Out of the Classroom and Into the Voting Booth? Analyzing the Effects of Education on Political Participation

By

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A dissertation submitted in partial fulfillment of

the requirements for the degree of

Doctor of Philosophy

(Political Science)

at the

UNIVERSITY OF WISCONSIN-MADISON

2012

Date of final oral examination: May 10, 2012

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Acknowledgments

This project could not have been completed without the encouragement, support, and advice of many people. The earliest supporters of this project—unwitting though they may have been—are my parents. Even though facing a constant barrage of "Why?" from a toddler surely grew tiresome, they always answered, and even encouraged, my inquiries. This encouragement undoubtedly provided the basis for my curiosities that underlie this project; for this I am deeply grateful.

My wife, Nina, and daughter, Natalie, have also provided immeasurable amounts of support and encouragement throughout this project. Although they provided this support and encouragement in vastly different forms, the common theme of their contribution is the fact that spending time with them served as the ultimate inspiration for finishing up my work each day and for finishing the project as a whole. Love sure is a great motivator.

Completion of this project would not have been possible without the training and support provided by John Witte, Bob Haveman, Bobbi Wolfe, and Tom Kaplan. I was incredibly fortunate to have a full foursome of advisors and mentors, each of whom imparted incomparable wisdom, advice, training, support, and—most importantly—friendship. It is from them that I learned what good research looks like and how it is done; their influences pervade the pages of this dissertation.

Finally, friends, colleagues, and faculty in ITP and the Political Science Department have been instrumental in helping me work through this project and bring it to where it is today. Friday afternoons at the Union with Jason Engle, Jake Neiheisel, and Sarah Niebler will be forever remembered fondly. Professors Ken Goldstein, Barry Burden, and Geoffrey Borman

have also provided invaluable support and advice along the way. I have undoubtedly benefited both personally and professionally from the advice, suggestions, and help provided by Leticia Bode, Meghan Condon, Josh Cowen, Sara Dahill-Brown, David Fleming, Dimitri Kelly, Jared Knowles, Lesley Lavery, Deb McFarlane, Molly Wesling, Amber Wichowsky, and all my colleagues in ITP. Finally, Mary Tedeschi deserves her own special thanks. Mary always made the trains run on time, but more importantly she made sure that coming to the office would be fun each and every day.

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Abstract

This dissertation identifies and analyzes the wide-ranging causal effects of formal education on political participation in the United States. It employs a comprehensive theoretical framework in which the effects of education operate through two interdependent mechanisms. First, education is theorized to affect political participation by increasing and individual's level of knowledge and skills. Second, education is hypothesized to affect political participation by increasing an individual's socioeconomic status, which provides greater access to personal and social resources that facilitate participation. This project goes beyond previous work and recognizes that education is more than the number of formal years of schooling completed; it is a complex collection of skills, experiences, and relationships that individuals acquire throughout their formative years. Recognition of this reality allows each mechanism to be affected by a variety of educational policies, practices, and contexts, a sampling of which include credit requirements, civics instruction, and exposure to applied civic activities.

Drawing on a wide variety of large-scale, nationally-representative datasets, the theoretical framework is tested in a systematic and rigorous manner using a variety of empirical approaches that allow for causal inference. Results of the empirical analyses are remarkably consistent with the theoretical framework. They demonstrate that civics instruction has a positive effect on levels of knowledge and skills and that knowledge and skills, in turn, influence political participation. The results also reveal that educational attainment affects political participation through the hypothesized mechanism. The breadth of the datasets employed in this project allow for detection of causal heterogeneity along several dimensions, including the level of the education system and the mode of political participation. By improving our understanding

of the relationship between education and political participation, this dissertation provides evidence-based insights into the policies and practices that are most effective for preparing individuals to become effective participants in our democratic society.

Chapter 1. The Role of Education in a Democratic Society: A Review of Theory and Evidence

1.1. Introduction

A society's character is profoundly shaped by the nature and quality of its educational institutions. The influence of these institutions stems from their ability to provide individuals with a diverse set of skills and experiences that have the potential to affect a wide variety of economic, social, and political outcomes. Scholars have long recognized the importance of formal education and have spent significant time, energy, and resources attempting to gain a more thorough understanding of its wide-ranging effects. Within political science, scholars have focused primarily on analyzing the relationship between formal education and participation in politics, and democratic society more generally. These analyses are diverse in approach, but not in conclusion; nearly all of them conclude—either implicitly or explicitly—that formal education is instrumental in preparing individuals to meaningfully participate in the political process. This conclusion is present in normative accounts that compellingly argue that a primary purpose of formal education is to prepare individuals to positively contribute to a democratic society. It is present in works that propose theoretical mechanisms through which formal education may influence political participation. It also pervades research that documents the empirical

relationship between formal education and participation in politics. In short, the conventional wisdom in political science holds that formal education exerts a strong causal effect on political participation.

This dissertation argues and illustrates that the conventional wisdom is correct, but incomplete. The notion that education has *a* causal effect on political participation is an overly simplistic characterization of the relationship between these two factors; education is not a monolithic entity, but a complex collection of skills, experiences, and relationships that individuals acquire throughout their formative years. Each skill, experience, or relationship has the potential to affect political participation in a unique manner. Moreover, the effect of each skill, experience, or relationship on political participation is unlikely to be identical across individuals, or across modes of political participation. Rather, these effects are likely to differ, and I believe they are likely to differ systematically. Consequently, education is unlikely to have a single causal effect on political participation, but many different causal effects. This dissertation is devoted to identifying and analyzing the wide-ranging effects of formal education on political participation. More specifically, drawing on literatures in political science, education, sociology, economics, and other fields, this project systematically and comprehensively examines—both theoretically and empirically—the complex, multifaceted relationship between formal education and political participation.

This dissertation deviates from traditional analyses of the relationship between education and political participation in two important ways. First, this project does not exclusively consider education to be the number of years of formal schooling completed, which, almost without exception, is the operationalization that has been employed in previous studies of the

relationship between education and political participation. Operationalizing education as the number of years of formal schooling completed has several important—yet largely unrealized—implications. I discuss these implications in greater detail in a later part of this chapter, but at this point it is important to note that such an operationalization 1) precludes some important factors from being able to theoretically link formal education to political participation and 2) implicitly assumes homogeneity in the effect of education on political participation. Together, these implications obscure the complex nature of the causal relationship between education and political participation and have largely deterred in-depth analyses of the topic.

Second, this dissertation differs from most previous analyses of education and political participation in that it moves beyond the dominant theoretical paradigms and places an explicit focus on the mechanisms through which education affects political participation. Existing studies generally cast education as either a resource that lowers the cost of participation or a sorting mechanism that imbues status and efficacy, which facilitate participation. These paradigms present a useful starting point for analyzing the relationship between education and political participation, but they have two primary drawbacks. First, these conceptions do not provide detailed insight into the precise mechanisms through which education may exert its effects on political participation; the concepts are too broad. Second, the two conceptions are generally portrayed as being mutually exclusive in nature with no reason for them to necessarily be so. By placing an explicit focus on the multiple mechanisms through which education may affect political participation, this dissertation illustrates that education simultaneously operates as both a resource and a sorting mechanism. The focus on broad theoretical concepts instead of precise mechanisms in previous work is at least partially attributable to data constraints; political

scientists have rarely employed data that allows for determination of the specific educational mechanism that might influence participation. By employing a wide variety of datasets that are not commonly used in political science this dissertation illustrates that multifaceted effects of education on political participation are not only possible, but likely.

Taken as a whole, this dissertation represents a wide-ranging and comprehensive analysis of the relationship between formal education and political participation. By engaging the debate over the nature of the relationship between educational attainment and political participation, this dissertation extends one of the seminal literatures in American politics. However, by simultaneously focusing on the precise mechanisms that underlie the relationship, this dissertation hopes to push the literature examining the relationship between education and political participation in a new, more fruitful direction. This chapter proceeds by laying the groundwork for my analysis of the relationship between formal education and political participation. I begin by outlining prominent normative accounts arguing that a primary goal of formal education should be to prepare individuals to meaningfully participate in a democratic society. I then summarize the literature documenting the empirical relationship between formal education and political participation and outline the two primary schools of thought that have developed in an effort to explain this relationship. This comprehensive review of the literature provides an effective segue into the next portion of the chapter, which discusses what I consider to be the main shortcomings of the existing theoretical and empirical work on the relationship between education and political participation. This discussion will set the stage for the conceptual framework I use to analyze the relationship between formal education and political participation, which I develop in the following chapter.

1.2. Should Education Affect Democratic Citizenship?

A long line of political theorists and philosophers has written on the topic of formal education and considered its structure, role, and purpose in a democratic society. These thinkers disagree on a wide variety of issues, ranging from the necessity of educational equality for all citizens to the possession of authority to educate children to the methods of distributing schooling. Despite the diverse viewpoints on many topics, there is remarkable consistency in the belief that a sustainable democratic society requires an informed citizenry, and that formal education is the primary means through which such a citizenry can be shaped and maintained.

The belief that formal education is vital to the success of a democratic society can be traced back at least as far as Plato. Plato firmly believed that the responsibility of educating children resided solely with the state, which was responsible for providing educable children with an understanding of the "good life." Plato's conception of the good life is grounded in the presence of harmony between individual and societal welfare; any action taken by an individual that improves his welfare must also improve the welfare of society. In Plato's view, education is necessary to imbue individuals with the proper conception of the good life and to provide encouragement for them to pursue it, and thus pursue a just and ideal society.

Although Plato undeniably envisioned a role for education in creating citizens who could sustain and promote a democratic society, his student Aristotle was perhaps even more explicit in his view of the political importance of formal education. Indeed, Aristotle begins Book VIII of his *Politics* by writing "No one will doubt that the legislator should direct his attention above all to the education of youth, or that the neglect of education does harm to states." Aristotle goes on to state that citizens should be educated in a manner that best suits the characteristics of their

government and society. Underlying this statement is Aristotle's belief that education should be designed to produce citizens that can provide effective contributions to society. Related to this belief is Aristotle's conviction that education is the key to societal reproduction, and societal success more generally. This conviction is perhaps best summarized by Aristotle's statement that "All who have meditated on the art of governing mankind have been convinced that the fate of empires depends on the education of youth." The arguments set forth by Plato and Aristotle—which hold that formal education is the primary mechanism through which successful democratic societies are established, maintained, and advanced—have remained relevant for centuries. Indeed, the ideas first expressed in Athens over 2,000 years ago have had a perceptible influence on the educational writings of several contemporary theorists and scholars.

John Dewey's *Democracy and Education* (1916) is perhaps the seminal contemporary treatise on the importance of formal education in a democratic society. A thorough reading of this work reveals the depth of Dewey's belief in the inseparability of democracy and education. Dewey accepts the standard view that democracy requires an educated citizenry for its success, but he deems that view superficial and goes on to describes a deeper link between democracy and education. Specifically, Dewey conceives of democracy as not only a form of government, but a societal arrangement where citizens are interdependent and the actions of one influence the actions and wellbeing of others. Dewey argues that the only way that such a democratic society can be established, maintained, and reproduced is through the existence of an education system that imbues individuals with an appreciation of the importance of social relationships and civility during policy discussions and any resulting policy or institutional change. In Dewey's words: "A society which makes provision for participation in its good of all its members on equal terms

and which secures flexible readjustment of its institutions through the different forms of associated life is in so far democratic. Such a society must have a type of education which gives individuals a personal interest in social relationships and control, and the habits of mind which secure social changes without introducing disorder."

The ideas expressed by Dewey are echoed and expanded upon in Amy Gutmann's (1987) *Democratic Education*. Like Dewey, Gutmann views democracy as not only a form of government, but also as a social structure characterized by mutual commitment and trust among the citizenry where the core value is "conscious social reproduction in its most inclusive form." Gutmann believes that establishment, maintenance, and reproduction of such a society requires the citizenry to possess critical thinking skills, moral reasoning abilities, and an awareness of others. Although these skills can be acquired in diverse ways, Gutmann argues that formal education should be the primary setting for such skill acquisition. Indeed, Gutmann identifies the primary purpose of formal education as development of "democratic" or "deliberative"—Gutmann uses the terms interchangeably—character. The concept of deliberative character encompasses the skills identified earlier—critical thinking, moral reasoning, and an awareness of others—and provides individuals with the ability to meaningfully contribute to a democratic society. In Gutmann's view, deliberative individuals have the ability to understand the societal importance of mutual trust and respect. They are able to judge whether laws and governmental actions are consistent with foundational democratic principles. They are willing and able to separate their self-interests from the interests of the larger democratic society. In short, deliberative individuals have both the ability and will to effectively perpetuate their democracy.

Echoing Dewey, Gutmann believes that formal education is the key to creating such deliberative individuals.

Related to, and perhaps inseparable from, formal education is knowledge. In their seminal exploration of the political knowledge of Americans, Delli Carpini and Keeter (1996) draw on the work and ideas of democratic theorists to make a powerful case for the importance of an informed citizenry in a democratic society. The authors systematically lay out the requirements of citizens in a democracy and convincingly contend that citizens are better equipped to meet these democratic requirements if they are well informed. Although Delli Carpini and Keeter's discussion of democratic requirements focuses mainly on the level of information possessed by the citizenry, the issue of formal education is an undercurrent through the whole discussion; formal education is a mechanism through which individuals can gather the information, or learn how to gather the information, necessary for informed democratic participation.

The notion that formal education should be designed to provide individuals with the skills and ability to meaningfully participate in a democratic society is not a novel one; theorists, philosophers, and scholars have been making this normative case for over two thousand years. The review presented above is not a comprehensive catalog of all scholars that have made this argument, but it is a review of the most influential, notable, and relevant expressions of this viewpoint. Although the nuances of this viewpoint have certainly evolved over time, the basic belief that a primary purpose of formal education should be to prepare citizens for effective democratic participation is remarkable for its consistency.

1.3. Does Education Affect Political Participation? If so, how?

Believing that formal education *should* prepare individuals to participate in a democratic society is clearly distinct from knowing that formal education *does* provide individuals with the skills and abilities to meaningfully contribute to democratic society. To ascertain whether formal education is attaining the normative ideal, a long line of scholarship has analyzed the empirical relationship between formal education and democratic participation. The findings from this research have been remarkably consistent, routinely detecting a strong positive correlation between educational attainment and political participation, which is usually operationalized as registering to vote and voting.

The strong correlation between educational attainment and political participation was detected in some of the earliest, and most influential, empirical work on political participation in America. For example, the authors of *The American Voter* write, "Formal education…has many striking consequences for political behavior…" (Campbell et al. 1960, p. 475). Several other prominent works around this time also identified educational attainment as a key factor in explaining political and civic participation (e.g. Campbell, Gurin, and Miller 1954; Key 1961; Verba and Nie 1972). Converse (1972, p. 324) succinctly summarizes these observations when he writes, "There is probably no single variable in the survey repertoire that generates as substantial correlations in such a variety of directions in political behavior material as level of formal education…." Since this early work, a number of seminal studies have further confirmed this relationship. Wolfinger and Rosenstone's (1980) thorough analysis of the determinants of voter turnout concluded that, of all the components of socioeconomic status, an individual's educational attainment was the best predictor of his or her voter turnout status. A little more than

a decade later, Rosenstone and Hansen (1993) echo this viewpoint, and the relationship was subsequently confirmed in studies by Verba, Schlozman, and Brady (1995), Putnam (2000), and Burden (2009), among others.

Until recently, the nature of the relationship between formal education and political participation was unquestioned; it was assumed that educational attainment exerted a causal effect on political participation. The recent emphasis in political science on issues of causal inference has led scholars to express renewed interest in the causal nature of the relationship between formal education and political participation. Scholars note that although the traditional causal interpretation of the relationship may well be accurate, such an interpretation is not warranted by the methodological approaches employed in the analyses upon which this interpretation is based; none of the studies exploit exogenous variation in educational attainment that would allow for identification of the causal effect of educational attainment on political participation. The inability to convincingly identify the causal effect of education on political participation leaves open the possibility that the relationship is spurious. That is, it is possible that unobserved factors influencing both educational attainment and political participation—such as motivation or intelligence—are responsible for the observed relationship. Several scholars have expressed this view (Green 2005; Kam and Palmer 2008), which has served to refocus attention on the causal nature of the relationship.

The uncertainty over the causal nature of the relationship has spurred a series of investigations that attempt to exploit exogenous sources of variation in educational attainment to identify the causal effect of attainment on participation. Using American National Election Survey data, Milligan, Moretti, and Oreopolous (2004) instrument educational attainment using

compulsory schooling laws and conclude that a causal relationship exists. Dee (2004) reaches a similar conclusion in his analysis of High School and Beyond (HS&B) and General Social Survey (GSS) data. In his HS&B analysis, Dee uses the proximity of a two-year college as an instrument for educational attainment; child labor laws serve as the instrumental variable in his GSS analysis.

Not all inquiries find educational attainment to be causally related to political participation. Kam and Palmer (2008) employ propensity score matching techniques with the Parent-Child Political Socialization Survey and HS&B data, and conclude that educational attainment and political participation are not causally related. It is worth noting, however, that this study has been critiqued on methodological grounds.[1] Although he draws on a separate dataset and employs different analytical techniques, Tenn (2007) also finds that educational attainment has very little effect on political participation, as measured by registering to vote and voting.

The most recent work on this topic has been done by Sondheimer and Green (2010). This study draws on well-known experiments of educational interventions (Perry Preschool and Tennessee STAR) that induced different rates of high school completion between the treatment and control groups. As a result, the authors use assignment-to-treatment as an instrument for educational attainment and conclude that a causal relationship between attainment and participation exists.

[1] See Mayer (2011) and Henderson and Chatfield (2011), which demonstrate that the results of Kam and Palmer (2008) are highly sensitive to various specification choices. See Kam and Palmer (2011) for a rejoinder.

Taken as a whole, it seems likely that education—operationalized as the number of years of formal schooling completed—exerts a causal effect on political participation. As the literature examining the relationship between education and participation progressed, scholars naturally began to theorize about the precise mechanisms that might be driving the observed empirical relationship. This theorizing has produced two primary schools of thought regarding the mechanisms through which education affects participation. The first school of thought considers education to be a resource that lowers the cost of participation; education imbues individuals with skills, knowledge, and social networks that facilitate political participation. The second school of thought conceives of education as a sorting mechanism that bestows status and efficacy upon individuals, which makes them more likely to participate in the political process. Although these two conceptions of educational mechanisms are not necessarily mutually exclusive, this fact is not readily discernable from the extant literature, which almost exclusively considers these mechanisms in isolation.[2] As such, I review these schools of thought separately.

1.3.1. Education as a Resource

For years, the predominant conception of the mechanisms through which education shaped political participation was shaped by Wolfinger and Rosenstone's (1980) *Who Votes?* This book offers a tri-faceted theoretical account of the mechanisms through which education may increase political participation. First, the authors argue that education increases cognitive skills, which provide individuals with greater ability to gather the information and knowledge required to participate in the political process. Second, they contend that people with higher levels of education experience greater satisfaction from participating in politics than do

[2] Nie, Junn, and Stehlik-Barry (1996) and Gomez (2008) are important exceptions to this trend.

individuals with lower levels of education. Third, the authors maintain that formal schooling provides individuals with experience navigating bureaucratic organizations. This experience comes in useful when individuals wade through the dual processes of registering to vote and voting.

Despite a lack of direct empirical tests of the original theory, the account presented by Wolfinger and Rosenstone (1980) has remained a dominant paradigm regarding the mechanisms through which education increases political participation. In the years since its publication, scholars have extended, expanded, and tested the theory. Perhaps the definitive statement of education as a resource that lowers the cost of participation is presented in Verba, Schlozman, and Brady's (1995) *Voice and Equality*. Like Wolfinger and Rosenstone, the authors conclude that education positively influences political participation through the development of cognitive ability. However, the authors also determine that education affects participation by introducing individuals to social networks where they can be recruited to participate in politics, by developing civic skills, and providing individuals with opportunities to earn high levels of income and work in prestigious occupations. In short, the authors argue that education provides individuals with a wide variety of resources, all of which serve to foster participation. The authors' evidence supporting these contentions comes from analyses of an individual-level, cross-sectional survey that asks respondents to recall features of their adolescence, including characteristics of the school they attended and activities in which they participated.

Other prominent conceptions of education as a resource are presented in Nie, Junn, and Stehlik-Barry (1996) and Campbell (2006). Like many before them, Nie, Junn, and Stehlik-Barry (1996) argue that education influences democratic citizenship by increasing cognitive

ability, which they measure using a ten item assessment of verbal proficiency. However, the authors argue that the increase in cognitive ability provided by education influences a relatively narrow aspect of democratic citizenship. Specifically, they contend that improved cognitive ability only serves to increase political tolerance and political knowledge, which they collectively refer to as "democratic enlightenment." Nie, Junn, and Stehlik-Barry do not believe cognitive ability influences other aspects of democratic citizenship.

By arguing that education serves to inculcate norms of civic participation, Campbell (2006) presents a somewhat different resource-based view of education than most scholars that preceded him. Whereas other resource-based views of education consider it to lower the cost of participating, Campbell's view—echoing Wolfinger and Rosenstone's statement that people with higher levels of education experience greater satisfaction from participating in politics—implicitly argues that education provides information and values that raise the cost of not participating. In a sense, Campbell's argument represents the flip side of the traditional education-as-a-resource coin.

The quality of empirical support for these theoretical conjectures is variable. On the low-quality end of the spectrum lie Wolfinger and Rosenstone (1980), who provide no empirical support for their conjectures; they simply rely on the empirical correlation between educational attainment and political participation. On the higher-quality end of the spectrum lie Verba, Schlozman, and Brady (1995) and Campbell (2006). These studies marshal survey data that the authors subject to multivariate analytical techniques to provide fairly convincing empirical support for their arguments. The quality of the empirical evidence presented by Nie, Junn, and Stehlik-Barry falls in between the two ends of the spectrum. The authors measure cognitive

ability—more precisely "verbal cognitive proficiency"—using a ten-item vocabulary test from the General Social Survey. Although the authors argue that the test is "potent and well-validated", it is difficult to believe that the test provides a highly valid and reliable measure of individuals' cognitive ability.

1.3.2. Education as a Sorting Mechanism

Although Nie, Junn, and Stehlik-Barry (1996) argues that education serves as a resource for specific aspects of democratic citizenship, this work is best known for providing the original and definitive statement of education as a sorting mechanism. In this work, Nie, Junn, and Stehlik-Barry contend that education positively affects democratic citizenship—specifically "democratic engagement"—by imbuing individuals with an understanding of their interests and the ability to effectively engage the political process in pursuit of those goals, primarily by increasing individuals' social status that provides them access to individuals and institutions that can affect political change. In this view, the effect of formal education on democratic engagement is not absolute, but relative; it is individuals' level of education relative to the average level of education in their environment that affects their democratic engagement. To illustrate the implications of this theory, consider two hypothetical individuals. The first individual graduated from high school and lives in an environment where the average individual has an 8^{th} grade education. The second individual graduated from college and resides in an environment where the average individual has completed high school, but is identical to the first individual in all other respects. The traditional view holds that the second person—the college graduate—would be more likely to exhibit democratic engagement. According to Nie, Junn, and

Stehlik-Barry, however, these individuals are equally likely to exhibit democratic engagement because they possess the same relative education levels. Although somewhat unintuitive, this theory gained immediate traction within political science because it represented a potential solution to Brody's (1978) famous "puzzle of political participation," which noted that despite the 1) strong individual-level relationship between educational attainment and voter turnout and 2) the rising level of educational attainment in the population, voter turnout had been declining over time. By arguing that the effect of education on participation was relative, not absolute, Nie, Junn, and Stehlik-Barry (1996) provided a potential solution to this paradox.

The elegance of the theory may have caused scholars to overlook the rigor of its original empirical support. The initial tests were somewhat weak and failed to directly test the theory. Recently, however, scholars have exhibited renewed interest in empirically evaluating the claim that education acts as a sorting mechanism and have subjected the theory to much more rigorous tests. Perhaps the best test of the theory can be found in Campbell (2009), which employs data from the National Civic Engagement Study, coupled with information from the U.S. Census Bureau, to provide a direct test of the sorting model. Campbell's analysis provides partial confirmation of the theory. He finds that education acts as a sorting mechanism only for one type of democratic engagement—electoral activity—and only when the educational environment accounts for variation across age and place. Campbell certainly finds some support for the original theory, but concludes that its initial claims were overly broad. Additional empirical support for the sorting model comes from work by Gomez (2008) who uses county-level data from several sources in his tests. Like Campbell, Gomez finds some support for the sorting model of education. It is worth noting, however, that Gomez also concludes that education has

an additive effect, a finding that is more consistent with the conception of education as a resource.

Taken as a whole, the literature provides evidence that education can serve as both a resource and a sorting mechanism. This literature, however, does not effectively discern when and how education serves each of these two purposes. This is at least partially due to the fact that education is generally operationalized as the number of years of formal schooling completed. This operationalization has a number of important implications—many of which are largely unrealized—that I discuss in the next section.

1.4. Limitations of Existing Theory and Evidence

The previous sections of this chapter illustrate that political scientists have devoted substantial effort to understanding the relationship between formal education and political participation, and that significant progress has been made in this area. Scholarship has evolved from uncovering positive correlations between educational attainment and political participation to making headway in determining whether the correlation is causal in nature. Similarly, early work on the relationship between education and political participation theorized about the mechanisms driving the relationship, but conducted relatively weak empirical tests of the theories, if any were conducted at all, while recent work has gone to greater lengths to provide more direct and rigorous empirical tests of relevant theories. Such progress has clearly resulted in a superior understanding of the relationship between formal education and political participation. However, in spite of this progress, a number of limitations—both theoretical and empirical—continue to afflict existing work. This section identifies three primary shortcomings of extant scholarship—the conflation of education and educational attainment, a failure to

consider potential heterogeneity, and a relatively weak basis for causal claims—and describes how these limitations serve to hinder our understanding of the relationship between education and political participation. In doing so, this discussion foreshadows a number of features of the theory that I develop in the following chapter and characteristics of the empirical approaches I employ throughout this project.

Many of the limitations of prior work on the relationship between formal education and political participation can be traced to the routine conflation of education and educational attainment. The vast majority of scholarship in political science, both theoretical and empirical, considers education to be the number of years of formal schooling completed. Although such an operationalization is attractive for several reasons—not the least of which is ease of measurement—it also has several features that serve to impede our understanding of the relationship between formal education and political participation. First, it results in the development of theories in which educational attainment serves as the starting point for a theory of the relationship between education and political participation. This is the case in both Nie, Junn, and Stehlik-Barry's (1996) theory and Verba, Schlozman, and Brady's (1995) Civic Voluntarism Model; each theory assumes that completion of additional years of schooling will result in the acquisition of characteristics and resources that will result in a greater likelihood of political participation. On its face, such a starting point seems natural and quite reasonable; it is only upon further reflection—through a perspective other than political science—that such a starting point is revealed to be problematic.

From the viewpoint of education scholars, a theory of the relationship between education and any outcome that starts with educational attainment ranges from, at best, unrealistic, to, at

worst, counterproductive. The lack of realism stems from the implicit assumption that educational attainment—and by extension, education—is exogenous. Indeed, the theories outlined by both Nie, Junn, and Stehlik-Barry (1996) and Verba, Schlozman, and Brady (1995) assume exogeneity of education, as evidenced by the fact that nothing in their theories is allowed to affect educational attainment. Although such an assumption is obviously unrealistic—dozens of factors influence an individual's educational attainment—the lack of realism alone is not necessarily problematic; every theory must make simplifying assumptions in order to provide a tractable portrayal of the relationship of interest. However, it is imperative that these simplifying assumptions do not distort the relationship being analyzed, an imperative that is violated when educational attainment is assumed to be exogenous in the context of a theory of the relationship between education and political participation.

Assuming educational attainment to be exogenous within a theory of education and political participation induces a distortionary portrayal of the relationship because it excludes whole dimensions of education from being able to theoretically affect political participation. For example, assuming educational attainment to be exogenous effectively prevents educational policies, pedagogical practices, and schooling context from being able to theoretically affect political participation outcomes. Similarly, the prevailing theoretical approach precludes knowledge and skills from being able to affect political participation independent of educational attainment. These examples do not represent an exhaustive list of the consequences of assuming educational attainment to be exogenous, but they provide powerful illustrations of the distortions that can be induced by the traditional theoretical approaches used to analyze the relationship between education and political participation.

A second primary limitation of existing research, which is also influenced by the conflation of education and educational attainment, is the implicit assumption of homogeneity in the effect of education on political participation. When education is measured as the number of years of formal schooling completed and then included as a continuous predictor of some political variable in a linear model—common practice in empirical analyses in political science—the resulting interpretation is a linear one.[3] That is, these analyses lead to conclusions that completing an additional year of schooling—whether it be 3rd grade, 12th grade, or senior year of college—will lead to an identical increase in the likelihood of participating in the political process. This interpretation is pervasive in existing work that documents the positive correlation between educational attainment and political participation (Rosenstone and Hansen 1993). Even scholarship that purports to identify the causal effect of completing an additional year of schooling on political participation focuses very little, if any, attention on the particular grade or level of schooling where the effect is identified; it is implicitly assumed that an analysis where the effect is identified at 12th grade and an analysis where the effect is identified at the second year of college should return identical results, and puzzlement is expressed when studies return divergent results.[4] From a political science perspective such a belief may seem uncontroversial, but education scholars would object to considering all levels of the education system to be identical; completing 7th grade is substantively distinct from graduating from high

[3] It is important to note that not all analyses of the relationship between education and political participation have been conducted in this manner. For example, see Burden (2009) where education is not measured continuously, but as a series of dummy variables indicating the highest level of education completed.

[4] For example, see Sondheimer and Green (2010), which identifies the effect of graduating from high school compared to Kam and Palmer (2008) or Tenn (2007) which primarily identify the effect of completing an additional year of postsecondary education.

school, which is very different from completing a third year of college. As a result, it is unrealistic to expect a constant effect of educational attainment on political participation. Rather, the effect is likely to be heterogeneous and I believe that the effect heterogeneity is likely to be systematic, which is a reality that any theory should take seriously.

The lack of attention devoted to effect heterogeneity is not limited to the level of the education system. Indeed, prior work has largely failed to consider the possibility that the effects of education, however conceived and measured, might vary across individuals with different socioeconomic characteristics. For example, a certain schooling policy or practice, such as exposure to and participation in student government, might affect a high-SES individual much differently than it might affect a low-SES individual, and these differential experiences may manifest themselves in varying levels of later-life participation in politics. Any theory should genuinely consider possibilities such as these.

Existing work has given more consideration to the possibility that the effects of education might differ across modes of political participation, but this consideration is mainly limited to contentions that different types of participation are affected by different educational mechanisms. For example, Nie, Junn, and Stehlik-Barry (1996) hypothesize that education increases democratic enlightenment, which they define to be political tolerance and political knowledge, through the mechanism of increased verbal cognitive proficiency while education increases democratic engagement, defined as active participation, through the mechanism of increased social status. However, existing work contains relatively little, if any, consideration of potential heterogeneity in the effects of a single educational mechanism across different modes of political participation. For example, questions as to whether increased knowledge and skills caused by

education have one effect on voting behavior but a different effect on civic voluntarism have gone largely unexamined in previous work on the relationship between education and political participation. As noted above, any theory must take the potential for heterogeneity seriously if we hope to develop a more complete understanding of the relationship between education and political participation.

A third shortcoming of previous scholarship examining the association between education and political participation is the relatively limited basis for the causal claims that have been made. These limitations stem from two primary factors: 1) the strength of the assumptions required for many of the empirical estimates to be interpreted in a causal nature, and 2) the quality of the measures and empirical tests that previous studies have employed as the basis for drawing inferences about the effects of education on political participation.

As reviewed above, much of the empirical evidence on the relationship between education—however defined and measured—and political participation comes from regression analysis of cross-sectional survey data (e.g. Wolfinger and Rosenstone 1980; Verba, Schlozman, and Brady 1995; Nie, Junn, and Stehlik-Barry 1996; Burden 2009). A causal interpretation of estimates generated by such an approach requires the assumption of conditional independence. That is, it must be assumed that, conditional on the contents of the regression model, the variable(s) measuring education are completely uncorrelated with the residual term; violation of this assumption could result in estimation of a spurious relationship between education and political participation. Put another way, unobserved factors correlated with both education and political participation could bias the coefficients on the education variable(s), which could lead

to a misinterpretation of the relationship.[5] For example, suppose that an individual's motivation level is positively correlated with both education and political participation, but because motivation is difficult to observe it is not able to be included in the regression model. This exclusion will produce a coefficient on the education variable that is upwardly biased; some of the effect of motivation will be wrongfully attributed to education. This example illustrates that the conditional independence assumption is very strong, and unlikely to ever be fully met. Thus, the most appropriate question is perhaps not whether the conditional independence assumption has been met, but how large the bias resulting from its violation might be.

