefit from the action of voting. A voter’s level of education and level of political knowledge are two contributing factors that could affect the cognitive benefit of voting: the higher a voter’s level of education or political knowledge, the higher cognitive benefit a voter can derive from the action of voting.

Level of education is a demographic factor that has been traditionally associated with general voter turnouts. MIT Election Data and Science Lab published a report about 2016 presidential election turnout: Less than 50% of eligible voters with high school degrees or less have turned out at 2016 presidential election, while 70% of voters who have obtained higher than a high school education cast a ballot (Data, 2020). Burden et al. (2014) also identified level of education attainment as the most important determinant of voter turnouts since the 1980s. Young voters also seem to exhibit the positive correlation between education and turnout as the general voting population. Tufts University’s Center for Information and Research on Civic Learning and Engagement (CIRCLE) published their latest research results from their project “Youth Voting and Civic Engagement in America” on youth voting in 2020 (CIRCLE, 2020). Their data disclosed a huge disparity in youth voting among different education groups: youth with college experience tended to vote at a much higher rates than young people without a college experience. The effect of education on youth turnout has been proven to be one of the most prominent factors to hold young voters back from casting their ballots. To give a more concrete, quantitative example of the effect of education on youth turnout specifically, CIRCLE’s analysis on the education gap in the youth electorate from 2012 indicated that

Figure 2: Proportion of Young people in the Overall Youth Citizen Population and in the Youth Electorate by the Level of Education, 2012



Source: CIRCLE’s analysis of 2012 national exit poll

non-college-educated young people were underrepresented among young people who voted: an estimated 66% of young people with at least some college experience voted in 2012, but 35% of those who have not attended college voted in 2012. An overrepresentation of college-educated young people and an underrepresentation of non-college youth among young people who voted is evident from Figure 2.

Level of political knowledge – whether voting-specific or civic-knowledge-related – is proven to be strongly correlated with voter turnout. Vandermaas-Peeler (2018) found a remarkable dearth in election-specific political knowledge of an average American, which has impeded the registration and voting process: when presented with a wide variety of real and fictional election laws, an average American displayed a low level of familiarity with the rules in their state. Furthermore, a higher level of education did not necessarily translate to a higher level of familiarity with election laws, suggesting that level of political knowledge is not a confounding variable, but rather an independent variable that could affect voter turnout along with level of education. Likewise, the pattern of low civic knowledge among American voters also applies to the youth. A Pew Research Center’s nationwide political knowledge survey in 2018 also revealed a low average level of civic knowledge among American voters (Doherty, Kiley and Johnson, 2018). For example, only 54% could correctly identify the vice president as the person who cast the tie-breaking vote in a deadlocked Senate; fewer than half (41%) were aware that 60 votes are needed to end a filibuster in the U.S. Senate. The level of civic knowledge is proven to be the lowest among young eligible voters out of all age groups: comparing to 24% for Age 30-49, 23% for Age 50-64, 33% for Age 65+, just 14% of young eligible voters scored high on a 4-question index of civic knowledge about the Electoral College, filibuster, Senate tie-break procedure and presidential term limits.

Table 1: Respondents Answering Party with House Majority Before Presidential Election by Age Group

	Age 18-29	Age 30-49	Age 50-69	Age 70+
Incorrect Answer/Don't Know/Missing	1077	1128	831	386
Correct Answer	1155	2149	1640	540
Total	2232	3277	2471	926
Percentage Correct	51.75%	65.58%	66.37%	58.32%

The responses with incorrect answers, "Don't know", "missing" are grouped together in ANES dataset

Table 2: Respondents Answering Party with House Majority After Presidential Election by Age Group

	Age 18-29	Age 30-49	Age 50-69	Age 70+
Incorrect Answer/Don't Know/Missing	1341	1541	1153	509
Correct Answer	891	1736	1318	417
Total	2232	3277	2471	926
Percentage Correct	39.92%	52.98%	53.34%	45.03%

The responses with incorrect answers, "Don't know", "missing" are grouped together in ANES dataset

A low level of civic knowledge among young voters compared to other groups is also been corroborated by various other sources, such as the American National Election Studies (ANES), a series of academically-run national surveys of voters in the United States, conducted before and after every presidential election. To help visualize the disparity in the level of civic knowledge among different age groups, there are two variables from the ANES time series study in 2016 (ANES, 2016) related to political knowledge. The two variables record respondents' answers to two political knowledge questions asking whether the respondents know the party with senate majority before the election and the party with house majority after the election, which could serve as a rough indicator of respondent's basic level of political knowledge. The table above cross tabulates the responses by age group. The table further supports that the current level of political knowledge possessed by America's youth remains very low compared to other age groups. From the table, we could observe that eligible young voters had the lowest percentage of accuracy for both basic political knowledge questions, 51.75% for pre-election majority and 39.92% for post-election majority.

4 Theory and Hypothesis

4.1 Establishing the Theoretical Framework

The decision to vote involves a trade-off between the cost and the benefit of voting. When the benefit outweighs the cost, the voter will proceed to cast a ballot. More precisely, if we evaluate voting as a decision making process from the perspective of rationality, we can assume that voting will follow the cost-benefit principle, a systematic approach to estimating the strengths and weaknesses of alternatives used to determine options which provide the best approach to achieving benefits while avoiding costs (Posner, 2000). A net present value is the difference between benefits and costs as they occur over time in a cost-benefit analysis (Ross, 1995). Since the probability that any individual vote will alter the election result is diminutive, and the cost of voting in time, transportation, and convenience remains high, we would expect the net present value of voting to be negative and all voters would abstain. However, we clearly have not yet observed a mass majority of eligible voters abstaining from any election in the past 200 years. In fact, the high rates of turnout at elections are explained by the cognitive

benefits arising from the act of voting (Sanders, 1980), corroborated by previous findings in political psychology suggesting that emotional benefits have played an important role in political mobilization (Valentino et al., 2011).

Citizens with higher level of education or political knowledge are posited to derive a higher level of cognitive benefit from voting than those with less education or political knowledge because of three reasons. First, they have attained a higher level of cognitive benefit from voting by having a stronger interest in and emotional connection to politics (Wolfinger and Rosenstone, 1980). Perhaps more importantly, higher level of education or political knowledge also lowers a voter's information cost, thus facilitating political learning (Wolfinger and Rosenstone, 1980). More learning opportunities raise political awareness, increase political participation, and subsequently unlock the cognitive benefit of voting as citizens become more engaged and invested (Zukin et al., 2006). And last but not least, voting can be seen as a means of self-expression, a cognitive-behavioral approach to the deep self (Deffenbacher et al., 1996). By casting a ballot, voters are essentially expressing their own political preferences and validating their sense of meaning within a political system (Riker and Ordeshook, 1968). In particular, the psychological benefit brought by high education attainment and enriched political knowledge will enable eligible voters to understand the impact of public policies relevant to their interests, and therefore express their political preferences effectively through different forms of civic participation. Therefore, citizens with higher levels of education and political knowledge will boost their cognitive benefit by self-expression, and hence are more likely to turnout than citizens with lower level of education and political knowledge.

When the benefits outweigh the costs of voting, citizens with a positive net present value will vote (McMurray, 2015). In order to identify the root causes of low youth turnout at US presidential elections and account for the gap between youth intention and turnout at presidential election, there are two key objectives of this study: for young eligible voters, find out how to lower their physical cost of voting, and how to improve their cognitive benefit of voting.

4.2 Exploring the Relationship between Electoral Reforms and Youth Turnout

On the one hand, the act of voting requires persistence to overcome the physical cost of voting, and young eligible voters are aware of the physical cost of voting they are facing during elections. Therefore, making the registration and voting process more convenient for them can potentially increase youth turnout. Electoral reforms are effective ways to reduce institutional barriers to political participation, streamline, simplify, and modernize the election process, and thus lower the physical cost of voting. This study will evaluate five electoral reforms, including preregistration, online registration, no-excuse absentee voting, election-day registration (EDR)/same-day registration (SDR), and early voting, both separately and in composite scales. Hence, this study supplements and elaborates on electoral reform data after 2012 to understand the effect of electoral reforms on youth turnout in presidential elections. Along with the existing data from Holbein and Hillygus (2020) before 2012, this study provides a complete and quality panel data model accounting for the relationship between electoral reforms and youth turnout.

With the theoretical framework in mind, the first hypothesis to be tested is as follows:

H_{1A} : Young voters will be more likely to turnout if the registration and election process is streamlined, simplified, and modernized.

By contrast, if my analysis does not support this hypothesis, the null hypothesis will turn out to be true:

H_{0A} : A streamlined, simplified, and modernized registration and election process will have no effect on youth turnout.

The null hypothesis could be true if young eligible voters have lost trust in the current voting system with any existing electoral reforms, but rather prefer electronic voting, a more revolutionary alternative that will completely overturn the current voting system. Electronic voting is an extremely controversial topic for electoral reform in recent discussions home and abroad, but has never been implemented in the US at either a local or federal level. Electronic voting

has a possibility for delivering tremendous efficiency and convenience compared to traditional voting polls, and thus is predicted to have a positive effect on youth turnout. Eligible young voters, compared to other age groups, tend to be more habituated to and proficient in the use of modern electronic devices in their daily lives. A Pew Research Center study has indicated that compared to any other age groups, eligible young voters have the highest rate of electronic device ownership, and they are much more comfortable with the use of technology and social media (Silver, Huang and Taylor, 2019). Unfortunately, professionals have predicted that two decades of scientific and technical analysis demonstrate that secure Internet voting systems are not possible now or in the immediate future because an online voting system is vulnerable to malware and manipulation (Kamarck and West, 2019). It will take longer for cybersecurity and cryptography experts to figure out a bullet-proof and user-friendly online voting system (Herrnson et al., 2009). If electronic voting were to be the true stimulus to youth turnout, we would expect at least another decade of low youth turnout, until a form of reliable and secure electronic voting becomes a reality.

4.3 Learning about the Impact of Education and Political Knowledge on Youth Turnout

On the other hand, existing literature has long emphasized the importance of education and political knowledge on voting behaviors. Both factors are considered to improve voter turnout primarily through the development of cognitive skills. In particular, level of education and level of political knowledge affect young eligible voters' ability to derive cognitive benefit from voting. Those with higher levels of education or political knowledge are posited to derive higher levels of cognitive benefit from voting than those with lower levels of education or political knowledge. The anticipated obstacles, distractions, and inconvenience that contribute to the physical cost of voting could be offset by young eligible voters' perceived cognitive benefit of voting from higher levels of educational attainments and political knowledge. Therefore, this paper continues to explore the impact of education and political knowledge on youth turnout. This study will test the following hypotheses:

H_{1B} : Young voters who have attained a higher level of education will be more

likely to turnout than those who haven't.

H_{1C} : Young voters who have information about government, elections, and candidates will be more likely to turnout than those who don't.¹

On the contrary, if my analysis does not confirm my hypotheses, the following null hypothesis will turn out to be true:

H_{0B} : Level of education attainment will have no effect on youth turnout.

H_{0C} : Knowledge about government, elections, and candidates will have no effect on youth turnout.

The null hypotheses above would be true if young voters tend to take shortcuts or use heuristics while voting, instead of deriving information and making judgment based on their education attainment and political knowledge. Social networks and social interactions are key component generating voters' political views and choices and lead to homogeneity of votes in a certain group (Berelson, Lazarsfeld and McPhee, 1986). Additionally, voters also tend to develop a persistent affiliation with a political party, which results in consistent voting behaviors due to family influence and various other factors (Green, Palmquist and Schickler, 2004). The acquisition of these sociological and psychological-based heuristics, such as opinion leaders and party affiliation, does not involve any requirement in level of education and political knowledge. Therefore, these heuristics allow voters who do not wish to invest in learning about any political information to bypass the challenges associated with low level of education and political knowledge and cast their ballots. In that case, knowledge of government, elections, and candidates will not affect youth turnout.

4.4 Eliminating the Negative Impact of Education and Political Knowledge on Youth Turnout

More importantly, this study further investigates whether the cognitive benefit of voting, such as the positive influence brought by level of education and level of political knowledge,

¹Please note that information is measured on a continuum or scale, and should not be seen as binary.

is able to be amplified, so that it would overpower the physical cost of voting and encourage youth turnout. Just like proposing electoral reforms as a potential solution that addresses the physical cost of voting for young voter, this paper also proposes a solution that guides young voters to bypass the limitation of their education and political knowledge levels, increase their cognitive benefit of voting, and thus boost their turnout.