Causal claims about the relationship between education and political participation made in some previous work are also limited by the quality of the education-related measures that been used as the basis for inferences. For example, Nie, Junn, and Stehlik-Barry measure verbal cognitive proficiency using a ten-item vocabulary test from the General Social Survey. Ignoring the issue of why educational attainment is assumed to influence democratic enlightenment through verbal cognitive ability, as opposed to any other dimension of knowledge or ability, measuring an individual's verbal cognitive proficiency with ten items on the GSS would immediately raise reliability- and validity-related flags for most education scholars and psychometricians. Similarly, Verba, Schlozman, and Brady (1995) ask individuals to recall aspects of their schooling experiences that occurred years, even decades, ago. These examples

[5] Although the causal claims made in many studies are based on the assumption of conditional independence, other scholarship has employed research designs that allow causal inferences to be made under assumptions that are perhaps more plausible. For example, several studies use instrumental variables techniques to identify the causal effect of educational attainment on political participation (Sondheimer and Green 2010; Milligan, Moretti, and Oreopolous 2004; Dee 2004). These studies assume the exclusion restriction used to identify the parameter of interest is a valid one. Another study—Tenn (2007)—employs a fixed effects approach, which allows for valid causal claims about education to be made under the assumption that all time-varying unobservables are conditionally independent of the variables measuring education.

illustrate the tendency for political scientists examining the relationship between education and political participation to devote relatively more attention to ensuring the quality of the political-related measures and relatively less attention to relevant education-related measures. Although this tendency is fully understandable, it is not fully desirable; high-quality measures of both political participation and education are necessary to develop a more comprehensive understanding of the complex relationship between these two factors.

1.5. Summary

This chapter illustrates that political theorists and philosophers have long believed that formal education should occupy an important space in a democratic society. According to this line of argument, it is through education that individuals acquire the skills, knowledge, and understanding of social norms necessary to effectively participate in a democratic society. Of course, believing that education should prepare individuals to contribute to a democratic society is quite distinct from knowing that education actually exerts such an effect. Thankfully, a robust collection of research has investigated the empirical relationship, with nearly all of it uncovering evidence of a positive relationship between education and political participation. These empirical findings naturally led to the development of theories about the precise mechanisms driving the relationship. This theorizing has produced two primary schools of thought regarding the mechanisms through which education affects participation. The first school of thought considers education to be a resource that lowers the cost of participation; education imbues individuals with skills, knowledge, and social networks that facilitate political participation. The second school of thought conceives of education as a sorting mechanism that bestows status and efficacy upon individuals, which makes them more likely to participate in the political process.

These theories have been subjected to empirical tests in recent years and great progress has been made in understanding the relationship between education and political participation. However, despite this progress, a number of theoretical and empirical limitations afflict existing work. In particular, three primary shortcomings of extant scholarship—the conflation of education and educational attainment, a failure to consider potential heterogeneity, and a relatively weak basis for causal claims—obscure our understanding of the relationship between education and political participation. The discussion of these limitations foreshadows several features of the theoretical and empirical approaches that I employ throughout this project.

Chapter 2. A Conceptual Framework for Analyzing Education and Political Participation

2.1. Introduction

The previous chapter illustrates that significant progress—both theoretical and empirical—has been made in understanding the relationship between education and political participation. However, it also demonstrates that existing research exhibits a number of limitations, the most prominent of which include routine conflation of education and educational attainment and a general failure to consider potential heterogeneity in the relationship between education and political participation. Throughout this chapter, readers will notice an implicit awareness of—but not an explicit focus on—these limitations as I develop the conceptual framework that guides this analysis of the relationship between education and political participation. It will quickly become clear that the framework guiding this project is at least as much an extension and revision of previous theories as it is creation of any wholly new paradigm. Indeed, as illustrated in the brief overview of the framework presented in the following paragraphs, the primary mechanisms that structure existing theories also play a prominent role in the conceptual framework used in this analysis.

As in previous work on the relationship between education and political participation, the conceptual framework guiding this project has a significant role for educational attainment.

Specifically, in this project educational attainment is theorized to affect political participation by increasing individuals' socioeconomic status; as individuals progress through the education system, they become immersed in social networks that make them increasingly likely to participate in the political process. However, in contrast to previous work, this framework does not assume educational attainment to be exogenous. An individual's educational attainment is hypothesized to be affected by educational policies, practices, and context. In addition, an individual's attainment is theorized to be affected by his or her level of knowledge and skills; individuals with greater knowledge and skills are likely to progress further through the education system.

The second mechanism through which education is presumed to affect political participation is the instillation of knowledge and skills. As individuals learn about the political process and acquire skills that facilitate participation, they become more likely to do so. Several factors are theorized to contribute to individuals' acquisition of knowledge and skills in this framework, including educational policies, pedagogical practices, and schooling context. In addition, educational attainment is also hypothesized to contribute to individual-level knowledge and skills; the natural process of maturation is likely to imbue individuals with the abilities necessary to navigate the political process. A feature of the conceptual framework that occupies an important place in this study is the consideration of causal heterogeneity. Such heterogeneity is theorized to occur along several dimensions, including the mode of political participation, the level of the education system, and the socioeconomic characteristics of individuals. Such realities are not only acknowledged, but systematically incorporated into the theoretical and analytical frameworks guiding this project.

This chapter proceeds by first describing how previous theoretical work informs the conceptual framework employed in this project; it will quickly become apparent that the major features of existing theory are incorporated into this framework. The chapter then transitions to revising and extending existing theory, and incorporating new ideas, to fill out the conceptual framework. The third and final section of the chapter outlines the specific empirical questions and issues that emerge from the conceptual framework and briefly discusses how they will be addressed in this project.

2.2. Base of the Conceptual Framework- Existing Scholarship

Beginning with *The American Voter* and extending through several subsequent seminal works, political scientists have measured education as the number of years of formal schooling completed and—using this measure—have detected strong, positive correlations between education and political participation (Campbell et al. 1960; Verba and Nie 1972; Converse 1972; Wolfinger and Rosenstone 1980; Rosenstone and Hansen 1993; Verba, Schlozman, and Brady 1995; Putnam 2000; Burden 2009). The routine detection of these strong empirical correlations naturally led to theorizing about the precise mechanisms responsible for producing the observed relationship between educational attainment and political participation. As reviewed in Chapter 1, this theorizing has produced two primary schools of thought regarding the mechanisms through which educational attainment may affect participation. The first school of thought—associated primarily with Wolfinger and Rosenstone (1980) and Verba, Schlozman, and Brady (1995)—considers education to be a resource that lowers the cost of participation; education imbues individuals with skills, knowledge, and social networks that facilitate political participation. The second school of thought—first presented by Nie, Junn, and Stehlik-Barry

(1996) and subsequently tested by Campbell (2009) and Gomez (2008)—conceives of education as a sorting mechanism that bestows status and efficacy upon individuals, which makes them more likely to participate in the political process.

Both lines of conjecture described above have been subjected to empirical scrutiny and, despite the fact that many of these tests were not optimally designed or executed, there is a relatively strong consensus that existing evidence is sufficiently strong to support the view that education serves as both a resource and sorting mechanism in its effects on political participation. Given this consensus, the theoretical work described above serves as the starting point for the conceptual framework guiding this analysis of the relationship between education and political participation.

Stating that existing theoretical work serves as the starting point for developing the conceptual framework employed in this analysis effectively confirms that educational attainment occupies a prominent role in this project. And indeed, in line with previous work, the framework guiding this project begins with educational attainment being theorized to affect political participation through the twin mechanisms of increased socioeconomic status and increased knowledge and skills. As these mechanisms have structured existing theories on the relationship of education and political participation, they are fairly well-established in the political science literature. Interestingly, however, the origin and undergirding for these theoretical mechanisms can be traced to disciplines other than political science; sociologists have much to say about educational attainment and socioeconomic status while economists have long analyzed the relationship between educational attainment and the acquisition of knowledge and skills.

Sociologists have long recognized that educational attainment and socioeconomic status are heavily intertwined. Commencing with the seminal work of Blau and Duncan (1967) and continuing through the influential extensions and revisions of Sewell and Hauser (1975), Wright (1979), Goldthorpe (1980), Baron and Bielby (1980), and others sociologists have endeavored to understand the factors that influence an individual's socioeconomic status, also referred to as attained status or social class. Although these studies differ in minor respects, they are united in their assessment that educational attainment is one of the most important determinants of socioeconomic status. The precise processes through which educational attainment affects socioeconomic status have been studied in detail by sociologists (see above citations). Although these studies are both interesting and informative, an in-depth exploration and summary of this topic is beyond the scope of this project. More relevant to this project is an examination of the process through which increased socioeconomic status might result in increased levels of political participation.

Political scientists have presented two primary explanations of the processes through which increased socioeconomic status, by way of increased educational attainment, may lead to higher levels of political participation. Nie, Junn, and Stehlik-Barry (1996) argue that it occurs through social network centrality; formal education results in people being significantly more likely to be at the center of politically important social networks. This central positioning provides individuals with greater proximity to policymakers, increased accessibility to political information, and a favorable venue for having their voices heard. Rosenstone and Hansen (1993) and Verba, Schlozman, and Brady (1995) present a similar, but not identical, depiction of the process. These authors argue that educational attainment results in an increased likelihood of

placement in social and political networks where individuals can be more easily recruited and mobilized by political leaders. Although these accounts purport to be different, they are effectively flip sides of the same coin; the primary difference is that Nie, Junn, and Stehlik-Barry (1996) ascribe primary participatory agency to the potential participant while Rosenstone and Hansen (1993) and Verba, Schlozman, and Brady (1995) attribute primary agency to individuals other than the potential participant and secondary agency to the potential participant. The basic prediction of increased political participation stemming from higher socioeconomic status, however, is identical across these two accounts.

Rather than attempting to adjudicate between these competing—yet ultimately very similar—accounts, this project presents a more general depiction of the process through which increased socioeconomic status results in increased political participation. In doing so it incorporates the two depictions presented above. The account in this project draws on the classic sociological work on status attainment, which argues that increased socioeconomic status provides individuals with increased levels of both personal and social resources. Personal resources are possessions of the individual and may include things such as wealth, power, and prestige while social resources are those resources accessible through an individual's direct and indirect ties, but do not belong directly to the individual (Lin 1999). The canonical example of a social resource involves an individual using the occupational positions of his or her friends to try and gain employment.

It is easy to envision how increased levels of personal and social resources could result in increased political participation. Indeed, the two accounts reviewed above present several personal and social resources that could result in increased political participation. A sampling of

these resources include greater proximity to policymakers, increased accessibility to political information, and increased likelihood of being recruited to participate in politics. Although the resources identified in previous accounts are undeniably visible and important resources through which increased socioeconomic status resulting from higher educational attainment could increase political participation, they by no means comprise an exhaustive list of such resources; one could imagine several other resources provided by increased socioeconomic status that could increase political participation. Thankfully, compiling an exhaustive list of such resources is unnecessary for the purposes of this project; it is sufficient to state that higher levels of educational attainment result in increased socioeconomic status, which provides individuals with personal and social resources that can result in increased levels of political participation.

Readers may notice that the approach taken in this project implicitly reframes the debate over whether education operates as a resource or as a sorting mechanism in its effects on political participation. In contrast to previous work, this project does not consider educational attainment operating as a resource or a sorting mechanism to be an either/or proposition. By influencing individuals' socioeconomic status, educational attainment is clearly theorized to operate as a sorting mechanism. However, this sorting alone is not sufficient to result in increased levels of political participation; it is the increased resources available to the sorted individuals that ultimately result in greater political participation and these resources would not have been available to individuals had they not achieved higher levels of educational attainment. Thus, in this aspect of the conceptual framework, education is theorized to simultaneously operate as both a sorting mechanism and a resource. Below, Figure 2-1 presents a graphical depiction of one

path through which educational attainment is theorized to affect political participation: increased socioeconomics status, which in turn increases personal and social resources.

Figure 2-1. Conceptual Model of the Effect of Education on Political Participation- SES Component

In addition to being theorized to affect political participation through the mechanism of increased socioeconomic status, the conceptual framework guiding this project hypothesizes that educational attainment affects political participation through the mechanism of increased knowledge and skills. The idea that educational attainment might affect outcomes—be they political, social, or economic—by increasing knowledge and skills has a long history in the scholarly literature. The genesis of this idea can be traced to economist Jacob Mincer's (1958) article that related an individual's level of knowledge and skills—their human capital—to their income. Mincer's colleague Gary Becker expanded upon the concept of human capital—and

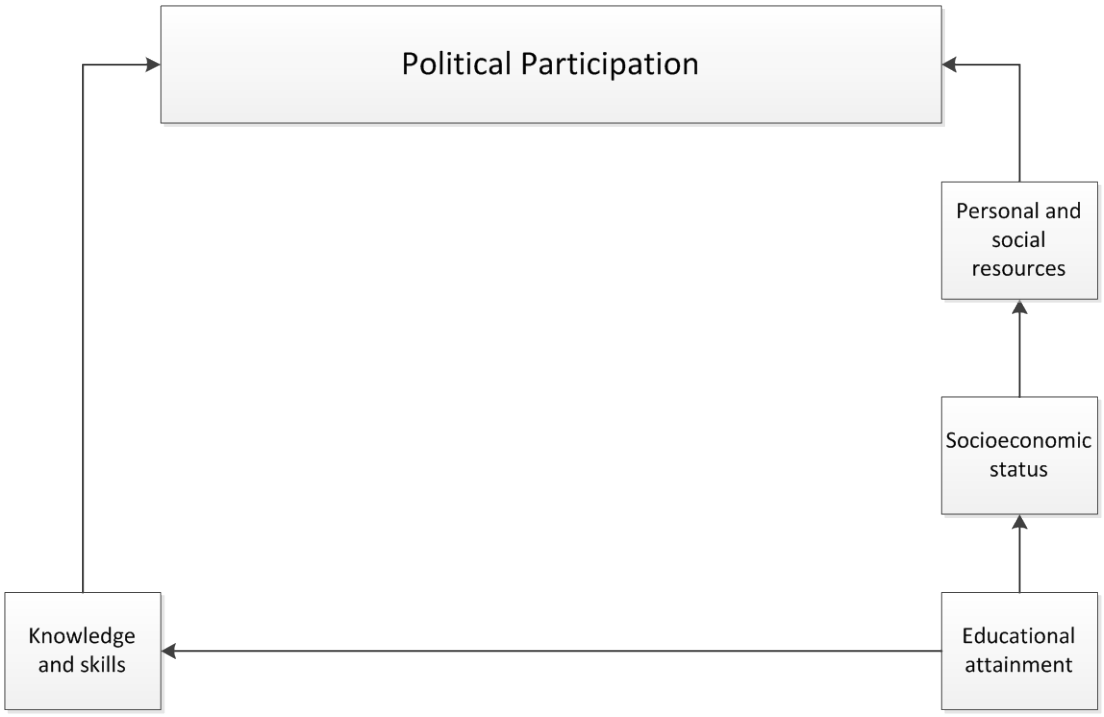
described the integral role of education in its generation—in his seminal (1964) book and series of subsequent works on the topic.

The concept of human capital, and the role of education in its development, seems to have been imported into the political science literature, and applied to political participation outcomes, by Wolfinger and Rosenstone (1980). They argue that education increases cognitive skills, which increases an individual's ability to learn about and understand "complex, abstract, and intangible subjects such as politics" (Wolfinger and Rosenstone 1980, p. 35). They also argue that schooling provides individuals with experience navigating bureaucratic requirements, a skill that comes in handy when individuals must wade through the processes of voter registration and voting. This basic line of theorizing is echoed in one form or another by Rosenstone and Hansen (1993), Verba, Scholzman, and Brady (1995), and Nie, Junn, and Stehlik-Barry (1996). In sum, major works that have considered the role of education in affecting political participation outcomes theorize that it does so, at least partially, through the generation of human capital. So does this project.

The approach taken in this project also ascribes to the view that the human capital—the knowledge and skills—imparted by education, specifically educational attainment, can affect an individual's level of political participation. The specific knowledge and skills that educational attainment may provide that are potentially relevant to political participation outcomes are myriad. A very incomplete sample includes knowledge of the actions required to be able to participate in politics, skill in finding the information necessary required to meaningfully participate, and knowledge that allows for discernment of individual political beliefs and interests, among others. A complete catalog of the knowledge and skills that are potentially

relevant to political participation outcomes is beyond the scope of this chapter; at this point it is sufficient to state that, like the previous literature, educational attainment is theorized to affect political participation through the impartation of knowledge and skills—the generation of human capital. The discussion to this point leads to Figure 2-2, which provides a graphical depiction of the two mechanisms through which educational attainment is theorized to affect political participation: 1) increased socioeconomic status, which leads to increased personal and social resources and 2) increased knowledge and skills.

Figure 2-2. Conceptual Model of the Effect of Education on Political Participation- SES and Knowledge/Skills Components



To this point, the development of the conceptual framework guiding this project has, with some modifications, been based on the insights of existing scholarship. Consequently, it is

perhaps not surprising that Figure 2-2 presented above exhibits similarities to some of the frameworks employed in previous scholarship, particularly the work of Nie, Junn, and Stehlik-Barry (1996). However, as described above, there are some notable differences between the current conceptual framework and those employed in previous work. Specifically, this portion of the framework deviates from previous work by reframing the debate over whether education operates as a resource or as a sorting mechanism in its effects on political participation. In contrast to previous work, this project does not consider educational attainment operating as a resource or a sorting mechanism to be an either/or proposition. By influencing individuals' socioeconomic status, educational attainment is clearly theorized to operate as a sorting mechanism. However, this sorting alone is not sufficient to result in increased levels of political participation; it is the increased resources available to the sorted individuals that ultimately result in greater political participation and these resources would not have been available to individuals had they not achieved higher levels of educational attainment. Whether this is process is referred to as sorting or as resource provision is semantic; it is the process that takes place that truly matters. Similarly, whether the knowledge and skills that education provides are referred to as a resource or as something else is immaterial. In the context of this project, it only matters that knowledge and skills acquired through educational attainment are theorized to affect political participation. The next section of this chapter will illuminate additional, more consequential, differences between the conceptual framework guiding this project and those that have been employed in previous work. Specifically, in the next section of the chapter I incorporate a number of significant revisions, extensions and new ideas into the framework.

2.3. The Rest of the Conceptual Framework-Revisions, Extensions, and New Ideas

2.3.1. Endogeneity of Educational Attainment

To this point, development of the conceptual framework has relied primarily on the insights of existing work (See Figure 2-2 above). However, as described in the preceding chapter, extant scholarship exhibits several limitations, with a number of them being theoretical in nature. Through extensions, revisions, and incorporation of new ideas into the framework presented in Figure 2-2, this section of the paper further develops the conceptual framework guiding this project. In doing so it seeks to mitigate many of the theoretical limitations that have afflicted previous work.

The first major revision of the conceptual model presented in Figure 2-2 involves recognizing the endogeneity of educational attainment. As described in Chapter 1, existing work assumes, either implicitly or explicitly, that educational attainment is exogenous, an assumption that is problematic because it has the potential to induce a distortionary portrayal of the relationship between education and political participation.[6] To alleviate this issue, this project operates under the assumption that educational attainment not only affects, but is also affected by, the two mechanisms through which it operates: 1) socioeconomic status, and 2) knowledge and skills.

As described above, educational attainment provides individuals with knowledge and skills and higher socioeconomic status, both of which facilitate increased levels of political participation. However, it is also an empirical reality that a child's ultimate educational

[6] Nie, Junn, and Stehlik-Barry (1996) seem to recognize the potential for verbal cognitive proficiency to influence educational attainment, but they present an argument that their measure of verbal cognitive proficiency precludes the potential endogeneity from afflicting their analysis. See footnote 13 in Chapter 3.

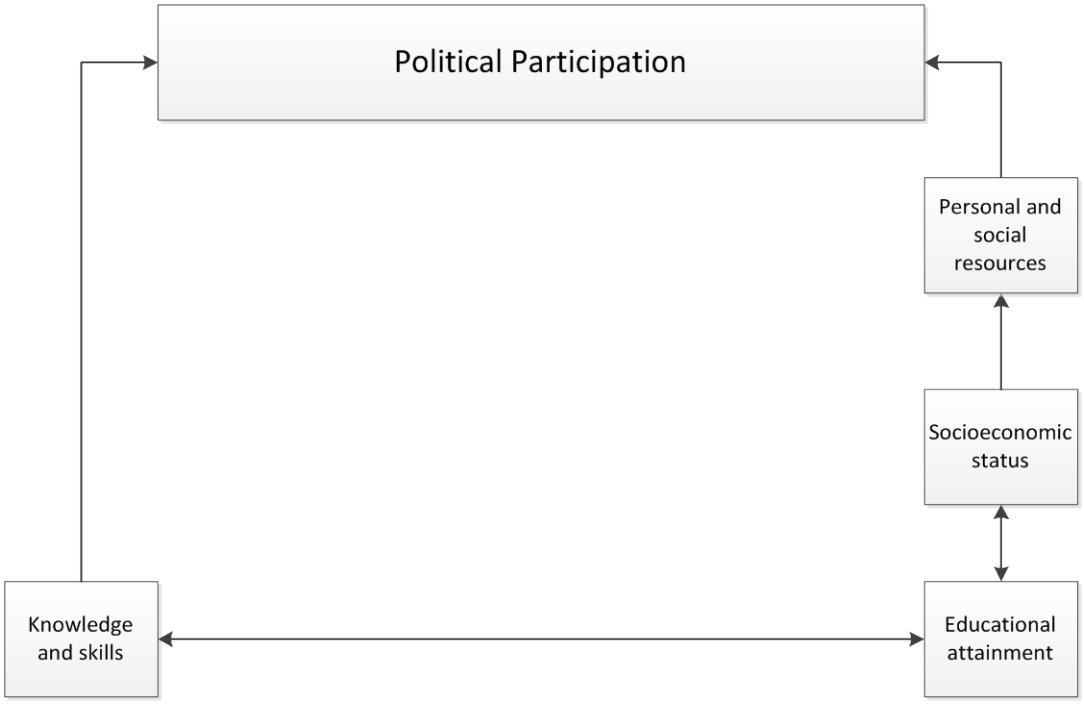
attainment is strongly predicted by the socioeconomic status of his or her family—as measured by level of parental education. In addition, a strong case can be made that these correlations can be interpreted causally; see Nichols and Favreault (2009) for estimates of the strength of the relationship as well as a tabular summary of other prominent estimates of the relationship. The strength of the estimates of the relationship between a child's ultimate educational attainment and the socioeconomic status of his or her family, and the consistency with which this relationship is detected, suggests that the conceptual framework guiding this project must be designed to account for the reality that educational attainment both affects and is affected by socioeconomic status.

Similarly, as described above, it is well-established in the political science literature that individuals acquire knowledge and skills as they progress through the education system (Wolfinger and Rosenstone 1980; Verba, Schlozman, and Brady 1995; Nie, Junn, and Stehlik-Barry 1996). Less established, but no less plausible, is the possibility that individuals' levels of knowledge and skills affect their ultimate educational attainment. Indeed, reflection on this topic reveals that individuals' knowledge and skills almost certainly feed back to affect their educational attainment. To illustrate this relationship one only needs to consider the fact that the vast majority of postsecondary institutions have admission standards. At a minimum, most undergraduate institutions require a diploma—a signal that the prospective student possesses a minimum level of knowledge and skills—for entry. Many graduate and professional programs admit students based on their undergraduate grade point average and their performance on relevant assessments, such as the GRE, the GMAT, the LSAT, or the MCAT. In short, these programs admit students on the basis of their knowledge and skills. As further evidence that

knowledge and skills affect an individual's ultimate educational attainment, consider that poor academic performance—a lack of knowledge and skills—is often cited as a major factor influencing a student's decision to drop out of high school or middle school (Rumberger 1995; Rotermund 2007). Taken together, it seems indisputable that individuals' levels of knowledge and skills feed back to affect their ultimate educational attainment it suggests that the conceptual framework employed in this project needs to account for this reality.

Incorporating the endogeneity of educational attainment into the graphical depiction of the conceptual model results in Figure 2-3, which is presented below. As indicated by the bi-directional arrows, the model now illustrates that educational attainment both affects and is affected by the two mechanisms through which it operates: 1) socioeconomic status, and 2) knowledge and skills. Although this theoretical revision results in a more realistic depiction of the relationship between educational attainment and political participation, that is not its sole purpose; it also has important implications for the empirical analyses that will be used to test the framework being developed. Specifically, it illustrates the imperative to design and execute the empirical analyses in a manner that results in the closure of what Morgan and Winship (2007) refer to as "backdoor paths" when attempting to isolate and estimate the causal relationships depicted in the conceptual model. That is, it illustrates the need to condition on socioeconomic status when estimating the effect of educational attainment of political participation through the mechanism of knowledge and skills. Similarly, it demonstrates the imperative to condition on knowledge and skills when estimating the effect of educational attainment on political participation through the mechanism of increased socioeconomic status.

Figure 2-3. Conceptual Model of the Effect of Education on Political Participation- SES and Knowledge/Skills Components Recognizing Endogeneity



2.3.2. Incorporation of Educational Policies, Practices, and Context

As described previously, political scientists have routinely assumed educational attainment to be exogenous in their analyses of the effect of education on political participation. The first step in recognizing the endogeneity of educational attainment involved allowing it to both affect and be affected by an individual's socioeconomic status and their level of knowledge and skills. Although these two factors are certainly important influents of educational attainment, particularly in the context of an analysis of the effect of education on political participation, they are by no means its only determinants; education scholars have long focused on identifying how educational policies, pedagogical practices, and schooling context might

affect educational attainment. For example, there is evidence that policies imposing increased graduation credit requirements result in higher dropout rates, and thus lower levels of educational attainment (Lillard and DeCicca 2001; Bishop and Mane 2001). Similarly, Rumberger (1995) and Rumberger and Thomas (2000) find that schooling context and educational policies and practices influence dropout rates; researchers generally estimate that about 20 percent of the variability in dropout rates can be explained by schooling policies, practices, and context (Rumberger and Lim 2008). See also Timar, Biag, and Lawson (2007) for an analysis of how education policy interactions affect dropout rates.

Of course, educational policies, practices, and context are not limited to affecting educational attainment through their influence on dropout rates. These factors can also influence educational attainment in myriad other ways, including enrollment and persistence in postsecondary education. For example, financial aid policies have been shown to increase college enrollment and completion (Dynarski 2003; Dynarski 2004). Similarly, collegiate context and practices have been shown to affect college completion rates (Bound, Lovenheim, and Turner 2010). Clearly, the effects of educational policies, practices, and context have the potential to affect educational attainment in wide-ranging and diverse ways. The previous paragraphs were not designed to comprehensively catalog all potential ways that educational policies, practices, and context might influence educational attainment; such an effort is beyond the scope of this project. Rather, the preceding paragraphs were intended to illustrate that a comprehensive analysis of the relationship between education and political participation must consider the potential influence of educational policies, practices, and context, specifically through their effects on educational attainment.

Education scholars have clearly examined how policies, practices, and contexts can affect educational attainment. Political scientists have analyzed the relationship between educational attainment and political participation ad nauseam. However, with only one (inadvertent) exception, there has been no research that explicitly examines how educational policies, practices, and context affect political participation by increasing educational attainment. The sole exception is recent work by Sondheimer and Green (2010) that uses random assignment to early childhood education programs as an instrument to identify the effect of educational attainment on political participation. Although the authors focus exclusively on the relationship between educational attainment and political participation, their analysis has the potential to inform the broader issue of how educational policies, practices, and contexts might affect political participation. Specifically, their analysis indicates that a particular educational policy—in this case an intensive early childhood education program—increases political participation by increasing educational attainment. Later chapters of this project will systematically consider how other policies, practices, and contexts might have similar effects.

To this point it is clear that educational policies, practices, and context enter the conceptual framework through their effects on educational attainment. That, however, is not the only way these factors enter the framework. Education scholars have also spent significant time, energy, and resources examining how educational policies, practices, and context affect student achievement, or knowledge and skills. The list of policies, practices, and contexts that have been found to affect student achievement is nearly inexhaustible. Again, though, comprehensively cataloging the policies, practices, and contexts that have been shown to affect student achievement is unnecessary. At this point, it is only important to realize that an analysis of the

relationship between education and political participation must consider how educational policies, practices, and context might affect political participation through the mechanism of increased knowledge and skills.

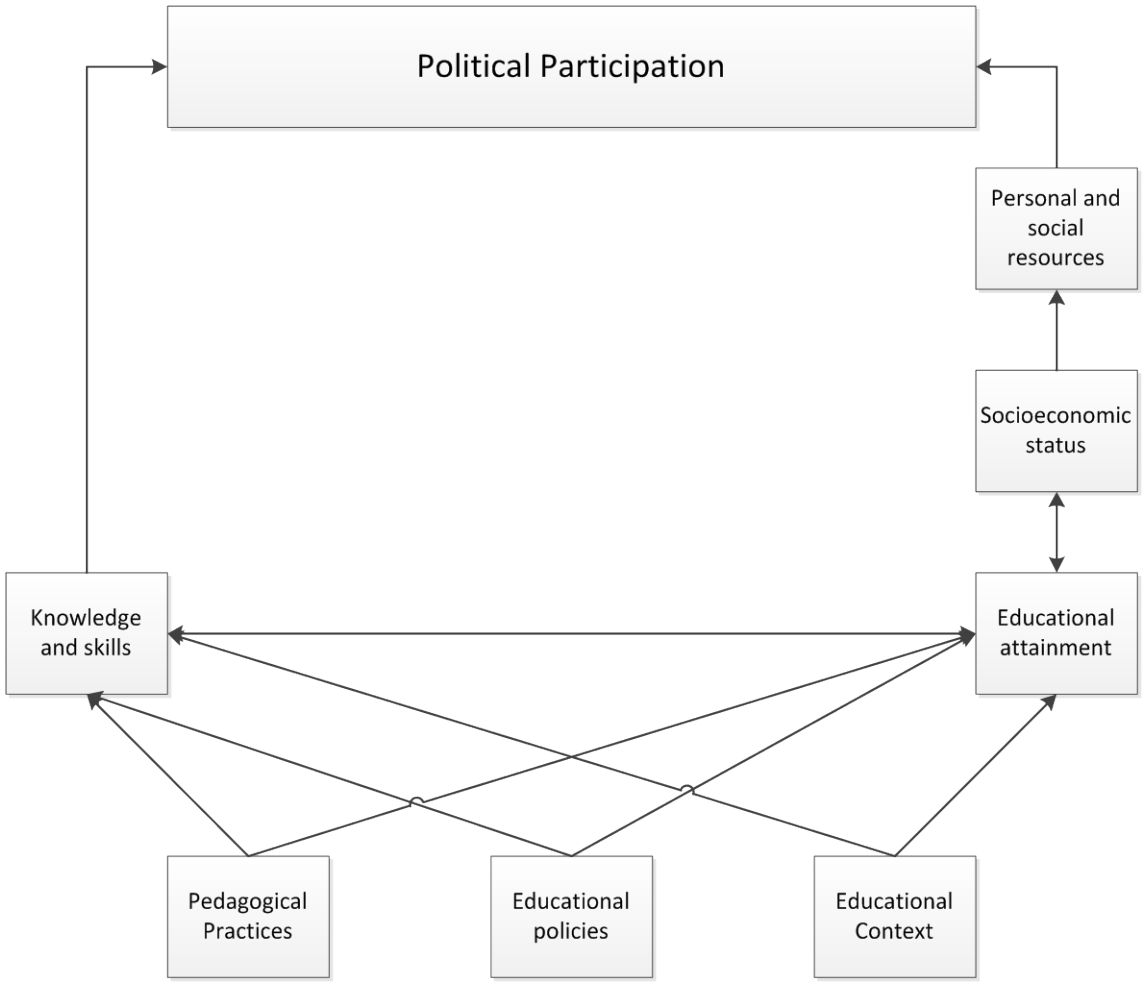
For a long time, based largely on work by Langton and Jennings (1968), conventional wisdom in political science held that schooling policies, practices, and contexts had little impact on political-related outcomes, specifically political knowledge. In recent years, beginning with the work of Niemi and Junn (1998), political scientists have begun to revise this conventional wisdom. Niemi and Junn (1998) found evidence that civics instruction does increase political knowledge. They also find that discussing current events in the classroom serves to increase knowledge even further. Since the publication of Niemi and Junn's work, there has been a small renaissance in research into the effect of schooling policies, practices, and contexts on political-related outcomes. Like Niemi and Junn, Conover and Searing (2000, p. 115) conclude that high school experiences, including formal civics education, "are clearly a factor in the evolution of the practice of citizenship". Similarly, Gimpel, Lay, and Schuknecht (2003) find that exposure to civics courses was associated with political discussion, political knowledge, and political efficacy. Finally, Bachner (2010) finds that completion of a high school civics/government course increases the predicted probability of voting in a post-high school election by 3-6 percentage points.

Other recent work has explored the effects of schooling context on civic engagement and political participation. Using data the from the longitudinal Youth-Parent Socialization Study as the basis for his analysis, Campbell (2006) finds that the "civic culture" of a high school is positively related to both participatory intentions while in high school as well as actual

participation at later points in individuals' lives. Campbell (2007; 2008) also examines the role of classroom diversity and classroom climate on behavioral outcomes. He concludes that an open classroom environment has a positive effect on adolescent civic knowledge, appreciation of political conflict, and intentions of becoming an informed voter. To the contrary, racial diversity results in less political discussion, which correlates with a lower likelihood of adolescents' intentions to become an informed voter. Lay (2007) presents evidence that school size has only a slight positive relationship with participation in extracurricular activities and volunteering.