Thereby, I would like to propose my last hypothesis that will require further analysis:

H_{1D} : The negative influence brought by low level of education and level of political knowledge on youth turnout can be overcome by providing accessible, electronic voting information in a form of survey.

Conversely, if I fail to reject the null hypothesis, the following statement will be validated:

H_{0D} : The negative influence brought by low level of education and level of political knowledge on youth turnout can not be overcome by providing accessible, electronic voting information in a form of survey.

The null hypothesis would be true if the negative influence brought by low level of education and level of political knowledge on youth turnout can only be overcome by a more comprehensive and robust system of civics education. Civics education in America has been highly decentralized and in steep decline over the past three decades. According to "The Civic Mission of Schools," a recent national report cosponsored by Carnegie Corporation of New York and the Center for Information and Research on Civic Learning and Engagement (CIRCLE), most high school civics education today comprises only a single government course, compared to the three courses in civics, democracy, and government that were common until the 1960s (Fields, 2003). With all other factors being equal, various researches have demonstrated that the more civics education young eligible voters have, the more likely they are to participate in civic and political affairs. Therefore, compared to a reform in the civics education system, the provision of accessible, electronic voting information in a form of survey might not be effective

in boosting youth turnout.

4.5 Alternative Mechanisms

I also acknowledge some alternative theoretical arguments and potential causes of low youth turnout. Young voters might not be voting due to some other factors, including socioeconomic, cognitive and demographic. The alternative mechanisms are worthy of further research, yet this study will not empirically test them.

4.5.1 Socioeconomic Factors: Homeownership and Residential Stability

A low homeownership rate and a low level of residential stability among young voters is likely to increase the physical cost of voting and discourage civic participation. Hall and Yoder (2018)'s research about homeownership highlighted homeowners' special influence in American politics: Homeowners often participate more in politics, pay attention to issues that affect them as homeowners, and participate in ways consistent with protecting their investment in the value of their property. More importantly, voter registration requires a physical address, and homeowners usually have a stable home address, which facilitates the registration process. However, young people have barely begun their career and are often considered to have low financial and residential stability. Until 2019, more than half of the American youth were locked out of homeownership, some of them do not even have a stable rental housing (Emmons, 2019). The effect of homeownership on voting has been found to be the largest among younger homeowners and those who purchase single family residences, which coincide with young voter population (Hall and Yoder, 2018). Thus, for young Americans, increasing residential stability and providing more affordable housing could be a partial remedy to high physical cost of voting and ultimately raise youth turnout.

4.5.2 Cognitive Factors: Dissatisfaction, Political Alienation, and Voter Apathy

Influenced by the mass media, the American youth's dissatisfaction towards the electoral system and presidential candidates leads to political alienation and voter apathy. Voter apathy among young voters reduces the cognitive benefit of voting and results in low turnout rates.

The 2013 Harvard Public Opinion Project found that a majority of 18-to-29-year-old Americans would replace every member of Congress, if given the chance (Kohnle, 2013). This compelling sense of dissatisfaction towards Congress could also be applicable to candidates at presidential elections (Harwood, 1996), thus giving rise to political alienation: approximately half of the youth who advocated replacing all Congressmen claim that they would definitely or very likely not vote in upcoming elections. Popular televised sources and social media platforms that young citizens are often exposed to, such as *the Daily Show* and Twitter, tend to rate presidential candidates more negatively. As a result, the major audience and users, young American voters gradually exhibit more cynicism and disillusionment toward presidential candidates, the electoral system and the traditional news media at large. A citizen's sense of alienation from the current political system often leads to voter apathy, the abstention from voting in that government's elections, in a representative democracy (Dean, 1960). It is possible that this disillusionment towards candidates and the electorate evolves into a collective sense of voter apathy among young American voters, consistently lowering youth turnout.

4.5.3 Demographic Factors: Gender, Religion, and Ethnicity

Young Americans' civic engagement across different gender, religion and ethnicity groups of American youth are not equal. These demographic characteristics could be major factors that affect their turnout.

Young women are more likely to turn out than their male counterparts. CIRCLE's analysis has shown that ever since the 1990s, young women have voted and volunteered more and been more engaged than their young male counterparts (CIRCLE, 2020). In 1996, 54% of women ages 18-29 voted while only 50% of men did so. In 2012, this difference continued to widen to nearly 8%. However, in the general voter population, the gender gap in turnout has been much smaller and grown more slowly: there was a 3% gap in 1996, 2000 and 2004, and a 4% gap in 2012 and 2016. The impact of gender is more significant on youth turnout compared to general voter turnout.

While the gender distribution has been roughly at an even split across different age groups

throughout years, the religious and ethnic composition of young eligible voters in America are constantly changing and drastically different from other age groups. It is also important for us to understand the impact of religion and ethnicity on youth turnout.

Eligible young voters with a religious affiliation are more likely to turn out than those who don't have a religious affiliation. A Pew Research study in 2008 shows that fewer young voters say they are affiliated with a religious tradition and report regular attendance at worship services, compared with those age 30 and older. Among all voters, 40% attend religious services weekly or more often; among those 18-29, just 33% do so (Keeter, Horowitz and Tyson, 2008). Regular church attendance is strongly associated with a higher probability of voting (Gerber, Gruber and Hungerman, 2016). Thus, the growing secularization among young citizens might account for the low youth turnout comparing to other age groups.

Among young eligible voters, ethnic minorities usually turn out at a lower rate than their white counterparts, with an exception of black youth turnout surpassing white youth turnout since 2008. According to CIRCLE, young racial and ethnic minorities are more likely than their white counterparts to have advocated for a policy or participated in a demonstration, and the turnout rate for young ethnic minorities has been steadily increasing (CIRCLE, 2020). However, the active participation in policy advocacy and the increasing turnout rate haven't induced a higher turnout for young ethnic minorities other than African Americans, comparing to white Americans. On the contrary, from 1972 to 2008, Latinos and Asians have been consistently voting at a much lower rate than white Americans: for instance, in 2008, turnout among African American youth was 58.2%, turnout among white youth was 52%, yet turnout among Asian and Hispanic youth was around 40% (Kirby and Kawashima-Ginsberg, 2009). The racial gap in youth turnout indicates that young ethnic minorities other than African Americans are much less likely to vote compared to their white counterpart at presidential elections.

5 Research Design

The research is divided into two parts: the first part of this study addresses the physical cost of voting through potential electoral reforms; the second part discusses the cognitive benefit

of voting, proposes and tests with a solution to temper the detrimental effect of low cognitive benefit on youth voting brought by level of education and level of political knowledge.

5.1 Electoral Reforms to Address Physical Cost of Voting

Proper electoral reforms could possibly streamline, simplify and modernize the current registration and election process, and thus lower the physical cost of voting. Out of the fifty states in America and Washington, DC, a majority of them have enacted and implemented some of the five electoral reforms from 2012 and 2020, including preregistration, online registration, no-excuse absentee voting, election-day registration (EDR)/same-day registration (SDR), and early voting.

Table 3: Electoral Reform Implementations 2012 VS 2020, by Number of States

Electoral Reform	2012	2016
Early Voting	35 states + DC	44 states + DC
Preregistration	7 states + DC	14 states + DC
Same Day/Election Day Registration	13 states + DC	25 states + DC
Online Registration	14 states	41 states + DC
No-excuse Absentee Voting	30 states	35 states + DC

- Here, the number of states that implement preregistration refers to those specifically allowing 16-year-old or above to preregister. Because of shortage in data, election-day registration (EDR) and same-day registration (SDR) are combined into one single category for analysis.
- Sources: NCSL Elections and Campaign Database for data from 2020, Pew Research Center for data from 2016, NPR Stories on Election 2012: Early And Absentee Voting By State, Ballotpedia: Voting in the 2012 general elections for data from 2012, and NCSL State Elections Legislation Database for data from 2012.

To learn about each of these electoral reforms and its scope of impact on young voters, it is necessary to examine the impact of the five electoral reforms on youth turnout across 50 states and Washington, DC that have different combinations of electoral reform rules enacted from 2012, 2016, and 2020. In particular, this study adopts the methodology Holbein and Hillygus used to analyze their electoral reform data prior to 2012 (Holbein and Hillygus, 2020) and performs a Difference-in-Differences (DiD) analysis with two-way fixed effects, state and year, on a self-compiled dataset containing the implementation status of the five electoral reform rules by state and year from 2012 to 2020. The dependent variable is percentage youth turnout, and the independent variables are each state’s status on all five electoral reforms in 2012, 2016, and 2020.

Along with the existing data from Holbein and Hillygus (2020) before 2012, this study provides a complete and quality panel data model accounting for the relationship between electoral reforms and youth turnout. Nevertheless, unlike the two composite scales utilized by Holbein and Hillygus (2020) that is more complex², this study employs a more intuitive measurement quantifying the impact of different electoral reforms on youth turnout. I have created separate binary variables to indicate each state's status for five electoral reforms across all three presidential election years³ as a treatment variable while doing the Difference-in-Differences analysis.

5.1.1 Difference-in-Differences with Two-Way Fixed-Effects

Difference-in-Differences (DiD)⁴ is a statistical technique attempting to mimic an experimental research design in an observational study. A DiD analysis scrutinizes the differential effect of a treatment on a treatment group versus a control group (Angrist and Pischke, 2008). Applying a DiD analysis to electoral reform data allows us to evaluate the impact of each electoral rules after 2012 and different combinations of them to discover the potential complementarities among these rules. The DiD analysis in this study estimates the effect of all five electoral reforms on percentage youth turnout in states that have implemented them (treatment group), versus the states that have not implemented them (control group) across years.

Because this DiD analysis studies the effect of electoral reforms in different states during a period of time, variations that remain constant within states and years will introduce bias and obfuscate the results from the DiD analysis. Therefore, this study gravitates towards a DiD model with two-way fixed effects, by state and year. A two-way fixed-effects model is a standard model used to estimate causal effects of binary treatment variables with panel data extending across more than two time periods and where different units may adopt the treatment at different time periods (Angrist and Pischke, 2008). It can help remove all sources of variations associated with time-invariant factors in a state and state-invariant shocks across

²See Chapter 6 of Holbein and Hillygus (2020) P160: "The first creates a simple mean scale of these six reforms. The second is a simple three-item mean scale with the registration-based reforms – preregistration, same-day, registration, and online registration.

³1 as the state has implemented such reform prior to such year, 0 as the state hasn't implemented such reform prior to such year

⁴see appendix for more explanation

time. However, it is also important to acknowledge that a two-way fixed-effects model cannot necessarily rule out time-variant factors related to each state or state-specific shocks over time.

5.1.2 Change in the Dependent Variable of Interest

Due to the lack of data in youth turnout, I have experienced a series of setbacks in finding data for the originally intended dependent variable, percentage youth turnout by state and year for 2012, 2016, and 2020. I have attempted to use the age group breakdowns in exit polls as an estimated percentage youth turnout, but the data for more than half of the states for 2020 turned out to be missing. For 2012 and 2016, five states did not report the respondents' age breakdown at exit polls, so their percentage youth turnout are missing as well. Furthermore, the imprecision of this estimated data based on exit poll age group breakdown gives rise to more uncertainties and biases, as national exit polls have aroused harsh criticism among scholars and the general public with regard to their accuracy in recent elections (Barreto et al., 2006). The lack of youth turnout statistics has led to an insufficient amount of data to run the originally proposed DiD analysis. Therefore, still striving to conduct a DiD analysis as planned, this study substitutes the intended dependent variable, percentage youth turnout by state and year, with percentage total vote by state and year, in a hope that when finally acquiring youth turnout data in the future, scholars will be able to perform the originally proposed DiD analysis.

Even though there is little direct evidence that the effect of electoral reforms on total votes could be applied to youth votes, if such a pattern exists, it is likely to be generalizable to youth votes. Young voters have always preferred to vote through the new electoral reform policies compared to the other age groups. First and foremost, compared to only 36% of the general voter population who voted early or absentee in 2016, 49% of young voters reported voting early or absentee in 2016 (CIRCLE, 2020). What's more, preregistration is a policy specifically for young voters, allowing young citizens to register before being eligible to vote, so it is more likely to yield a more significant impact on youth turnout compared to other age groups. Scholars have also shown that there are nontrivial positive effects of online registration on turnout, especially for young people during presidential election years (Yu, 2019). In addition, letting citizens register and vote on the same day increases turnout among 18- to 24-year-olds, which

is a sub-group of age 18-29, by as much as 10 percentage points — a potential difference of millions of votes (Hill and Grumbach, 2019). Young voters' preference for electoral reforms over traditional forms of voting suggests the findings about the effect of electoral reforms on percentage total votes might be also applied to youth votes. Moreover, this particular pattern could probably affect the turnout rate of young voters at a much larger scale than voters from all age groups.

As a result, in the DiD analysis, the status of each electoral reform by state and year are the independent variables. I have created separate binary variables for each reform indicating whether or not that reform was in effect for a particular state-year. The dependent variable is the percentage total vote by state and year. This study offers one single linear regression model that contains all of the treatment variables simultaneously for all five reforms.

5.2 Qualtrics Survey to Address the Cognitive Benefit of Voting

This study has proposed a positive relationship between an individual's level of education and cognitive benefit of voting and a positive relationship between an individual's level of political knowledge and cognitive benefit of voting. In particular, the higher an individual's level of education or political knowledge, the higher their cognitive benefit of voting will be, the more likely they are going to turn out. However, a missing piece in the existing literature is an evaluation of whether this negative effect from low level of education and political knowledge is possible to be mitigated, or even completely offset by providing eligible young voters some "extra help" in an accessible electronic format.

This study has devised an online survey that aids young eligible voters to acquire more cognitive benefit of voting and potentially increase their turnout. In the meantime, this survey is also designed to help all young voters learn more about their own ideologies and make decisions on who to vote for, without any prerequisite knowledge of politics, parties, current events, election-specific laws, or candidates. While taking this survey, respondents are provided with the information they need to choose a presidential candidate in their best interest in a very short amount of time, saving them valuable time and effort, lowering the physical cost of

voting while increasing the cognitive benefit of voting, and making voting a less difficult, more convenient experience for them.

5.2.1 Survey Logistics

This study has been certified as exempt and approved by the Internal Review Board at UCSD to collect survey data from respondents with their consent. The survey is hosted on Qualtrics, a cloud-based platform for creating and distributing web-based surveys. Through an online survey platform Amazon Mechanical Turk (MTurk), the survey reaches out to its ideal group of respondents, eligible young voters all around the nation from age 18 to 29. MTurk is a website run by Amazon that works as a readily available marketplace to match “workers” with available work from various “requesters”, providing an easy access to a large, diverse pool of willing participants for the survey.

5.2.2 Survey Design

The survey design is inspired by the rational actor theory of voting and the theory of issue voting. The rational actor theory argues that the process of voters casting their ballots essentially mimics the process of consumers consider choosing among products: Voters always have their goals in mind and choose actions that help them achieve these goals in a logical way (Downs, 1957). According to the rational actor theory, even not equipped with an abundance of relevant information, voters are still able to make a reasonable and rational choice of candidate based on all resources they are given. The theory of issue voting comes from the classic Hotelling-Downs economic voting model of spatial competition, which we can see as an extension of the rational actor theory. It describes when voters cast their vote in elections based on political issues and assumes that each voter will vote for the candidate or party that is closest to his or her political position on the issues salient to the voter (Downs, 1957). An application of issue voting is adequate in this survey because the theory of issue voting doesn't require voters to possess any party preference, prior political knowledge, and understanding of economic performance. This survey is truly built upon the principle of issue voting to eliminate the negative impact from low level of education and level of political knowledge to the greatest extent.

Meanwhile, the survey design also integrates a cognitive approach. Inspired by the concept of value priorities, “a set of principles that provide people with a way of knowing what they must do and what type of person they must be so that they can live the best way possible, taking into account their environment and personal attributes” (Schwartz, 2013), this survey mimics and reconstructs voter’s psychology at elections based on their value priorities. Thus, apart from voter’s preferred position on each of these issues that affects voter’s decisions, this study also incorporates a scale to measure how salient an issue is for each young voter from 1 to 10. The assumption is that having a scale of importance is better than having all the issues assigned equal weights in the survey because it allows voter to prioritize what they care about the most or the least in the voting process.

The objective of this survey is to assess whether it will motivate young eligible voters with lower levels of education or political knowledge to overcome the disadvantage brought by low cognitive benefit of voting and to turnout at a higher rate. To provide realism, this survey is highly year-specific in nature and has been drafted in the context of the most recent 2020 presidential primary. The choice of candidates is among Democrat and Republican primary candidates who were invited to the debates, did not drop out before November 2019⁵ and had a clear platform on national issues: Joe Biden (D), Mike Bloomberg (D), Pete Buttigieg (D), Tulsi Gabbard (D), Amy Klobuchar (D), Bernie Sanders (D), Tom Steyer (D), Elizabeth Warren (D), Andrew Yang (D), Cory Booker (D), Joe Walsh (R), Donald Trump (R), Bill Weld (R), Mark Sanford (R), and Rocky De La Fuente (R).

The selected issues to be included in the survey have two primary characteristics: firstly, the candidates have talked about all of them extensively in the presidential debates for both parties and the final debates between Joe Biden and Donald Trump⁶; secondly, the candidates have relatively diverse stands on these issues, which allows me to set the candidates apart from each other in my algorithm to be discussed later. The 10 issues featured in my survey are education,

⁵There are 15 Democrat and Republican candidates who still remained in the race after November 2019, relevant information could be found on the election timeline in a Washington Post article: Who qualified for the January Democratic debate

⁶NYtimes article on main issues at presidential debate 2020

tax on the wealthy, universal basic income, health care, abortion, gun control, marijuana legalization, national security, trade with China, and climate change⁷. Out of the 10 multiple choice questions that ask for respondents' preferred position on the ten chosen issues, two of them are originally from ANES time series study⁸. The other eight questions are original, but I have followed the styles and guidelines of ANES survey question design while writing the other eight ideology questions (ANES, 2016). More importantly, to eventually match each respondent with his/her closest-aligned candidate (candidates), I have crafted them carefully so that they are directly corresponding to all candidates' platforms, where all the information could be found on their campaign websites.

Last but not least, the feedback section is crucial to survey design for evaluating the impact of this survey on the respondents: whether the experience taking an issue- and priority-based survey will make them more likely to turn out at future presidential elections. After the respondents have been presented with a survey that measures their stand on important social and political issues as well as the scale of importance, they receive their most ideal candidate (candidates) from the 2020 presidential primary. Upon receiving the recommended candidate(candidates), the respondents are asked to imagine that the 2024 primary election were actually taking place next month, and the same primary candidates who ran in 2020 also runs in 2024. In this hypothetical situation, the respondents are asked the likelihood they would vote for a presidential candidate in either Democratic primary or Republican primary⁹, which is crafted to emulate their actual turnout rate. As explained in more detail below, the survey also includes an experimental element, in which there is a control group who is not asked about political issues or given a candidate recommendation. The difference in respondents' likelihood to vote between control group and experimental groups, who are asked about their positions and do receive their recommended candidate(candidates), will measure the effect of the ideology

⁷For specific questions, please see the appendix

⁸the questions on abortion and gun control are taken directly from the ANES Public Opinion and Electoral Behavior

⁹The exact question wording is as the following:

Imagine that the 2024 primary election were actually taking place next month.

Suppose that the same primary candidates* who ran in 2020 were running in 2024. (Joe Biden (D), Mike Bloomberg (D), Pete Buttigieg (D), Tulsi Gabbard (D), Amy Klobuchar (D), Bernie Sanders (D), Tom Steyer (D), Elizabeth Warren (D), Andrew Yang (D), Cory Booker (D), Joe Walsh (R), Donald Trump (R), Bill Weld (R), Mark Sanford (R), and Rocky De La Fuente (R).)

On a scale of 1 to 10, where 1 means certain not to vote and 10 means certain to vote, how likely would you be to vote for a presidential candidate in either Democratic primary or Republican primary?

quiz and provision of a candidate recommendation.

5.2.3 Survey Flow

Below is a flowchart and a table streamlining the flow of my survey¹⁰:

Figure 3: Survey Process Flowchart

1	2	3	4
Basic information	Political Knowledge Quiz	Ideology Quiz/ Placebo Questions	Feedback Questions
Age, gender, level of education, location	Ex. vote to win electoral college: 270	For experimental group 1 and 2, take respondent input and output the 2020 candidate(s) most aligned with respondent	Ask user's probability of voting/ask user how likely to vote for the output most aligned candidate(s)

At the beginning of the survey, all respondents will be asked to fill out their age, race, gender, and highest level of education attained or in progress. Then, they will answer a political knowledge quiz containing government-specific, election-specific, and candidate-specific questions. Some of these questions come from iSideWith quizzes¹¹, Pew Research Center surveys and ANES time series study. Others are original, but possess a similar level of difficulty to the questions asked in the above three resources. Respondents' answers to basic information section and the political knowledge quiz section will allow me to put them into separate groups based on their levels of political knowledge and levels of education in the future analysis.

Afterwards, the survey will proceed to an embedded experiment in which certain respondents will be randomly presented with different questions and receive different contents based on their responses. In particular, the survey flow separates all respondents into 2 experimental and 1 control groups. The control group, roughly a third of the respondent, will be given some placebo questions about coffee that are completely irrelevant to politics. The first experimental group, roughly a third of all respondents, will be given an ideology quiz that takes their preferred

¹⁰For the full survey, check out the Appendix section.

¹¹iSideWith.com a non-partisan voter education and civic engagement website that allows its users to compare their political beliefs to those of political parties, candidates, and ideologies

position of 10 issues in the form of 10 multiple choice questions, and output them a candidate (candidates) that closest aligned with their ideologies. The second experimental group, roughly a third of all respondents, will be given an ideology quiz with a scale of importance for each issue. At the end, they will also view an output of their most ideologically-aligned candidate (candidates). So the experimental groups will both receive a candidate (candidates) of best match, while control group will not receive an output candidate (candidates).

Table 4: Difference in Questions Directed to Control Group, Experimental Group 1, and Experimental Group 2 in the Survey

Group	Questions
Control	Placebo questions about coffee
Experimental Group 1	Questions about 10 Issues
Experimental Group 2	Questions about 10 Issues and Scale of Importance

At the end of the survey, all respondents, no matter which of the three groups they have been placed into, will enter a feedback section that asks about their actual vote in 2020 and a hypothetical question on their future voting decision: In a hypothetical situation where the 2024 primary election were actually taking place next month and the same primary candidates who ran in 2020 were running in 2024, what would be their likelihood to vote for a presidential candidate in either Democratic primary or Republican primary. The ideology quiz, as a treatment for experimental groups, is intended to capture the difference in the likelihood of voting between control and experimental groups after taking the survey. Specifically, through a set of issue-oriented and priority-based questions, this study aims to provide young eligible voters a better understanding of their own political priorities and a more convenient process of getting to know themselves as a political entities. But most importantly, through the feedback section, the study seeks to assess whether the treatment will help young eligible voters acquire more cognitive benefit of voting and encourage them to turnout, regardless of level of education and political knowledge.

As a result, in the survey data analysis, the primary independent variable is the randomized treatment. Level of education and knowledge can also be moderating influences on the treatment effect, and therefore are also seen as independent variables. The dependent variable is

respondents' answers to the hypothetical question on their future voting decision, as mentioned above.

5.2.4 Survey Algorithm

I would also like to explain the design of the survey algorithm for mapping respondent's input of their preferred position and scale of importance on each issue to the output candidate (candidates) of best match. This algorithm is embedded as Javascript code in my survey right before the feedback section, when the survey output a candidate (candidates) of best match to the two experimental groups. For each respondent, the following formula is used to calculate the lowest score of match and output the best matching candidate (candidates:

$$S = \min_{c_1 \dots c_j} \sum_{i=1}^{10} |r_i - c_{ji}| * w_i$$

where

S = the minimum score of match of all candidates c_j ,

$$j \in \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}^{12}$$

r_i = the respondent's position on issue i ,

$$i \in \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}^{13}$$

c_{ji} = the candidate c_j 's position on issue i ,

$$j \in \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\},$$

$$i \in \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}^{14}$$

w_i = the weight of each issue, represented by a fraction 1 over the respondent's input importance on a scale of 1 to 10, on issue i ,

$$i \in \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}^{15}$$

This formula employs a very intuitive approach. For each respondent, it takes the Euclidean

¹²15 candidates featured in the survey: c_1 – Joe Biden (D), c_2 – Mike Bloomberg (D), c_3 – Pete Buttigieg (D), c_4 – Tulsi Gabbard (D), c_5 – Amy Klobuchar (D), c_6 – Bernie Sanders (D), c_7 – Tom Steyer (D), c_8 – Elizabeth Warren (D), c_9 – Andrew Yang (D), c_{10} – Cory Booker (D), c_{11} – Joe Walsh (R), c_{12} – Donald Trump (R), c_{13} – Bill Weld (R), c_{14} – Mark Sanford (R), and c_{15} – Rocky De La Fuente (R).