Although all of these analyses provide important insight into the relationship between education and political participation, they do not do so in the context of a comprehensive, well-defined comprehensive framework. This does not mean, however, that analyses of this type cannot be incorporated into such a framework. Indeed, much of the work reviewed above suggests—implicitly or explicitly—that schooling policies, practices, and contexts either increase knowledge and skills directly, or increase political engagement through the mechanism of increased knowledge and skills. As such, the conceptual model is extended to allow schooling policies, practices, and context to affect political participation through increased knowledge and skills. The specific educational policies, practices, and contexts that will be analyzed will be more explicitly identified and detailed in later chapters. However, a sampling of the factors that will be examined include credit requirements, exposure to formal civics instruction, and the opportunity to participate in applied civic activities. Figure 2-4 presents a graphical depiction of the conceptual model with the incorporation of educational policies, practices, and context. It is clear that each of these factors affect both educational attainment and knowledge and skills, which in turn affect political participation.

Figure 2-4. A Conceptual Model of the Effect of Education on Political Participation



2.3.3. Considering Causal Heterogeneity

So far, the conceptual framework guiding this project has been developed in three distinct stages. First, the theoretical insights of existing work served as the basis for hypothesizing that educational attainment affects political participation through the twin mechanisms of socioeconomic status and increased levels of knowledge and skills. Second, the assumption of the exogeneity of educational attainment employed in nearly all previous work was relaxed,

allowing for educational attainment to both affect and be affected by socioeconomic status and knowledge and skills. Third, the conceptual framework was extended to allow room for educational policies, practices, and contexts to affect political participation by increasing educational attainment or by increasing knowledge and skills The fourth, and final, step in the development of the conceptual framework involves systematically incorporating and considering causal heterogeneity.

Causal heterogeneity is a vitally important—but oft-overlooked—aspect of social science research, particularly research with a policy-relevant dimension. By focusing solely on mean relationships, scholars and policy analysts can overlook important information. As an example, consider a generic policy evaluation where the policy of interest is found, on average, to have no effect on the outcome of interest. However, it could very well be the case that the finding of no mean effect is obscuring the fact that the policy has a large positive effect on one group of citizens, but a large negative effect on a second group of citizens. If such a case were true, the optimal policy recommendation might be to target the policy toward the group for whom it has a large positive effect. Such a recommendation would not be possible if the analysis focused solely on the average effect of the policy on the outcome of interest.

In the context of this project, there are several dimensions along which causal heterogeneity could reasonably be expected to occur. More specifically, it is reasonable to expect causal heterogeneity by 1) the mode of political participation, 2) the level of educational attainment, 3) the level of knowledge and skills, and 4) the socioeconomic characteristics of individuals. The reality of multidimensional causal heterogeneity is not only acknowledged, but systematically analyzed in this project.

The overarching goal of this project is to comprehensively examine the complex, multifaceted relationship between formal education and political participation. By this point, it is hopefully clear that education is not some monolithic entity, but rather a complex collection of skills, experiences, and relationships that individuals acquire throughout their formative years. Similarly, political participation is not a singular action, but a broad term encompassing a diverse set of actions and activities (Verba and Nie 1972; Verba, Schlozman, and Brady 1995). Registering to vote, voting, engaging in political discussions, attending campaign events, canvassing for candidates, and donating money to candidates are all—along with dozens of other actions and activities—modes of political participation. Each of these types of participation is influenced by a unique set of factors. For example, the main requirement for donating money to a candidate is the possession of fiscal resources while engaging in political discussions requires no fiscal resources, but does require at least a basic understanding of, and interest in, the subject of conversation. Given the unique features of each mode of political participation, coupled with the fact that the various facets of education may affect these features in different manners, it is reasonable to expect that the structural parameters relating education to political participation will vary by the mode of political participation.[7] The specific expectations regarding precisely how the relationship between education and the various modes of political participation might differ will be laid out in the relevant empirical chapters; at this point, it is only important to recognize that such heterogeneity is likely to be present.

[7] Although it is not termed as such, Nie, Junn, and Stehlik-Barry (2006) recognize that the effect of education on political participation is likely to vary by the mode of participation. Specifically, their sorting model of education is theorized to be most relevant for modes of participation that are based on some form of competition.

The second dimension along which causal heterogeneity is likely to be present is the level of educational attainment and its effect on political participation through the mechanism of increased socioeconomic status. Given the structure of the education system, and its relationship to social networks, the assumption of homogeneity in the effect of educational attainment on political participation implicit in much existing work is unrealistic. The education system in the U.S. is structured in a manner such that there are a number of generally recognized attainment milestones: high school graduation, attainment of a bachelor's degree, and perhaps completion of a professional or graduate degree. These attainment milestones translate to the composition of social networks; individuals tend to associate with others who have reached the same attainment milestone (i.e. high school dropouts associate with other high school dropouts, college graduates socialize with other college graduates, etc). As a result, expectations of linearity in the effect of educational attainment through the mechanism of increased socioeconomic status seem misguided. More likely is a scenario where completion of an attainment milestone exhibits a substantial positive effect on political participation through the mechanism of increased socioeconomic status, but completion of intervening years of education exhibits a much smaller effect, if it exhibits one at all.

In a similar vein, the effect of education on political participation through the mechanism of knowledge and skills—the third dimension along which heterogeneity is likely to occur—is also unlikely to be linear. Rather, it is reasonable to assume that there will be a diminishing marginal return to the acquisition of knowledge and skills with respect to their effects of political participation. Many forms of political participation require a minimum threshold of knowledge and skills in order to effectively participate. Upon reaching that threshold, acquisition of

additional knowledge and skills have only a small effect—or perhaps no effect at all—on the likelihood of participating.[8] Such a scenario implies nonlinearity in the relationship between knowledge and skills and political participation, an implication that will be systematically investigated in this project.

Finally, the effects of education on political participation are likely to vary by the socioeconomic characteristics of individuals. Educational policies, practices, and contexts designed to increase student knowledge have often been shown to have greater effects for subjects in which students receive relatively little exposure at home (i.e. mathematics) than for subjects in which students receive relatively more exposure at home (i.e. reading). Employing similar logic, it is reasonable to expect that educational policies, practices, and contexts will have a greater effect on political participation, at least through the development of knowledge and skills, for students who receive relatively little civic knowledge and skill development outside of the schooling environment. For analytic purposes, it is reasonable to expect that such students will be of lower socioeconomic status.

With the incorporation of causal heterogeneity, the development of the conceptual model guiding this project is complete. Of course, the conceptual model does not contain every conceivable factor that might affect political participation; this model is designed to present a straightforward representation of the relationship between education and political participation. To facilitate this straightforward representation, other factors that might affect political

[8] This phenomenon could be responsible for "Brody's Puzzle of Participation" where he notes that educational attainment is a very strong predictor of political participation, educational attainment has risen, but political participation has declined. Perhaps the attainment gains are occurring over and above the requisite threshold.

participation are excluded from the conceptual model, but will be included in all empirical models to the extent possible.

2.4. Research Questions and Outline of Empirical Chapters

A number of research questions flow naturally from the conceptual model presented above and systematic and comprehensive analysis of these questions serves as the basis of the empirical chapters that follow. The first of these empirical chapters will be devoted to examining how educational policies, practices, and contexts contribute to the development of knowledge and skills that facilitate political participation. In effect, it will investigate the lower left-hand portion of the conceptual framework. Among other questions, this chapter will analyze the relationship between civics knowledge and skills and the following three educational policies and practices: 1) Civics graduation credit requirements; 2) Civics coursetaking and instruction; and 3) Opportunity to participate in applied civic activities, specifically debate, mock trial, and student government. Given the emphasis on causal heterogeneity in the conceptual framework, all of these analyses will investigate whether the structural relationships vary across students with different socioeconomic backgrounds, with the hypothesis being that relationships are likely to be stronger for students who acquire civic knowledge and skills primarily at school, relative to students who may acquire some civic-related knowledge and skills in their home environment.

The analyses will be performed primarily using restricted-use data from the 2006 National Assessment of Educational Progress (NAEP) Civics Assessment. This dataset contains a wide variety of information for nationally-representative samples of 4^{th}, 8^{th}, and 12^{th} grade students. Specifically, it contains information on several dimensions of students' civic

knowledge and skills as well as in-depth information on civics-related policies, practices, and context. A detailed description of the dataset will be presented in the following chapter.

Taken as a whole, this chapter will provide substantial insight into how educational policies, practices, and contexts affect acquisition of knowledge and skills that facilitate political participation. It will provide evidence on which policies and practices are effective promoters of civic-related knowledge and skill acquisition and which are not. It will also illustrate potential heterogeneity in the relationship between educational policies, practices, and contexts and the acquisition of civics-related knowledge and skills.

Upon gaining an understanding of how educational policies, practices, and contexts affect the acquisition of civics-related knowledge and skills, this project will move on to analyzing how knowledge and skills affect political participation—the relationship depicted in the upper left-hand side of the conceptual framework. More specifically, this second empirical chapter will investigate the specific dimensions of knowledge and skills that are most effective at facilitating political participation. It will also investigate whether there is a threshold of knowledge and skills required for effective participation in specific political activities and, if so, whether acquisition of knowledge and skills above that threshold exhibits a diminishing marginal return with respect to the likelihood of political participation. Finally, despite the inherent difficulty of the task, the analysis will attempt to distinguish between knowledge and skills gained through educational attainment and those gained through educational policies, practices, and contexts.

These analyses will be conducted primarily using restricted-use data from the 2003 National Assessment of Adult Literacy (NAAL). The NAAL dataset contains valid and reliable measures of three dimensions of knowledge and skills—prose literacy, document literacy, and

quantitative literacy. It also contains several variables measuring acts of political participation, including voting in the 2000 presidential election, being registered to vote, and civic voluntarism. These measures will serve as the respective independent and dependent variables of interest in this portion of the project. This analysis will be conducted using data from the approximately 18,000 non-institutionalized respondents to NAAL that will be weighted to represent the entire U.S. household population age 16 and over of about 222 million in 2003. The analyses based on the NAAL data will be supplemented with analyses of High School and Beyond (HS&B), which surveyed a nationally-representative sample of sophomore in 1980 and followed them until 1992, when they were approximately 28 years of age. Relative to the NAAL dataset, HS&B contains a somewhat broader set of skill measures and similar measures of political participation. In concert, analyses of these different datasets will provide a comprehensive understanding of the role that knowledge and skills play in facilitating political participation.

As described above, the first two empirical chapters will focus almost exclusively on civics-related knowledge and skills—both their creation via educational policies, practices, and context and their effectiveness at facilitating political participation. In contrast, the third empirical chapter consists of a thorough description and analysis of the attainment-related effects of education. In particular, it will describe how educational policies, practices, and context can promote educational attainment and it will analyze the effect of educational attainment on political participation through the mechanism of greater personal and social resource availability resulting from increased socioeconomic status. In analyzing this effect there will be a heavy focus on potential causal heterogeneity. Specifically, as described above, the analysis will attempt to discern whether the effects of attainment on political participation are larger for

attainment milestones—high school graduation, earning a bachelor's degree, and perhaps earnings a graduate degree—than they are for completion of years of education between attainment milestones.

These analyses will be conducted using several longitudinal databases, including the 1979 cohort of the National Longitudinal Survey of Youth (NLSY79), High School and Beyond (HS&B), the National Education Longitudinal Study of 1988 (NELS:88), and the 1996 cohort of the Beginning Postsecondary Students study (BPS:96). These datasets, which will be described in detail in a later chapter, all contain the requisite measures of political participation, socioeconomic status, and educational attainment that allow for a high-quality analysis of the attainment-related effects on political participation via the mechanism of increased socioeconomic status.

Taken as a whole, the three empirical chapters described above will provide a wide-ranging, in-depth test of the conceptual framework developed in this chapter. In doing so, they will provide substantial insight into the complex, multifaceted relationship between education and political participation. In contrast to previous research that has focused almost exclusively on the correlation between educational attainment and political participation, this project will illustrate how the skills one acquires during formal schooling serve to influence individuals' political participation. It will demonstrate how the relationships one develops in school affect individuals' participation in the political process. It will exemplify how educational policies, practices, and contexts act to affect individuals' political engagement. Put simply, it will provide the most comprehensive understanding to date of the relationship between formal education and political participation

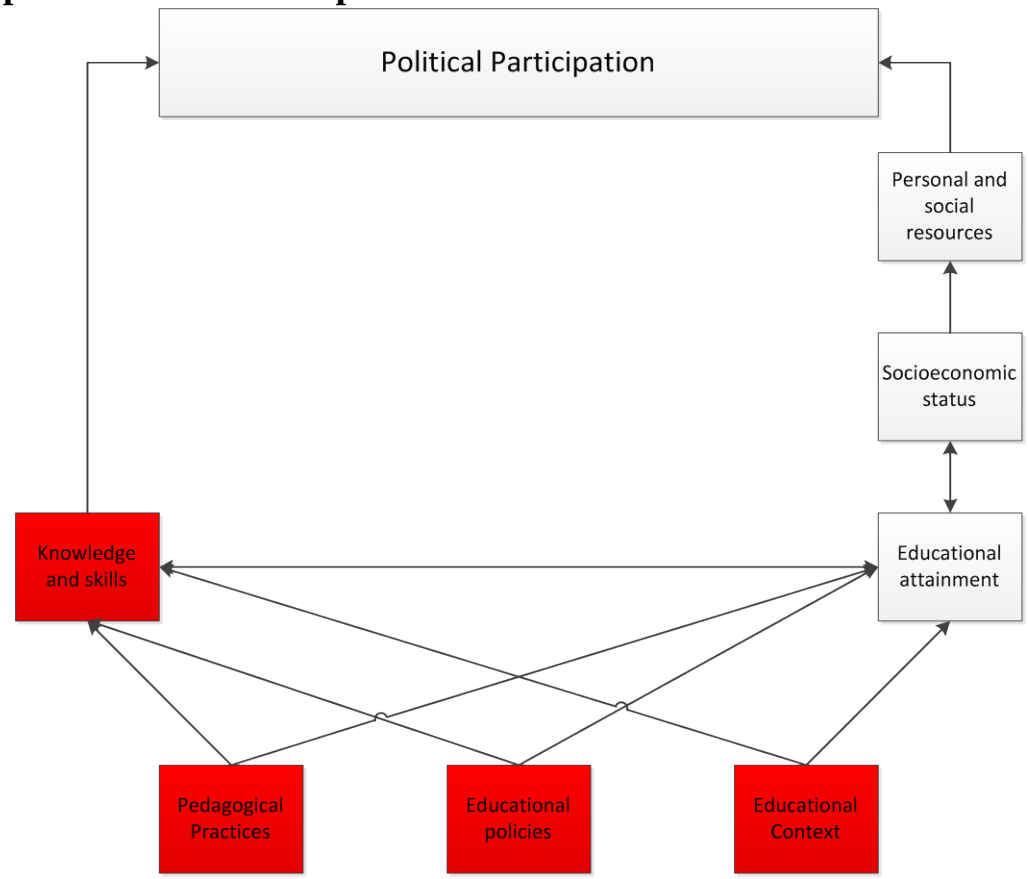
Chapter 3. The Effect of Educational Policies, Practices, and Context on Civic Knowledge and Skills

3.1. Introduction

The conceptual framework developed in Chapter 2 paints a complex, multidimensional portrait of the relationship between formal education and political participation. To provide a brief summary of its key features, the framework draws on existing scholarship in theorizing that educational attainment affects political participation through the twin mechanisms of increased knowledge and skills and increased socioeconomic status. However, unlike previous work, educational attainment is presumed to not only affect, but also be affected by each of these factors. In addition, educational attainment is hypothesized to be affected by educational policies, practices, and context. These factors—policies, practices, and context—are also expected to affect the level of individuals' civics-related knowledge and skills. Finally, underlying the whole framework is the consideration of causal heterogeneity, which is theorized to occur along several dimensions, including 1) the mode of political participation, 2) the level of educational attainment, 3) the level of knowledge and skills, and 4) the socioeconomic characteristics of individuals.

Given its breadth and complexity, efforts to empirically assess the full framework in a single, wide-ranging analysis would likely prove to be neither successful nor informative. Instead, a rigorous empirical analysis of the conceptual framework must proceed systematically, in a series of discrete stages that carefully analyze each aspect of the framework. This chapter represents the first stage in such an analysis. Specifically, by thoroughly analyzing the effects of educational policies, practices, and context on civics-related knowledge and skill acquisition, this chapter begins a rigorous, comprehensive evaluation of the conceptual framework depicted below. Employing a seldom-used—but very high-quality—dataset containing a wide-variety of information on nationally-representative samples of 4^{th}, 8^{th}, and 12^{th} grade students, this chapter applies several empirical approaches that support causal inference to explore how a number of visible educational policies, practices, and contexts—including credit requirements, civics coursetaking and instruction, and practical applications—affect acquisition of civics knowledge and skills. Figure 3-1 presented below provides a graphical depiction of the full conceptual framework, with boxes shaded in red illustrating the focus of this chapter.

Figure 3-1. A Conceptual Model of the Effect of Education on Political Participation: Focus of Chapter 3



Within this multidimensional conceptual framework, there are many places that an empirical evaluation could commence. It could begin by analyzing the direct link between an individual's level of knowledge and skills and their political participation. It could start by examining how educational attainment affects political participation through the mechanism of increased socioeconomic status. However, for two distinct reasons, this opening empirical chapter is devoted to analyzing the effect of educational policies, practices, and context on civics knowledge and skill acquisition. First, opening with these analyses highlights the policy relevance of this project. Educational policies, practices, and context are tangible aspects of the

education system that can be readily affected by policymakers. Research into the effects of educational policies and practices on other outcomes—mathematics achievement, reading achievement, and high school graduation, among others—has informed policy debates and spurred meaningful changes. The results presented in this chapter could bring evidence to bear on efforts to identify and implement the optimal educational policies and practices for preparing individuals to become informed citizens. Second, although a litany of political science research has examined the relationship between education and political participation, relatively little of it has focused on how educational policies, practice, and context affect political outcomes, including an individual's level of civics knowledge and skills. By highlighting this aspect of the framework, this opening empirical chapter hopes to illustrate the benefits of moving beyond attainment in analyses of the effects of education on individual-level political outcomes.

There are literally dozens of educational policies, practices, and context that could theoretically affect the acquisition of civic knowledge and skills, but the empirical analyses in this chapter focus on three dimensions of policy, practice, and context—1) Civics graduation credit requirements; 2) Civics coursetaking and instructional time; and 3) Opportunities to participate in applied civic activities—that were selected for two primary reasons. First, each of these dimensions represent a highly visible aspect of our education system and is designed provide students with a wide variety of knowledge and skills, including those necessary for effective democratic citizenship. Second, these dimensions of policy, practice, and context were selected because they can each be subjected to policy action, a necessary condition for the results of this project to have the potential to usefully inform a debate on how our education system might best prepare individuals to become effective contributors to our democracy. Furthermore,

aspects of these dimensions of policy, practice, and context—particularly civics coursetaking—have been the subject of previous research in political science and their effects remain debated in the literature. Additional evidence from a high-quality dataset analyzed using a variety of rigorous empirical techniques may help further this debate.

This chapter proceeds by first providing an in-depth description of the data that will be used as the basis for all analyses in this chapter. It then moves on to describing the specific policies, practices, and contexts that will be examined, detailing the empirical analyses that will be executed, and presenting the results of these analyses. The chapter concludes by discussing the implications of the results, both in the context of the conceptual framework and in the context education policy more broadly.

3.2. Data

Often referred to as "The Nation's Report Card", the National Assessment of Educational Progress (NAEP) has been used to measure student achievement in a wide variety of subjects—mathematics, reading, science, writing, U.S. history, world geography, civics, and economics—since the 1960s. These assessments occur on a regular cycle and are generally administered to nationally-representative samples of 4th, 8th, and 12th grade students with the results being used to gauge the level of student knowledge and skills across time and subjects.[9] The NAEP assessments—and the accompanying background data on students, teachers, and schools—are unparalleled in their breadth and depth, a feature that renders them optimal for an analysis of the relationship between educational policies, practices, and context on student knowledge and

[9] See http://nces.ed.gov/nationsreportcard/about/assessmentsched.asp for the previous and future schedule of NAEP assessments. In addition, NAEP assessments in certain subjects—reading, math, writing, and science—are designed to be representative at the state level, in addition to being nationally representative.

skills. As a result, all analyses in this chapter are conducted using restricted-use data from the 2006 administration of the NAEP Civics Assessment.

The design of the NAEP Civics Assessment is based on a framework developed by the National Assessment Governing Board (NAGB), which is a group of 26 individuals appointed by the U.S. Secretary of Education whose sole responsibility is to set NAEP policy.[10] The Civics Framework developed by NAGB recommends that the NAEP Civics assessment should measure of three primary dimensions: 1) Civic knowledge, 2) Intellectual and participatory skills, and 3) Civic Dispositions (U.S. Department of Education 2006). Within each of these primary dimensions, the framework lists a number of subcategories into which the assessment is organized. For the Civic Knowledge dimension of the framework, these subcategories—which are presented as questions—include:

- What are civic life, politics and government?
- What are the foundations of the American political system?
- How does the government established by the Constitution embody the purpose, values, and principles of American democracy?
- What is the relationship of the United States to other nations and to world affairs?
- What are the roles of citizens in American democracy?

The subcategories for the second dimension of the framework—Intellectual and participatory skills—are organized around three specific skills that the assessment should measure. They include:

- Identifying and describing;
- Explaining and analyzing; and
- Evaluating, taking, and defending positions.

[10] For more information on NAGB, see http://nces.ed.gov/nationsreportcard/about/nagb/

Finally, for the third dimension of the framework—Civics dispositions—there are five specific dispositions that the assessment is charged with measuring. These include:

- Becoming an independent member of society;
- Assuming the personal, political, and economic responsibilities of a citizen;
- Respecting individual worth and human dignity;
- Participating in civic affairs in an informed, thoughtful, and effective manner; and
- Promoting the healthy functioning of American constitutional democracy.

Guided by the framework, hundreds of multiple choice and constructed-response questions were developed to comprise the 4th, 8th, and 12th grade NAEP Civics Assessments.[11] The assessment is designed such that constructed-response questions consume approximately 40 percent of assessment time, with multiple choice questions consuming the remaining 60 percent. Upon development of the assessments, attention turned to sampling the students to whom the assessments would be administered. Like most nationally-representative surveys or assessments, NAEP employs a multistage sampling design.[12] To account for the complex sampling design in the estimation of coefficients and standard errors, all analyses in this chapter are conducted using the proper weights and sample design variables.

The NAEP Civics assessment was administered in the spring of 2006. Due to its length, each student did not take the complete assessment. Instead, each student answered two blocks of

[11] See http://www.nationsreportcard.gov/civics_2006/c0111.asp for sample questions from the 4th, 8th, and 12th grade 2006 NAEP Civics assessments.

[12] In the case of NAEP, the sampling design begins with schools being selected with a probability proportionate to the estimated number of students enrolled in the grade being assessed. In the second stage, students within selected schools are sampled to take the assessment. The public school sampling frame is the Common Core of Data (CCD). The private school sampling frame is the Private School Survey (PSS). A number of groups are deliberately oversampled to ensure that estimates for these subpopulations possess reasonable precision. Separate samples are selected for the 4th, 8th, and 12th grade assessments. The unweighted N for the 4th grade sample is approximately 7,000; the unweighted N for the 8th and 12th grade samples is approximately 9,200. After the samples have been selected, weights that permit the sample to reflect populations of interest are constructed. For more information on sampling, target populations, participation rates, weights, and other technical aspects of NAEP, see http://nces.ed.gov/nationsreportcard/tdw/

questions, with each block taking 25 minutes. The fact that each student does not take the full assessment has important implications for the analyses in this chapter. Because students do not take the full assessment there is not sufficient information to permit the calculation of individual-level scale scores. As a result, NAEP utilizes a method employed by a number of other large-scale assessments and surveys.[13] Specifically, instead of calculating individual-level scale scores, NAEP generates what are referred to as "plausible values" for each student. According to NAEP technical documentation, "A plausible value for an individual is not a scale score for that individual, but may be regarded as a representative value from the distribution of potential scale scores for all students in the population with similar characteristics and identical patterns of item response" (U.S. Department of Education 2008, 9).[14] As is standard practice in large-scale assessments utilizing this method, the NAEP dataset contains five plausible scale score values for each student.

The dependent variable in all analyses to follow is the five plausible values drawn from each student's distribution of potential scale scores. Although plausible values have several advantages over traditional point estimates of achievement—most notably reduced bias for population estimates and the incorporation of uncertainty stemming from imperfect measurement

[13] Examples include the Program for International Student Assessment (PISA), the Trends in International Mathematics and Science Study (TIMSS), and the third National Health and Nutrition Examination Survey (NHANES III).

[14] The idea underlying plausible values was drawn from Rubin's (1987) multiple imputation procedure designed to deal with missing data. Applied to NAEP assessments, the general idea is that because students do not take the full assessment it is not possible to observe their true ability, and associated scale score. However, it is possible to observe factors related to students' true abilities. Specifically, it is possible to observe students' responses to test items as well as their background and demographic characteristics. Observation of these factors can be leveraged to produce a conditional distribution of a student's ability, which can easily be transformed into a conditional distribution of a student's possible scale score. Random draws are then taken from each student's conditional, or posterior, scale score distribution and included in the NAEP dataset as plausible values. See Mislevy (1991) for additional details on the plausible values methodology employed in NAEP.

of student ability—they also introduce some practical complications. Specifically, instead of a single dependent variable, analysts of NAEP achievement data are effectively faced with five dependent variables that must be simultaneously analyzed. Luckily, statistical procedures have been developed to appropriately analyze data containing plausible values. Intuitively, these procedures apply a specified statistical procedure—a calculation of means, a cross tab, a regression, or any other procedure—to each of the five plausible values. Each application of the procedure returns a set of coefficients and standard errors. These sets of coefficients and standard errors are then combined, most often using a set of combination rules developed by Rubin (1987). All analyses in this chapter are conducted using appropriate procedures for analyzing data containing plausible values.

For each grade, the distribution of scale scores from which each student's plausible values are drawn has a theoretical range of 0-300, with means of 154, 150, and 151 for grades 4, 8, and 12, respectively. The standard deviation for each grade is approximately 35. By itself, the NAEP scale is arbitrary and relatively meaningless; instead of a scale ranging from 0-300, analysts could have easily constructed a scale that ranged from 0-600, 0-900, or any other range of values. Substantive meaning is imparted to the scale in two ways: 1) expert-defined achievement levels and 2) the creation of item maps.

NAGB, in consultation with expert panels, identifies three cutscores on the NAEP scale that result in the creation of four achievement levels—Below Basic, Basic, Proficient, and Advanced.[15] The cutscores used to define the achievement levels vary slightly by grade. For

[15] For definitions of the Below Basic, Basic, Proficient, and Advanced achievement levels for each grade, and for more information about NAEP Civic achievement levels generally, see http://www.nagb.org/publications/civicsbook.pdf

example, 4th grade students are defined as achieving at the Basic, Proficient, and Advanced levels if they score above 136, 177, and 215, respectively. For eighth graders, the comparable cutscores are 134, 178, and 213, respectively. At the 12th grade level, the cutscores defining the Basic, Proficient, and Advanced levels are 139, 174, and 204, respectively. In general, the distance between achievement levels is approximately 40 points on the NAEP Civics scale. This interval will prove useful in assessing the substantive significance of the results of the analyses that follow.

In addition to achievement levels, item maps are also used to ascribe substantive meaning to the otherwise arbitrary NAEP Civics scale. In this technique, test items are mapped onto different points of the test scale. Each item is mapped in a manner such that if a student answered the item correctly it provides an example of the knowledge and skills possessed by students performing at that part of the scale. The technique can perhaps best be illustrated by an example using the 4th grade NAEP Civics assessment. The item map created for this assessment demonstrates that a student with a scale score of 145 knows that only citizens can vote in the U.S. A student with a scale score of 154 is able to identify an illegitimate use of power. A student scoring at 243 recognizes that defendants have a right to a lawyer. Thus, the item map provides explicit examples of knowledge and skills possessed by students scoring at different parts of the scale.[16]

In addition to the measures of student ability described above, the NAEP datasets contain an extremely rich set of background characteristics for students, teachers, and schools. These

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[16] For the item maps created for the 4th, 8th, and 12th grade Civics assessments, see http://nces.ed.gov/nationsreportcard/itemmaps/index.asp

measures are instrumental in the analyses in this chapter as they serve as both the measures of policy, practice, and context, as well as important controls. Student-level background characteristics contained in the dataset include demographic measures that are standard in education datasets—sex, race, age, free- or reduced-price lunch eligibility, special education status, and English language learner status—as well as a number of less common, but very useful, measures. These additional measures include state of residence, urbanicity, mother's educational attainment, father's educational attainment, several variables designed to measure socioeconomic status,[17] several variables designed to measure student's home environment,[18] and the number of days the student was absent the previous month. In addition, the dataset also contains responses to a battery of questions asking the student about the NAEP assessment, including its difficulty, how much effort they exerted on the test, and the importance of doing well on the assessment. Finally, the 12th grade dataset contains measures of students' civics coursetaking histories.

The set of teacher background characteristics, which are contained in the 4th and 8th grade NAEP Civics datasets, is also extensive. It contains measures of teacher demographics, including race, experience—both overall experience and experience teaching social studies, the type of certification the teacher holds, the teacher's highest educational degree, their undergraduate major and minor, and their graduate major and minor (if applicable). In addition, there are several variables that measure aspects of social studies teaching. Specifically, there are

[17] These measures include receipt of a newspaper at home, receipt of a magazine at home, the number of books in the home, the presence of a computer at home, the presence of encyclopedias at home,

[18] These measures include the frequency that students discuss school with their parents, the amount of homework done by students, and language spoken at home.

variables measuring the amount of time spent on social studies and civics instruction, whether teachers only teach social studies/civics or whether they teach additional subjects as well, whether social studies/civics is taught as an integrated or discrete subject, the materials that teachers use in their teaching of social studies/civics, the pedagogical techniques that teachers employ when teaching social studies/civics, the methods that teachers use to assess social studies and civics knowledge.[19]

Like the student and teacher background characteristics, the set of school-level measures contains a rich set of variables measuring the schooling environment. Specifically, there are measures of school type, grade range, enrollment, student mobility, teacher mobility, student absenteeism, teacher absenteeism, and student retention-in-grade. In addition, there are several measures of the characteristics of the student body, such as the proportion of students who are:

- English language learners;
- Eligible for free- or reduced-price lunch;
- Eligible for Title I services;
- Gifted and talented;
- Recipients of instruction in a language other than English; and
- Recipients of special education services.

Finally, the NAEP datasets contain measures of the grades in which civics courses are offered as well as civics high school coursetaking requirements.

The NAEP Civics data are unparalleled in the breadth and depth of their measures of civics knowledge and skills, as well as in their measures of student, teacher, and school

[19] Specific social studies materials measured include textbooks, non-textbook readings, primary documents, quantitative data, computer software, films or videos, and materials from other subjects. Specific pedagogical techniques measured include completion of worksheets, receipt of lectures, participation in debates, participation in mock trials, writing letters, having visitors from the community, participation in community projects, accessing information via the internet, discussing current events, and participation in student government. Specific assessment methods include multiple choice, fill-in-the-blank, written paragraphs, projects, and essays.

characteristics that might affect civics knowledge and skills. Despite the appealing features of the NAEP Civics data, they are seldom used as the basis for scholarly analysis. In fact, Niemi and Junn's (1998) *Civic Education: What Makes Students Learn* is the only scholarly work that makes extensive use of the NAEP Civics data. Using data from the 1988 administration of the 8th and 12th grade NAEP Civics assessment, this book presents a descriptive analysis of what 8th and 12th graders know about civics and then move on to conduct multivariate analyses that attempt to isolate the effect of civics coursetaking on knowledge. The dependent variable in the multivariate analyses, however, is the percent of questions that students answered correctly. Although these analyses are informative, they do not make full or proper use of the NAEP Civics achievement data.

This chapter builds upon the work done by Niemi and Junn (1998) in two distinct ways. First, in addition to analyzing data on 8th and 12th grade students, it also examines how educational policies, practices, and context affect the civic knowledge and skills of 4th grade students. If civic education is similar to other dimensions of education, subject interest and achievement trajectories are determined well before middle and high school, making it important to examine what takes place in elementary school. Second, this chapter analyzes the NAEP Civics data using empirical approaches and statistical techniques that are better suited to the structure of the data and allow causal conclusions to be drawn with more confidence.

3.3. Policy, Practice, and Context

Literatures in education, public policy, and economics are replete with studies evaluating the effect of a given educational policy, practice, or context on a social, educational, or economic outcome of interest. Very few works, however, analyze the effects of educational policies,

practices, or contexts on political outcomes; the studies reviewed in the following section represent the exceptions. The relative paucity of attention to this class of relationships is likely due to data constraints, as opposed to questions of plausibility. The description of the 2006 NAEP Civics datasets illustrate that such constraints are not an issue in this project; these datasets contain substantial information on both policies, practice, and context as well as a relevant political outcome—student civic knowledge and skills. Consequently, this chapter comprehensively examines the effects of three dimensions of policy, practice, and context—1) Civics graduation credit requirements; 2) Civics coursetaking and instructional time; and 3) Opportunities to participate in applied civic activities. It begins by analyzing the effects of civics graduation credit requirements, an issue heretofore unexplored in the political science literature. It then moves on to estimating the effects of civics coursetaking, and instruction, which is a topic with a fairly long history in the political science literature. The final empirical analysis explores the effects of opportunities to participate in three applied civic activities—student government, mock trial, and debates—on civic knowledge and skills.