¹³10 issues featured in the survey: 1 – education, 2 – tax on wealthy, 3 – universal basic income, 4 – health care, 5 – abortion, 6 – gun control, 7 – marijuana legalization, 8 – national security, 9 – trade with China, and 10 – climate change

¹⁴If a candidate c_j 's position on an issue i is missing, the formula will change the respondent's input preferred position for such issue to be 0.

¹⁵for the first experimental group, the formula will assume the importance to be 1 for any issue i

distance between each candidate’s position and the respondent’s position at each issue. For each candidate, the formula computes the score of match by adding up such euclidean distance for each issue, multiplied a fraction of 1 divided by the scale of importance. At the end, the formula calculates the lowest score of match among all the candidates, and the candidate (candidates) associated with the lowest score of match will be ouputted as the candidate (candidates) of best match.

6 Datasets

This study employs a few datasets. Some of them are available online, some of them are self-compiled.

6.1 Existing Datasets

This study utilizes data from ANES (American National Election Studies) and CCES (Co-operative Congressional Election Study). Both studies provide high-quality time-series data on voting, public opinion, and political participation, and include relevant variables of my interest: for example, respondent’s age, turnout, level of education and level of political knowledge.

6.2 Self-compiled Datasets

This study utilizes three original datasets that take text data from credible online resources including the National Conference of State Legislatures (NCSL), Ballotpedia, and NPR. All the text data are compiled and processed into variables ready for data analysis.

6.2.1 Electoral Reform Dataset

The first one is a self-compiled dataset of electoral reform rules by state and year to expand on the findings from Holbein and Hillygus (2020). The specific electoral reform rules for each state from 2020 are real-time information, easily obtained from NCSL’s Elections and Campaigns database¹⁶. All the 2020 data is further confirmed by each secretary of state website where state-specific voting laws at presidential elections are outlined. The 2012 and 2016 data are from a multitude of credible resources online. The specific electoral reform rules for each state from 2016 are found via NCSL’s The Canvass 2016 and a 2016 report from Pew Research

¹⁶NCSL: State Laws Governing Early Voting, Absentee and Mail Voting Policies, Preregistration, Online Registration, Same-Day Registration, and Election-Day Registration

Center. The specific electoral reform rules for each state from 2012 are derived from NPR Stories on Election 2012, Ballotpedia, and NCSL’s The Canvass 2012.

Because the electoral reform laws are text data, to prepare it for quantitative analysis, I have first categorized the text data into an ordinal variable to indicate the status of an electoral reform in a certain state at a given year to be either “implemented” or “not implemented”. After that, I have recoded this ordinal variable into a binary variable of 0 and 1, 0 as such electoral reform has not been implemented, 1 as such electoral reform has been implemented. Below is an example demonstrating the status of preregistration in a certain state at a given year:

Table 5: Status of Preregistration

Numeric Value	Ordinal Value	Electoral Reform Text Data
1	Implemented	16-year-olds may preregister
0	Not Implemented	16-year-olds may not preregister

This dataset is used to assess the impact of each electoral reform rules on youth turnout.

6.2.2 Candidate Position Dataset

The second one is a dataset that records the positions that the selected 2020 presidential primary candidate took on the 10 featured issues in the survey. For each of the issues, I have created a question that is specific and representative to each candidate’s platform. All candidate’s positions on every single issue is recorded and verified by their own campaigning website, Ballotpedia, and Washington Post. If a candidate’s position is unclear, I will make sure to indicate in my data. To prepare my data for analysis, I have recoded all policy preferences of candidates into numerical values on a quantitative policy spectrum. Below is an example. The variable Education (ED) records the recoded values of three possible policy preferences on whether federal government should pay for full tuition at public colleges and universities. All candidates’ stand on the ten issues will be categorized and recoded in a similar ordinal fashion¹⁷.

¹⁷The questions could be found in the appendix

Table 6: Education (ED)

Numeric Value	Text
1	Yes
2	Partial
3	No

This dataset is used when the survey algorithm matches a respondent to a best matching candidate (best matching candidates).

6.2.3 Survey Dataset

The third one is a dataset that contains all valid responses from the survey. Each question in the survey is recorded as a variable in the dataset. All of its answer choices are recoded into numerical values on Qualtrics for analysis.

This dataset is used to evaluate whether the negative effect from low level of education and political knowledge on youth turnout could be mitigated.

7 Results and Discussion

7.1 Results from Electoral Reforms

The first hypothesis H_{1A} posits that young eligible voters will be more likely to turnout if more electoral reforms are implemented. In order to understand the relationship between electoral reforms and youth turnout, this study performs a Difference-in-Differences regression analysis with two-way fixed effects, by state and year. It is important to keep in mind that due to data limitations, this DiD analysis is performed with total votes as its dependent variable, not youth vote. The table below provides the result from the DiD analysis. Overall, this regression analysis renders a statistically insignificant result for the electoral reform dataset. Thus, we are unable to provide compelling evidence in support of the hypothesis H_{1A} .

Meanwhile, because electoral reforms are often bundled and implemented into a package of legislation, we could suspect that there might be potential multicollinearity among all five treat-

Table 7: Electoral Reform Difference-in-Differences Analysis with Two-Way Fixed Effect and Individual Treatments: State and Year, 2012-2020

Electoral Reform	Regression Coefficient
Early Voting	0.00300 (0.00746)
Preregistration	-0.00053 (0.00728)
Same/Election Day Registration	0.00142 (0.00623)
Online Registration	0.00986 (0.00800)
No-excuse Absentee Voting	0.00171 (0.00738)
Num. obs.	153
R ²	0.02264
Num. groups: State	51
Num. groups: year	3

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ° $p < 0.1$. With Fixed Effect: State and Year

ment variables in the DiD analysis. It is possible that changes to one individual election law may actually reflect on changes to other election laws in the same year. Such multicollinearity can cause serious problems because it could undermine the statistical significance of independent variables by inflating the variance and standard error of regression coefficients (Farrar and Glauber, 1967). In response to the concerns associated to multicollinearity, this study has detected and measured multicollinearity among all five treatment variables using the variance inflation factor (VIF), which assesses how much the variance of an estimated regression coefficient increases if the treatment variables are correlated¹⁸. In general, the lower the VIFs is, the less multicollinearity we can observe from the treatment variables. If no factors are correlated, the VIFs will all be 1. The VIFs for each electoral reform treatments for the regression analysis are listed in the chart below. There are two different ways we can interpret the VIFs. For instance, for early voting, the VIF is approximately 2.5. This indicates that the estimated variance of early voting is about 2.5 times greater than it would have been if the early voting coefficient had been entirely non-related to other variables in our DiD model. Alternatively, the early voting coefficient is 150% greater than it would be, if there were no collinearity effect at all between early voting and other variables. Although researchers' choices for an acceptable

¹⁸For a more thorough explanation for VIF, please visit the appendix

VIF threshold value could vary from one study to another, the general consensus is that a VIF between 5 and 10 indicates high correlation that may be problematic; and if the VIF goes above 10, the regression coefficients are poorly estimated due to multicollinearity (James et al., 2013). In our analysis, the VIFs for all the electoral reform treatments are way below 5 and 10, and therefore the regression result doesn't raise a concern about multicollinearity.

Table 8: Multicollinearity Assessment of the Difference-in-Differences Model with Individual Treatments

Electoral Reform	VIFs
Early Voting	2.437094
Preregistration	1.815969
Same/Election Day Registration	1.879994
Online Registration	2.609722
No-excuse Absentee Voting	2.400968

Nevertheless, Holbein and Hillygus (2020) handled the potential multicollinearity problems among treatment variables in a different way: they have constructed two composite scales to purge out the concerns regarding multicollinearity. Hence, in addition to a multicollinearity assessment using VIFs, this study has also adopted Holbein and Hillygus (2020)'s approach and observe whether using composite scales in a DiD analysis on Post-2012 electoral reform data would yield a similar result as Pre-2012 electoral reform data from Holbein and Hillygus (2020). On top of a DiD analysis with individual electoral reform treatments, this study has run two additional DiD regression analysis, each with one composite scale defined in Holbein and Hillygus (2020). The first composite scale is a simple mean scale of these six reforms, and the second is a three-item mean scale with the registration-based reforms – preregistration, same-day registration, and online registration (Holbein and Hillygus, 2020). Because the post-2012 electoral reform data has a combined category of SDR and EDR, the second composite scale in our regression analysis is a four-item mean scale of preregistration, same-day and election-day registration, and online registration. Similar to the results from the DiD analysis with individual treatments above, the results from the two composite scales also fail to demonstrate the projected positive relationship between electoral reforms and youth turnout. The tables below show the first composite scale yields a statistically insignificant result for the post-2012

electoral reform data. The second composite scale exhibits a weak statistical significance with a p-value of 0.0706.

Table 9: Electoral Reform Difference-in-Differences Analysis with Two-Way State and Year Fixed Effect and Composite Scale 1, 2012-2020

	Model with the First Composite Scale
Composite Scale 1	0.02 (0.01)
Num. obs.	153
R ²	0.02
Num. groups: State	51
Num. groups: year	3

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ° $p < 0.1$. With Fixed Effect: State and Year

Table 10: Electoral Reform Difference-in-Differences Analysis with Two-Way State and Year Fixed Effect and Composite Scale 2, 2012-2020

	Model with the Second Composite Scale
Composite Scale 2	0.02° (0.01)
Num. obs.	153
R ²	0.03
Num. groups: State	51
Num. groups: year	3

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ° $p < 0.1$. With Fixed Effect: State and Year

The overall statistically insignificant results from our analysis is inconsistent with Holbein and Hillygus (2020), where the two authors manage to show a positive relationship between same-day registration, preregistration, and online registration and youth turnout, and a negative relationship between election-day registration, early voting, absentee voting for pre-2012 data. This inconsistency could be attributed to four different factors. On the one hand, if there truly exists a positive relationship between electoral reforms and percentage youth vote from 2012 to 2020, two reasons might account for the statistically insignificant result from the DiD analysis, providing some possible explanations for the observed inconsistency between our results and the results from Holbein and Hillygus (2020).

7.1.1 Missing Youth Turnout Data

This DiD analysis might have yielded a statistically insignificant result that is inconsistent with Holbein and Hillygus (2020)'s results because it does not directly measure the impact of electoral reforms on youth turnout. Its dependent variable is the percentage total vote due to the lack of youth turnout data. Although the relationship between electoral reforms and total vote could also be applied to youth vote, there is no guarantee that the trend observed from all voters would always apply to young voters. For example, preregistration would have the most impact on young voters, and is almost likely to have no effect on older voters' turnout decisions. Preregistration is an electoral reform policy targeted at helping teenage voters to preregister and facilitate their voting process when they are adults and had minimal effect on older voters.

7.1.2 Omitting Specification in Preregistration Status

Omitting the specifications in state-specific preregistration laws in the DiD analysis might help explain the statistically insignificant result contrary to Holbein and Hillygus (2020)'s findings. To avoid missing data in 2012 and 2016, the electoral reform dataset only assigns a status of "implemented" to states that allow 16-year-old or older to preregister. The states that have other preregistration criteria will receive a status of "not implemented". If the other preregistration specifications are found online for 2012 and 2016, we might be able to derive a statistically significant result.

7.1.3 Using New Electoral Reform Data After 2012

On the other hand, if there doesn't exist a positive relationship between these electoral reforms and percentage youth vote from 2012 to 2020, the inconsistency between our results and Holbein and Hillygus (2020)'s results could be simply attributed to using electoral reform data from different times. Perhaps electoral reforms before 2012 do have a relationship with youth turnout, but the newly-enacted electoral reforms after 2012 do not necessarily follow the same trend.

7.2 Results from Survey

In total, this study has collected and validated 367 copies of survey responses. Among all the respondents, 159 of them belong to Control Group, 104 are in Experimental Group 1, and the rest 104 are in Experimental Group 2. Overall, respondents show a gender balance and an even age distribution. They are racially and ethnically diverse with 47% ethnic minorities, which corresponds to the growing racial and ethnic diversity among eligible young voters. A more detailed profile of respondents regarding gender, age, and ethnic composition is attached below.

Table 11: Gender Composition of Respondents Across All Groups

Male	Female	Others
191	169	7
52%	46%	2%

Table 12: Age Composition of Respondents Across All Groups

Age 18-24	Age 25-29
150	217
41%	59%

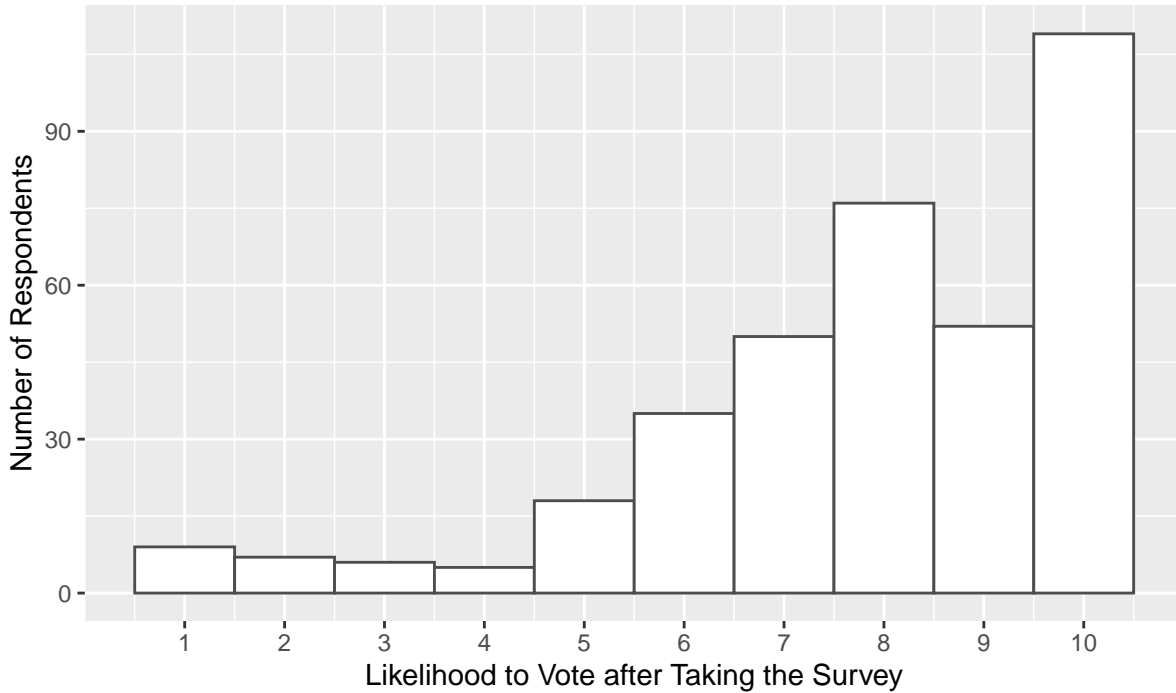
Table 13: Ethnic Composition of Respondents Across All Groups

White	Black	Hispanic	Asian	Native American	Others
195	67	43	30	7	25
53%	18%	12%	8%	2%	7%

On top of the respondents' profile, it is also worth noting that most respondents have expressed a strong likelihood to vote after taking the survey. Likelihood to vote after taking the survey is the dependent variable, which is measured from respondents' answers to a hypothetical question in the feedback section of the survey: Suppose the 2024 primary election were actually taking place next month and the same primary candidates who ran in 2020 were running in 2024, what would be their likelihood to vote for a presidential candidate in either Democratic primary or Republican primary on a scale of 1 to 10. Over 70% respondents report their likelihood to vote after taking the survey being greater than 80%, and 26% of respondents

report that they will certainly vote at the next election.

Figure 4: Likelihood to Vote after Taking the Survey Across All Groups of Respondents



7.2.1 The Effect of Education and Political Knowledge on Youth Turnout

The second hypothesis H_{1B} and the third hypothesis H_{1C} state that young eligible voters will be more likely to turnout at presidential elections if they attain a higher level of education, or they have more knowledge about government, election and candidates. To better understand the impact of education and political knowledge on youth turnout, this study has also included two simple bivariate regression analysis on respondents' level of education and likelihood to vote after taking the survey, as well as respondents' level of political knowledge and likelihood to vote after taking the survey. The two regression models provide mixed support for my hypotheses H_{1B} and H_{1C} . On the one hand, the first linear model suggests a positive linear relationship between level of education and youth turnout: the higher level of education a young eligible voter attains, the more likely the voter is going to turnout. The relationship is statistically significant, with a p-value less than 0.05. On the other hand, the second linear model representing the relationship between political knowledge and youth turnout has turned out to be statistically insignificant, with a p-value greater than 0.05. These findings have provided evidence for hypothesis H_{1B} , but not H_{1C} .

Table 14: Relationship between Level of Education and Youth Turnout

	Effect of Level of Education on Likelihood to Vote
Intercept	6.8*** (0.4)
Education Coefficient	0.2* (0.1)
R ²	0.0
Num. obs.	367
RMSE	2.2

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 15: Relationship between Level of Political Knowledge and Youth Turnout

	Effect of Level of Political Knowledge on Likelihood to Vote
Intercept	7.9*** (0.2)
Political Knowledge Coefficient	-0.1 (0.2)
R ²	0.0
Num. obs.	367
RMSE	2.2

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

7.2.2 The Effect of the Survey on Youth Turnout

Inconsistent with hypothesis H_{1D} , there is no significant difference in the distribution of respondents' likelihood to vote between control and experimental groups, as shown in the density plot with different group assignments.

The average likelihood to vote after taking the survey is even higher in the control group, compared to the experimental groups. An unpaired two-sample t-test between control and experimental groups, which compares the average likelihood to vote of the two independent groups, has demonstrated similar results as the density plot in Figure 5. To avoid inaccurate result from unequal sample sizes and variances between groups, this study uses a Welch's t-test instead of a classical t-test¹⁹. The resulted p-value is 0.179, which is not statistically significant.

¹⁹Please visit the appendix for more information about the t-test

Figure 5: Density Plot of Likelihood to Vote after Taking the Survey, with Different Group Assignment

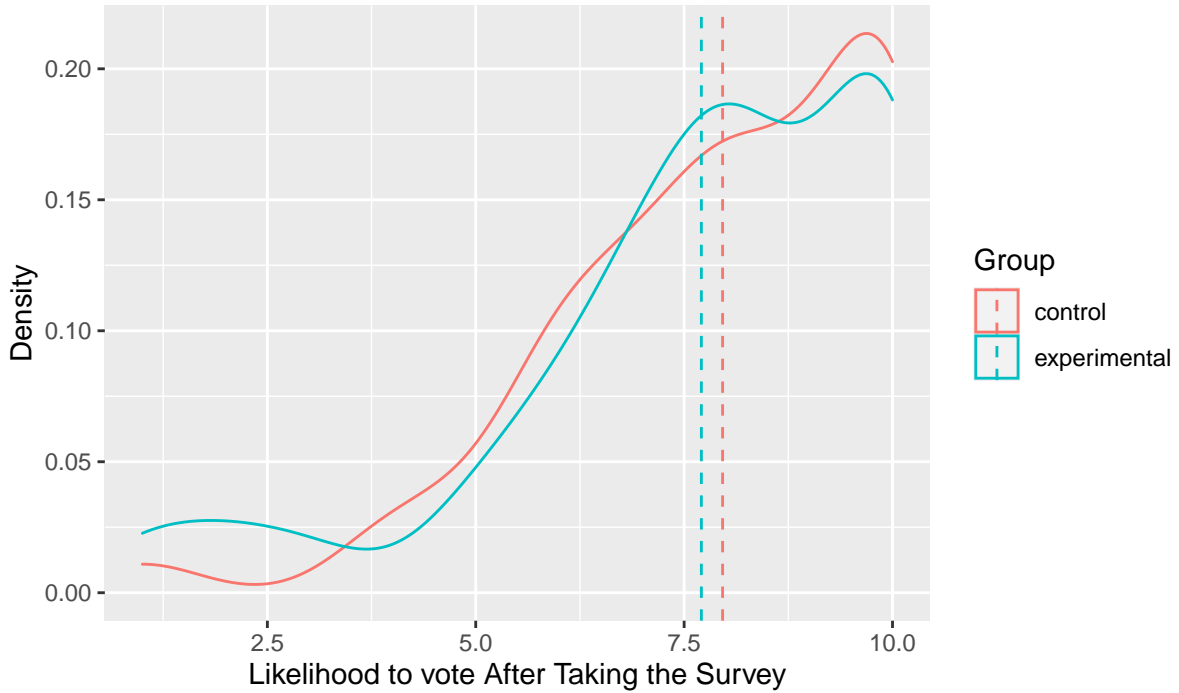


Table 16: Result from the T-Test between Control and Experimental Groups on Likelihood to Vote

$$\boxed{t(356.01) = 1.35 \quad p = .179 \quad d = 0.14}$$

To further corroborate the findings from the t-test and detect the variance, this study also uses a more complex two-sample Kolmogorov–Smirnov test (KS Test) because the t-test assumes normality and (generally) equal variance. A KS test is a non-parametric and distribution-free test used to differentiate samples from different distribution without any assumption about the distribution of the data²⁰. Similar to the t-test, the KS test also gives a statistically insignificant result. Both the t-test and the KS test suggest that the ideology quiz and provision of a candidate recommendation do not increase respondent’s likelihood to vote.

Table 17: Result from the KS Test between Respondents in Control and Experimental Groups on Likelihood to Vote

$$\boxed{D = .18252, p = .1648}$$

Nevertheless, the t-test statistics and the density plots haven’t specified whether respondents

²⁰Please visit the appendix for more information about the KS test

with low level of education and political knowledge in the experimental groups have a higher likelihood to turnout compared to those in the control group after taking the survey. Therefore, we further separate the control and treatment groups into small subgroups based on level of education and political knowledge, and apply a t-test between the sub-group with low level of education in control group and the sub-group with low level of education in the experimental groups. The results again, unlike what we have expected, show that the ideological quiz has no effect on increasing the likelihood to vote for respondents with low level of education. Another t-test between the sub-group with low level of political knowledge in control group and the sub-group with low level of political knowledge also receives a statistically insignificant result.

Table 18: Result from the T-Test between Respondents with Low Level of Education in Control and Experimental Groups on Likelihood to Vote

$$\boxed{t(101.80) = 0.79 \quad p = .432 \quad d = 0.15}$$

Table 19: Result from the T-Test between Respondents with Low Level of Political Knowledge in Control and Experimental Groups on Likelihood to Vote

$$\boxed{t(236.16) = 1.14 \quad p = .255 \quad d = 0.15}$$

To further corroborate the findings from the t-test and detect the variance, this study also uses KS Tests between respondents with low Level of education and political knowledge in control and those in experimental groups to detect patterns that eluded the t-test. Similar to our findings from the t-test, the KS Test also produces statistically insignificant results. Both tests have revealed that for young eligible voters with low level of education and political knowledge, this survey can't help them bypass the limitation associated to education and political knowledge, increase their cognitive benefits of voting and improve their turnout, suggesting that the null hypothesis H_{0D} is true.

Table 20: Result from the KS Test between Respondents with Low Level of Education in Control and Experimental Groups on Likelihood to Vote

$$\boxed{D = .10847, p = .8434}$$

Table 21: Result from the KS Test between Respondents with Low Level of Political Knowledge in Control and Experimental Groups on Likelihood to Vote

$$\boxed{D = 06486, p = .9981}$$

7.2.3 The Effect of Candidate Match on Likelihood to Vote

In the feedback section that the experimental groups received, there is another question asking for respondents' likelihood to vote for the recommended candidate (candidates) at the presidential primary in a hypothetical situation where the 2024 primary election were actually taking place next month and the same primary candidates who ran in 2020 were running in 2024²¹. It is also very important to consider that the respondents' satisfaction towards the recommended candidate would be reflected by their likelihood to vote for that candidate, and would have influenced their likelihood to turnout after taking the survey. Thus, this study has conducted another regression analysis on the relationship between respondents' likelihood to vote for the recommended candidate and their reported likelihood to vote. The result below demonstrates that there exists a positive relationship between respondents' likelihood to vote for the recommended candidate and their reported likelihood to vote after taking the survey with statistical significance.