3.3.1. Credit Requirements, Coursetaking, and Amount of Civics Instruction

Within the relatively small body of research examining the effect of educational policies, practices, and contexts on political outcomes, the vast majority of work has analyzed the effect of formal civics coursetaking. For a long time, based largely on work by Langton and Jennings (1968), conventional wisdom in political science held that civics coursetaking had little impact on political-related outcomes, specifically political knowledge. In recent years, however, beginning with the work of Niemi and Junn (1998), political scientists have begun to revise this conventional wisdom. Using data from the 1988 administration of the NAEP Civics assessment,

Niemi and Junn (1998) found evidence that civics instruction does increase political knowledge, at least among 12th graders. Since the publication of Niemi and Junn's work, there has been a slight renaissance in research into the effect of schooling policies, practices, and contexts—including civics coursetaking—on political outcomes. Gimpel, Lay, and Schuknecht (2003) find that exposure to civics courses was positively associated with political discussion, political knowledge, and political efficacy. Similarly, Bachner (2010) finds that completion of a high school civics/government course increases the predicted probability of voting in a post-high school election by 3-6 percentage points. Finally, in the context of postsecondary education, Hillygus (2005) provides evidence that exposure to a social science curriculum while in college is predictive of future political engagement.

This section of the chapter follows in the footsteps of Langton and Jennings (1968) and Niemi and Junn (1998) in that it attempts to answer the first-order question of whether formal civics instruction, and related policies, result in increased levels of civics knowledge and skills. It does so in three distinct steps. First, it examines whether the primary policy lever related associated with high school civics coursetaking—state-level graduation requirements—affect students' levels of civics knowledge and skills. Second, it analyzes whether completion of civics courses affect students' civics achievement. This analysis possesses similarities to that of Niemi and Junn (1998), but it differs in two important ways—it uses the plausible values as the measure of civics achievement, not the percent of questions answered correctly, and it employs an empirical approach that allows causal conclusions regarding the effect of civics coursetaking on knowledge and skills to be drawn with more confidence. Finally, whereas the first two analyses in this chapter focus primarily on the high school level, the third analysis examines the

relationship between civics instructional time and civics achievement among 4th and 8th grade students. This aspect of the analysis will provide among the first evidence into whether formal civics instruction increases the civics knowledge and skills of elementary and middle school students.

Civics Graduation Credit Requirements- State Level

Graduation credit requirement policies have a long history in the U.S. education system. As early as 1932, 34 states had enacted policies specifying a set of coursework that students must complete in order to graduate from high school (Wright 1956; Carlson and Planty forthcoming). These policies were intended to ensure that students were exposed to a set of courses that provided them with the skills necessary to be effective contributors to society. Over time, and especially after the National Commission on Excellence in Education released *A Nation At Risk: The Imperative for Education Reform* in 1983, graduation credit requirements became a policy lever to which states routinely turned in attempts to increase student achievement. Although credit requirement policy actions have focused most heavily on the subjects of reading and math, many states have specified the number of credits in civics, and social studies more generally, that students must complete in order to graduate from high school. Table 3-1, below, presents the number of states with each level of civics credit requirements in 2006. The table illustrates that 15 states did not require students to take a civics courses in order to receive a high school diploma and an additional 25 states only required completion of a single course.

Table 3-1. Number of States, by Level of Civics Graduation Credit Requirement: 2006

Credit Requirement	Number of States
0	15
0.5	25
1.0	9
1.5	2

Note: Includes District of Columbia. Credits are presented as Carnegie Units. A Carnegie unit is defined as 120 hours of instruction in one subject, an amount of instruction generally achieved over the course of one school year.

Source: Education Commission of the States

To estimate the effect of state-level civics graduation credit requirements on students' civics knowledge and skills, this analysis exploits the cross-state variation in civics requirements. However, it does not simply regress 12th graders' NAEP Civics achievement measures on state credit requirements and a set of control variables. Rather, it leverages the fact that the NAEP Civics assessment was administered to nationally-representative samples of both 8th and 12th graders and conducts a difference-in-differences analysis.

Difference-in-differences techniques can be used when there are observations for two groups—one of which was subjected to a specific policy and a second that was not—both before and after the policy went into effect. In the context of this analysis, there is a group of students in states with civics credit requirements and a group of students in states with no civics credit requirements. There are also observations for individuals in both groups of states at time points prior to experiencing the policy (8th grade) and after experiencing the policy (12th grade). At the most basic level, the difference-in-differences estimator is the average change in the outcome for the treatment group minus the average change in the outcome for the control group. That is:

$$DD = \left(\overline{Y}_{t2} - \overline{Y}_{t1}\right) - \left(\overline{Y}_{c2} - \overline{Y}_{c1}\right) \quad (3\text{-}1)$$

In equation 3-1, Y-bar represents average civics achievement, *t* and *c* index the treatment group (requirements) and control group (no requirements), respectively, and *1* and *2* index the time period prior to which students were affected by the policy (8th grade) and the time period after which individuals were affected by the policy (12th grade). An appealing feature of the difference-in-differences approach is its ability to control for period-invariant characteristics, observed or unobserved. In the case of this analysis, the difference-in-differences approach controls for all unobserved factors of the educational system, such as quality, that do not vary between 8th and 12th grade. Of course, it may not be the case that all potential confounding factors are invariant across periods. Luckily, difference-in-differences analyses can also be conducted in a regression framework, which allows for observed factors that vary across periods to be included in the model; such is the approach used for the difference-in-differences analysis in this chapter. Specifically, the following model is estimated:

$$Y_{igt} = \gamma T_{ig} + \lambda P_{it} + \delta\left(T_{ig} \times P_{it}\right) + \boldsymbol{\phi X_{igt}} + \boldsymbol{\rho S_{igt}} + \varepsilon_{igt} \qquad (3\text{-}2)$$

In this model, *i*, *g*, and *t* index individuals, groups—high or low requirements, and periods—8th grade or 12th grade, respectively. In addition, *Y* represents the plausible values measuring NAEP Civics achievement, *T* represents an indicator variable for a case being in the group subject to credit requirements and *P* represents an indicator variable for 12th graders. The coefficient on the interaction between the interaction of the requirement dummy and the 12th grade indicator—represented by δ in equation 3-2—is the difference-in-differences estimate. Finally, ***X*** and ***S*** represent vectors of student and school characteristics, respectively, that are

included as covariates in the model, and ε is an error term.[20] In addition to eliminating threats of bias from observed period-varying factors, inclusion of variables measuring student and school characteristics can also serve to increase the precision of the difference-in-differences estimate. See Angrist and Pischke (2009) for a more thorough treatment of difference-in-differences analysis.

The model presented in equation 3-2 is estimated using OLS over the pooled 8th and 12th grade NAEP Civics data. As noted above, it is estimated using the proper weights and sampling design variables, with the five plausible values serving as the measure of civics achievement. The model is estimated using techniques designed to account for the use of plausible values as the outcome measure.[21] Results from the estimation of this model can be found in Table 3-2, below. This table presents results for the first three terms of equation 3-2—the treatment group indicator, the 12th grade indicator, and the difference-in-differences estimate; results for the variables contained in the vectors of student and school characteristics are available upon request.

[20] Variables contained in the vector of student characteristics include measures of sex, race, mother's education, importance of doing well on NAEP, difficulty of the NAEP assessment, effort exerted on NAEP, urbanicity, English language learner status, disability status, age, number of books in the home, presence of a computer at home, amount of homework done each night, time spent talking to parents about school, home language, and the number of days absent. The vector of school-level characteristics contains variables measuring enrollment, racial composition of the student body, school type, the percent of the student body with limited English proficiency, student absenteeism, student mobility, Title I status of the school, the percentage of the student body eligible for free- or reduced-price lunch, and the percentage of the student body receiving special education services.

[21] Specifically, it is estimated using Stata 11's "mi: estimate" command.

Table 3-2. Coefficient and standard errors from difference-in-differences model estimating the effect of credit requirements on student achievement

Variable	Coefficient (S.E.)
Treatment group	0.100
	(1.21)
12^{th} grade	-7.36***
	(1.57)
Difference-in-differences estimate	0.06
	(1.73)

Note: *$p < .10$; **$p < .05$; ***$p < .01$. The N is 16,513.

The results illustrate that state credit requirements have no effect on 12^{th} graders' civics achievement. In addition to being statistically insignificant, the point estimate on the difference-in-difference term is effectively zero. Interestingly, the conditional mean score for 12^{th} graders is over 7 points lower than the conditional mean score for 8^{th} graders. Results for the variables contained in the vectors of student and school background characteristics are largely in line with expectations and prior research. As noted above, full results are available upon request.

In the analysis presented above, students were considered to be in the treatment group if they resided in a state that required at least one semester of civics in order to graduate from high school while students were considered to be in the control group if they were subject to no state requirements. Although the definitions of the treatment and control groups employed above are the most natural, other definitions are possible and should be examined. Consequently, equation 3-2 was estimated using a second definition of treatment and control groups. In this analysis, students were considered to be in the treatment group if they resided in a state that required at least one full year of civics in order to graduate from high school while students were considered

to be in the control group if they were required to complete less than one year of civics in order to graduate. The results of this analysis are substantively similar to those presented in Table 3-2; state credit requirements are again estimated to have no statistically significant effect on 12th grade students' levels of civics knowledge and skills. Full results from the second analysis are available upon request.

Civics Coursetaking

Graduation credit requirements are a policy lever that states routinely use to try to increase achievement, but the results presented above indicate that requirements alone—at least in their current form—do not result in increased levels of knowledge and skills. In addition, other studies have shown that students are routinely allowed to graduate from high school without fulfilling all graduation credit requirements (Carlson and Planty forthcoming). Consequently, analyzing the effect of credit requirements on civics achievement is not equivalent to analyzing the effect of coursetaking on civics achievement; this section of the chapter is devoted to conducting the latter analysis.

The Grade 12 NAEP Civics dataset contains student-level measures of high school civics coursetaking by grade. More specifically, it contains a measure of whether a student took a civics or government course in 9th grade, a measure of whether a student took a civics course in 10th grade, a measure of whether a student took a civics course in 11th grade, and a measure of whether a student took a civics course in 12th grade. The top panel of Table 3-3, below, presents the proportion of students that report taking a civics or government course in each of grades 9-12. The four grade-specific variables were summed to construct a measure of the number of years that a student took a civics or government in high school. This variable serves as the basis

for the analysis of the effect of coursetaking on students' levels of civics knowledge and skills. The middle panel of Table 3-3 presents the proportion of students who took zero, one, two, three, and four years of civics or government courses during high school. The mean number of years in which students took a civics or government course is 1.8. Finally, as described in further detail below, any analysis of the effect of civics coursetaking on civics achievement should control for the time that has elapsed since students took their last civics course. Consequently, a series of variables were developed that indicate whether student's most recent civics course was in 12th grade, 11th grade, 10th grade, 9th grade, or not applicable. The bottom panel of Table 3-3 presents the percent of students falling into each category.

Table 3-3. Percentage of students taking a civics/government course in each of grades 9-12, total years of civics/government coursetaking, and recency of civics/government coursetaking: 12th grade students

Variable	Percent
	Grade of Civics Coursetaking
Took course in 9th grade	35.9
Took course in 10th grade	37.7
Took course in11th grade	47.8
Took course in 12th grade	65.0
	Yrs. Of Civics Coursetaking
Zero years of civics/gov't	5.1
One year of civics/gov't	46.6
Two years of civics/gov't	18.8
Three years of civics/gov't	15.7
Four years of civics/gov't	13.7
	Recency of Civics Coursetaking
Last course in 12th grade	65.0
Last course in 11th grade	18.8
Last course in 10th grade	6.1
Last course in 9th grade	5.0
Last course NA	5.1

Multiple analyses are performed to examine the relationship between civics coursetaking and students' levels of civics knowledge and skills. The first analysis is similar to that of Niemi and Junn (1998) in that it regresses civics achievement on the measure of civics coursetaking, a measure of the amount of time since students took their last civics course, and a set of control variables. More formally, the following model is estimated:

$$Y_{is} = \gamma C_{is} + \boldsymbol{\tau R_{is}} + \boldsymbol{\phi X_{is}} + \boldsymbol{\rho_s} + \varepsilon_{is} \quad (3\text{-}3)$$

In this model, *i* and *s* index individuals and schools, respectively. In addition, *Y* represents the plausible values measuring NAEP Civics achievement, *C* represents the measure of civics coursetaking described above, and $\boldsymbol{R}$ represents a vector of indicator variables measuring the amount of time that has elapsed since students took their last civics course.[22] Finally, $\boldsymbol{X}$ represents a vector of student characteristics, $\boldsymbol{\rho}$ is a school fixed effect, and ε is an error term.[23] The model is estimated over the 12th grade NAEP Civics data using OLS and, like the previous models, employs the proper weights, sampling design variables, and techniques to account for the multiply imputed nature of the achievement measures.

Results from the estimation of this model reveal that civics coursetaking has a positive, statistically significant effect on 12th graders' NAEP Civics achievement. Specifically, conditional on the contents of the model presented in equation 3-3, each additional year of civics

[22] Specifically, the series of dummy variables indicate whether students took their last civics/government course in 12th grade, 11th grade, 10th grade, 9th grade, or if they never took a civics/government course during high school.

[23] Although the model is similar to that used by Niemi and Junn (1998), it is not identical as Niemi and Junn do not include school fixed effects. The 12th grade NAEP Civics data do not contain measures of teacher characteristics. Variables included in the vector of student background characteristics include sex, race, mother's education, importance of doing well on NAEP, difficulty of the NAEP assessment, effort exerted on NAEP, English language learner status, free or reduced-price lunch status, disability status, age, number of books in the home, presence of a computer at home, presence of a newspaper at home, presence of a magazine at home, presence of an encyclopedia at home, amount of homework done each night, time spent talking to parents about school, home language, AP Civics coursetaking, long-term educational goals, and the number of days absent.

coursetaking was estimated to increase achievement on the NAEP Civics assessment by a little less than one scale score point—0.89 scale score points to be exact. So, while the effect is statistically significant, it is fairly small substantively. To provide an illustration of the magnitude, a student who takes zero years of civics coursework is estimated to score about four scale score points lower than a student who takes four years of civics coursework. This magnitude corresponds to a little more than 0.1 standard deviations of the Grade 12 NAEP Civics scores.

In spite of the inclusion of the control variables in equation 3-3, it is possible that unobserved factors correlated with civics coursetaking, such as interest in politics, could be biasing the coefficient estimate on the coursetaking variable. That is, the estimated relationship between civics coursetaking and civics achievement may be spurious. Altonji, Elder, and Taber (2005) have developed a method for gauging the potential role of selection bias in an observational context. Under a set of assumptions, the authors' method permits the calculation of a point estimate and standard error of the bias resulting from selection on unobservables.[24] That bias estimate can then be used to calculate the ratio of selection on unobservables to selection on observables that would be required to account for the observed relationship between the treatment—civics coursetaking—and the outcome—NAEP Civics achievement.

[24] Specifically, the method for estimating the bias is valid under the condition that selection on unobservables is equal to selection on observables. Slightly more formally, it is valid under the condition that the covariance of the treatment and the mean of the distribution of the index of observables is the same as the covariance of the treatment and the mean of the distribution of the index of unobservables, after adjusting for differences in the variance of the distributions. This condition requires some assumptions, including 1) that the set of observed variables is chosen at random from the full set of variables that determine civics coursetaking and NAEP Civics achievement, and 2) that the number of observed and unobserved variables is large enough that none of the elements dominates the distribution of civics coursetaking or NAEP Civics achievement. In this application, I estimated the model in equation 3-3, which contains a large number of observable characteristics. Even so, it is unlikely that the necessary assumptions will be perfectly met, and thus the required condition is unlikely to hold exactly. That said, the resultant bias estimate can certainly convey useful information.

Obtaining a bias estimate using the method developed by Altonji, Elder, and Taber (2005) begins with the assumption that selection on observables is equal to selection on observables. More formally, in the context of this application, the condition can be written as:

$$\frac{cov(C_i, \boldsymbol{\delta O_i})}{var(\boldsymbol{\delta O_i})} = \frac{cov(C_i, \varepsilon_i)}{var(\varepsilon_i)} \quad (3\text{-}4)$$

In this expression, *i* indexes students, *C* represents the measure of civics coursetaking in equation 3-3, $\boldsymbol{\delta O_i}$ represents the index of observable characteristics—the $\boldsymbol{\tau R}$, $\boldsymbol{\phi X}$, and $\boldsymbol{\rho}$ terms—in equation 3-3, and ε_i is the error term from equation 3-3. Elder and Jepsen (2011) note that of the four terms in this expression, all except $cov(C_i, \varepsilon_i)$ can be obtained through estimation of equation 3-3 under the restriction that that γ=0 (i.e. there is no treatment effect). However, combining the three estimable terms into equation 3-4 allows for the identification of the fourth term—$cov(C_i, \varepsilon_i)$. An estimate of the covariance between civics coursetaking and the index of unobservables permits calculation of an estimate of the bias of the OLS estimate of civics coursetaking in equation 3-3. This bias estimate can than be compared to the OLS estimate to calculate a ratio of selection on unobservables to selection on observables that would be required to account for the entire observed relationship between the treatment—civics coursetaking—and the outcome—NAEP Civics achievement.

Execution of this method returns a bias estimate of 0.124. The positive sign on the bias estimate indicates that unobserved factors are indeed likely resulting in an upwardly biased estimate of the effect of civics coursetaking on NAEP Civics achievement. However, the ratio of the OLS estimate for civics coursetaking—0.89—to the bias estimate—0.124—is 7.19. This implies that selection on unobservables would need to be over seven times stronger than

selection on observables to account for the full effect of civics coursetaking on NAEP Civics achievement. Given the rich array of observable characteristics, it is unlikely that selection on unobservables is over seven times stronger than selection on observables. As a result, it seems highly likely that civics coursetaking has at least some positive effect on NAEP Civics achievement.

To provide additional assurance that the estimated relationship between civics coursetaking and 12th grade NAEP Civics achievement is not spurious in nature, a further sensitivity analysis is conducted. The Grade 12 NAEP Civics dataset contains a school-level variable measuring the number of civics/government credits that are required to graduate from that high school. This measure was used to identify students who took the minimum number of civics/government credits required to graduate from their high school. Then, equation 3-3 is estimated over the subsample of students who took the minimum number of civics/government courses required to graduate. By restricting the sample to students who took the minimum number of civics/government courses required for graduation, concerns of endogeneity stemming from the self-selection of students who are interested in politics into civics/government courses are mitigated.

Estimation of equation 3-3 over the restricted sample further confirms that high school civics coursetaking has a positive effect on NAEP Civics achievement. Indeed, the coefficient on the variable measuring civics coursetaking is 1.64 and highly statistically significant. The fact that the coefficient on civics coursetaking is nearly twice as large when equation 3-3 is estimated over the restricted sample as it is when equation 3-3 is estimated over the full sample suggests that civics coursework may be disproportionately beneficial to students who take civics

courses to meet requirements (i.e. are not very interested in politics/civics). Such a scenario is sensible; students who are very interested in politics are likely to score well on the NAEP Civics test regardless of whether they take a formal civics course because they are likely to acquire civics knowledge and skills outside of the classroom. This is less likely to be true for students who do not have significant interest in politics; a greater proportion of their civics knowledge and skills is likely to come from classroom instruction. Below, Table 3-4 summarizes the major findings from the analyses in this section.

Table 3-4. Summary Table of Results from Analyses of Relationship Between Civics Coursetaking and NAEP Civics Achievement

Variable	**Coefficient (S.E.)**
Full Sample	
Years of civics coursetaking	0.89**
	(0.40)
Selection on Observables/Unobservables Analysis- Full Sample	
Bias estimate	0.12***
	(0.01)
Ratio of selection on unobservables to selection on observables necessary to eliminate entire effect	7.19 NA
Restricted Sample	
Years of civics coursetaking	1.64***
	(0.61)

Note: *$p < .10$; **$p < .05$; ***$p < .01$. Full results from all analyses are available upon request. The N for the full sample analysis is 9,148. The N for the restricted sample analysis is 4,898.

Taken as a whole, it is clear that high school civics coursetaking has a positive, significant effect on NAEP Civic achievement. This finding, which held up under multiple sensitivity analyses, is consistent with the findings of Niemi and Junn (1998) and suggests that

formal civics coursework is a tool that can be used to increase the level of civic knowledge and skills among American high school students. Moreover, there is evidence that formal civics courses may have a disproportionately large benefit on the civic knowledge and skills of students who may not be exceedingly interested in politics or civics, and take civics courses solely to meet graduation requirements.

Amount of Civics Instruction: 4th and 8th grade

Although the existing literature in political science has focused primarily on estimating the effect of high school civics coursetaking on civics knowledge and skills, there is no reason to believe that the positive impact of civics instruction on civic knowledge and skills will be confined to the high school level. To the contrary, there are reasons to suspect that the effect of civics instruction on students' knowledge and skills will be even stronger at the elementary and middle school levels than at the high school level. Indeed, research has demonstrated that economic returns to schooling investments decline as students age (Heckman 2006; Carneiro and Heckman 2003). In light of this fact, it is reasonable to expect that civic returns—including knowledge and skills—to schooling investments and interventions may also decline as students age. Consequently, it is important to analyze the effect of civic instruction on civic knowledge and skills not only for high school students, but also for students in middle school and elementary school. The remainder of this section is devoted to conducting such an analysis.

Information from the 4th and 8th grade NAEP Civics datasets is used to estimate the effect of civics instruction on the civic knowledge and skills of elementary and middle school students. At each grade level, teachers of the sampled students were asked to estimate the amount of time they spend on social studies instruction in a typical week. They were also asked to estimate, of

the amount of time spent on social studies instruction, the proportion that was devoted to civics/government instruction. Taken together, the information contained in these two variables can be used to construct a measure of the amount of time spent on civics instruction in a typical week.

The variable measuring the amount of time spent on social studies instruction is categorical in nature in the NAEP dataset. That is, it consists of five ranges of values (e.g. 0-29 minutes of social studies instruction, 31-60 minutes of social studies instruction, etc.). As a result, some method must be used to transform the categories that teachers selected into the underlying metric, minutes of instruction. Choosing the midpoint of the relevant range is common practice in such situations, but a different approach is employed in this analysis. Specifically, the amount of time spent on social studies instruction was estimated by randomly drawing a value from a uniform distribution spanning the range of values that correspond to the relevant category of the variable. For example, if a teacher indicated that she spent 0-29 minutes on social studies instruction, then a value was randomly drawn from a uniform distribution that spanned 0-29 minutes. Such an approach incorporates naturally occurring variation to an extent that the selection of a specific point does not.

Similarly, the variable measuring the proportion of time devoted to civics/government instruction is categorical in nature with six ranges of values. As a result, the approach described above—randomly drawing a value from a uniform distribution spanning the range of relevant values—is used to estimate the proportion of time devoted to civics/government instruction. After generating estimates for the amount of time spent on social studies instruction and the proportion of time devoted to civics/government instruction, the two values were multiplied to

provide an estimate of the amount of time spent on civics/government instruction. The resulting variable was then logged to address the non-normal nature of the distribution. This variable—the natural log of the amount of time spent on civics instruction—plays a prominent role in the analyses that follow. Table 3-5, below, presents summary statistics for the amount of time spent on social studies instruction, the proportion of time devoted to civics instruction, and the amount of time spent on civics instruction for 4th and 8th grade students. Interestingly, 4th grade students receive, on average, only about 20 minutes of civics instruction per week while 8th graders receive over an hour. For both grades, only about 20-25 percent of social studies instructional time is spent on civics/government-related instruction.

Table 3-5. Summary Statistics for Variables Measuring Instructional Time: Grades 4 and 8

Variable	Mean	Std. Dev.	Min.	Max.
		4th Grade		
Amt. of soc. stud. instruction	107.7	57.2	0	240
Proportion of time civics	18.5	19.7	0	100
Amt. of civics instruction	21.3	29.1	0	226
		8th Grade		
Amt. of soc. stud. instruction	311.5	117.4	2	600
Proportion of time civics	27.9	25.6	0	100
Amt. of civics instruction	86.2	91.9	0	590

Upon construction of the variable measuring the amount of time spent on civics instruction, the following model was used to estimate its' effect on the civic knowledge and skills of 4th and 8th grade students:

$$Y_{ias} = \gamma C_{ias} + \boldsymbol{\phi X_{ias}} + \boldsymbol{\psi A_{ia}} + \boldsymbol{\rho S_{is}} + \varepsilon_{ias} \quad (3\text{-}5)$$

In this model, *Y* represents the plausible values measuring NAEP Civics achievement, *i*, *a*, and *s* index individuals, teachers, and schools, respectively, *C* is the variable measuring the

natural log of the amount of time spent on civics instruction, $\boldsymbol{X}$ represents a vector of observable student characteristics, $\boldsymbol{A}$ represents a vector of observable teacher characteristics, $\boldsymbol{S}$ is a vector of observable school characteristics, and ε is an error term.[25] This model was estimated via OLS using the proper weight and sampling design variables; it was estimated separately for students in 4th and 8th grade.

Results from estimation of the model presented in equation 3-5 are detailed in Table 3-6, below. The results indicate that the amount of time spent on civics instruction has a positive and statistically significant effect on the NAEP Civics achievement of both 4th and 8th graders. In line with expectations, the estimated effect of time spent on civics instruction is larger—nearly 1.7 times larger—for 4th grade students than it is for 8th grade students. Substantively, the results imply that doubling civics instruction will result in an increase of about 0.6 scale score points for 4th grade students and a little more than one-third of a scale score point for 8th grade students. A tripling of civics instruction would increase NAEP Civics achievement for 4th graders by approximately one scale score point; the analogous effect of such an increase on 8th grade NAEP Civics achievement would be about 0.6 scale score points. Although a tripling of civics instruction may sound like a dramatic increase, such an action would only result in, on average, about one hour of civics instruction per week for 4th grade students. Such an increase at the 8th

[25] Contained in the vector of individual-level characteristics are variables measuring sex, race, mother's education (8th grade only), state of residence, importance of doing well on NAEP, difficulty of the NAEP assessment, effort exerted on NAEP, urbanicity, English language learner status, disability status, age, number of books in the home, presence of a computer at home, amount of homework done each night, time spent talking to parents about school, and the number of days absent. Included in the vector of teacher characteristics are variables measuring teacher race, experience, type of certification, and highest degree. The vector of school-level characteristics contains variables measuring enrollment, racial composition of the student body, school type, the percent of the student body with limited English proficiency, student absenteeism, teacher absenteeism, student mobility, Title I status of the school, the percentage of the student body eligible for free- or reduced-price lunch, the percentage of the student body receiving special education services, and the percentage of the student body receiving gifted and talented services.

grade level would result in about five hours of civics instruction per week, or about an hour per day. Given the current education policy context in the United States, such an increase is unlikely to be practical at the 8th grade level. Taken together, the results suggest that any increases in civics instruction are most realistic at the 4th grade level and that such increases would likely result in meaningful increases in students' levels of civics knowledge and skills.

As has been the case with previous analyses, results for the variables contained in the vectors of student and school background characteristics are largely in line with expectations and prior research. Full results are not tabled in the body of the paper, but are available upon request.

Table 3-6. Coefficients and standard errors for natural log of minutes of civics instruction from models predicting NAEP Civics achievement

Variable	Coefficient (S.E.)
	8th Graders
Natural log of minutes of civics instruction	0.52***
	(0.17)
	4th Graders
Natural log of minutes of civics instruction	0.88***
	(0.21)

Note: *$p < .10$; **$p < .05$; ***$p < .01$. The Ns for the 8th and 4th grade analyses are 7,091 and 5,811, respectively.

Summary and Discussion

Four main findings have emerged from the analyses in this section of the chapter. First, civics graduation credit requirements have no impact on students' level of civic knowledge and skills. The relative ineffectiveness is likely attributable to two primary factors. First, credit requirements are so minimal that they are below the effective floor of student civics/government coursetaking. Table 3-1 illustrates that 40 states only require students to complete zero or one

semesters of civics coursework in order to graduate from high school. Table 3-3 reveals that nearly 95 percent of students take at least one year of civics/government coursework, with over 45 percent taking two or more years of coursework. For any policy to be effective, it must change the behavior of the individuals it is intended to affect. Given that student's civics coursetaking generally exceeds the state-mandated requirements, the policy is unlikely to induce any significant behavioral change, and is thus unlikely to have any discernible effect on student achievement. Second, even if civics credit requirements are able to induce behavioral changes among students, recent studies have found that graduation credit requirements are often poorly implemented and enforced (Carlson and Planty, forthcoming). That is, students are routinely allowed to graduate without meeting all requirements. It is difficult for a policy to have a meaningful impact if its provisions are not rigorously enforced.

The second main finding emerging from this section of the chapter is the positive effect of civic high school coursetaking on NAEP Civics achievement. For the full sample, each additional year of civics/government instruction was estimated to increase NAEP Civics achievement by a little less than one scale score point; the results were even stronger when the sample was restricted to students who took the minimum number of civics courses required to graduate from their high school. Sensitivity analyses indicate that the finding is unlikely to be able to be attributed to unobserved factors. Although the statistical significance of these results is clear, the substantive significance is less so. One common method for assessing the substantive significance of a finding is the calculation of an "effect size", which is the ratio of the coefficient estimate to the standard deviation of the outcome measure. In this case, an additional year of high school coursework is estimated to increase NAEP Civics achievement by about one

scale score point, which when coupled with the standard deviation of 35 scale score points, corresponds to an effect size of about 0.03 standard deviations. An effect size of this magnitude is generally considered to be small. A second method that can be used to assess the substantive significance of the results involves using the NAEP achievement levels. As described earlier, the interval between achievement levels is in the neighborhood of 35 to 40 scale score points. The results presented in Table 3-4 suggest that a student who takes four years of civics coursework will score approximately four points higher than a student who took no civics coursework in high school. This effect corresponds to about one-tenth of the distance between NAEP achievement levels. So, if a student scored just above the Proficient cutscore, having that student take four years of civics coursework will get her 10 percent of the way to the Advanced cutscore, but the remaining 90 percent of achievement gains will need to occur through other means. Again, the effect does not appear to be substantively large.

Third, as with high school coursetaking, the amount of time devoted to civics instruction in 4th and 8th grade has a positive effect on students' NAEP Civics achievement, with the effect for 4th grade students being significantly larger than the effect for 8th grade students. The effect for 8th grade students seems fairly small substantively—a tripling of civics instruction, which would result in five hours of civics instruction per week, would increase achievement by less than one point on the NAEP Civics scale. Among 4th graders, a tripling of civics instruction would result in about one hour of instruction per week and is estimated to increase NAEP Civics achievement by about one scale score point. Again, given the standard deviation of 35 scale score points and the approximately 40 point interval between NAEP achievement levels, the magnitude of these effects seem fairly small. That said, there appears to be a greater return to

civics instruction at the 4th grade level than at the 8th grade level. This is consistent with a line of prominent research that finds that the returns to schooling investments decline as students age (Heckman 2006; Carneiro and Heckman 2003). In terms of policy consequences, these findings suggest that educational interventions designed to increase civic knowledge and skills might be best targeted toward younger students.

Finally, the analyses in this section of the chapter return some evidence that the effects of formal civics instruction and coursetaking disproportionately accrue to students with low levels of interest in politics. Specifically, the effect of civics coursetaking on NAEP achievement among individuals who took the minimum number of civics courses required to graduate from high school is nearly twice as large as the effect among the full population. From a policy standpoint, such a finding is reason for optimism. If policy can be designed in a manner such that it increases civic coursetaking among individuals who would be least likely to otherwise enroll in such courses, then the result might be a relatively larger increase in the level of civic knowledge and skills among American youth and adolescents.

Taken together, this section of the chapter has provided substantial insight into the relationship between formal civics instruction—and related policies and practices—and students' civic knowledge and skills. The analyses reveal that formal civics instruction can be used to increase students' civic knowledge and skills, but they also illustrate that formal civics instruction is not a panacea; further achievement gains will need to be realized through alternative means. The next section of the chapter assesses the potential of one prominent alternative for producing increased levels of civic knowledge and skills. Specifically, it explores how exposure to applied civic activities affects students' NAEP Civics achievement.

3.3.3. Applied Civics Activities

Oftentimes the most effective way to become more skilled at a given activity—and to acquire additional knowledge about it—is to practice that activity. This is true of changing a tire, it is true of hitting a golf ball, and it very well may be true of becoming an effective civic participant. Consequently, this section of the chapter assesses the effect of exposure to applied civics activities on students' levels of civics knowledge and skills. More specifically, it estimates the effect of exposure to three particular applied civics activities—student government, mock trials, and debates—on students' NAEP Civics achievement. Each of these activities has the potential to provide students with an increased understanding of multiple civic dimensions, including the structure of our government, the roles of citizens in American democracy, and the knowledge and skills required to effectively fulfill these roles. This increased understanding may manifest itself in the form of higher achievement scores on the NAEP Civics assessment. All analyses conducted below utilize both the 4th and 8th grade NAEP Civics data.

Although each of the three applied civics activities analyzed in this section of the chapter are common in schools across the country, student exposure to each activity is far from universal. Below, Table 3-7 presents the proportion of 4th and 8th grade students who are exposed to each of the three activities examined in this section of the chapter, as reported by their teachers. The table illustrates that student government is the activity to which students have the least exposure; less than one-third of students in both 4th and 8th grade have an opportunity to participate in student government. In contrast, approximately half of 8th grade students have an opportunity to participate in a mock trial and over three-fourths of 8th graders are provided with

opportunities to participate in debates. The analogous numbers for 4th grade students are about 40 and 50 percent, respectively.