Table 22: Relationship between Candidate Matching and Likelihood to Vote

	Effect of Candidate Matching on Likelihood to Vote
Intercept	8.2*** (0.2)
Candidate Match Coefficient	0.6* (0.3)
R ²	0.0
Num. obs.	312
RMSE	2.2

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 23: Statistical models

²¹The original question is worded as the following: Based on the ideology quiz you were asked earlier, we matched you up with candidate(s) On a scale of 1 to 10, with 1 meaning definitely would not vote for ... , and 10 meaning definitely would vote for ... , how likely would you vote for

8 Conclusion

This thesis sought to explain the reasons behind low youth turnout compared to other age groups at recent presidential elections, account for the gap between young eligible voters' original turnout intentions and their actual turnout rates, and possibly provide a solution to this problem. This paper's goals have been twofold. First, it aimed to assess the effect of electoral reforms on youth turnout, and second, evaluate the impact of education and political knowledge on youth turnout, and devise an issue-voting-based method for young eligible voters to overcome the potential negative influence associated with low level of education and political knowledge. To achieve its objectives, this paper adopts the methodology of Holbein and Hillygus (2020), and quantitatively measures the relationship between the implementation of electoral reforms and youth turnout from 2012 to 2020 through a Difference-in-Differences analysis including a two-way fixed effects regression of state and year. On top of electoral reform data, this study also creates an experiment to evaluate whether the negative impact brought by low level of education and political knowledge can be mitigated, through an issue-voting- and priority-based survey distributed to young eligible voters nationwide. Through various statistical techniques, including Two-sample T-Tests, Kolmogorov-Smirnov Tests, and Ordinary Least-Square Regressions, this paper has further explored the extent of the influence of education and political knowledge on youth turnout, discussed whether such influence could be minimized, and identify the true factors that influence youth turnout.

In addition to the above, this paper makes two important contributions to the broader discussion of youth turnout. First, it bridges the gap of analysis on electoral reform after 2012 and its impact on youth turnout in the existing literature, and provides an alternative scale of measuring electoral reforms in addition to Holbein and Hillygus (2020)'s measurement, which could be useful to future research endeavors. This study uses both individual treatment variables and Holbein and Hillygus (2020)'s composite scales for the DiD analysis of electoral reform and its impact on youth turnout. Second, this study offers an insight into how mitigate the negative influence associated low level of education and political knowledge on youth turnout. Though education and political knowledge are frequently touched upon and discussed as factors that affect youth turnout, how to eliminate the negative impact of these two factors on youth

turnout has remained to be an unaddressed topic. This thesis identifies this research gap and attempt to empirically address the problem of low youth turnout.

On the one hand, the results from the electoral reform analyses suggest that electoral reforms are statistically insignificant factors to youth turnout after 2012. However, these results should be interpreted with caution. By all means, having statistically insignificant results in this analysis, does not indicate that there is no relationship between these electoral reforms and youth turnout. The statistical insignificance could be primarily attributed to the lack of youth turnout and electoral reform data. Despite the lack of youth turnout data at the present time, the theoretical framework and initial evidence presented in this thesis suggest several avenues for future studies. Considering that Holbein and Hillygus (2020) and this study have already built up a solid foundation for a future DiD regression analysis, they can utilize the electoral reform dataset and adopt the methodology from this study to examine the effect of electoral reforms on youth turnout. Here, I also want to urge for online databases to make their old electoral reform data in archives accessible to researchers, as a dataset with historical electoral reform data would have offered researchers so much more convenience in the data collection process.

On the other hand, the results from the survey data support the previous findings on the positive relationship between educational attainment and youth turnout. More importantly, they also reveal a statistically positive relationship between the likelihood to vote for the respondents' recommended candidate and their likelihood to vote at all. One interpretation of these results is that young eligible voters are not receptive to the recommendation of candidate from the survey, unless the candidate recommended to them is the candidate they already had an underlying or preexisting preference for. This might be due to various factors, including stubbornness, a potential lack of trust in the candidate recommendation, and a strong existing preference towards a candidate or a few candidates. If the candidate recommendations at the end of the survey are identical to young eligible voters' preferred candidates, the candidate recommendation would serve as a positive reinforcement of young eligible voters' original candidate choice that increases their cognitive benefit of voting, and encourage them to turnout as

a form of self-expression. Although there is little information about why the reinforcement of candidate preference improves youth turnout, I would like to offer a possible explanation. It is likely that the reinforcement of their preferred candidates enables young eligible voters to better understand their political ideologies based on issues and priorities, and thus provides them with the rational justification to express their preference towards this candidate. During the survey process, young eligible voters have become more "aware" of their political preference. This sense of political awareness reassures them of their candidate preferences, and thus improving their turnout. Hence, this thesis conjectures that political awareness of young eligible voters is an alternative factor that affects youth turnout.

The development of such political awareness requires young people to experience a more in-depth self-exploration and a higher level of self-understanding. Naturally, political awareness will slowly improve with age, as voters start to learn more about their own political opinions and preferences (Demetriou, 2000). Political awareness also provides an explanation for the gap in turnout between young eligible voters and eligible voters age 30 and above. Even though a larger proportion of young eligible voters have received higher education than the older generations of eligible voters (Hussar et al., 2020), the advantages associated with high levels of educational attainment does not translate into more youth turnout because old eligible voters have acquired a higher level of political awareness over time.

While further study is needed to corroborate its findings, this thesis provides novel insight into the reasons behind low youth turnout and attempts to propose a few potential solutions to this problem, which will hopefully provide some inspiration for future research. This thesis has also identified two broad areas of future research. First, studies should focus on properly analyzing the relationship between electoral reforms and youth turnout, once youth turnout and electoral reform data becomes available in the future. Second, future research can further explore the positive relationship between the reinforcement of young eligible voters' candidate preferences and youth turnout, either by continuing to study the impact of political awareness on youth turnout, or by offering alternative explanations for the positive relationship between the reinforcement of existing candidate preferences of young eligible voters and youth turnout.

The ideology- or priority-based survey from this thesis might be beneficial to increase young eligible voters' political awareness, but it should not be the only way to boost young eligible voters' political awareness. Future studies can work on possibly identifying some methods to improve young voters' political awareness.

9 Appendix

9.1 Electoral Reforms

- **No-Excuse Absentee Voting:** a voting procedure that doesn't require voters to provide an "excuse" for why they will not be able to vote on Election Day
- **Preregistration:** a voting procedure that allows individuals younger than 18 years of age to register to vote, so they are eligible to cast a ballot when they reach 18, the voting age for all state and federal elections.
- **Online Registration:** a voting process that follows essentially the same process as traditional paper-back registration, but instead of filling out a paper application, the voter fills out a form via an Internet site, and that paperless form is submitted electronically to election officials.
- **Same-Day Registration (SDR):** a voting procedure that allows individuals to register whenever they show up at the polls (be it on Election Day or during an early voting period).
- **Election-Day Registration (EDR):** a voting procedure that is more restrictive than SDR; allows individuals to register when they get to the polls on Election Day only.
- **Early Voting:** a voting procedure that allows voters in a public election to vote before a scheduled election day.

9.2 Statistical Methods

- **Fixed Effect Model General Equation for N observations and T time periods:**

$$y_{it} = X_{it} \beta + \alpha_i + u_{it}$$

for $t = 1, \dots, T$ and $i = 1, \dots, N$

Where: y_{it} is the dependent variable observed for individual ii at time tt .

X_{it} is the time-variant $1 \times k$ (the number of independent variables) regressor vector.

β is the $k \times 1$ matrix of parameters. α_i is the unobserved time-invariant individual effect.

For example, the innate ability for individuals or historical and institutional factors for countries. u_{it} is the error term.

- **Difference-in-Differences Model:** $y_{it} = \gamma_{s(i)} + \lambda_t + \delta I(\dots) + \varepsilon_{it}$

Where: y_{it} is the dependent variable for individual i and t

$s(i)$ is the group to which i belongs (i.e. the treatment or the control group)

$I(\dots)$ is short-hand for the dummy variable equal to 1 when the event described in (\dots) is true, and 0 otherwise.

- **Variance Inflation Factor:** Multicollinearity is the state where three or more variables are highly correlated and contain similar information about the variance within a given dataset. The Variance Inflation Factor (VIF) is a measure of multicollinearity among predictor variables within a regression. It is calculated as the following:

$$V.I.F. = \frac{1}{1-R^2}$$

- **T-Test:** The t-test is a statistical test for the mean of a population. It should be used whenever all of the following criteria apply:

- the population standard deviation σ is unknown, and
- the population is known to be normally distributed

The formula for the t-test is

$$t = \frac{\bar{X} - \mu}{s/\sqrt{n}}$$

- **KS Test:** The Kolmogorov-Smirnov Test (KS test) is based on the cumulative distribution function of the underlying distribution. For the two-sample test, the null hypothesis is that the two samples were drawn from the same distribution.

An expression for KS test statistic is:

$$K_n = \sup_x |(F_n - F)(x)|$$

9.3 Replication Data

Replication data for this thesis can be found on my GitHub page. The Senior Honor Thesis repository contains all the processing, analysis, and visualization of my data, and allows for the replication of all tables and figures included in my thesis.

Please visit my Github repository for details:

<https://github.com/lid006/Senior-Honor-Thesis>

9.4 Survey

Below attached is my full survey.

Survey Flow:

Block: Consent (1 Question)

Branch: New Branch

If University of California, San Diego Consent to Act as a Research Subject Description: Researche... I do not agree to participate Is Selected

EndSurvey:

Block: Basic info (5 Questions)

Block: Political knowledge -- General (5 Questions)

Block: Political knowledge -- Election Specifics (4 Questions)

Block: Political knowledge -- Candidate Specifics (2 Questions)

BlockRandomizer: 1 - Evenly Present Elements

Block: Ideology with Importance (22 Questions)

Block: Ideology (12 Questions)

Block: Placebo block (16 Questions)

Branch: New Branch

If

If The following section consists of an ideology quiz. You will be asked to answer 10 questions abou... Is Displayed

Block: Feedback Experimental (7 Questions)

EmbeddedData

group = experiment2

Branch: New Branch

If

If The following section consists of an ideology quiz. You will be asked to answer 10 questions abou... Is Displayed

Block: Feedback Experimental (7 Questions)

EmbeddedData

group = experiment1

Branch: New Branch

If

If Please answer the following questions Is Displayed

Standard: Feedback Control (4 Questions)

EmbeddedData

group = control

EndSurvey: Advanced

Page Break

Start of Block: Consent

Q95 University of California, San Diego

Consent to Act as a Research Subject

Description: Researchers at the University of California, San Diego are inviting you to participate in a research study on political preferences and voting behavior. Participation in this survey should take about 10 minutes. Your participation is voluntary.

Incentives and Costs: You will be paid \$1.5 USD for completing this survey. There will be no cost to you for participating in this study.

Risks: Your participation in this study does not involve any risk to you beyond that of everyday life.

Confidentiality: Your Mechanical Turk Worker ID will be used to distribute payment to you but will not be stored with the research data we collect from you. Please be aware that your MTurk Worker ID can potentially be linked to information about you on your Amazon public profile page, depending on the settings you have for your Amazon profile. We will not be accessing any personally identifying information about you that you may have put on your Amazon public profile page.

Alternatives to Participation: Your participation in this study is entirely voluntary. You may choose to withdraw at any time.

Withdrawal Without Consent: The PI may remove you from the study without your consent if the PI feels it is in your best interest or the best interest of the study. You may also be withdrawn from the study if you do not follow the instructions given you by the study personnel.

Contacts and Questions: If you have other questions or research-related problems, you can contact the researcher at 831-920-9681 or email at lid006@ucsd.edu. You may also call the UCSD Human Research Protections Program Office at 858-246-HRPP (858-246-4777) to inquire about your rights as a research subject or to report research-related problems.

Consent: By agreeing to participate in this research, you confirm that you have read this consent information, are at least 18 years old, and provide your consent to participate. If you choose not to participate, the survey will end immediately. Please print or save a copy of this page for your records.

- I agree to participate (4)
- I do not agree to participate (5)

End of Block: Consent

Start of Block: Basic info

Page Break

QID2 Let's start with some basic information about you:

18 19 20 21 22 23 24 25 26 27 28 29

What is your age? ()



JS X→

QID6 To which gender identity do you most identify with?

- Male (1)
- Female (2)
- Other Identity (3)
- Prefer not to answer (4)

X→

QID7 Please specify your ethnicity:

- Black or African American (1)
- White American (2)
- Hispanic or Latino (3)
- Asian (4)
- American Indian/Alaska Native (5)
- Native Hawaiian/Other Pacific Islander (6)
- Others (7)
- Prefer not to answer (8)



QID16 In which state are you registered to vote?

▼ Alabama (1) ... Not yet registered to vote (53)



QID17 Highest education obtained (If you're currently completing a degree, select that degree) :

- Less than high school (1)
- High school graduate (2)
- Some college (3)
- 2 year degree (4)
- 4 year degree (5)
- Professional/Master degree (6)
- Doctorate (7)

Page Break

End of Block: Basic info

Start of Block: Political knowledge -- General

QID60 The following section consists of a political knowledge quiz. You will be asked to answer 10 questions about American politics, government, and election without any assistance. We are interested in how much people know about politics, so when you are not sure, please just give your best guess.

Please do not look up the answers!



QID10 1. In the case of a tied vote in the U.S. Senate, is the deciding vote cast by

- The vice president (1)
 - The president (2)
 - The Senate majority leader (3)
 - The Senate parliamentarian (4)
-



QID11 2. A filibuster in the U.S. Senate can be used to prevent legislation from coming to a vote. Of the 100 U.S. senators, how many votes are needed to end a filibuster?

- 51 (1)
 - 60 (2)
 - 67 (3)
 - 70 (4)
-



QID12 3. Do you happen to know which political party has a majority in the U.S. House of Representatives?

- Republican Party (1)
 - Democratic Party (2)
-



QID13 4. Which of the following rights is guaranteed by the First Amendment to the Constitution?

- The right of free speech (1)
- The right to bear arms (2)
- The right to privacy (3)
- The right to remain silent (4)

End of Block: Political knowledge -- General

Start of Block: Political knowledge -- Election Specifics



QID14 1. How many votes does a candidate need to win the Electoral College?

- 538 (1)
 - 450 (2)
 - 270 (3)
 - 280 (4)
-



QID15 2. Can eligible voters vote by absentee ballot in your state?

- Yes (1)
 - Maybe (2)
 - No (3)
-



QID18 3. Can eligible voters register online in your state?

- Yes (1)
 - Maybe (2)
 - No (3)
-



QID19 4. True or False: If you are registered to vote but forget your ID at a polling station, you are not allowed to vote.

- True (1)
- False (2)
- Depends (3)

End of Block: Political knowledge -- Election Specifics

Start of Block: Political knowledge -- Candidate Specifics



QID20 1. Which presidential election 2020 candidate has run in an election prior to 2020?

- Elizabeth Warren (1)
 - Bernie Sanders (2)
 - Hilary Clinton (3)
 - Pete Buttigieg (4)
 - Mike Bloomberg (5)
-



QID21 2. Which candidate wants to give all Americans a universal basic income of \$1,000 per month?

- Amy Klobuchar (1)
 - Andrew Yang (2)
 - Joe Biden (3)
 - Bernie Sanders (4)
 - Donald Trump (5)
-

Page Break

End of Block: Political knowledge -- Candidate Specifics

Start of Block: Ideology with Importance

QID104 The following section consists of an ideology quiz. You will be asked to answer 10 questions about your preferred position on certain social and political issues and the importance of these issues. Choose the option that is the closest to your view.

JS X→

QID79 1. Which one of the opinions on this page best agrees with your view on education?

- 1. federal government should pay for full tuition at public colleges and universities (1)
 - 2. federal government should pay for partial tuition at public colleges and universities (2)
 - 3. federal government should not pay for tuition at public colleges and universities (3)
-

JS X→

QID101 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
 - 2 (0.4)
 - 3 (0.6)
 - 4 (0.8)
 - 5 (1.0)
-

JS X→

QID100 2. Economic inequality in the United States has been steadily increasing since the 1980s. To combat a concentration of wealth at the top, some people are proposing a tax on the net worth of extremely wealthy individuals, rather than just on income.

What is your position on taxing the rich?

- 1. A tax on the assets held by the wealthiest Americans as well as their income (1)
 - 2. No tax on assets, but adjust tax on capital gains of the wealthiest Americans to be higher (2)
 - 3. No change on the current tax policy (3)
 - 4. Call for a tax reform for flat tax policy (i.e. Everyone pays at the same tax rate, regardless of their income) (4)
 - 5. Less tax on the rich (5)
-



QID71 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
 - 2 (0.4)
 - 3 (0.6)
 - 4 (0.8)
 - 5 (1.0)
-



QID83 3. In part to offset job losses from automation, some Americans have embraced the proposal of a “universal basic income”, – that every American should get a check from the federal government regardless of work status. Others don't support it and believe that there are better alternatives out there, such as raising minimum wage and increase earned income tax credit. Where would you place yourself on this issue?

- 1. Yes, the federal government should pay a universal basic income to every American adult. (1)
- 2. Open to it, the federal government should strengthen the social safety net, universal basic income should be an option to consider (2)
- 3. No, the federal government should find better alternatives out there to address job losses from automation (3)



QID82 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
- 2 (0.4)
- 3 (0.6)
- 4 (0.8)
- 5 (1.0)



QID85 4. Some people feel there should be a government insurance plan which would cover all medical and hospital expenses. Others feel that medical expenses should be paid by individuals, and through private insurance plans, such as UnitedHealth, Kaiser and Anthem, or some other company paid plans. Where would you place yourself on this scale?

- 1. Government should provide full coverage of health insurance and eliminate private insurance (1)
- 2. Government should provide some more coverage of health insurance, with role for private insurance (2)
- 3. Government should provide a public health care insurance option (3)
- 4. Government should provide some less coverage of health insurance (4)
- 5. Medical expenses should be paid by individuals, and through private insurance plans (5)



QID84 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
- 2 (0.4)
- 3 (0.6)
- 4 (0.8)
- 5 (1.0)



QID87 5. Which one of the opinions on this page best agrees with your view on abortion legally?

- 1. By law, abortion should never be permitted (1)
- 2. The law should ban abortion after certain stage of pregnancy, with exceptions for life-threatening circumstances to the mother. (2)
- 3. By law, a woman should always be able to obtain an abortion as a matter of personal choice. (3)



QID88 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
- 2 (0.4)
- 3 (0.6)
- 4 (0.8)
- 5 (1.0)



QID90 6. Do you think the federal government should make it more difficult for people to buy a gun than it is now, make it easier for people to buy a gun, or keep these rules about the same as they are now?

- 1. Much more difficult with a universal background check, ban in assault weapons, a license requirement, and registration of all firearms (1)
- 2. More difficult with a universal background check, ban in assault weapons, a license requirement, and registration of all assault weapons (2)
- 3. More difficult with a universal background check and ban in assault weapons (3)
- 4. Remain the same (4)
- 5. Less difficult with looser restrictions on interstate gun purchases (5)

JS X→

QID89 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
- 2 (0.4)
- 3 (0.6)
- 4 (0.8)
- 5 (1.0)

JS X→

QID92 7. In recent years, many states have taken initiative by legalizing marijuana, reforming drug laws and sentencing guidelines, and winding down the “War on Drugs.”

What is your stand on the issue of legalizing recreational marijuana?

- 1. Yes, federal government should legalize recreational marijuana and delete the records of those convicted on charges of recreational marijuana use and possession (1)
- 2. No, but federal government should decriminalize marijuana (meaning users could not be arrested for possessing it), and let states decide on legalization (2)
- 3. No, federal government should not legalize recreational marijuana or delete the records of those convicted on charges of recreational marijuana use and possession (3)

JS X→

QID91 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
 - 2 (0.4)
 - 3 (0.6)
 - 4 (0.8)
 - 5 (1.0)
-



QID94 8. Some people believe that we should spend much less money for defense. Others feel that defense spending should be greatly increased. Where would you place yourself on this issue?

- 1. Defense spending should decrease (1)
 - 2. We need to re-assess and re-prioritize our military investments first before we decide on a cut or increase on defense budget (2)
 - 3. Defense spending should increase (3)
-



QID93 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
 - 2 (0.4)
 - 3 (0.6)
 - 4 (0.8)
 - 5 (1.0)
-



QID96 9. Some people have suggested raising tariff against Chinese imports in order to protect American interests (job, economy, intellectual property, etc) and revive American manufacturing. Others say that tariff will only exacerbate foreign relation with China and hurt US economy. Where would you place yourself on this issue?

- 1. Yes, US should place a tariff against China, it is an effective tool (1)
 - 2. Yes, US should place a tariff against China temporarily, until a deal has been made (2)
 - 3. No, US should apply pressure to China in other ways (3)
-



QID95 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
 - 2 (0.4)
 - 3 (0.6)
 - 4 (0.8)
 - 5 (1.0)
-



QID98 10. In recent years, climate change has emerged as a key issue. Many people view setting a price on carbon emissions (a carbon tax or cap-and-trade) as a cost-effective way for countries to reduce emissions, while others are concerned that it would increase energy prices for consumers, with poorer households being disproportionately affected.

Where would you place yourself on this issue?

- 1. Yes, federal government should set a price on carbon, such as with a carbon tax or cap-and-trade (meaning that A central authority allocates or sells a limited number of permits that allow a discharge of a specific quantity of a specific pollutant over a set time period). (1)
- 2. Open to it, the federal government should have a mechanism in reducing greenhouse gas emissions. (2)
- 3. No, federal government should not impose a price on carbon emission, there are better ways to reduce green house emissions (3)
- 4. No, federal government should not impose a price on carbon emission, climate change's impact is questionable (4)



QID99 How important is the above issue to you on the scale of 1 to 5, **1** as the **least important**, **5** as the **most important**?

- 1 (0.2)
- 2 (0.4)
- 3 (0.6)
- 4 (0.8)
- 5 (1.0)

Page Break

JS

QID128 After clicking the "next" button, you will be viewing the 2020 presidential candidate(s) most aligned with your own ideology:

End of Block: Ideology with Importance

Start of Block: Ideology

QID103 The following section consists of an ideology quiz. You will be asked to answer 10 questions about your preferred position on certain social and political issues. Choose the option that is the closest to your view.

JS X→

QID43 1. Which one of the opinions on this page best agrees with your view?

- 1. federal government should pay for full tuition at public colleges and universities (1)
 - 2. federal government should pay for partial tuition at public colleges and universities (2)
 - 3. federal government should not pay for tuition at public colleges and universities (3)
-

JS X→

QID27 2. Economic inequality in the United States has been steadily increasing since the 1980s. To combat a concentration of wealth at the top, some people are proposing a tax on the net worth of extremely wealthy individuals, rather than just on income.

What is your position on taxing the rich?

- 1. A tax on the assets held by the wealthiest Americans as well as their income (1)
 - 2. No tax on assets, but adjust tax on capital gains of the wealthiest Americans to be higher (2)
 - 3. No change on the current tax policy (3)
 - 4. Call for a tax reform for flat tax policy (i.e. Everyone pays at the same tax rate, regardless of their income) (4)
 - 5. Less tax on the rich (5)
-



QID78 3. In part to offset job losses from automation, some Americans have embraced the proposal of a “universal basic income”, – that every American should get a check from the federal government regardless of work status. Others don't support it and believe that there are better alternatives out there, such as raising minimum wage and increase earned income tax credit. Where would you place yourself on this issue?

- 1. Yes, the federal government should pay a universal basic income to every American adult. (1)
 - 2. Open to it, the federal government should strengthen the social safety net, universal basic income should be an option to consider (2)
 - 3. No, the federal government should find better alternatives out there to address job losses from automation (3)
-



QID47 4. Some people feel there should be a government insurance plan which would cover all medical and hospital expenses. Others feel that medical expenses should be paid by individuals, and through private insurance plans, such as UnitedHealth, Kaiser and Anthem, or some other company paid plans. Where would you place yourself on this scale?

- 1. Government should provide full coverage of health insurance and eliminate private insurance (1)
 - 2. Government should provide some more coverage of health insurance, with role for private insurance (2)
 - 3. Government should provide a public health care insurance option (3)
 - 4. Government should provide some less coverage of health insurance (4)
 - 5. Medical expenses should be paid by individuals, and through private insurance plans (5)
-



QID25 5. Which one of the opinions on this page best agrees with your view on abortion legally?

- 1. By law, abortion should never be permitted (1)
 - 2. The law should ban abortion after certain stage of pregnancy, with exceptions for life-threatening circumstances to the mother. (2)
 - 3. By law, a woman should always be able to obtain an abortion as a matter of personal choice. (3)
-



QID33 6. Do you think the federal government should make it more difficult for people to buy a gun than it is now, make it easier for people to buy a gun, or keep these rules about the same as they are now?

- 1. Much more difficult with a universal background check, ban in assault weapons, a license requirement, and registration of all firearms (1)
 - 2. More difficult with a universal background check, ban in assault weapons, a license requirement, and registration of all assault weapons (2)
 - 3. More difficult with a universal background check and ban in assault weapons (3)
 - 4. Remain the same (4)
 - 5. Less difficult with looser restrictions on interstate gun purchases (5)
-



QID50 7. In recent years, many states have taken initiative by legalizing marijuana, reforming drug laws and sentencing guidelines, and winding down the “War on Drugs.”

What is your stand on the issue of legalizing recreational marijuana?