Table 3-7. Percent of students exposed to applied civic activities

Activity	Percent of Students
	8th Graders
Student Government	29.5
Mock Trial	57.6
Debate	77.0
	4th Graders
Student Government	30.3
Mock Trial	41.5
Debate	53.9

Student Government

Student government elections are an oft-satirized aspect of the high school experience. Films and novels routinely portray student council elections as superficial affairs dominated by personality, popularity, ambition, and disgraceful tactics; although this is perhaps not so different from elections for other offices. However, even within these satirical portrayals it is clear that students face many of the same challenges and must make many of the same decisions that they would have to make in the course of participating in an official election. First, they have to make the basic choice of whether to participate or not. If they choose to participate, they must identify the various candidates and discern the group or "party" with which the candidates are associated. In addition, they must determine which candidate's policy platform most closely aligns with their preferences, they must attempt to distinguish high-quality information from low-quality information, and they must locate basic information such as the date of the election and the

process for casting a ballot. In short, student government elections can serve as a sort of dress rehearsal for participating in "real" elections.

Estimating the causal effect of exposure to student government on civics knowledge and skills requires a method that results in students exposed to student government being indistinguishable from students not exposed to student government on all characteristics except exposure to student government, or where any differences between the two groups can be accounted for in a manner that renders treatment status ignorable. Put another way, treatment status—exposure to student government—must be exogenous. Failure to achieve treatment exogeneity leaves open the possibility that the observed relationship between exposure to student government and civics achievement is spurious.

There are several approaches that, under certain assumptions, can be used to produce estimates that warrant causal interpretations—the difference-in-differences technique presented above is one such approach. This analysis utilizes a second approach to estimate the effect of exposure to student government on civics knowledge and skills. Specifically, it utilizes a propensity score-based technique. Developed by Rosenbaum and Rubin (1983), the propensity score is the conditional probability that an individual is exposed to a given treatment, in this case student government. The estimated propensity score can be used in a variety of ways in an attempt to produce causal estimates, including as the basis for matching, as a conditioning variable in a regression framework, or as the basis for stratification (Angrist and Pischke 2009). All of these approaches have been shown to have the ability to produce causal estimates, but they each have drawbacks that result in them not being ideal for use in this analysis. For example, it has been shown that matching techniques are most effective at replicating the results from

randomized experiments—considered the gold standard in causal estimates—when there exists a large group of potential comparison cases, relative to the group of treatment cases; this condition is not present in this analysis. As a result, this analysis employs an approach in which the inverse of the propensity score is used to weight cases in a weighted least squares regression model. This approach has been shown to produce consistent estimates that have a causal interpretation under a set of plausible assumptions (Hirano and Imbens, 2001; Imbens, 2004).

The first step in conducting this analysis involves estimating each student's propensity score—the conditional probability that they have the opportunity to participate in student government. The propensity score is estimated using a probit regression in which exposure to student government is predicted by a vector of student background characteristics, a vector of teacher characteristics, and a vector of school characteristics. More formally, the model can be written as follows:

$$\Pr(G_{ias} = 1) = \Phi(\boldsymbol{\gamma X_{ias}} + \boldsymbol{\psi A_{ia}} + \boldsymbol{\rho S_{is}}) \quad (3\text{-}6)$$

In this model, which was estimated separately over the sample of 4th and 8th grade students who took the NAEP Civics assessment, *G* represents exposure to student government, *i*, *a*, and *s* index individuals, teachers, and schools, respectively, $\boldsymbol{X}$ represents a vector of observable student characteristics, $\boldsymbol{A}$ represents a vector of observable teacher characteristics, $\boldsymbol{S}$ is a vector of observable school characteristics, and Φ is the inverse CDF of the standard normal distribution.[26] Upon estimation of this model, the resulting estimates were used to generate each student's predicted probability of being exposed to student government. That is, the estimates

[26] The full list of variables included in the model used to estimate the propensity score is extensive and is available upon request.

were used to generate the propensity score. Below, Figures 3-2 and 3-3 present histograms of the estimated propensity scores for two groups—those exposed to student government and those not exposed to student government—for 4th and 8th grade, respectively. The histograms reveal that most individuals not exposed to student government exhibit relatively low propensity scores; the vast majority of scores are below 0.5. Estimated propensity scores for individuals exposed to student government are more variable, but the vast majority of estimates are above 0.5. This histogram reveals the need for an inverse propensity score weighting scheme.

Figure 3-2. Distribution of Estimated Propensity Scores- 4th Grade: By Exposure to Student Government

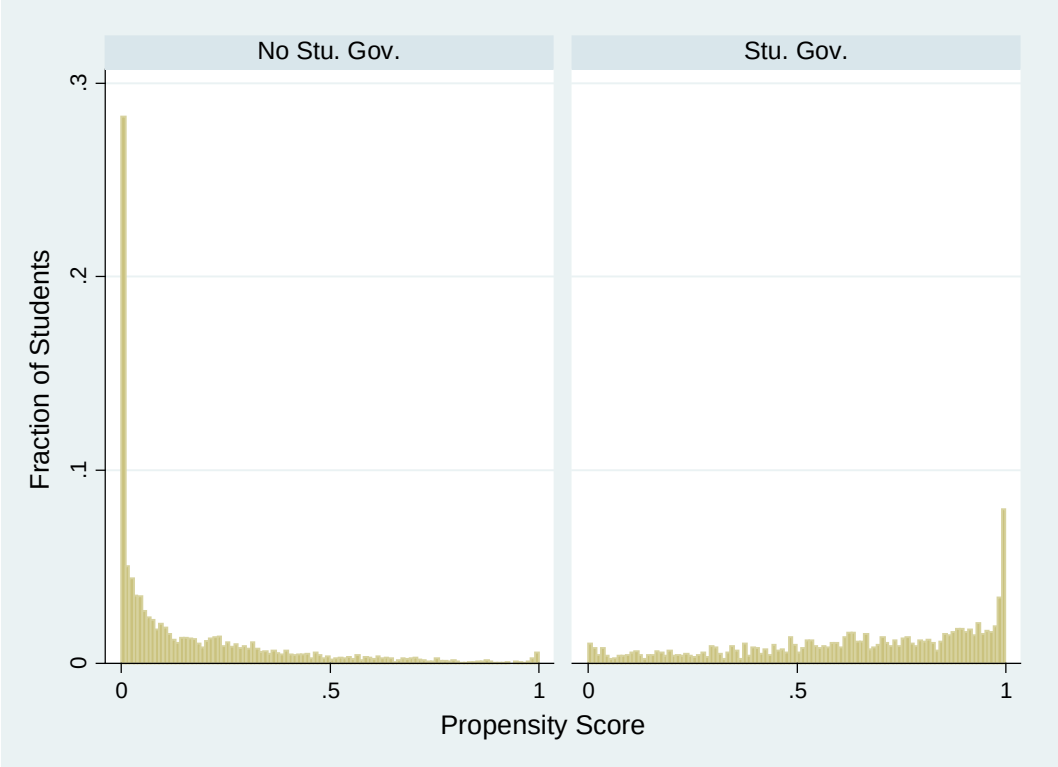
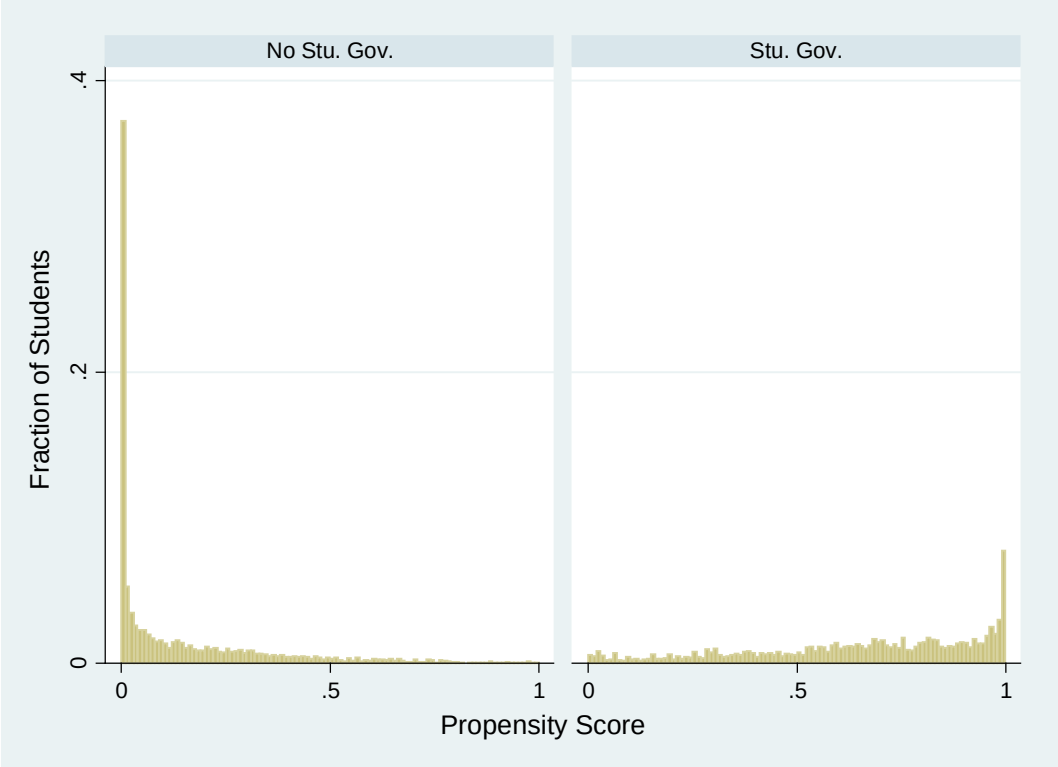


Figure 3-3. Distribution of Estimated Propensity Scores- 8th Grade: By Exposure to Student Government



After obtaining an estimated propensity score for each student, weights were constructed based on the inverse of this estimate. Specifically, the following weights were constructed:

$$\widehat{\omega}_i(g_i, x_i) = \frac{g_i}{\hat{e}(x_i)} + \frac{1-g_i}{1-\hat{e}(x_i)} \quad (3\text{-}7)$$

where *i* indexes students, *g*=1 if an individual was exposed to student government and 0 if they were not, and $\hat{e}(x)$ is the estimate of the propensity score. Intuitively, this weighting scheme assigns high weights to two types of students: 1) those that were estimated to be very likely to be exposed to student government, but were not and 2) those that were estimated to be very unlikely to be exposed to student government, but were. Conversely, low weights are assigned to 1) students that were estimated to be very likely to be exposed to student government, and were and

2) students that were estimated to be very unlikely to be exposed to student government, and were not. After constructing these weights, they were used in the estimation of the following weighted least squares regression model:[27]

$$Y_{ias} = \gamma G_{ias} + \boldsymbol{\phi X_{ias}} + \boldsymbol{\psi A_{ia}} + \boldsymbol{\rho S_{is}} + \varepsilon_{ias} \quad (3\text{-}8)$$

In this model, which is similar to other models presented above, *Y* represents the plausible values measuring NAEP Civics achievement, *i*, *a*, and *s* again index individuals, teachers, and schools, respectively, $\boldsymbol{X}$ represents a vector of observable student characteristics, $\boldsymbol{A}$ represents a vector of observable teacher characteristics, $\boldsymbol{S}$ is a vector of observable school characteristics, and ε is an error term.[28] Results from estimation of equation 3-8, which was estimated over the two samples identical to those used in the estimation of equation 3-6, are presented in Table 3-8, below.

[27] More specifically, the weights used in the analysis are the product of the base sampling weights contained in the dataset and the inverse propensity score weights calculated using equation 3-7. Such an approach is regularly used to correct for item nonresponse (Wun et al. 2004). Such an approach is less common in this context, but the underlying reasoning is identical.

[28] Excluded from the models are students with an inverse propensity weight in excess of 100. This resulted in the exclusion of less than a dozen outliers. Contained in the vector of individual-level characteristics are variables measuring sex, race, mother's education, state of residence, importance of doing well on NAEP, difficulty of the NAEP assessment, effort exerted on NAEP, urbanicity, English language learner status, disability status, age, number of books in the home, presence of a computer at home, amount of homework done each night, time spent talking to parents about school, and the number of days absent. Included in the vector of teacher characteristics are variables measuring teacher race, experience, type of certification, and highest degree. The vector of school-level characteristics contains variables measuring enrollment, racial composition of the student body, school type, the percent of the student body with limited English proficiency, student absenteeism, teacher absenteeism, student mobility, Title I status of the school, the percentage of the student body eligible for free- or reduced-price lunch, the percentage of the student body receiving special education services, and the percentage of the student body receiving gifted and talented services.

Table 3-8. Coefficients and standard errors for exposure to student government from WLS models predicting NAEP Civics achievement

Variable	Coefficient (S.E.)
	8th Graders
Exposure to student government	1.78
	(1.28)
	4th Graders
Exposure to student government	0.23
	(0.88)

Note: *$p < .10$; **$p < .05$; ***$p < .01$. The Ns for the 8th and 4th grade analyses are 7,281 and 5,867, respectively.

The results illustrate that exposure to student government does not have a statistically significant effect on students' achievement on the NAEP Civics assessment of either 4th or 8th grade students. For 8th graders, the coefficient on the variable measuring exposure to student government is positive—1.77 scale score points—but the accompanying p-value is 0.181. For 4th grade students, the coefficient on the variable is also positive—0.23 scale score points—but does not come close to achieving statistical significance. For both grades, coefficients on the variables contained in the vector of student characteristics are largely in line with previous work, with students who report the NAEP test being easier than normal performing better than students who report the test being more difficult, and expected differences by the level of mother's education, disability status, English language learner status, and free- or reduced-price lunch eligibility. In addition, the results for variables contained in the vectors of teacher and school characteristics are also in line with expectations. Full results are available upon request.

Mock Trial

Like student government, mock trials can provide students with an opportunity to practice participating in one of the foundational aspects of our democracy. Through participation

in mock trials students may develop an appreciation of rational argument and debate, persuasion, justice, equality, and a number of other features of an ideal democracy. This increased appreciation of democratic ideals gained through participation in mock trials may result in higher scores on the NAEP Civics assessment.

To assess whether the opportunity to participate in mock trials results in higher levels of civic knowledge and skills, an approach nearly identical to the one used in the analysis of student government is employed. Specifically, like the student government analysis, this analysis isolates the effect of having the opportunity to participate in mock trial on NAEP civics achievement through the estimation of a weighted least squares regression model in which each student is weighted by the inverse of his or her propensity score. Each student's propensity score—their predicted probability of having the opportunity to participate in mock trial—is estimated using the model presented in equation 3-6, with the only difference being the substitution of the variable measuring the opportunity to participate in mock trial for the variable measuring the opportunity to participate in student government on the left-hand side of the equation. As was the case in the analysis examining the effect of exposure to student government, the estimated propensity scores for individual exposed to mock trial are largely concentrated above 0.5 while scores for individual not exposed to mock trial are largely below 0.5. However, for both groups there are individuals with estimated propensity scores across the full spectrum. This is true for both grade 4 and grade 8.[29]

[29] Histograms of the distribution of estimated propensity scores by exposure to mock trial are not presented for considerations of space, but are available from the author upon request.

Upon estimation of each student's propensity score, weights were constructed based on the inverse of this estimate. Specifically, weights were constructed using equation 3-7 and then used in the estimation of the following weighted least squares regression model:

$$Y_{ias} = \gamma M_{ias} + \boldsymbol{\phi X_{ias}} + \boldsymbol{\psi A_{ia}} + \boldsymbol{\rho S_{is}} + \varepsilon_{ias} \quad (3\text{-}9)$$

This model, which was estimated separately for 4th and 8th grade students, is nearly identical to the one presented in equation 3-8. The only difference between the two models is the replacement of the variable measuring exposure to student government in equation 3-8 with the variable measuring exposure to mock trial—represented by the *M* term in equation 3-9.[30] Results from estimation of the model presented in equation 3-9 are presented in Table 3-9, below. The results reveal that the opportunity to participate in mock trial has a positive, statistically significant effect on students' levels of civics knowledge and skills in 8th Grade. Specifically, having the opportunity to participate in mock trial is estimated to increase NAEP Civics achievement by approximately 2.5 scale score points, a magnitude corresponding to an effect size of about 0.07 standard deviations. However, exposure to mock trial is estimated to have no statistically significant effect on the NAEP Civics achievement of 4th grade students, although the point estimate is positive. As in the analysis of the effects of having the opportunity to participate in student government, all control variables contained in the vectors of student, teacher, and school characteristics are largely in line with expectations and full results are available upon request.

[30] See footnote 28 for a listing of the full contents of the model.

Table 3-9. Coefficients and standard errors for exposure to mock trial from WLS models predicting NAEP Civics achievement

Variable	Coefficient (S.E.)
	8th Graders
Exposure to mock trial	2.49**
	(1.08)
	4th Graders
Exposure to mock trial	0.46
	(1.00)

Note: *p < .10; **p < .05; ***p < .01. The Ns for the 8th and 4th grade analyses are 7,332 and 5,899, respectively.

Participation in Debates

The final applied civic activity analyzed in this section of the chapter is participation in debates. Being presented with the opportunity to participate in debates could result in students developing an increased level of respect for opposing viewpoints and an increased appreciation of well-reasoned and thoughtful arguments, both hallmarks of a healthy democracy.

The same approach used in the two analyses presented above—weighted least squares regression with each student weighted by the inverse of his or her estimated propensity to receive the treatment—is also used to estimate the effect of participation in debates on civics knowledge and skills. As in the previous analyses, students' propensity scores are estimated using the model presented in equation 3-6, weights are calculated using equation 3-7 and then used in the estimation of the following model:

$$Y_{ias} = \gamma D_{ias} + \boldsymbol{\phi X_{ias}} + \boldsymbol{\psi A_{ia}} + \boldsymbol{\rho S_{is}} + \varepsilon_{ias} \quad (3\text{-}10)$$

This model is nearly identical to the ones presented in equations 3-8 and 3-9. The only difference between the models is the inclusion of the variable measuring opportunities to

participate in debates—represented by the *D* term in equation 3-10—in place of the variables measuring exposure to student government (equation 3-8) or exposure to mock trial (equation 3-9).[31] Estimation of the model in equation 3-10 reveals that opportunities to participate in debates has a positive effect on the NAEP Civics achievement of 4th graders, but no effect on the achievement of 8th graders. For 4th grade students, having the opportunity to participate in debates was estimated to increase NAEP Civics achievement by over two scale score points. The point estimate for 8th grade students is in excess of one scale score point, but a relatively large standard error prevents the estimate from reaching traditional levels of statistical significance. As before, all control variables contained in the vectors of student, teacher, and school characteristics exhibit coefficients that are largely in line with expectations and full results are available upon request.

Table 3-10. Coefficients and standard errors for exposure to debates from WLS models predicting NAEP Civics achievement

Variable	Coefficient (S.E.)
	8th Graders
Exposure to debate	1.33
	(1.46)
	4th Graders
Exposure to debate	2.06**
	(0.98)

Note: *$p < .10$; **$p < .05$; ***$p < .01$. The Ns for the 8th and 4th grade analyses are 7,324 and 5,894, respectively.

Summary

The analyses in this section of the chapter return an interesting set of results. First, the results illustrate that opportunity to participate in student government has no positive effect on

[31] See footnote 28for a listing of the full contents of the model. A histogram of estimated propensity scores by exposure to debate is available from the author upon request.

the NAEP achievement of either 4th or 8th grade students, although the positive point estimate comes fairly close to reaching statistical significance for 8th graders. Second, it is clear that the opportunity to participate in debates has a positive effect on the NAEP Civics achievement of 4th graders but not 8th graders while the opportunity to participate in mock trials has a positive impact on the civics achievement of 8th graders, but not 4th graders. As with the case with the civic coursetaking and instructional time results, the statistical significance of the results in this section is clear, but the substantive significance is not immediately apparent. In the cases where exposure to applied activities results in statistically significant achievement increases—mock trial (and almost student government) for 8th graders and debate for 4th graders—the magnitude of the achievement increase was in the range of 2.0-2.5 scale score points. The magnitude corresponds to an effect size of about 0.06 to 0.07 standard deviations. Such an effect is fairly small, but certainly not negligible. A second way of assessing the magnitude is in relation to the NAEP achievement levels. As noted earlier, there is generally a 35 to 40 point interval between achievement levels on the NAEP scale. An effect of 2.5 scale score points corresponds to approximately 6-7 percent of that distance. Like formal civics instruction, exposure to applied civic activities is a tool that can be used to increase students' levels of civic knowledge and skills, but it is clearly not a magic bullet.

Upon first glance, the pattern of results presented above may appear somewhat random, but the heterogeneity may actually be systematic in nature. Specifically, it appears that the more technical and complex activities—student government and mock trial—have positive effects (or nearly positive effects) on 8th graders' civic achievement, but no effect on the civics achievement of 4th grade students. In contrast, the less complex applied activity, opportunity to participate in

debates, had a positive effect on 4th grade civics achievement, but no effect on 8th graders. This pattern suggests that exposing younger students to less complex applied activities might be optimal for increasing their levels of civics knowledge and skills. Older students, on the other hand, may have acquired these fairly basic skills and their achievement can best be increased through exposure to more complex applications that simulate real-world civic activities. Although the explanation provided above fits the pattern of results quite nicely, it is far from the only possible interpretation. Additional research is needed to assess whether such an explanation—less complex activities benefiting young students and more complex activities benefiting older students—remains valid in different contexts.

The results presented in Tables 3-8 to 3-10 can best be considered intention-to-treat (ITT) estimates; they are estimates of the effect of being in a social studies class where the teacher conducts each of the applied activities, thus giving students an opportunity to participate in the activity. However, there is no way to determine how actively any student actually participates in the activity. As a result, the treatment-on-the treated (ToT) estimates would be larger than the ITT estimates. Future research would do well to attempt to estimate ToT parameters.

3.4. Discussion and Conclusion

This chapter presented a wide-ranging and thorough analysis of the effects of three dimensions of policy, practice, and context—1) Civics graduation credit requirements; 2) Civics coursetaking and instructional time; and 3) Opportunities to participate in applied civic activities—on students' civics knowledge and skills, as measured by performance on the 2006 NAEP Civics assessment. The results of these analyses were interesting and illuminating, and

they have a variety of implications for both the conceptual framework guiding this project and for education policy more broadly.

In the context of the conceptual framework, the results presented in this chapter provide an empirical illustration that any investigation into the effects of education that considers education to be solely the years of formal schooling completed results in an incomplete portrayal of the effects of education. This chapter clearly illustrates that policies, practice, and context—and not only additional years of schooling—affect students' levels of civics knowledge and skills. Although it is clear that state civics graduation credit requirements have no effect on NAEP Civics achievement, it is equally clear that coursetaking and civics instruction have a positive effect on students' civics knowledge and skills at the 4th, 8th, and 12th grade levels, with the effect being stronger at lower grade levels than higher grade levels.

In addition to increasing students' civic knowledge and skills through formal coursework, it is also clear that student exposure to applied civics activities can result in increased levels of civics achievement. Different activities have different effects across grade levels, with the more complex applications—such as mock trials—exerting an effect on the achievement of 8th graders, but not 4th graders, and less complex activities—like debates—proving to increase the achievement of 4th graders, but not 8th graders. Such findings make clear that specific activities occurring within the schooling environment affect students' civic knowledge and skills acquisition. Moreover, the pattern of results is a paradigmatic illustration of causal heterogeneity, a primary feature of the conceptual framework guiding this project.

The conceptual framework developed in Chapter 2—and summarized in the opening pages of this chapter—specifies two paths through which the knowledge and skills that affect

political participation can be developed: 1) Through educational, policies, practices, and context, or 2) Through increased educational attainment. This chapter was devoted to analyzing how policy, practice, and context affect civic knowledge and skills. For two reasons, we can be sure that the observed effects are truly due to differences in policies, practice, and context—the intended mechanism—and not increased attainment. First and foremost, all students in the analyses have identical attainment levels, thus preventing differences in attainment from producing the observed differences in knowledge and skills. Second, the depth and breadth of the NAEP Civics datasets result in measures of specific policies, practices, and contexts that are unparalleled in their accuracy. This fact, coupled with the expansive array of student, teacher, and school background characteristics contained in the datasets, lends additional confidence that the observed effects of policy, practice, and context on NAEP Civics achievement are not spurious in nature.

It is possible that the analyses in this chapter will strike some as incomplete because they do not explicitly assess how the affects of educational policies, practices, and contexts affect later-life participation in politics. This, however, was by design. As described in the introduction to this chapter, efforts to empirically assess the full conceptual framework in a single, wide-ranging analysis would likely prove to be neither successful nor informative. Instead, a rigorous empirical analysis of the conceptual framework must proceed systematically, in a series of discrete stages that are carefully designed to confirm each aspect of the framework. This chapter confirmed that educational policy, practice, and context can and do affect students' levels of civic knowledge and skills. The following chapters examine how civic knowledge and

skills relate to later-life political participation. In doing so, the link between educational policies, practice, and context and later-life political participation is more explicitly examined.

To this point, the discussion has focused primarily on the implications of the results presented in this chapter for the conceptual framework. However, the results also have broader implications for our education system. Specifically, this chapter demonstrates that students' civic knowledge and skills can be increased through various educational policies, practices, and contexts. However, possessing evidence on specific mechanisms through which civic achievement can be increased is clearly not sufficient for doing so; policymakers must consciously decide whether increasing students' civic knowledge and skills is a priority for our education system. In recent years civic education has decidedly not been a priority. The low prioritization of civic education can perhaps best be illustrated by the recent finding that only about one-quarter of 4th, 8th, and 12th grade students scored at least "Proficient" on the 2010 NAEP Civics assessment. In addition, 12th graders performance on the assessment declined between 2006 and 2010. This troubling level of performance, along with the current state of political discourse in the country, suggests that we might want to reconsider the prioritization of civic education.

Chapter 4. How Do Knowledge and Skills Relate to Participation in Politics?

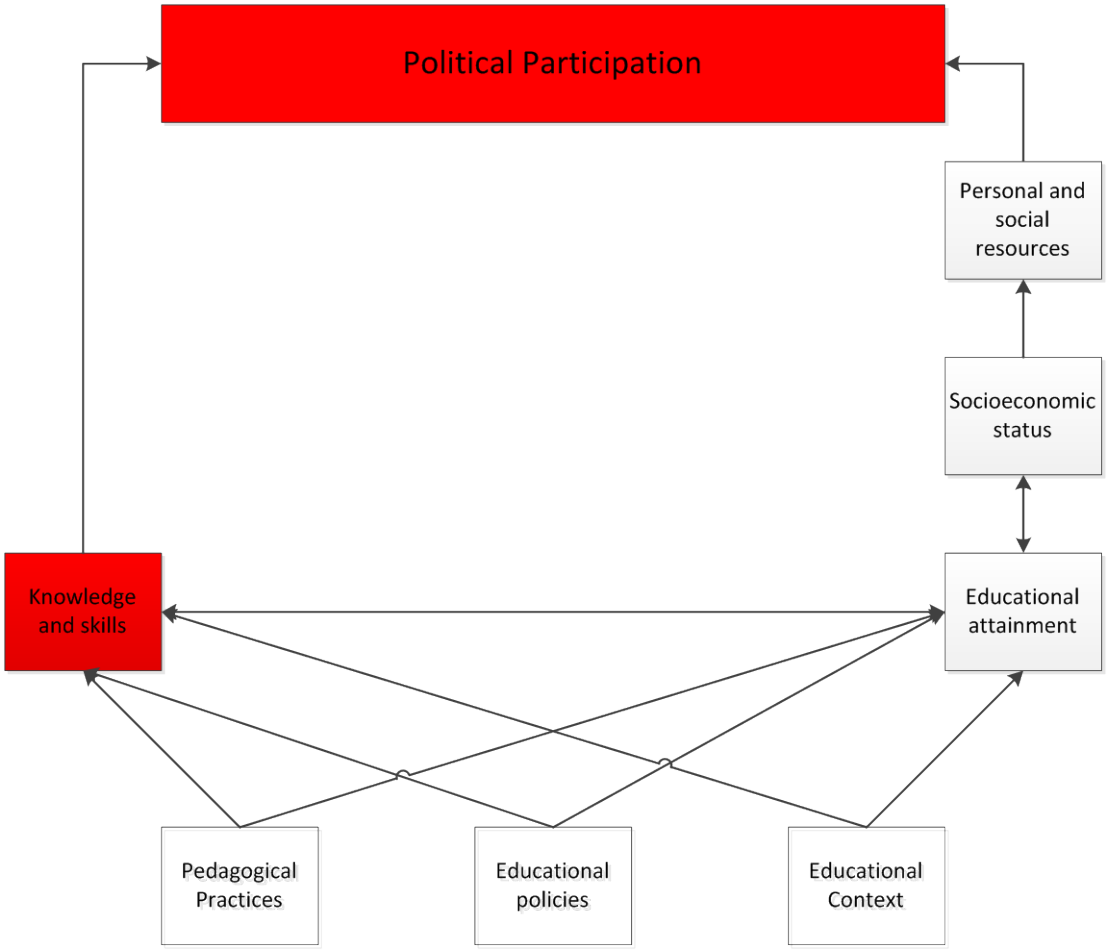
4.1. Introduction

Chapter 3 made clear that educational policy, practice, and context can impact the level of civic knowledge and skills among American youth and adolescents. The analyses demonstrated that the amount of civics instruction received by students has a positive effect on civics achievement; these positive effects were detected at the 4th, 8th, and12th grade levels. Additionally, the results revealed that the opportunity to participate in applied civic activities—student government, mock trial, and debate—can result in higher levels of civic knowledge and skills among 4th and 8th grade students. Although civic knowledge is an important end in and of itself, it may also serve as a means to an even more essential end—effective participation in democratic society.

This chapter assesses how individuals' levels of various skills contribute to their ability to effectively participate in democratic society. In doing so, this chapter takes the next logical step in empirically testing the conceptual framework of the relationship between education and political participation that was developed in Chapter 2; having demonstrated that educational policies and practices can affect levels of civic knowledge and skills, the focus now turns to using multiple datasets—containing high-quality and multidimensional measures of individuals'

levels of knowledge and skills—to analyze how knowledge and skills translate into actual participation in our political process. Figure 4-1 presented below provides a graphical depiction of the full conceptual framework, with boxes shaded in red illustrating the focus of this chapter.

Figure 4-1. A Conceptual Model of the Effect of Education on Political Participation: Focus of Chapter 4



This chapter proceeds by first providing a broad overview of the research into political knowledge and skills. This review will briefly discuss the levels of knowledge and skills possessed by individuals in the population, as well as the effects of these factors on civic

outcomes of interest. The chapter will then move on to describe the specific research questions that motivate this chapter, lay out the data that will be brought to bear on these questions, and outline the methods that will be used to analyze the data. The chapter concludes by presenting the results of the analyses and discussing their implications, both in the context of the conceptual framework and in the context of research and policy more broadly.

4.2. The Literature on Political Knowledge, Skills, and Civic Engagement

Delli Carpini and Keeter's (1996) work is the definitive statement on the level of political knowledge possessed by members of the U.S. population, and several major findings emerge from their analyses. First, the authors report that a majority of citizens are unable to correctly answer more than 50 percent of various batteries of factual questions related to politics. The authors do not explicitly make a normative judgment about the desirability of these results, but it is clear that there is room for improvement. Second, Delli Carpini and Keeter provide evidence that the overall level of civic knowledge did not change significantly across the approximately fifty year period they studied. Galston (2001) notes the surprising nature of this finding, given the positive relationship between formal education and political knowledge and the significant increase in mean levels of educational attainment in the population over time. However, Delli Carpini and Keeter argue that this potential puzzle can be explained by "educational inflation." Although the average level of formal education has increased within the population, individuals at each level of education possess lower levels of political knowledge than their peers in previous decades. Third, Delli Carpini and Keeter find substantial heterogeneity in levels of political knowledge across demographic subgroups. It is not surprising that individuals with greater self-

reported levels of political interest exhibit greater levels of political knowledge. It is somewhat more surprising, though, that levels of political knowledge vary by gender and race.

Delli Carpini and Keeter's (1996) main findings have been largely confirmed by other sources of information on the level of Americans' political knowledge, most notably the National Assessment of Educational Progress (NAEP). The NAEP Civics Assessment, which was the basis of the empirical analyses presented in Chapter 3, is administered to nationally representative samples of 4th, 8th, and 12th grade students on a regular cycle and is the best measure of what American youth and adolescents know about U.S. politics and government. In contrast to Delli Carpini and Keeter, authors of the NAEP Civics reports provide a normative characterization of the results of the assessment. Results from the 2010 administration of the NAEP Civics assessment indicate that less than 30 percent of students in 4th, 8th, and 12th grade possess a level of civic knowledge and skills that the NAEP Civics assessment framework deems to be Proficient; over 70 percent of students at each grade level scored at the Basic or Below Basic levels (National Center for Education Statistics 2011).

The 2010 NAEP Civics results also illustrate that the level of civic knowledge possessed by 8th and 12th graders exhibited little change from 1998 to 2010, although fourth graders' civic knowledge did increase by a meaningful amount—about 0.2 standard deviations—over this time period. Finally, like Delli Carpini and Keeter (1996), the NAEP Civics results indicate significant heterogeneity in levels of civic knowledge across demographic subgroups. At all three grade levels, White students exhibit a higher level of civic knowledge than Black and Hispanic students. At the 4th grade level, females score higher than males; there are no gender differences at the 8th or 12th grade levels. The results also indicate a positive relationship

between income and civic knowledge and between parental education level and civic knowledge at all grade levels.

Taken as a whole, the evidence indicates that, on average, the American population possesses an underwhelming level of civic knowledge and that there are inequities in the possession of this knowledge. Although the unimpressive state of civic knowledge may seem largely benign—a viewpoint certainly expressed in a line of research (e.g. Popkin 1994; Lau and Redlawsk 1997; Lau and Redlawsk 2001)—there are several reasons why it is potentially worrisome. In his review article, Galston (2001) identifies several civic attributes that civic knowledge has been found to affect. Specifically, civic knowledge has been found to contribute to:

- Greater levels and quality of political participation;
- Greater support for democratic values;
- Greater levels of social and public trust;
- Better understanding and comprehension of political events;
- Greater consistency of views across issues and time; and
- Instrumental rationality and a better understanding of one's interests.

The ability of civic knowledge to affect these factors, all of which play a vital role in fostering a healthy democratic society, demonstrates the potential importance of promoting and nurturing the acquisition of civic knowledge across the population.

Relative to civic knowledge, the role of specific skills in promoting civic attributes like those listed above has been the subject of much less empirical scholarship. As described in earlier chapters, several scholars have theorized that the positive empirical relationship between education and political participation is at least partially attributable to increased levels of cognitive and civic skills imparted by education (Wolfinger and Rosenstone 1980; Rosenstone

and Hansen 1993; Verba, Schlozman, and Brady 1995; Nie, Junn, and Stehlik-Barry 1996). These theoretical conjectures, however, lack specificity; it is not clear just what types of cognitive and civic skills the authors theorize to affect political participation.

When they exist, the empirical tests of these conjectures provide some insight into the specific types of skills that the scholars may have been envisioning when they were constructing their theories. For example, Nie, Junn, and Stehlik-Barry (1996) measure cognitive ability using a ten-item assessment of verbal proficiency contained in the General Social Survey. They find that improved cognitive ability—as measured by this ten-item test of verbal ability—serves to increase political tolerance and political knowledge, which they collectively refer to as "democratic enlightenment." The authors do not find evidence that cognitive ability influences other aspects of democratic citizenship. Although Nie, Junn, and Stehlik-Barry (1996) are to be commended for conducting among the first empirical tests of the conjecture that education affects civic outcomes through the mechanism of increased skills, their empirical test leaves much to be desired.[32] The authors measure a single dimension of cognitive ability—verbal cognitive proficiency—using a battery containing only ten items. In addition to employing an imperfect skill measure, neither the theory nor the accompanying empirical test considers the wide range of other skills that have the potential to affect civic outcomes, such as political participation.

Although progressing, the literature on the relationship between an individual's level of various skills and his or her civic abilities and actions, including political participation, remains

[32] Condon (2009) employs a high-quality measure of an individual's communication skills while in high school and finds these skill levels to be related to several political outcomes of interest.

incomplete. Scholars have long theorized that education provides individuals with skills that result in greater levels of political participation, but these theories lack specificity with respect to the exact types of skills that are theorized to affect political participation. In addition, the few existing empirical tests generally focus on a single dimension of skill, such as verbal ability, and often rely on less than ideal skill measures. As the following sections describe, this chapter builds on existing work by systematically considering how various dimensions of knowledge and skill might affect an individual's political participation. It then empirically tests the relationship between these various dimensions of knowledge and skills and an individual's political participation with datasets that are seldom used in political science, but contain high-quality measures of multiple skill dimensions, as well as political participation outcomes.

4.3. Research Questions and Data

Effective participation in the political process requires individuals to possess at least a baseline amount of several different types of knowledge and skills. As an example, consider the seemingly simple act of casting an informed vote in an election. In order to perform this action, individuals must first be registered to vote. At a minimum, becoming registered to vote requires individuals to acquire information regarding locations at which they are able to register, to fill out any required forms, and to have knowledge and possession of any required documentation. Next, assuming that the individual was able to register successfully, one must have knowledge of the role and purpose of the office for which the election is being held—general civic knowledge—in order to cast an informed ballot. Then, the individual must identify the various candidates running for office, discern each candidate's position on policies that are salient to the individual, and—based on the candidate's policy preferences and any other factors germane to

the voting decision—determine the candidate for which the individual will vote. Finally, the individual must cast his or her ballot on Election Day, an action that requires knowledge of the date of the election, the individual's polling place, any required documentation or identification, and the process of actually casting a ballot.

This brief, stylized vignette illustrates that the seemingly simple act of casting an informed vote in an election requires a variety of different types of knowledge and skills. Individuals must possess basic civic knowledge; they need to have the ability to search for, acquire, and process information; they must be able to navigate bureaucratic processes; and they need to possess the ability to reason, among other skills. This chapter broadly explores how various dimensions of knowledge and skills relate to an individual's participation in the political process. First, it analyzes how specific dimensions of knowledge and skills—basic civic knowledge, reading ability, prose literacy, document literacy, and quantitative literacy—are empirically related to various acts of political participation, such as voting and being registered to vote. Which skills are most strongly related to acts of political participation? Does one skill appear to be more important than the others? Questions such as these are addressed in this section of the chapter. Second, the chapter examines potential heterogeneity and nonlinearities in the relationships between the four dimensions of knowledge and skills and political participation. Does the effect of a specific skill vary across different types of political participation? Is the relationship between skill levels and political participation linear? Is there some threshold above which the participation-related return to skills diminishes? Such questions will be assessed in the second part of the empirical analyses presented in this chapter.

Data from two nationally-representative datasets—1) The National Assessment of Adult Literacy and 2) High School and Beyond—are used to address the research questions outlined above. These datasets are not commonly used in political science research, but they are very well suited for serving as the basis of an analysis of the relationship between skills and political participation; as described below, they contain both high-quality and multidimensional measures of individuals' levels of knowledge and skills as well as political participation outcomes.

4.3.1. The National Assessment of Adult Literacy

The National Assessment of Adult Literacy (NAAL) is designed to evaluate the level of English literacy among American adults aged 16 and older (National Center for Education Statistics 2012). Administered to a nationally-representative sample, the assessment was last fielded in 2003 and the restricted-use data from that administration serve as the basis for many of the empirical analyses that follow. In its efforts to comprehensively assess literacy among American adults, the NAAL measures three distinct dimensions of literacy—prose literacy, document literacy, and quantitative literacy—and reports a separate scale score for individuals on each literacy dimension.

The NAAL describes prose literacy as "The knowledge and skills needed to perform prose tasks (i.e., to search, comprehend, and use information from continuous texts). Prose examples include editorials, news stories, brochures, and instructional materials. Prose texts can be further broken down as expository, narrative, procedural, or persuasive" (Kutner et al. 2007). This description makes clear the relevance of prose literacy for effective political participation. Editorials, news stories, and brochures are classic means of conveying information in political

campaigns and effective participants must have the ability to locate these documents and comprehend the information presented in them.

The primary difference between prose literacy and document literacy—the second dimension of literacy measured by the NAAL—is the object of the literacy; whereas prose literacy focuses on continuous texts, document literacy is measured in the context of noncontinuous texts. Specifically, document literacy is described as "The knowledge and skills needed to perform document tasks (i.e., to search, comprehend, and use information from noncontinuous texts in various formats). Document examples include job applications, payroll forms, transportation schedules, maps, tables, and drug and food labels" (Kutner et al. 2007). Again, document literacy is a clear prerequisite for effective political participation; the ability to navigate voter registration forms and electoral ballots are clear examples of document literacy.

The third dimension of literacy, quantitative literacy, is described as "The knowledge and skills required to perform quantitative tasks (i.e., to identify and perform computations, either alone or sequentially, using numbers embedded in printed materials). Examples include balancing a checkbook, figuring out a tip, completing an order form, and determining the amount of interest on a loan from an advertisement" (Kutner et al. 2007). Although the potential relationship between quantitative literacy and effective political participation is more opaque than those between participation and prose or document literacy, it is possible that quantitative literacy may facilitate political participation.

The NAAL measured literacy using an assessment that was administered to a nationally-representative sample of American adults aged 16 and older. The assessment is designed to simulate several literacy-related activities that people face on a daily basis. In order to maximize

authenticity, the literacy tasks that comprise the assessment utilize actual texts and documents as the basis of the assessment items, all of which are open ended in nature. The full assessment consists of 12 blocks of tasks with an average of about 11 questions in each block. Due to its length, no individual takes the complete assessment. Instead, each person is administered three blocks of items, and item response theory methods are used to transform individuals' responses to the questions into scale scores. For each of the three literacy dimensions, the scale ranges from 0 to 500 with means of 275, 271, and 283 for the prose, document, and quantitative literacy dimensions, respectively.[33] Standard deviations for all three literacy dimensions are approximately 60. Individuals' performances on the three literacy dimensions serve as the primary skill measures in many of the analyses to follow.[34]

In addition to the skill measures described above, the NAAL dataset contains a wide variety of additional individual-level variables, including demographic characteristics, labor market participation and outcomes, family and household characteristics, and—most importantly for the analyses in this chapter—community and civic involvement measures. Specific measures of community and civic involvement include being registered to vote, voting in the 2000 presidential election, volunteering with a community organization or group, sources of information about current events, public affairs, and government, and use of library services.

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[33] A group of experts known as the Committee on Performance Levels for Adult Literacy mapped four literacy levels—Below Basic, Basic, Intermediate, and Proficient—onto the 0-500 scale to better provide a substantive interpretation of the scale scores. For more information regarding the mapping of literacy levels onto the NAAL scale, see Hauser et al. (2005) and White and Dillow (2005).

[34] Technically, because individuals do not take the full assessment, a precise scale score is not calculated for each individual on each of the three literacy dimensions. All analyses in this chapter employ proper statistical techniques—multiple imputation techniques—to account for the plausible value-based measures of skills. Individuals' scores on the three literacy dimensions correlate at about 0.85. However, analyses have concluded that, despite these high correlations, the scales truly measure different constructs, see Rock and Yamamoto (2001).

Table 4-1 presents descriptive statistics for the participation measures. Several of these measures will serve as dependent variables in the analyses presented later in this chapter. A number of variables from the other domains—demographics, labor market participation, family characteristics—will serve as important controls.

Table 4-1. Percentage of individuals who participate in political and community participation activities

Measure	Percent
Political Participation	
Registered to vote	76.7
Voted in 2000 presidential election	55.4
Volunteering	
Ever volunteer	38.6
Most days per week	2.2
A few days per week	6.0
Once per week	9.3
Less than once per week	21.0
Sources of information on politics and government	
Some or a lot of info from newspaper	64.4
Some or a lot of info from magazines	44.7
Some or a lot of info from internet	42.9
Some or a lot of info from TV or radio	89.3
Some or a lot of info from brochures and books	43.0
Some or a lot of info from family and friends	63.1

Source: National Assessment of Adult Literacy

4.3.2. High School and Beyond

High School and Beyond (HS&B) is a panel study that first surveyed a nationally representative sample of high school sophomores in 1980. These individuals were re-interviewed in 1982, 1984, 1986, and 1992; sample members were approximately 28 years old at the final follow-up interview in 1992. The primary purpose of the study is to "observe the

educational and occupational plans and activities of young people as they pass through the American educational system and take on their adult roles" (Brown and Fetters 1984, p. 1). Given this purpose, individuals were asked about a wide variety of topics at each interview. During the interviews that took place while the sample members were in high school—as sophomores in 1980 and seniors in 1982—they were asked about schooling experiences and activities, their attitudes toward education and politics, future educational and labor market plans, and a wide variety of demographic and other background characteristics.[35] In addition, they were administered cognitive tests in several subjects, including reading, vocabulary, and civics. Item response theory techniques were used to transform individuals' responses to the assessment items into scale scores. For each subject, the scale ranges from 1-99 with a mean of approximately 48-49 and a standard deviation of about 25.

As the sample members transitioned into postsecondary education or the labor market, the focus of the interviews moved away from their schooling experiences, but continued to inquire about a wide array of topics, including civic and political participation. Specific civic and political participation activities contained in the HS&B dataset include:

- being registered to vote;
- voting;
- volunteering or working on a political campaign;
- communicating with elected officials;
- attempting to persuade individuals to vote for a specific candidate;
- discussing public or political problems;
- contributing money to a candidate;
- attending political meetings or rallies; and
- being elected to an office in government or a political party.

[35] In addition to surveying students, HS&B surveyed their principals, teachers, and parents as well. Data from these interviews are also contained in the HS&B dataset. For a comprehensive description of the HS&B dataset, see Zahs et al. (1995).

Many of these participation activities were measured in both 1986 and 1992; some of the activities were measured in 1984 as well. Several of the participation measures described above serve as the dependent variables in analyses to follow while individuals' performances on the cognitive tests administered as part of HS&B during high school are used as measures of individuals' skills. Demographic and other background characteristics serve as important controls in the analyses. Table 4-2 presents descriptive statistics for selected political participation measures.

Table 4-2. Percentage of individuals who participate in political and community participation activities

Measure	Percent
Vote 1984 election	48.8
Registered to vote 1984	53.7
Frequently discuss public/political problems 1986	
With friends	28.2
With co-workers	22.5
With community leaders	5.5
With family	26.6
With politicians	3.7
Attend political gatherings 1986	15.2
Try to persuade people to vote for a candidate 1986	23.5
Contribute money to candidate 1986	12.9
Party officer/elected government 1986	1.0
Campaign for candidate 1986	10.8
Registered to vote 1986	66.9
Vote 1988 election	52.7
Vote local, state, national election 1992	33.6
Registered to vote 1992	65.0

Source: High School and Beyond

4.4. Empirical Strategy for Analyzing the Relationship Between Skills and Participation in Politics

Empirical analysis of the relationship between an individual's level of skills and his or her participation in the political process proceeds in three primary stages. First, using simple cross-tabs, I assess the bivariate relationships between several types of skills—prose literacy, document literacy, quantitative literacy, general civic knowledge, vocabulary skills, and reading ability—and various measures of political participation. These results will provide the first indication as to whether individuals with higher levels of skills exhibit higher levels of political participation.

After assessing the various bivariate relationships between skills and political participation, focus will turn to attempting to isolate the causal effect of various skill dimensions on an individual's political participation. All of these analyses will be performed within a regression framework. The differential structures of the HS&B and NAAL datasets require estimation of slightly different models, a fact that has both benefits and drawbacks. The primary drawback is a lack of parsimony; a single model cannot be used to analyze all relationships between skill levels and political participation. The main advantage, however, is the ability to explore to explore whether the effects of skills on political participation are robust across multiple datasets and model specifications.

As described above, the NAAL is administered to a nationally-representative cross-section of adults aged 16 and older and contains multiple measures of political participation, skills, and background characteristics. Given the contents and structure of the dataset, the first model that will be used to estimate the causal effect of skills on political participation can be written as:

$$\Pr(P_i = 1) = \phi(\boldsymbol{\beta S_i} + \boldsymbol{\delta X_i} + A_i) \quad (4\text{-}1)$$

In this model, P represents a given act of political participation—measured dichotomously—for individual *i*, $\boldsymbol{S}$ represents one of the three literacy dimensions described above, $\boldsymbol{X}$ is a vector of background characteristics, *A* is a measure of individual's educational attainment, and ϕ represents the inverse normal CDF, making this a probit model. The vector of background characteristics contain measures of race/ethnicity, gender, age, region, years in the state, labor force participation, earnings, the presence of books, computers, and magazines in the home, marital status, number of hours watching television per day, disability status, public assistance receipt, health, and income. This model is estimated via marginal maximum likelihood, an estimator necessitated by the latent nature of the skill measure.[36]

Not every NAAL political participation measure is binary in nature. In addition to the dichotomous measures of voter registration, voting, and volunteering, an index of information sources is constructed. The index is based on six items inquiring whether respondents obtain "some or a lot" of their information from newspapers, magazines, the internet, TV and radio, brochures and books, and family and friends. For each item, respondents are given a one if they report obtaining "some or a lot" of information from these sources; they are given a zero if they report obtaining "a little or none". An individual's score on the index is created by simply summing his or her scores on each of the six items. Given the structure of the index, the

[36] The NAAL dataset does not contain an exact scale score for each individual. Instead, it contains individuals' responses to the assessment items they were administered. These responses, rather than a scale score or some other singular measure, are used directly in the estimation of the model.

following model—estimated via marginal maximum likelihood—is used in the cases where the index serves as the dependent variable:[37]

$$P_i = \boldsymbol{\beta S_i} + \boldsymbol{\delta X_i} + A_i + \varepsilon_i \quad (4\text{-}2)$$

This model is nearly identical to the one presented in equation 4-1; the only difference is one of functional form. All contents of the model are described above.

The inclusion of the *A* term in equations 4-1 and 4-2 has important implications. Specifically, it means that the relationship between knowledge and skills and political participation is conditional on an individual's educational attainment. Consequently, the model is isolating the causal effect of skills on political participation and not confounding it with educational attainment. As stated in the introduction of Chapter 3, a rigorous empirical analysis of the conceptual framework must proceed systematically, in a series of discrete stages that carefully analyze each aspect of the framework. This chapter is devoted to analyzing the direct relationship between knowledge and skills and political participation.

Within the framework of the models presented in equations 4-1 and 4-2, a causal interpretation of the coefficients on the variables measuring skills relies on the conditional independence assumption. Although this is undeniably a strong assumption, the extensive set of background variables contained in the NAAL dataset makes the conditional independence assumption more plausible than it might be in analyses based on other, less comprehensive datasets.

[37] Again, the marginal maximum likelihood estimator is necessitated by the latent nature of the skill measure and the fact that the NAAL dataset does not contain exact scale score measures, but rather individuals' responses to assessment items.

The HS&B dataset possesses both similarities to and differences from the NAAL dataset. Like NAAL, HS&B surveyed a nationally cross-section of individuals. Unlike NAAL, however, HS&B surveyed high school sophomores in 1980, rather than adults in 2003. In addition, unlike NAAL, HS&B followed these individuals over a 12-year period. As a result, there is information on these individuals at multiple points in time, a fact that requires estimation of a slightly different model. The general model that will be used to analyze the relationship between skills and the voter registration and voting measures contained in HS&B can be written as:

$$\Pr(P_{iht} = 1) = logit^{-1}(\boldsymbol{\beta S_{i1982}} + \boldsymbol{\delta X_{it}} + A_{it} + \gamma_h) \quad (4\text{-}3)$$

Equation 4-3 presents a model of the probability that individual *i* who attended high school *h* participated in politics at time *t*. An individual's participation is modeled as a function of her skill level *S* in 1982, a vector of her background characteristics $\boldsymbol{X}$ at time *t*, and her educational attainment *A* at time *t*, and a high school fixed effect γ. As described earlier, measures of political participation are taken at three points in time—1984, 1986, and 1992—meaning that *t* can take on any of these three values depending on the measure of participation. For example, if the outcome measure was being registered to vote in 1986, then the background and attainment variables from the 1986 follow-up survey would be contained in the model. However, if the outcome variable was being registered to vote in 1992, then the model would contain the background and attainment measures from the 1992 follow-up.

Like NAAL, not all of the political participation measures from HS&B are binary in nature. In addition to the dichotomous measures of voter registration and voting, two indices are constructed from the variables contained in HS&B's 1986 follow-up and serve as dependent variables in analyses to follow. The first index—a political discussion index—is based on five

items inquiring whether respondents discuss politics or public affairs with their friends, families, coworkers, community leaders, and elected politicians. For each item, respondents are given a one if they report discussing politics or public affairs frequently; they are given a zero if they report discussing these topics infrequently or never. An individual's score on the index is created by simply summing his or her scores on each of the five items. The second index—a political participation index—is created in a similar manner. For each of five items—attending a political gathering, persuading people to vote for a candidate, contributing money to a candidate, serving as a party officer or elected official, and involvement with a political club or organization—individuals are assigned a one if they report participating in the activity and a zero if they report not participating. Individuals' scores on the index are generated by summing their scores on each of the five items. Given the structure of the indices, the following model—estimated via OLS—is used in the cases where the indices serve as the dependent variables:

$$P_{ih1986} = \boldsymbol{\beta S_{i1982}} + \boldsymbol{\delta X_{i1986}} + A_{i1986} + \gamma_h + \varepsilon_{ih1986} \qquad (4\text{-}4)$$

This model is very similar to the model presented in equation 4-3; the only major difference is the functional form. This model is linear while model 4-3 makes use of the logistic function.

A drawback to the HS&B dataset is the fact that measures of individuals' skill levels are not available after they graduate from high school, a fact that forces reliance on measures of individuals' skills that were taken during their senior year in high school; this is indicated by the 1982 subscripts in equations 4-3 and 4-4. Reliance on high school skill measures is certainly suboptimal, but other features of the model are designed to mitigate the suboptimality. Specifically, inclusion of the attainment measure at time *t* is designed to condition out any

additional skills that were developed after high school graduation through additional years of schooling. Additionally, the high school fixed effect partials out school policies, practices, and context that may influence an individual's likelihood of political participation through mechanisms other than skill development. Overall, the structure of the HS&B dataset results in a model that is admittedly imperfect. However, multiple steps have been taken to ensure that the results will provide valuable insight into the relationship between an individual's level of knowledge and skills and his or her participation in the political process.

The final set of analyses will focus on refining and extending the results of models 4-1 through 4-4. Specifically, these set of analyses will have two primary purposes. First, they will attempt to discern which types of skills are necessary or sufficient for participation in different types of political activities. Second, this set of analyses will test for nonlinearities in the relationships between skills and participation; they will attempt to identify a skill threshold above which the return to additional skills is negligible.

4.5. Results

4.5.1. Bivariate Results

The first stage of analysis for the NAAL dataset—tabulating the mean scale score on each of the three literacy dimensions for individuals who report participating and not participating in various political activities—reveals a strong bivariate relationship between an individual's skill level and participation in political activities. As Table 4-3 illustrates, across all three literacy dimensions—prose, document, and quantitative—individuals who report being registered to vote, voting in the 2000 presidential election, and ever volunteering have higher average scale scores than individuals who report not participating in those three activities.

Across the literacy dimensions, the mean difference in scale scores for individuals who report participating and not participating in the three activities noted above range from 15 to 30 scale score points. The magnitudes of these differences are substantial; the differences range from about a quarter to a half of a standard deviation.

Table 4-3. Average scale score for individuals who do and do not report political participation, by skill dimension and political participation activity

	Prose literacy		Document literacy		Quantitative literacy	
Measure	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Political Participation						
Registered to vote	284.4***	263.5	277.6***	261.7	291.8***	267.1
Voted in 2000 presidential election	289.2***	265.7	280.6***	263.6	296.7***	269.5
Volunteering						
Ever volunteer	294.3***	262.2	286.5***	259.8	300.6***	270.5
Sources of information on politics and government						
Some or a lot of info from newspaper	279.9***	264.3	272.8***	265.0	286.1***	275.1
Some or a lot of info from magazines	279.3***	271	271.6	269.4	284.0*	281.1
Some or a lot of info from internet	294.5***	259.1	289.0***	255.1	301.8***	266.9
Some or a lot of info from TV or radio	276.7***	258.5	271.8***	257.3	284.0***	269.3
Some or a lot of info from brochures and books	277.5***	272.6	269.5	271.4	281.4	283.4
Some or a lot of info from family and friends	276.5**	272.0	272.6***	266.0	282.4	282.9

* $p<.10$; ** $p<.05$; *** $p<.001$

Source: National Assessment of Adult Literacy

Across the three literacy dimensions, there is some variability in the strength of the relationships between skill levels and sources of information about politics and government. Within the dimension of prose literacy, individuals who report getting “some or a lot” of their information from each of six sources have significantly higher average scale scores than individuals who report getting “a little or no” information from each of the sources. However,

within the dimensions of document and quantitative literacy, the relationships between skill levels and information sources are not as consistent; for some information sources, individuals who report getting "some or a lot" of their information from that source have significantly higher scale scores than individuals who report getting "a little or none." This is not true for other information sources, however.

Overall, the results presented in Table 4-3 provide preliminary evidence that an individual's skill levels—particularly her prose literacy ability—may affect her level of political participation. Of course, these are only bivariate results from a single dataset. Subsequent results will demonstrate whether similar conclusions can be drawn from another dataset.

Table 4-4 presents the bivariate relationships between the HS&B-based measures of political participation and three dimensions of individuals' skill levels—civic skills, vocabulary skills, and reading skills. Specifically, it reports the average scale score for individuals who report participating and not participating in various political activities across multiple years. Substantively, the results are quite similar to the NAAL results. It is clear that individuals who report being registered to vote and voting in elections scored significantly higher on the civics, vocabulary, and reading tests they were administered during their senior year in high school than individuals who report not voting or being registered to do so; this finding is present in the measures from 1984, as well as 1986, 1988, and 1992. In general, the score differences between participants and non-participants are in the range of 0.10-0.15 standard deviations, which is smaller than the magnitude of the differences observed in the NAAL dataset, but still consequential.

Table 4-5 presents the average scale score for individuals at various points on the political discussion and participation indices described earlier. Consistent with the results in Tables 4-3 and 4-4, there is a positive relationship between an individual's score on an index and their average scores on the civics, vocabulary, and reading tests they were administered during their senior year in high school. The slight exception to this pattern, however, occurs for individuals who score a five on the political participation index; these individuals have among the lowest average scores. In spite of this exception, bivariate linear regressions of each of the index variables on each of the skill measures return positive coefficients, all of which are significant at $p<0.001$. Taken together, the bivariate analyses clearly illustrate that various skill dimensions are strongly related to participation in the political process. These relationships are detected across multiple skill dimensions, types of political participation, time periods, and datasets. The next set of results assesses whether the relationships persist in a multivariate framework where the models contain a wide variety of covariates described earlier.

Table 4-4. Average scale score for individuals who do and do not report political participation, by skill dimension and political participation activity

	Civic score		Vocab score		Reading score	
Measure	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
1984						
Registered to vote	51.0***	49.4	50.7***	49.4	50.8***	49.4
Vote presidential election	51.8***	49.0	51.8***	48.6	51.9***	48.6
1986						
Registered to vote	51.0***	48.9	51.0***	48.4	51.1***	48.5
1988						
Vote presidential election	52.1***	48.2	52.1***	47.9	52.1***	48.0
1992						
Registered to vote	51.0***	48.9	50.9***	48.7	51.1***	48.4
Vote any election	51.8***	49.5	51.8***	49.3	51.8***	49.3

* $p<.10$; ** $p<.05$; *** $p<.001$

Source: High School and Beyond

Table 4-5. Average scale score for individuals at various points on political discussion and participation indices, by skill dimension and index

Measure	**Civic score**	**Vocab score**	**Reading score**
Political discussion index-1986			
Zero	49.6	49.3	49.4
One	50.7	50.1	50.3
Two	52.0	51.9	51.5
Three	53.3	53.7	53.9
Four	51.8	52.9	52.3
Five	54.5	57.0	57.7
Political participation index-1986			
Zero	49.7	49.6	49.6
One	51.6	51.3	51.3
Two	51.0	50.5	51.2
Three	51.3	51.3	51.5
Four	52.7	52.5	52.6
Five	49.4	48.8	48.6

Note: Bivariate linear regressions of the skill measures on the index variables return a positive coefficient that is significant at p<.001

Source: High School and Beyond

4.5.2. Multivariate Results-NAAL

As described earlier, the NAAL dataset contains a broad set of measures that may be correlated with individuals' levels of political participation as well as their skill levels. It is important to condition on these measures when attempting to isolate the effects of skills on political participation; equations 4-1 and 4-2 present the models that do so. Three models were estimated for each outcome measure. The first model contains the document literacy while the second model contains the prose literacy measure and the third model contains the quantitative literacy measure. All models contain the extensive set of control variables described above.

Tables 4-6 and 4-7 present the coefficients and standard errors for the skill measures resulting from estimation of the models presented in equations 4-1 and 4-2, respectively.[38] The results make clear that the bivariate relationships presented in Table 4-3 are robust to a multivariate analysis. For the three dichotomous participation measures—being registered to vote, voting in the 2000 presidential election, and ever volunteering—all of the skill measures are positive and highly statistically significant. Although attempting to discern any patterns across outcomes and skill measures is a somewhat hazardous proposition, there is some evidence that skill levels may be more strongly related to voting in an election than being registered to vote or ever volunteering. The coefficients for the skill measures are of a slightly higher magnitude for this outcome. In addition, across the three skill measures—document literacy, prose literacy, and quantitative literacy—there is some evidence that prose literacy may be more strongly related to participation outcomes than either of the other two skill dimensions. In an ideal world this proposition could be more formally tested by estimating a model containing all

[38] Full results from the estimation of the models are available upon request.

three skill measures. However, the software required for analyzing the NAAL data—the AM statistical package—does not possess the capability to estimate models containing more than one latent independent variable. Regardless of the specific skill dimension that is most strongly related to political participation outcomes, the results presented in Tables 4-6 and 4-7 make clear that an individuals' skill level has a positive effect on his or her participation in the political process.

Table 4-6. Coefficients and standard errors for skill measures from estimation of equation 4-1

Skill Measure	(1)	(2)	(3)
	Registered to vote		
Document literacy	0.081***		
	0.013		
Prose literacy		0.087***	
		0.013	
Quantitative literacy			0.085***
			0.015
N	16244	16244	16244
Skill Measure	*Vote 2000 presidential election*		
Document literacy	0.137***		
	0.011		
Prose literacy		0.141***	
		0.011	
Quantitative literacy			0.122***
			0.013
N	16948	16948	16948
Skill Measure	*Ever volunteer*		
Document literacy	0.099***		
	0.011		
Prose literacy		0.125***	
		0.009	

Table 4-6. Coefficients and standard errors for skill measures from estimation of equation 4-1

Skill Measure	(1)	(2)	(3)
Quantitative literacy			0.099***
			0.011
N	18082	18082	18082

* $p<.10$; ** $p<.05$; *** $p<.001$

Table 4-7. Coefficients and standard errors for skill measures from estimation of equation 4-2

Skill Measure	(1)	(2)	(3)
	Information Index		
Document literacy	-0.001		
	0.023		
Prose literacy		0.065***	
		0.023	
Quantitative literacy			-0.065**
			0.024
N	18083	18083	18083

* $p<.10$; ** $p<.05$; *** $p<.001$

Results from the models estimating the effect of skills on the political information index are more variable. Table 4-7 demonstrates that there is no relationship between document literacy and an individual's score on the political information index. Prose literacy, however, is positively and significantly related to the number of sources from which individuals obtain "some or a lot" of political information. Finally, an individual's level of quantitative literacy is negatively and significantly related to an individual's score on the political information index.

It is perhaps not surprising that higher levels of prose literacy result in individuals obtaining "some or a lot" of political information from a greater number of sources, relative to

the number of sources from which individuals with lower prose literacy levels obtain similar amounts of information; the ability to seek out and comprehend information from a wide variety of sources will result in individuals being more likely to do so. The significant and negative relationship between quantitative literacy and scores on the political information index may seem somewhat surprising upon first glance. However, the results in Table 4-3 illustrate that the bivariate relationships between information sources and quantitative literacy are much weaker than the relationships between the information source index and the other skill dimensions, particularly prose literacy. Consequently, it is certainly plausible that the effect of quantitative literacy on the information source index is indeed negative, and that this relationship emerges only after conditioning on the broad set of covariates contained in the model.

4.5.3. Multivariate Results-HS&B

The results based on analysis of the NAAL dataset clearly demonstrate that an individual's skill levels have a positive effect on his or her participation in the political process. In addition, there is some evidence that prose literacy is the skill dimension most positively related to political participation outcomes; this proposition is further examined in the context of the HS&B data. Tables 4-8 through 4-11 present coefficients and standard errors for the skill measures—civics skills, vocabulary skills, and reading skills—resulting from estimation of the models presented in equations 4-3 and 4-4. Results are presented separately for the 1984, 1986, 1988, and 1992 political participation outcomes. Four models are estimated for each of the participation outcomes—three models each containing one specific skill measure and a fourth

model containing all three skill measures. As described earlier, all models also contain a wide variety of controls.[39]

Table 4-8. Coefficients and standard errors for skill measures from estimation of equation 4-3: 1984 outcomes

Skill Measure	(1)	(2)	(3)	(4)
	Registered to vote-1984			
Civic score	0.018***			0.010*
	0.005			0.006
Vocab score		0.020***		0.011
		0.005		0.007
Reading score			0.015***	0.007
			0.005	0.007
N	6222	6419	6384	5936
Skill Measure	*Voted in 1984 pres. election*			
Civic score	0.013***			-0.002
	0.005			0.006
Vocab score		0.023***		0.011
		0.005		0.007
Reading score			0.024***	0.020***
			0.005	0.006
N	6035	6234	6207	6021

Echoing the findings from the NAAL data, the results presented in Table 4-8 indicate that an individuals' skill level has a positive effect on their participation in the political process. In 1984—two years after scheduled graduation from high school—individuals with greater skill levels were more likely to be registered to vote and to vote in the 1984 presidential election. For both outcomes, each of the three skill measures is estimated to have a positive effect when it is the sole skill measure in the model. Although it is instructive to examine the relationship

[39] Full results from the estimation of the models are available upon request.

between participation outcomes and each skill measure separately, it provides little insight into the relative importance of each skill dimension. Some understanding of this issue can be achieved through the estimation of a model containing all three skill dimensions, the results of which are presented in column 4 of Table 4-8.[40] Not surprisingly, the results are more nuanced when the model contains all three skill measures. For the voter registration outcome, each skill measure has a positive coefficient, but only the civic skill measure reaches a conventional level of statistical significance; the vocabulary skill measure falls just short (p-value of 0.130). Looking at the 1984 presidential election voting outcome, an individual's reading skills are estimated to have a positive and highly significant effect. The vocabulary skill measure again falls just short of a conventional level of statistical significance (p-value of 0.118).