- 1. Yes, federal government should legalize recreational marijuana and delete the records of those convicted on charges of recreational marijuana use and possession (1)
 - 2. No, but federal government should decriminalize marijuana (meaning users could not be arrested for possessing it), and let states decide on legalization (2)
 - 3. No, federal government should not legalize recreational marijuana or delete the records of those convicted on charges of recreational marijuana use and possession (3)
-



QID37 8. Some people believe that we should spend much less money for defense. Others feel that defense spending should be greatly increased.

Where would you place yourself on this issue?

- 1. Defense spending should decrease (1)
 - 2. We need to re-assess and re-prioritize our military investments first before we decide on a cut or increase on defense budget (2)
 - 3. Defense spending should increase (3)
-



QID39 9. Some people have suggested raising tariff against Chinese imports in order to protect American interests (job, economy, intellectual property, etc) and revive American manufacturing. Others say that tariff will only exacerbate foreign relation with China and hurt US economy. Where would you place yourself on this issue?

- 1. Yes, US should place a tariff against China, it is an effective tool (1)
 - 2. Yes, US should place a tariff against China temporarily, until a deal has been made (2)
 - 3. No, US should apply pressure to China in other ways (3)
-



QID41 10. In recent years, climate change has emerged as a key issue. Many people view setting a price on carbon emissions (a carbon tax or cap-and-trade) as a cost-effective way for countries to reduce emissions, while others are concerned that it would increase energy prices for consumers, with poorer households being disproportionately affected.

Where would you place yourself on this issue?

- 1. Yes, federal government should set a price on carbon, such as with a carbon tax or cap-and-trade (meaning that A central authority allocates or sells a limited number of permits that allow a discharge of a specific quantity of a specific pollutant over a set time period). (1)
- 2. Open to it, the federal government should have a mechanism in reducing greenhouse gas emissions. (2)
- 3. No, federal government should not impose a price on carbon emission, there are better ways to reduce green house emissions (3)
- 4. No, federal government should not impose a price on carbon emission, climate change's impact is questionable (4)

Page Break

JS

QID127 After clicking the "next" button, you will be viewing the 2020 presidential candidate(s) most aligned with your own ideology:

End of Block: Ideology

Start of Block: Placebo block

Q85 Please answer the following questions

X→

QID106 1. Which type of coffee do you prefer most?

- Americano (1)
 - Black Coffee (2)
 - Caffe Latte (3)
 - Cappuccino (4)
 - Espresso (5)
 - Flavored Coffee (6)
 - Iced Coffee (7)
 - Irish Coffee (8)
 - Turkish/Greek Coffee (9)
 - Cold brew (10)
-

X→

QID107 2. How often do you drink coffee?

- Daily (1)
 - 2-3 times a week (2)
 - Weekly (3)
 - 2-3 times a month (4)
 - Monthly (5)
 - Never (6)
-



QID108

3. Where do you drink coffee most often?

- Home (1)
 - Cafe / Coffee shop Chain (2)
 - Restaurant (3)
 - Traditional mom and pop coffee shop (4)
 - Others (5)
-



QID109 4. For what reasons would you drink coffee? (Select all apply)

It wakes me up. (1)

It helps me perform at my job. (2)

It tastes good. (3)

It comforts me. (4)

It helps reduce stress. (5)

It is more like a habit (6)



QID110 5. What factors influence your choice of coffee shop/ cafe to make your purchases? (Select all apply)

- Patio at cafe/ seating outside (1)
- Location (2)
- Quality of coffee/ taste (3)
- Quality of service (4)
- Quality of food (5)
- Friendliness of staff (6)
- Speed of service (7)
- Availability of parking (8)
- Shop's environmental awareness (9)
- Wireless internet access availability (10)
- Fair trade acceptance of the shop (11)
- Comfort of cafe (12)
- Decor of the cafe (13)



QID113 6. How often do you drink tea?

- Daily (1)
 - 2-3 times a week (2)
 - Weekly (3)
 - 2-3 times a month (4)
 - Monthly (5)
 - Never (6)
-



QID114 7. For what reasons would you drink tea? (Select all apply)

- Health Benefits - Diet Support / Detox (1)
 - Habit and Routine (2)
 - Relaxation (3)
 - Medicinal (to provide energy etc.) (4)
 - Alternative to Coffee (5)
 - Socialize and Get Together (6)
 - I don't drink tea (7)
 - Other (8)
-



QID115 8. Where do you typically enjoy your tea?

- At Home (1)
 - At Tea Shop / Cafe (2)
 - At Work (3)
 - Street Tea Stalls (4)
 - Other (5)
-



QID117 9. Do you agree with the following statement:

"I am more of a coffee person than a tea person, and I would prefer coffee over tea."

- Strongly agree (1)
 - Agree (2)
 - Neither agree or disagree (3)
 - Disagree (4)
 - Strongly disagree (5)
-



QID116 10. What drives you to a new cafe/tea shop? (Select all apply)

- Online Media - Zomato/Facebook (1)
 - My willingness (2)
 - Brand Communication and Advertising (3)
 - Bloggers / Influencers (4)
 - Friend's recommendation (5)
-



QID118 11. Do you ever bring a reusable to-go cup/thermos to cafe/tea shop?

- Yes (1)
 - Sometimes (2)
 - Never (3)
-



QID119 12. Approximately, how many cups of coffee per day do you consider a moderate intake in a balanced diet?

- Less than one cup (1)
 - One to two cups (2)
 - Three to four cups (3)
 - Four to five cups (4)
 - More than five cups (5)
-



QID120 13. Approximately, how many cups of tea per day do you consider a moderate intake in a balanced diet?

- Less than one cup (1)
 - One to two cups (2)
 - Three to four cups (3)
 - Four to five cups (4)
 - More than five cups (5)
-



QID121 14. When thinking about the health effects of coffee, please select the statements that you agree with (Select all apply)

- Coffee may decrease the risk of suffering from some types of cancer (1)
 - Coffee may reduce the risk of developing type 2 diabetes (4)
 - Coffee may improve memory function in the elderly (8)
 - Pregnant women should not drink coffee (9)
 - Moderate coffee consumption may lead to dehydration (2)
 - Coffee decreases quality of sleep (3)
 - Coffee can give you stomach complaints (5)
-

QID122 15. What do you think about the demand of tea currently in the area you reside?

- Increase (1)
- Slightly increase (2)
- Stay the same (3)
- Slightly decrease (4)
- Decrease (5)

End of Block: Placebo block

Start of Block: Feedback Experimental

Q87

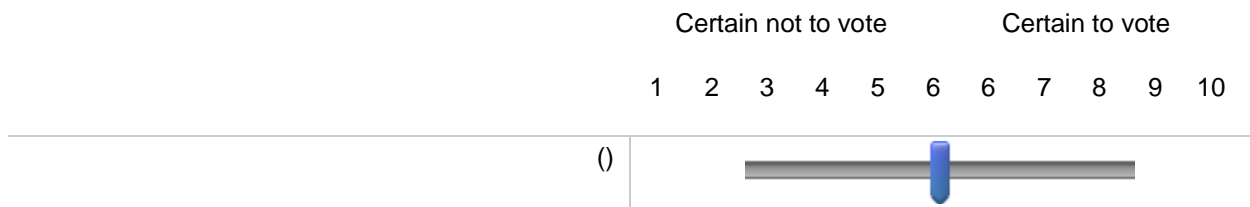
[\\${e://Field/CAND}](#)

Page Break

Q99 Imagine that the 2024 primary election were actually taking place next month. Suppose that the same primary candidates* who ran in 2020 were running in 2024.

*Joe Biden (D), Mike Bloomberg (D), Pete Buttigieg (D), Tulsi Gabbard (D), Amy Klobuchar (D), Bernie Sanders (D), Tom Steyer (D), Elizabeth Warren (D), Andrew Yang (D), Cory Booker (D), Joe Walsh (R), Donald Trump (R), Bill Weld (R), Mark Sanford (R), and Rocky De La Fuente (R).

Q96 On a scale of 1 to 10, where 1 means certain not to vote and 10 means certain to vote, how likely would you be to vote for a presidential candidate in either Democratic primary or Republican primary?



Q98 Based on the ideology quiz you were asked earlier, we matched you up with candidate(s) $\{e://Field/CAND\}$. On a scale of 1 to 10, with 1 meaning **definitely would not vote** for $\{e://Field/CAND\}$, and 10 meaning **definitely would vote** for $\{e://Field/CAND\}$, how likely would you vote for $\{e://Field/CAND\}$?

(If you were recommended more than one candidate, consider how likely would you vote for one of the recommended candidates if the presidential election were next month.)



Page Break

QID52 If you have voted in the 2020 election, which party/candidate did you vote for?

- Joe Biden (D) (1)
 - Donald Trump (R) (2)
 - Others (3)
 - I didn't vote (4)
-

QID63 If you have voted in the 2020 primary, which party/candidate did you vote for?

- Michael Bennet (D) (1)
 - Joe Biden (D) (4)
 - Mike Bloomberg (D) (5)
 - Pete Buttigieg (D) (6)
 - Tulsi Gabbard (D) (7)
 - Amy Klobuchar (D) (8)
 - Deval Patrick (D) (9)
 - Bernie Sanders (D) (10)
 - Tom Steyer (D) (11)
 - Elizabeth Warren (D) (12)
 - Andrew Yang (D) (13)
 - Cory Booker (D) (14)
 - Joe Walsh (R) (15)
 - Donald Trump (R) (16)
 - Bill Weld (R) (17)
 - Mark Sanford (R) (18)
 - Rocky De La Fuente (R) (19)
 - Someone else (20)
 - I didn't vote (21)
-

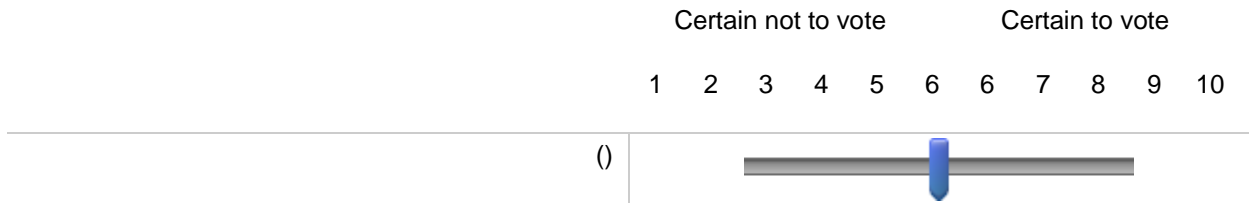
QID105 If you have any comments or feedback, feel free to leave it here:

End of Block: Feedback Experimental

Start of Block: Feedback Control

Q94 Imagine that the 2024 primary election were actually taking place next month. Suppose that the same primary candidates who ran in 2020 were running in 2024. On a scale of 1 to 10, where 1 means certain not to vote and 10 means certain to vote, how likely would you be to vote for a presidential candidate in this election (in either Democratic primary or Republican primary)?

*"same primary candidates ran in 2020" refer to the following list of candidates: Joe Biden (D), Mike Bloomberg (D), Pete Buttigieg (D), Tulsi Gabbard (D), Amy Klobuchar (D), Bernie Sanders (D), Tom Steyer (D), Elizabeth Warren (D), Andrew Yang (D), Cory Booker (D), Joe Walsh (R), Donald Trump (R), Bill Weld (R), Mark Sanford (R), and Rocky De La Fuente (R).



Page Break

Q135 If you have voted in the 2020 election, which party/candidate did you vote for?

- Joe Biden (D) (1)
 - Donald Trump (R) (2)
 - Others (3)
 - I didn't vote (4)
-

Q136 If you have voted in the 2020 primary, which party/candidate did you vote for?

- Michael Bennet (D) (1)
 - Joe Biden (D) (4)
 - Mike Bloomberg (D) (5)
 - Pete Buttigieg (D) (6)
 - Tulsi Gabbard (D) (7)
 - Amy Klobuchar (D) (8)
 - Deval Patrick (D) (9)
 - Bernie Sanders (D) (10)
 - Tom Steyer (D) (11)
 - Elizabeth Warren (D) (12)
 - Andrew Yang (D) (13)
 - Cory Booker (D) (14)
 - Joe Walsh (R) (15)
 - Donald Trump (R) (16)
 - Bill Weld (R) (17)
 - Mark Sanford (R) (18)
 - Rocky De La Fuente (R) (19)
 - Someone else (20)
 - I didn't vote (21)
-

Q138 If you have any comments or feedback, feel free to leave it here:

End of Block: Feedback Control

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