Similar results are observed for the 1986 participation outcomes. When included singularly, each skill measure is estimated to have a positive effect on the likelihood of being registered to vote in 1986 (Table 4-9). However, when all skill measures are included in the model, all coefficient estimates are positive, but none are significant. The measure of an individual's vocabulary skills comes closest, with a p-value of 0.162.

The other two 1986 outcomes are the participation and discussion indexes described earlier. Consistent with the pattern to this point, when included singularly all skill measures exhibit a positive, significant relationship with an individual's score on the political discussion index. In addition, when all three skill measures are included in the model, the measures of civic skills and vocabulary skills are both estimated to have a significant, positive relationship with the

[40] Although estimating a model containing all three skill measures can provide insight into the effects of a given skill dimension after conditioning on other skill dimensions, and is thus important to do, it is complicated by the high correlation among the skill dimensions—approximately 0.8. The collinearity among these variables is likely to increase their standard errors, thus making it more difficult to detect significant relationships.

political discussion index. In contrast, none of the skill measures—included singularly or simultaneously—exhibit a positive relationship with an individual's score on the political participation index. This somewhat surprising finding is discussed in greater detail below.

Table 4-9. Coefficients and standard errors for skill measures from estimation of equations 4-3 & 4-4: 1986 outcomes

Skill Measure	(1)	(2)	(3)	(4)
	Registered to vote-1986			
Civic score	0.013**			0.005
	0.006			0.007
Vocab score		0.017***		0.012
		0.006		0.008
Reading score			0.014**	0.007
			0.006	0.007
N	5151	5328	5292	5137
Skill Measure	*Political discussion index-1986*			
Civic score	0.009***			0.007**
	0.002			0.003
Vocab score		0.011***		0.008**
		0.003		0.004
Reading score			0.007***	0.000
			0.002	0.003
N	5753	5932	5912	5755
Skill Measure	*Political participation index-1986*			
Civic score	0.003			0.004
	0.002			0.002
Vocab score		0.000		-0.003
		0.002		0.003
Reading score			0.001	0.000
			0.002	0.003
N	5912	6076	6055	5899

Results for the sole 1988 outcome—voting in the presidential election—are fairly similar to the results for voting in the 1984 presidential election. Specifically, as demonstrated in Table 4-10, all three skill measures exhibit a positive, significant coefficient when included singularly in the model. When included together, an individual's civic and reading skills are both found to positively affect their likelihood of having voted in the 1988 election. This finding is similar to the 1984 results, in which an individual's reading skills also emerged as a significant determinant of voting in the 1984 presidential election in the model containing all three skill measures.

Table 4-10. Coefficients and standard errors for skill measures from estimation of equation 4-3: 1988 outcome

Skill Measure	(1)	(2)	(3)	(4)
	Voted in 1988 pres. Election			
Civic score	0.018***			0.011*
	0.005			0.006
Vocab score		0.019***		0.003
		0.006		0.008
Reading score			0.021***	0.014**
			0.005	0.007
N	5388	5576	5555	5380

Finally, there are two participation outcomes from 1992—10 years after sample members were scheduled to graduate from high school. In contrast to results from earlier years, there is no significant relationship between any skill measure and being registered to vote in 1992. As discussed in greater detail below, this could be partially attributable to the substantial temporal difference between the skill measurement and the measurement of the participation outcome. In spite of this ten-year difference, individuals' civic skills are found to be positively and

significantly related—both singularly and with the other skill measures in the model—to voting in any election in the year prior to being interviewed in 1992.[41]

Table 4-11. Coefficients and standard errors for skill measures from estimation of equation 4-3: 1992 outcome

Skill Measure	(1)	(2)	(3)	(4)
	Registered to vote-1992			
Civic score	0.005			0.002
	0.007			0.008
Vocab score		0.007		-0.004
		0.007		0.01
Reading score			0.009	0.009
			0.007	0.009
N	4166	4342	4328	4159
	Voted in any election-1992			
Civic score	0.013**			0.013*
	0.006			0.007
Vocab score		0.010		0.004
		0.007		0.009
Reading score			0.007	-0.002
			0.006	0.008
N	4497	4642	4620	4480

Taken a whole, the HS&B results further confirm that an individual's skill levels positively affect their participation in the political process. Across both time and multiple measures of political participation, all three skill dimensions were consistently found to have a positive effect. The implications of these findings for both the conceptual framework—and research and policy more broadly—will be discussed in the concluding section of this chapter.

[41] This does not include voting in the 1992 presidential election, which took place after the 1992 follow-up interviews were conducted.

4.5.4. Nonlinearities in the Effects of Skills on Political Participation

In addition to the main results presented above, a set of additional analyses were conducted in an effort to detect potential nonlinearities in the relationship between skill levels and participation in the political process. It is plausible that there is some threshold above which the participation-related return to skills diminishes. To assess this possibility a second-order skills term is added to the models presented in equations 4-3 and 4-4.[42] Estimation of these models revealed no evidence of nonlinearities in the relationship between skills and participation. Full results from the estimation of these models are available upon request.

4.6. Discussion

This chapter set out to assess whether an individual's level of knowledge and skills have a positive effect on their participation in the political process participation. Based on analysis of two datasets that contain high-quality measures of several skill dimensions as well as several measures of political participation, the answer is a resounding yes. The positive effect of skills on political participation was detected in both bivariate and multivariate settings, and across multiple skill dimensions, acts of political participation, and time periods. In confirming that an individual's skill levels positively affect their political participation, this chapter provides further evidence in support of the conceptual framework developed in Chapter 2. The analyses in Chapter 3 demonstrated that educational policies and practices can affect civic knowledge and skills. This chapter illustrates, in turn, that knowledge and skills affect political participation. Taken together, the results suggest that educational policies, practice, and context affect political participation through the mechanism of increased levels of knowledge and skills.

[42] Ideally, the NAAL dataset would also have been analyzed for the possibility of nonlinear skills effects. However, the software required to analyze the NAAL data does not permit specification of such a model.

Although this chapter provides convincing evidence that an individual's level of knowledge and skills has a positive effect on their participation in the political process, it left some questions unanswered and even raised others. Perhaps the most interesting question that was not able to be answered with the level of confidence one might desire concerns the specific skill dimension or dimensions that most strongly affect levels of political participation. Bivariate analysis of the NAAL data shows strong relationships between all three skill dimensions and the political participation measures, specifically being registered to vote, voting in the 2000 presidential election, and ever volunteering. These relationships were also detected in a multivariate setting when each literacy measure was included singularly in the model. The obvious response to this is including multiple literacy measures in a single model. Unfortunately, the structure of the dataset—coupled with the requirement of analyzing the data using the AM statistical package—does not permit the effects of multiple literacy measures to be estimated simultaneously.

Interestingly, there is substantially more clarity regarding the effects of the three literacy dimensions on number of sources from which political information is obtained. When each literacy dimension is included singularly in a model, the results indicate that prose literacy has a positive effect on an individual's score on the political information index, document literacy has no effect, and quantitative literacy has a negative effect. Considered as a whole, the evidence from NAAL indicates that skills clearly matter, but it is not clear which skill dimension is most important for being registered to vote, voting, and volunteering. It is clear, however, that prose literacy is the most important skill for promoting the acquisition of political information from a large number of sources.

As was the case with the NAAL analyses, each of the three skill and knowledge dimensions in the HS&B dataset—civic skills/knowledge, vocabulary skills, and reading ability—were found to be positively related to the vast majority of participation outcomes in both bivariate and multivariate settings. Unlike the NAAL data, HS&B affords the ability to include multiple skill dimensions in a model simultaneously. However, this ability fails to bring much clarity to the issue of which skill dimension is most important for various participation activities. There is some indication that reading skills are important determinants of voting in presidential elections, but such a conclusion should not be drawn with any reasonable amount of certainty. Similarly, there is some evidence that civic knowledge/skills are the most important skill dimension affecting political discussion with a wide variety of groups as well as voting in nonpresidential elections. Such propositions need much more evidentiary support, however, before they are to be believed with a reasonable degree of certainty. Attempting to better discern which skill and knowledge dimensions are the most important for participation in various participation activities is clearly an area ripe for additional research.

The analyses in this chapter examined the relationship between skills and their participation in a broad set of participation-related activities. In nearly every case, skills were found to have a positive effect on the measure of participation. An exception to this pattern was the political participation index, which was constructed from five items contained in HS&B's 1986 follow-up. In the multivariate analyses no skill dimension was found to be to an individual's score on the participation index, which comes as somewhat of a surprise given the results of the bivariate analysis (Table 4-5), coupled with the results of the other multivariate analyses. It is not entirely clear why no relationship is observed between the skill dimensions

and the participation index. It could be the case that the observed bivariate relationship was spurious. That is, socioeconomic status and political interest may be driving the bivariate relationship and after accounting for these factors in a multivariate context, skills are not truly affecting individuals' participation in the activities that comprise the index—donating money to a candidate, campaigning on behalf of a candidate, and others. Regardless, this finding will be the subject of future inquiries.

Early parts of this chapter discussed the possibility of a diminishing marginal return to skills in the context of their effects on political participation. Empirical inquiry into this possibility reveals no evidence of a nonlinear relationship. Whether such a finding is surprising or not is debatable, but all evidence points to a relationship in which an individual's likelihood of participating in the political process increases linearly in their skill level.

The NAAL and HS&B datasets are superior in many important respects to any previous dataset that has been used to analyze the effects of skills on political participation. Their measures of skills are unparalleled in their quality and breadth. They contain a broad set of background and educational measures that can be used as control variables in a multivariate analysis. The samples are nationally-representative in nature. However, in addition to these appealing features they also have limitations that should be acknowledged. First, the datasets require a trade-off between the breadth and quality of the education and skill measures and the breadth and quality of the participation measures. NAAL and HS&B contain unmatched skill and education measures, but imperfect participation measures. Datasets more commonly used in political science generally contain better participation measures, but significantly poorer skill and education measures, if they contain any at all. In an ideal world there would be multiple datasets

that each contain flawless measures of education, participation, and skills. However, in the absence of this ideal world, the tradeoff described above is one certainly worth making.

Other limitations are dataset-specific. First, NAAL is cross-sectional in nature, which requires reliance on the conditional independence assumption for a causal interpretation of the coefficients on the skill measures. Although this is undeniably a strong assumption, the extensive set of background variables contained in the NAAL dataset makes the conditional independence assumption more plausible than it might be in analyses based on other, less comprehensive datasets. Second, while HS&B is a panel dataset, it only follows individuals through young adulthood. In addition, individuals' skills are measured at only a single point in time. Together, this makes it more difficult to draw inferences about the effects of skills at later points in life, or how the development or evolution of skills might affect political participation. The NAAL results suggest that skills remain important throughout the life course, which demonstrates one of the benefits of analyzing this issue using two different datasets.

In spite of the limitations of the datasets and the questions that remain unanswered, the importance of the findings that emerged from this chapter are consequential. For decades political scientists have theorized that education affects political participation through the development of knowledge and skills (Wolfinger and Rosenstone 1980; Rosenstone and Hansen 1993; Verba, Schlozman, and Brady 1995; Nie, Junn, and Stehlik-Barry 1996), but have marshaled a relatively weak body of empirical evidence to support these claims. The results presented in this chapter provide unequivocal substantiation of these prior theoretical claims, as well those laid out in an earlier chapter of this project. In substantiating the previous theoretical claims, it also expands the reach of prior empirical evidence. The most prominent effort to date

to empirically assess the participation-related effects of skills is presented in Nie, Junn, and Stehlik-Barry (1996). These authors find that improved cognitive ability—as measured by a ten-item test of verbal ability on the General Social Survey—serves to increase political tolerance and political knowledge, which they collectively refer to as "democratic enlightenment." The results presented in this chapter indicate that the effects of skills reach much wider. Various skill dimensions are found to affect voting behavior, political discussion, information acquisition, and voluntarism, among others.[43] Put simply, the participation-related effects of skills reach much more widely than was previously known.

The last two chapters have presented the results of empirical analyses that have focused on examining the effects of education on political participation through the mechanism of increased levels of knowledge and skills. The results leave little doubt that education does indeed operate through this causal pathway. However, as described in Chapter 2, this is unlikely to be the sole pathway through which education affects political participation. The next chapter moves on to examining the attainment-related effects of education.

[43] Unfortunately, neither the NAAL nor HS&B datasets contain specific measures of political tolerance or political knowledge that would allow confirmation of the results presented by Nie, Junn, and Stehlik-Barry.

Chapter 5. Educational Attainment and Political Participation

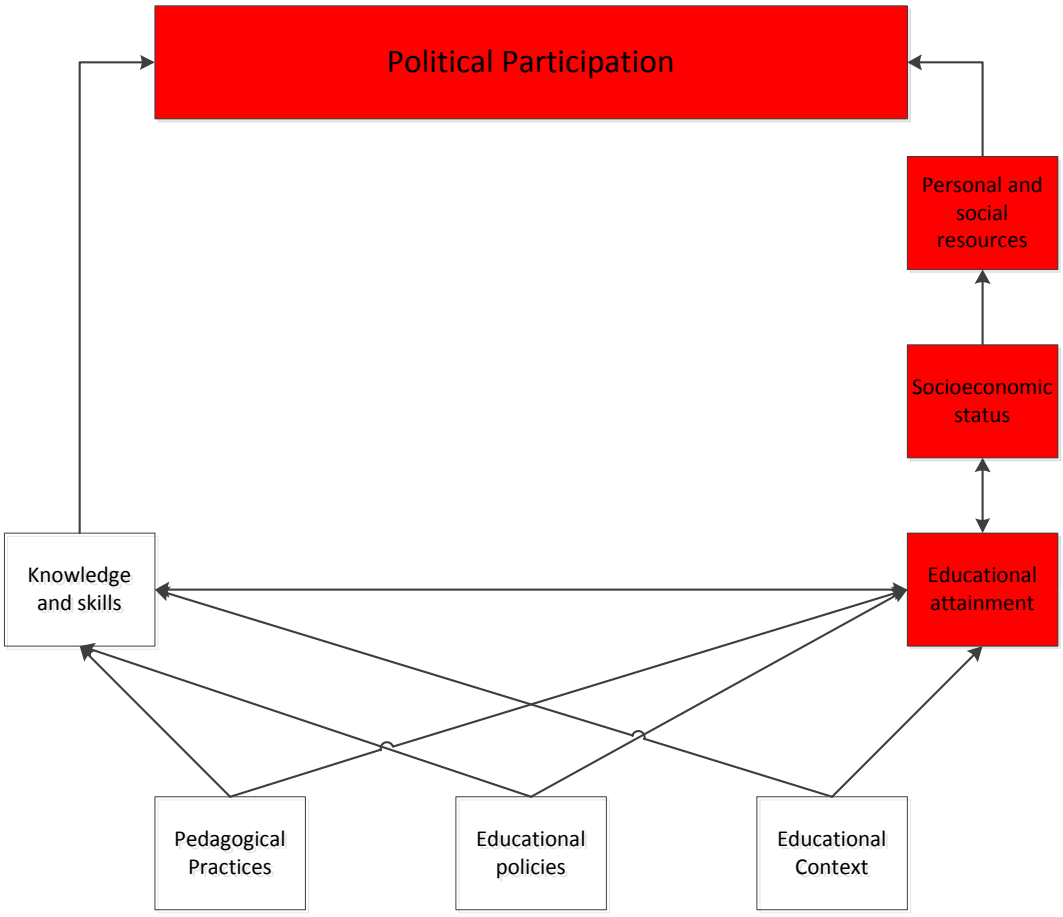
5.1. Introduction

To this point, the empirical analyses in this project have focused on analyzing how education affects political participation through the mechanism of increased knowledge and skills. Chapter 3 convincingly demonstrated that educational policies, practices, and context can affect an individual's level of civic knowledge and skills. In turn, Chapter 4 established that an individual's level of knowledge and skills exert a positive influence on his or her participation in the political process. Together, the analyses present compelling empirical evidence in support of the theoretical proposition that education affects political participation through the mechanism of increased knowledge and skills.

The conceptual framework developed in Chapter 2 makes clear that increased knowledge and skills is not the only mechanism through which education is theorized to affect political participation. Indeed, the effects of education are also postulated to operate by way of increased levels of attainment. As individuals increase their level of educational attainment they are theorized to move into higher socioeconomic strata. This increase in socioeconomic status is hypothesized to provide individuals with both easier and more access to personal and social

resources. The heightened level of resource availability is then theorized to result in greater levels of participation in the political process. Figure 5-1 presented below provides a graphical depiction of the full conceptual framework, with the causal pathway described above shaded in red.

Figure 5-1. A Conceptual Model of the Effect of Education on Political Participation: Focus of Chapter 5



The first part of this chapter is devoted to empirically testing the theoretical conjecture that education affects political participation by way of increased resource availability attributable to higher socioeconomic status resulting from increased attainment levels. As reviewed in an

earlier chapter, a good deal of existing research has attempted to discern whether the observed positive correlation is causal in nature, with the general consensus being that a causal relationship does indeed exist. However, the studies that provide the best evidence of a causal relationship between attainment and participation rely almost exclusively on reduced-form estimates. In doing so, these studies do not devote much, if any, attention to the mechanisms by which increased attainment results in greater levels of political participation. As described in greater detail below, the empirical analyses in this chapter will devote significant attention to explicitly testing the mechanism through which the attainment-related effects of education are theorized to operate.

Education is routinely referred to as the great equalizer, but the analyses in this chapter will demonstrate that not all education is equal. Prior research attempting to determine whether the observed positive correlation between educational attainment and political participation is causal in nature generally pays little attention to the level of education at which any causal effect is identified. Implicitly, this body of research assumes that the effect of completing a given year of education is equal to the effect of completing any other year of education; completing tenth grade, for example, is assumed to the same effect as graduating from high school. This implicit assumption of effect homogeneity is likely unrealistic, particularly given the mechanism through which attainment is theorized to operate in this project—increased personal and social resource availability stemming from higher levels of socioeconomic status. Drawing from a theoretical basis summarized below, the analyses in this chapter recognize the likelihood that the attainment-related causal effects of education are nonconstant, and are explicitly designed to detect causal heterogeneity.

To summarize, the goals of this chapter are twofold. First, the chapter will test the theoretical proposition that attainment-related effects of education operate by way of greater resource availability resulting from increased socioeconomic status—the pathway shaded in red in the figural model presented above. Second, based on hypotheses with strong theoretical backing, the analyses presented in this chapter will assess whether the attainment-related causal effects of education are heterogeneous in nature. Taken together, the results presented in this chapter will provide further insight into the participation-related effects of educational attainment, an area of research with a long history but—as this chapter will demonstrate—an incomplete understanding.

The chapter proceeds by first providing a brief review of the theory undergirding the empirical analyses in this chapter before summarizing the existing literature on the attainment-related effects of education on political participation. The chapter will then describe the data sources and empirical analyses used to accomplish the chapter's two goals—testing the theoretical mechanism and detecting heterogeneity in the attainment-related effects of education. The final two sections of the chapter will present the results of the empirical analyses and discuss their implications, both in the context of the conceptual framework and in the context of research and policy more broadly.

5.2. Review of Theoretical Basis

As detailed in Chapter 2, the proposed causal pathway for the attainment-related effects of education has much of its theoretical basis in the sociological literature on status attainment. This literature identifies educational attainment as a primary determinant of an individual's socioeconomic status (Blau and Duncan 1967; Sewell and Hauser 1975; Wright 1979;

Goldthorpe 1980; Baron and Bielby 1980) and, coupled with the body of work in political science demonstrating a strong positive correlation between socioeconomic status and political participation (Nie, Junn, and Stehlik-Barry 1996; Verba, Schlozman, and Brady 1995; Rosenstone and Hansen 1993), serves as the general foundation for the theoretical expectation that educational attainment affects political participation by way of increased socioeconomic status. This general foundation needs further extension and refinement, however, before it has the potential to serve as a viable and testable causal pathway; without refinement, the specific mechanism through which increased socioeconomic status results in greater political participation is left unidentified.

The necessary extensions and refinements of this foundation start with two explanations put forth by political scientists of the process through which increased socioeconomic status—by way of increased educational attainment—may lead to higher levels of political participation. Nie, Junn, and Stehlik-Barry (1996) argue that it occurs through social network centrality; formal education results in people being significantly more likely to be at the center of politically important social networks. This central positioning provides individuals with greater proximity to policymakers, increased accessibility to political information, and a favorable venue for having their voices heard. Rosenstone and Hansen (1993) and Verba, Schlozman, and Brady (1995) present a similar, but not identical, depiction of the process. These authors argue that educational attainment results in an increased likelihood of placement in social and political networks where individuals can be more easily recruited and mobilized by political leaders. Although these accounts purport to be different, they are effectively flip sides of the same coin; the primary difference is that Nie, Junn, and Stehlik-Barry (1996) ascribe primary participatory

agency to the potential participant while Rosenstone and Hansen (1993) and Verba, Schlozman, and Brady (1995) attribute primary agency to individuals other than the potential participant and secondary agency to the potential participant. The basic prediction of increased political participation stemming from higher socioeconomic status, however, is identical across these two accounts.

In addition to identifying educational attainment as a primary determinant of an individual's socioeconomic status, the status attainment literature also argues that increased socioeconomic status provides individuals with increased levels of both personal and social resources. Personal resources are possessions of the individual and may include things such as wealth, power, and prestige while social resources are those resources accessible through an individual's direct and indirect ties, but do not belong directly to the individual (Lin 1999). The prototypical example of a social resource involves an individual using the occupational positions of his or her friends to try and gain employment.

It is easy to envision how increased levels of personal and social resources could result in increased political participation. Indeed, the work by Nie, Junn, and Stehlik-Barry (1996), Rosenstone and Hansen (1993), and Verba, Schlozman, and Brady (1995) presents several personal and social resources that could result in increased political participation. A sampling of these resources includes greater proximity to policymakers, increased accessibility to political information, and increased likelihood of being recruited to participate in politics. Although the resources identified in previous accounts are undeniably visible and important resources through which increased socioeconomic status resulting from higher educational attainment could increase political participation, they by no means comprise an exhaustive list of such resources;

one could imagine several other resources provided by increased socioeconomic status that could increase political participation. Taken as a whole, this discussion presents the basic theoretical rationale for hypothesizing that increased educational attainment leads to increased resource availability, which results in greater levels of political participation.

To this point, the discussion presented above provides a strong theoretical basis for the proposed causal pathway through which educational attainment results in greater political participation, but it does not present a conceptual rationale for an expectation of heterogeneity in those effects. Like many other aspects of the theory motivating this chapter, the basis for an expectation of heterogeneity again draws on the status attainment literature. In its consideration of the relationship between educational attainment and socioeconomic status, the literature emphasizes the importance of completing educational milestones. For example, the literature holds that graduating from high school has a much stronger effect on an individual's socioeconomic status than completing 10^{th} or 11^{th} grade. Similarly, graduating from college is thought to be substantially more important than completing the years of postsecondary education that do not result in degree attainment. Empirically, this implies that the attainment-related effects of education on political participation will operate as a step function; there are theorized to be large observable effects when individuals complete an educational milestone—high school graduation or postsecondary degree attainment, particularly BA degree attainment—but relatively small, if any, effects for completion of interim years of education. The empirical analyses to follow will assess the accuracy of this conjecture, as well as those presented earlier in this section. Prior to that, however, a brief overview of the existing literature on the relationship between educational attainment and political participation is presented.

5.3. The Literature

Of all the empirical literatures relevant to this project, the body of work examining the relationship between educational attainment and political participation is undoubtedly the most robust. However, as the following review will illustrate, this literature is not without weaknesses, particularly in considering the precise mechanisms through which attainment affects political participation.

Some of the earliest and most influential work in the American political behavior literature recognized the strong, positive correlation between education, operationalized as the number of formal years of schooling completed, and political participation (Campbell et al. 1960; Campbell, Gurin, and Miller 1954; Key 1961; Verba and Nie 1972; Converse 1972). Following this early work, a number of seminal studies have further confirmed this relationship. Wolfinger and Rosenstone's (1980) thorough analysis of the determinants of voter turnout concluded that, of all the components of socioeconomic status, an individual's educational attainment was the best predictor of his or her voter turnout status. A little more than a decade later, Rosenstone and Hansen (1993) echo this viewpoint, and the relationship was subsequently confirmed in studies by Verba, Schlozman, and Brady (1995), Putnam (2000), and Burden (2009), among others.

For decades, the nature of the relationship between formal education and political participation was unquestioned; it was assumed that educational attainment exerted a causal effect on political participation. However, in recent years scholars have begun to note that a causal interpretation of the relationship between educational attainment and political participation is not warranted by the methodological approaches employed in the early work;

none of the studies exploit plausibly exogenous variation in educational attainment to identify its causal effect on political participation. Consequently, it is possible that the relationship detected in these early studies was spurious; unobserved factors influencing both educational attainment and political participation—such as motivation or intelligence—could be responsible for the observed relationship (see Kam and Palmer 2008 and Green 2005).

Following recognition of the possible spurious nature of the relationship, scholars undertook several studies attempting to exploit potentially exogenous sources of variation in educational attainment to identify its causal effect on participation. Using instrumental variables approaches, both Milligan, Moretti, and Oreopolous (2004) and Dee (2004) conclude educational attainment to have a positive effect on political participation. Similar conclusions were reached in recent work by Sondheimer and Green (2010), who draw on well-known experiments of experimental educational interventions (Perry Preschool and Tennessee STAR) that induced different rates of high school completion between the treatment and control groups, thus rendering initial assignment-to-treatment a valid instrument for educational attainment. Using this instrument, the authors find a positive effect of attainment on political participation.

Not all recent rigorous inquiries find educational attainment to be causally related to political participation. Using a fixed effects approach and Current Population Survey data, Tenn (2007) finds educational attainment to have very little effect on political participation. Kam and Palmer (2008) employ propensity score matching techniques with the Parent-Child Political Socialization Survey and High School & Beyond data, and also conclude that educational attainment and political participation are not causally related. This study, however, spurred a series of follow-up work demonstrating that the results in Kam and Palmer (2008) are highly

sensitive to various specification choices (Mayer 2011; Henderson and Chatfield 2011; but see Kam and Palmer 2011 for a rejoinder).

Taken as a whole, this recent body of work supports the conclusion that educational attainment exerts a causal effect on political participation. Less clear in this work—due to its reliance on exogenous variation for identification—is the precise mechanism driving the effect. As previewed above, there are two primary schools of thought regarding the mechanisms through which educational attainment affects participation through the mechanism increased socioeconomic status; Nie, Junn, and Stehlik-Barry (1996) argue that it occurs through social network centrality while others contend that educational attainment results in an increased likelihood of placement in social and political networks where individuals can be more easily recruited and mobilized by political leaders (Rosenstone and Hasen 1993; Verba, Schlozman, and Brady 1995). Unfortunately, the empirical evidence marshaled in support of these competing, yet similar, explanations is somewhat weak; the data used for the tests generally lack information required for direct tests of the theories. The following section presents a description of the data this project employs to test the proposed causal pathway through which increased educational attainment results in greater levels of political participation.

5.4. Data

Effectively accomplishing the twin goals of this chapter—testing the theoretical mechanism through which the attainment-related effects of education operate and assessing the potential for causal heterogeneity in these effects—is a task best performed with multiple datasets; as will become clear below, however, achieving each goal requires datasets with quite different features.

5.4.1. Causal Pathway-NLSY79

Analyzing the theoretical mechanism through which the attainment-related effects of education operate requires a dataset that contains information on political participation, educational attainment, socioeconomic status, and personal and social resources, among other dimensions. Securing a dataset with the requisite breadth and depth of information on each these topics is certainly a tall order, but the National Longitudinal Survey of Youth 1979 (NLSY79) is well-equipped to fill it. The NLSY79 interviewed a nationally-representative sample of young men and women who were ages 14-22 when they were first interviewed in 1979. These individuals were re-interviewed annually until 1994, with the follow-up interviews moving to biennial schedule from 1994 through the present. The sample members were last interviewed in 2010 and were 44 to 53 years old at the time of that interview. The original purpose of the NLSY79 involved the collection of information that would enable researchers to analyze the social, educational, and labor market outcomes of individuals as they transitioned from adolescence to adulthood. Consequently, the NLSY79 dataset contains a wide variety of measures along each of these dimensions.

The education measures contained in the NLSY79 are particularly rich, with data on individuals' achievement test scores, characteristics of their high schools, their high school transcripts, and their postsecondary educational experiences. Perhaps most important for this analysis, however, are the educational attainment measures contained in the data. At each interview, each respondent's highest level of completed education was recorded, thus providing a dynamic measure of each respondent's attainment level over a thirty-year period. These education measures play important roles in the analyses to follow.

The NLSY79 dataset also contains a variety of dynamic measures of socioeconomic status and personal and social resources. For example, the dataset contains over-time information on employment, the occupation of respondents as well as their spouse or partner, household income, household net worth, and possession of several types of assets, among other measures. Together, the variables contained in the NLSY79 data represent the most comprehensive set of socioeconomic status and resource measures available in any dataset, and will be instrumental in analyses to follow.

For most of its existence, the NLSY79 dataset was of limited utility to political scientists because it lacked any measures of political participation. This changed in 2008, when the American National Election Studies (ANES) was given permission to include a small number of political items on the survey instrument. Specifically, respondents were asked whether they voted in the 2006 midterm election, their political party affiliation, the strength of their party affiliation, their level of interest in politics, their views of government responsiveness to public opinion, and their levels of social trust. The participation-related measures serve as the dependent variables in the empirical analysis used to test the mechanism through which the attainment-related effects of education are hypothesized to operate.

In addition to these measures directly relevant to the analysis at hand, the NLSY79 data contain extensive background information on demographics, family structure, health, public program participation, crime, substance abuse, and attitudes and expectations about a diverse set of topics. Taken as a whole, the breadth, depth, and length of the NLSY79 dataset across multiple dimensions render it ideal for empirically testing the theoretical conjecture that

education affects political participation by way of increased resource availability attributable to higher socioeconomic status resulting from increased attainment levels.

5.4.2. Causal Heterogeneity-HS&B, NELS:88, and BPS

Investigation of potential heterogeneity in the causal effect of educational attainment on political participation requires one or more datasets that contain measures of political participation and provide a source of plausibly exogenous variation in educational attainment—or at least provide an analytical setting where concerns about unobservable characteristics that affect both educational attainment and political participation outcomes are mitigated. The second part of this chapter draws on three datasets that possess both of these features—High School and Beyond, the National Education Longitudinal Study of 1988, and the 1996 cohort of the Beginning Postsecondary Students study—to explore potential heterogeneity in the causal effect of educational attainment on political participation.

The High School and Beyond (HS&B) dataset was described in substantial detail in Chapter 4 and readers should refer to that description for a general overview of the dataset. This chapter exploits the fact that HS&B devoted significant attention to tracking and obtaining information from sample members who dropped out of high school; indeed, the study designers developed a survey instrument to be specifically administered to those individuals. This instrument contains items regarding the timing and reasons for dropping out as well as activities that the respondent substitutes for school, with a particular focus on employment. As will become apparent in a proceeding section, this information will be instrumental in the empirical analyses designed to assess the extent of causal heterogeneity in the political participation-related effects of educational attainment.

The National Education Longitudinal Study of 1988 (NELS:88) is the U.S. Department of Education's successor to HS&B. This study first surveyed a nationally representative sample of 8th grade students in 1988 and subsequent waves of data collection were conducted using the same panel of students in 1990, 1992, 1994, and 2000 (Curtin et al. 2002). These follow-ups were scheduled to coincide with respondents' sophomore year in high school, senior year in high school, two years after scheduled high school graduation, and eight years after scheduled high school graduation. Like HS&B, the NELS:88 survey instruments inquired about myriad aspects of students' academic, social, personal, and civic lives. Also like HS&B, NELS:88 intensively tracked and surveyed sample members who dropped out of high school. In addition to collecting data directly from students, NELS:88 also acquired information from several other sources, including the parents of sample members, school administrators, teachers, and—notably—students' high school transcripts. Taken as a whole, NELS:88 provides a wealth of information on all aspects of the lives of sample members—including political participation—beginning in their adolescence and continuing through their young adult years.

In contrast to HS&B and NELS:88—which first interview students during their K-12 years—the series of Beginning Postsecondary Students (BPS) studies first interview a nationally-representative sample of students at the end of their first year of postsecondary education. These students are subsequently re-interviewed at two later points during and after their postsecondary careers.[44] BPS is designed to collect information on a wide variety of topics, including student demographics, persistence in postsecondary education, reasons for leaving school, degree

[44] To date, there have been three BPS cohorts, with initial interviews in 1990, 1996, and 2004. The exact timing of the follow-up interviews varies somewhat across these three cohorts. The 1990 cohort was re-interviewed in 1992 and 1994 while the 1996 cohort was re-interviewed in 1998 and 2001; follow-up interviews for the 2004 cohort were conducted in 2006 and 2009.

attainment, school characteristics, schooling experiences, transition to the labor market, student debt, and political participation, among others (Wine, Janson, and Wheeless 2011).

This chapter uses data from the approximately 12,000 students who are included in the 1996 BPS cohort. These students were originally interviewed at the end of their first year of postsecondary education—the 1995-96 school year—and were re-interviewed in 1998 and 2001. At each follow-up interview, a substantial amount of information was collected on the individuals' educational, social, political, and economic outcomes. As described in greater detail below, the analyses in this chapter rely primarily on the political participation measures collected as part of the 2001 follow-up interview.

These three datasets focus not only on students who remain in school, but those who leave school as well. This fact, coupled with the datasets' emphases on different levels of the education system and their coverage of multiple dimensions of individuals' lives, render them ideal for analyzing potential heterogeneity in the causal effect of educational attainment on political participation. The following section describes the specific empirical approaches that will be used to conduct this analysis.

5.5. Empirical Approach-Attainment-Related Effects of Education

A structural equation modeling (SEM) approach is used to empirically test the causal pathway through which the attainment-related effects of education are theorized to operate. Such an approach has two primary advantages in the context of this analysis. First, SEM provides a systematic and rigorous method for explicitly testing theorized causal pathways. Second, SEM allows for the incorporation of latent constructs into a well-developed analytical framework. The discussion below makes clear that the empirical analysis exploits each of these advantages.

5.5.1. Measurement

The conceptual framework developed in Chapter 2 theorizes that increased educational attainment increases socioeconomic status, which results in greater resource availability—both personal and social. This increased resource availability is then hypothesized to result in greater levels of political participation. The first step in empirically testing this conjecture involves operationalizing each of the four concepts identified in the theory—educational attainment, socioeconomic status, personal and social resources, and political participation and engagement—using observed variables in the NLSY79 dataset. In addition, a rigorous test of the proposed theoretical pathway also requires identifying factors, and their corresponding measures in the NLSY79 dataset, that could induce a spurious relationship between political participation and the components of the theorized causal pathway.

Educational attainment is the central concept in the empirical analyses in this chapter—as well as a major part of the larger project—and is perhaps the most straightforward to operationalize. Consistent with nearly every previous political science study containing a measure of education, an individual's attainment is measured as the highest level of formal schooling completed. An issue that arises due to use of the NLSY79 dataset—some may call it a luxury—concerns the timing of this measurement. For the purposes of the analyses in this chapter, an individual's attainment level is measured at the time of the follow-up interview in calendar year 2000. By this time, individuals in the NLSY79 sample were 35 to 43 years old, ages by which the vast majority of individuals have completed their formal schooling.[45]

[45] The results of the analyses are not sensitive to the choice of year in which attainment is measured. Substantively similar results are obtained if attainment is measured in other years.

Whereas operationalizing educational attainment is rather straightforward, measuring socioeconomic status is significantly less so. Experts disagree about many aspects of the measurement of socioeconomic status, including its components and the relative contributions of the relevant components. Despite these broad disagreements, there are also important areas of agreement. Specifically, experts generally agree that socioeconomic status has multiple components and that an individual's occupation represents one of the most important components. This agreement serves as the basis for using occupational prestige as the measure of socioeconomic status in this chapter. The NLSY79 dataset contains Census occupational codes for NLSY79 respondents as well as their spouses or partners. Sociologists have developed several indexes—corresponding to the Census occupational codes—that are designed to measure the prestige of each occupation (see Nakao and Treas 1994; Stevens and Cho 1985; Hauser and Warren 1997). These occupational prestige scores were merged into the NLSY79 dataset and serve as the measure of socioeconomic status used in this chapter.[46] More specifically, each respondent's socioeconomic status is defined as the greater of 1) the respondent's occupational prestige score in 2004, or 2) the occupational prestige score of the respondent's spouse or partner in 2004; this measure can perhaps best be thought of as household socioeconomic status. Using the prestige scores from respondents' 2004 occupations ensures that individuals would have

[46] The occupational prestige scores developed by Nakao and Treas (1994) are used as the measure of socioeconomic status in this chapter. Because these scores were based on the 1980 Census occupation coding scheme while the NLSY79 dataset utilizes the 2000 Census occupation coding scheme, I use the process developed by Frederick (2010) to crosswalk Nakao and Treas' (1994) scores with the 2000 Census occupational codes. The results of all analyses are substantively similar if the occupational prestige scores developed by Stevens and Cho (1985) or Hauser and Warren (1997) are used in place of those developed by Nakao and Treas (1994). Indeed, all three occupational prestige indexes correlate at over 0.8.

sufficient time to transition into—and become well-established in—their chosen career fields. Indeed, at the time this measure was taken nearly all respondents were in their 40s.

The conceptual framework developed in Chapter 2 holds that increased socioeconomic status provides individuals with greater access to personal and social resources. Personal resources could be measured in several ways, but family income is perhaps the most direct and comprehensive measure of the concept. Consequently, the 2004 version of this measure is used as the primary measure of personal resources in this chapter.[47] A high-quality measure of social resources is more difficult to find in the NLSY79 data. In a way, occupational prestige is the best measure of social resources in the data; an individual's coworkers often comprise his or her most accessible social resources. As a result, in the structural equation model to follow, the direct path from socioeconomic status—measured by occupational prestige—to political participation serves as an estimate of the role of social resources.

The ultimate outcome of interest in this chapter—as well as in the larger project—is an individual's participation and engagement in the political process. Previous chapters have demonstrated that this broad concept can be measured in several ways, such as voter registration, electoral participation, political discussion, campaign participation, political information consumption, and even civic engagement. This chapter recognizes the breadth of the concept of political participation and—taking advantage of the ability of SEM to incorporate measurement models—considers it to be latent in nature. Such a consideration allows, even requires, the concept to be measured with multiple variables. As described above, the 2008 follow-up

[47] Recognizing that personal resources could be measured in a variety of ways, measures of recipient earnings and family net worth were tested in place of the family income measure in the analyses. The results are substantively similar.

interview of the NLSY79 respondents inquired, for the first time, about political-related topics. Responses to four of these questions—having a political party affiliation, being a strong partisan, level of political interest, and voting in the 2006 midterm elections—are included in the measurement model of political participation. Additional details regarding the specification of the measurement model are presented below.

As is the case with standard regression analysis, a causal interpretation of the coefficient estimates in a SEM relies on the conditional independence assumption. Consequently, it is important to condition on measures that could induce a spurious relationship between the components of the theorized causal pathway and the outcome of interest, political engagement. The NLSY79 dataset contains a rich set of such measures, and those used in the empirical analyses to follow include measures of demographics, skills, family structure, health, criminal behavior, substance abuse, and attitudes and expectations about a diverse set of topics.

Taken together, the components of the theoretical pathway are operationalized in a manner that permit a high-quality and direct empirical test; the selected variables represent valid and reliable measures of the relevant concepts and they have a logical temporal ordering. The following section describes how the measures are assembled into an empirical model.

5.5.2. Empirical Model

The empirical SEM can best be presented graphically and is done so in Figure 5-2, below. In this graphical depiction, square boxes represent variables that are observed in the NLSY79 data while circles represent latent constructs. The arrows (paths) represent parameters to be estimated while nonexistent paths represent relationships constrained to zero. In SEM parlance, variables—latent or observed—with arrows pointing to them are referred to as

endogenous variables while variables with no arrows pointing to them are referred to as exogenous. All endogenous variables possess an associated error term. The arrows connecting the error terms of the observed variables comprising the latent political engagement construct represent unmodeled covariance between the components. An important feature of the model that, for aesthetic reasons, is not evident in its graphical representation is the unmodeled covariance between all the exogenous variables;[48] effectively, this eliminates the assumption that the exogenous variables are wholly independent of one another.

As demonstrated in Figure 5-2, below, the model begins with paths from the exogenous variables to the four endogenous measures—educational attainment, occupational prestige, family income, and political engagement. These paths are included in an attempt to permit causal interpretation of the coefficients on the paths between the endogenous variables. It is worth noting that not every possible path from the exogenous variables to endogenous variables is present in the model; only those judged to be theoretically and empirically important are included.[49] In addition to paths from exogenous to endogenous measures, there are also paths among the endogenous variables. Specifically, there are paths from 1) educational attainment to occupational prestige, 2) occupational prestige to family income, and 3) family income to the latent measure of political participation. Together, these paths represent the theorized causal process that this chapter set out to test empirically.

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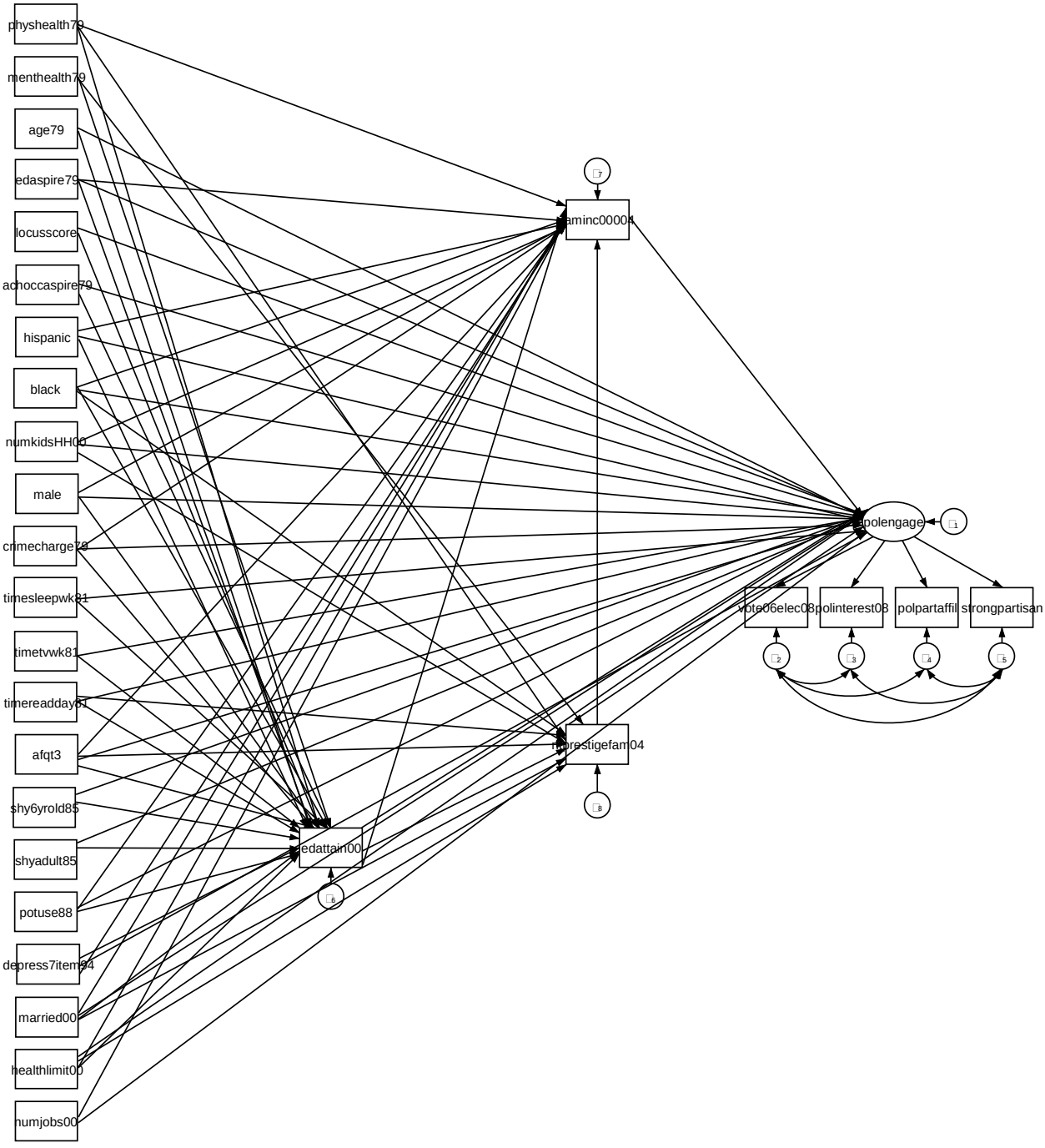
[48] Graphically illustrating these unmodeled covariances would make the figural model more cluttered than it is currently.

[49] Theoretically important paths were identified from existing literature as well as the conceptual model guiding this project. Empirically important paths were determined by examining the modification indices of earlier versions of the SEM. The model was also estimated with each observed participation measure in place of the latent political participation construct and the results are substantively similar.

Figure 5-2. Visual Representation of Structural Equation Model



The conceptual framework developed in Chapter 2 indicates that educational attainment is also theorized to affect political participation through the development of knowledge and

skills. Consequently, there is a path from educational attainment to the political participation measure designed to account for this effect.[50] Finally, the model has the latent measure of political participation, with paths to its four observed components—having a political party affiliation, being a strong partisan, level of political interest, and voting in the 2006 midterm elections. Taken as a whole, the SEM provides a rigorous, transparent empirical test of the theoretical conjecture that education affects political participation by way of increased resource availability attributable to higher socioeconomic status resulting from increased attainment levels. The model is estimated via a maximum likelihood estimator that utilizes information from cases with missing data—as well as those with no missing data—although the results are robust to a maximum likelihood estimator that listwise deletes cases with missing data.

5.6. Results-Attainment-Related Effects of Education

Prior to exploring the substantive results of the model, it is important to assess the extent to which the model fits the data. There are several measures of model fit in the SEM literature, but they fall into one of four main categories—likelihood ratio, population error, baseline comparison, and size of residuals (see Kaplan 2009 for in-depth description of each of the goodness-of-fit tests). Table 5-1 presents the relevant model fit statistics. Overall, the results of the goodness-of-fit tests indicate that the model fits the data fairly well.

The likelihood ratio test assesses whether the estimated model fits the data as well as a fully saturated model. The results of this test clearly reject the null hypothesis of no difference in the fit of the two models. However, given the unrealistic nature of an expectation of equivalent

[50] Ideally, there would first be a path from educational attainment to a skill measure and a second path from the measure of skills to the latent political participation measure. Unfortunately, the NLSY79 dataset does not contain a measure of skills for adults.

fit, the likelihood ratio test is generally not viewed as the most informative test of model fit. More informative tests include the root means square error of approximation (RMSEA), comparisons to baseline models, and residual size.

Table 5-1. Model fit statistics

Fit statistic	**Value**
Likelihood ratio	
chi-square statistic	1014.898
p-value	0.000
Population error	
RMSEA	0.021
90% CI, lower bound	0.019
upper bound	0.022
Baseline comparison	
CFI	0.956
TLI	0.952
Size of residuals	
CD	0.687

The RMSEA is the most popular measure of model fit and can generally be thought of as a chi-square test adjusted by sample size and degrees of freedom. The accepted rule of thumb holds that RMSEA values below 0.05 indicate good model fit; the estimated value of 0.021 falls well below this threshold. The Comparative Fit Index and the Tucker-Lewis Index provide various ways of comparing the target model to a baseline model—one in which there is complete independence among all variables. For both tests, values in excess of 0.95 are generally thought to indicate that the model fits the data well; both test statistics exceed this threshold. Finally, the coefficient of determination can be thought of as an R-squared for the whole model. Like the R-

squared statistic, values closer to one indicate better fit. The value of 0.687 indicates sufficiently good fit.

Having established that the model provides a good fit to the data, it is appropriate to discuss the substantive results. Table 5-2 presents the estimated standardized coefficients and their standard errors for the paths of theoretical interest. Specifically, it presents the estimates of the paths from the exogenous variables to educational attainment as well as estimates of the paths among the endogenous variables.[51]

Table 5-2. Coefficients and standard errors from paths of theoretical interest

Structural Model Paths	Standardized coef.	Standard error	*p*-value
Educational attainment 2000			
Physical health 1979	0.032	0.009	0.000
Mental health 1979	0.009	0.008	0.265
Age 1979	0.003	0.008	0.692
Educational aspirations 1979	0.440	0.009	0.000
Locus of control 1979	-0.006	0.008	0.482
Occupational aspirations 1979	0.006	0.008	0.493
Hispanic	-0.012	0.008	0.131
Black	0.068	0.009	0.000
Married 2000	0.020	0.008	0.010
Male	-0.053	0.008	0.000
Crime charge 1979	-0.022	0.009	0.009
Time spent sleeping 1981	-0.010	0.008	0.207
Time watching TV 1981	-0.057	0.008	0.000
Time reading 1981	0.005	0.008	0.502
AFQT score	0.384	0.010	0.000
Shy as a 6-year-old	0.012	0.008	0.145
Shy as an adult	0.010	0.008	0.215
Marijuana use 1988	-0.047	0.008	0.000
Depression score 1994	-0.016	0.008	0.049
Health limitations 2000	-0.010	0.009	0.248
Constant	2.011	0.139	0.000
Occupational prestige 2004			
Educational attainment 2000	0.301	0.012	0.000

[51] Results from the remaining paths are not presented for considerations of space, but are available upon request.

Table 5-2. Coefficients and standard errors from paths of theoretical interest

Structural Model Paths	Standardized coef.	Standard error	*p*-value
Family income 2004			
Educational attainment 2000	0.170	0.016	0.000
Occupational prestige 2004	0.193	0.013	0.000
Political engagement 2008			
Educational attainment 2000	0.139	0.019	0.000
Family income 2004	0.059	0.014	0.000
Occupational prestige 2004	0.094	0.015	0.000
Measurement Model	Standardized coefficient	Standard error	p-value
Political engagement			
Vote in 2006 election	0.911	0.046	0.000
Political interest	-0.693	0.031	0.000
Political party affiliation	0.303	0.017	0.000
Strong partisan	0.272	0.024	0.000

Taken as a whole, the empirical results provide strong support for the theory. At each stage of the theorized causal pathway, the estimated coefficients on the relevant variables are in the expected direction and highly significant. Take, for example, the first stage, which holds that increased educational attainment will result in greater socioeconomic status. Even after conditioning on a large set of other factors—the exogenous variables—the standardized coefficient estimate on educational attainment exceeds 0.3 and is highly significant. The results similarly support the second stage of the theoretical pathway, in which heightened socioeconomic status is hypothesized to result in greater levels of resources, as measured by family income. After conditioning on the exogenous variables and permitting a direct path from educational attainment to family income, the standardized coefficient on the socioeconomic status measure is nearly 0.2 and very significant. In the last stage of the theoretical pathway, increased personal resources—family income—are theorized to result in greater political

engagement and that is indeed what the empirical results show; the standardized coefficient is approximately 0.06 and highly significant. Finally, the results of the measurement model illustrate that the each observed measures loads significantly onto the latent political participation construct.[52] Considered together, these results provide substantial empirical support to the theoretical conjecture that education affects political participation by way of increased resource availability attributable to higher socioeconomic status resulting from increased attainment levels. Indeed, the effects of attainment through this path are estimated to be both positive and significant.

In addition to providing empirical support for theoretical pathway, the results of the model contain two additional findings of interest. First, the estimate of the direct path from the socioeconomic status measure—occupational prestige—to the latent measure of political participation is positive and significant. This path was designed to estimate the effect of social resource availability on political engagement and it demonstrates that the hypothesized relationship indeed exists. Second, the estimate of the direct path from educational attainment to political participation is positive and significant. Recall that the conceptual framework holds that educational attainment will affect political participation in two ways: 1) By increasing socioeconomic status and 2) By increasing an individual's level of knowledge and skills. The results presented above demonstrate that the participation-related effects of attainment operate through the first mechanism. The direct path from educational attainment to political engagement is designed to provide preliminary insight into whether attainment affects political

[52] The negative sign on the political interest variable in the measurement model is attributable to the coding of the variable; higher values indicate less interest.

participation through the mechanism of increased knowledge and skills. Although the model lacks a specific measure of skills in the adult years—requiring the results to be interpreted with caution—the positive and significant estimate of the direct path from educational attainment to political engagement provides preliminary evidence that attainment may indeed operate via this second theorized mechanism.

The first goal of this chapter involved testing the theoretical proposition that attainment-related effects of education operate by way of greater resource availability resulting from increased socioeconomic status. The SEM results presented above, which provide clear support for the theory, accomplish that goal. Consequently, the following section moves on to addressing the second goal of the chapter—assessing whether the attainment-related causal effects of education are heterogeneous in nature. In doing so, the analyses will focus less on mechanisms and more on causal identification, a luxury afforded by the explicit focus on mechanisms up to this point in the chapter.

5.7. Empirical Approach-Causal Heterogeneity in Attainment-Related Effects of Education

As implied by the selection of datasets used to analyze potential causal heterogeneity, the meaningful variation in educational attainment occurs at the secondary and postsecondary levels of the education system; it is those years that will serve as the focus of the empirical strategies used to identify the causal effect of educational attainment on political participation, as well as any accompanying heterogeneity in that effect. Within those years, the theoretical framework emphasizes the importance of completing educational milestones (i.e. degree attainment) relative to interim years of education. Consequently, a comprehensive analysis of potential causal

heterogeneity clearly requires multiple analyses; the analyses must separately identify the effects of completing educational milestones as well as interim years of education, ideally at both the secondary and postsecondary levels.

5.7.1. Interim Years of Education- Secondary Level

The first empirical analysis is designed to identify the effect of completing interim years of education at the secondary level—specifically completing grades 9, 10, and 11. This analysis exploits the fact that the HS&B study went to extensive lengths to track and obtain information from sample members that dropped out of high school. Specifically, the dataset contains information on the precise timing of when individuals dropped out, the primary reason each individual dropped out, whether sample members had siblings that dropped out, and individuals' evaluation of their dropout decision. As described in Chapter 4, the dataset also contains a wide variety of demographic and skill measures, as well measures of later-life political participation.

This information is used in the estimation of a set of models that, in their essence, compare the political participation of three groups of individuals: 1) those who dropped out in tenth grade, 2) those who dropped out after tenth grade or during eleventh grade, and 3) those who dropped out after eleventh grade. In terms of the canonical educational attainment measure, individuals in the first group have completed nine years of formal schooling, those in the second group have completed ten years, and those in the third group have completed eleven years. The first set of models that are estimated can be generally written as follows:

$$P_{it} = \beta E_i + \delta V_i + \boldsymbol{\gamma R_i} + \theta S_i + \lambda D_i + \varepsilon_i \quad (5\text{-}1)$$

Equation 5-1 presents a model of the probability that individual *i* participated in politics at time *t*. In this model, *E* represents an indicator for completing ten years of formal schooling

while *V* is a dummy for having completed eleven years of education—completion of nine years of schooling serves as the reference category. In addition, $\boldsymbol{R}$ represents a vector of dummies indicating the reason that individuals dropped out of school. Finally, the *S* and *D* terms represent whether the respondent had a sibling that dropped out of school and whether the respondent is happy with his or her decision to drop out, respectively. As described in Chapter 4, measures of political participation are taken at three points in time—1984, 1986, and 1992—meaning that *t* can take on any of these three values depending on the measure of participation; the independent variables were all measured in 1982, which is when the HS&B dropout questionnaire was administered.

To determine whether the results from estimation of this set of models are robust to the inclusion of additional factors, a second set of models are estimated. The only difference between this second set of models and those presented in equation 5-1 is the addition of skill measures—students' scores on the civics and readings tests administered at baseline—and a measure of socioeconomic status taken at baseline. These variables are not included in the first set of models because they are missing for a significant number of students in the analytic sample, a fairly unsurprising fact given that the analytic sample consists entirely of dropouts. The skill and socioeconomic status measures are represented by the $\boldsymbol{X}$ term in equation 5-2, below.

$$P_{it} = \beta E_i + \delta V_i + \boldsymbol{\gamma R_i} + \theta S_i + \lambda D_i + \boldsymbol{\rho X_i} + \varepsilon_i \qquad (5\text{-}2)$$

Restricting the analytic sample to individuals who dropped out of high school—but vary in the time they did so—mitigates potential concerns that unobservable characteristics may be biasing the results on the educational attainment measures. Such concerns are even further

mitigated by the "reason" fixed effects contained in the model; their inclusion effectively means that the model compares the political participation of individuals who dropped out for identical reasons, just in different grades. Taken together, this analysis provides a strong empirical test of the hypothesis that completing interim years of education at the secondary level will have little effect on an individual's level of political participation.

5.7.2. Educational Milestone- Secondary Level

The second empirical analysis is intended to estimate the effect of achieving an important educational milestone—high school graduation—on later-life political participation. The design of the analysis presented in this paper draws heavily on work presented in Carlson and Planty (forthcoming), which demonstrates that a significant number of individuals were allowed to graduate from high school without meeting state graduation credit requirements in math, science, or both subjects. Specifically, using an analytical approach that combines inverse probability of treatment weighting with regression analysis, the analysis effectively compares the later-life political participation of individuals who failed to meet the relevant math and science credit requirements but were allowed to graduate from high school with the later-life participation of individuals who failed to meet all credit requirements and were disallowed from graduating. The appeal of this analysis stems from the fact that the analytic sample consists entirely of individuals who failed to meet relevant state credit requirements. For one reason or another, some students were allowed to graduate while others were prevented from doing so; such decisions were likely to be fairly unsystematic. Taken as a whole, the restriction of the analytic sample—coupled with the asystematic decisions on allowing graduation—is likely to mitigate threats to validity posed by self-selection and other unobservable factors.

The first step in executing this analysis involves using the student high school transcripts contained in the NELS:88 dataset, combined with information on state-level graduation requirements, to determine whether students met all relevant credit requirements. Carlson and Planty (forthcoming) provides an in-depth description of the process used to make this determination. The results of this transcript audit indicate that a nontrivial number of students are allowed to graduate without meeting math and science state credit requirements.[53]

Among students who failed to meet math and science credit requirements, those who received a diploma (i.e. were allowed to graduate) were similar to those who were not allowed to graduate on most observable characteristics.[54] However, to ensure balance in the analytic sample on important observable characteristics—and thus provide a stronger basis for drawing causal conclusions from the analysis—a propensity score-based technique is employed. Specifically, similar to the empirical analyses in Chapter 3, this analysis employs an approach in which the inverse of the propensity score is used to weight cases in a weighted least squares regression model. This approach has been shown to produce consistent estimates that have a causal interpretation under a set of plausible assumptions (Hirano and Imbens, 2001; Imbens, 2004).

To perform this analysis, each student's propensity score—the conditional probability that they were allowed to graduate—must be estimated. The propensity score is estimated using a logistic regression in which receipt of a diploma is predicted by a vector of student background characteristics, a vector of school characteristics, and a state fixed effect. More formally, the model can be written as follows:

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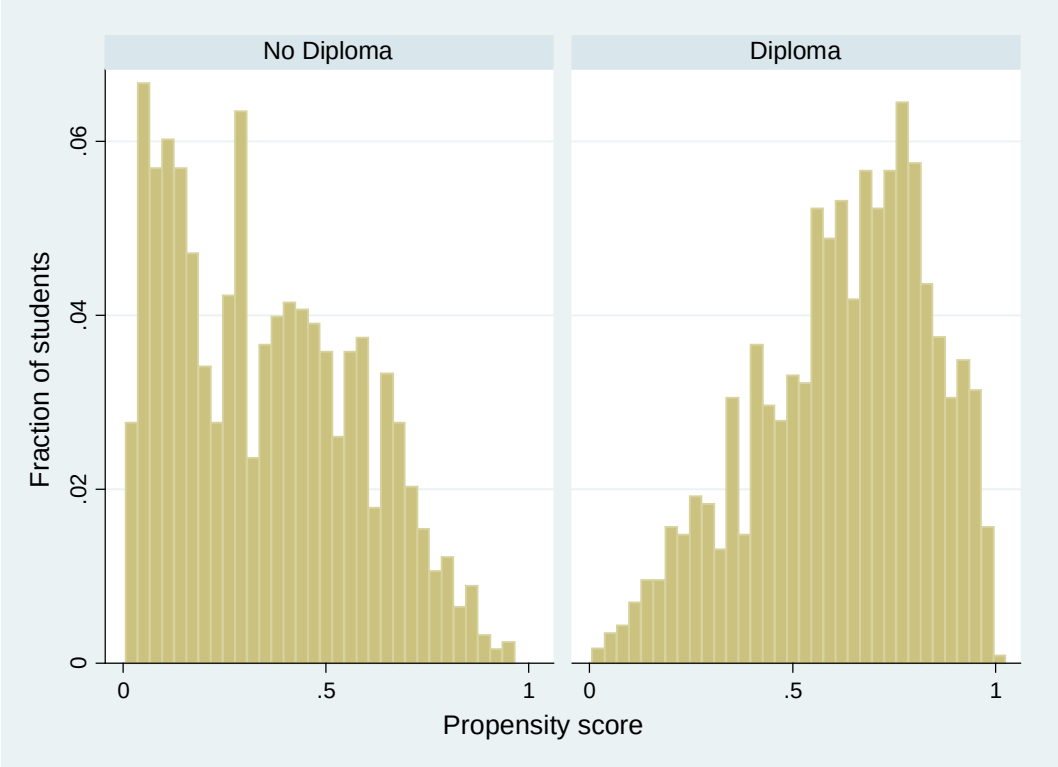
[53] Again, see Carlson and Planty (forthcoming) for a more in-depth description of the results of this analysis.

[54] Descriptive characteristics for these two groups are available from the author upon request.

$$\Pr(D_{is} = 1) = \text{logit}^{-1}(\boldsymbol{\gamma X_{is}} + \boldsymbol{\psi C_{is}} + \boldsymbol{\rho S_i}) \quad (5\text{-}3)$$

In this model, D represents diploma receipt for individual *i* who attended school *s*. The $\boldsymbol{X}$ term represents a vector of observable student characteristics, $\boldsymbol{C}$ is a vector of observable school characteristics, $\boldsymbol{S}$ represents a vector of state fixed effects, and $\text{logit}^{-1}(x) = e^x/(1+e^x)$. The vector of student characteristics contains measures of sex, race, socioeconomic status, math test scores, dropout risk, disciplinary actions, dropout risk, parental education, parental marital status, student disability status, locus of control, and self-concept. The vector of school characteristics includes measures of urbanicity, demographic composition, and enrollment. Upon estimation of this model, the resulting estimates were used to generate each student's predicted probability of being exposed to student government. That is, the estimates were used to generate the propensity score. Below, Figure 5-3 presents histograms of the estimated propensity scores for two groups—those who received a diploma and those who did not. The histograms reveal that the estimated propensity scores are distributed across the full range of values for both groups, although the distribution is somewhat denser at the higher values for diploma recipients while the reverse is true for individuals who did not receive a diploma. Although the histogram indicates overlap across the full range of values for both groups, an inverse propensity score weighting scheme will further improve this overlap.

Figure 5-3. Distribution of Estimated Propensity Scores: By Diploma Receipt Status



After estimating the propensity score for each student, weights were constructed based on the inverse of this estimate. Specifically, the following weights were constructed:

$$\widehat{\omega}_i(d_i, x_i) = \frac{d_i}{\hat{e}(x_i)} + \frac{1-d_i}{1-\hat{e}(x_i)} \quad (5\text{-}4)$$

where *i* indexes students, *d*=1 if an individual received a diploma and 0 if they did not, and $\hat{e}(x)$ is the estimate of the propensity score. Intuitively, this weighting scheme assigns high weights to two types of students: 1) those that were estimated to be very likely to receive a diploma, but did not and 2) those that were estimated to be very unlikely to receive a diploma, but did. Similarly, low weights are assigned to 1) students that were estimated to be very likely to receive a diploma, and did and 2) students that were estimated to be very unlikely to receive a diploma,

and did not. After constructing these weights, they were used in the estimation of the following weighted linear probability model:[55]

$$P_{is} = \lambda D_i + \boldsymbol{\gamma X_{is}} + \boldsymbol{\psi C_s} + \boldsymbol{\rho S_i} + \varepsilon_{is} \quad (5\text{-}5)$$

In this model, participation in political activity *P* is modeled as a function of diploma receipt *D*, a vector of student background characteristics ***X***, a vector of school characteristics ***C***, a state fixed effect ***S***, and an error term ε. Six specific political participation activities are analyzed: voting in the 1992 presidential election, being registered to vote in 1994, voting in the 1994 midterm elections, voting in the 1996 presidential election, being registered to vote in 2000, and voting in any election in 1999 or 2000 (excluding the 2000 general election). For each of the six outcomes, the estimate associated with λ represents the coefficient of interest; it is the estimated causal effect of graduating from high school on later-life political participation. Contents of the vectors of student and school characteristics were described earlier. The design of this analysis, coupled with the statistical techniques employed in its execution, will provide a strong empirical test of the hypothesis that completing an educational milestone—high school graduation—will have a positive effect on later-life political participation. In addition, it will contribute to testing the hypothesis that graduating from high school will have a larger effect than completing an interim year of education, which was predicted to have little, if any, effect.

5.7.3. Interim Years of Education-Postsecondary Level

Conceptually similar to the analysis of the participation-related effects of completing an interim year of secondary education, the third empirical analysis estimates the effect of completing an interim month of postsecondary education by exploiting the fact that a significant

[55] Logit models were also estimated and the results are substantively similar; they are available upon request.

proportion of individuals who enter postsecondary education end up leaving without earning a degree. This analysis is performed using the BPS dataset, which contains extensive information on such individuals. Specifically, the dataset contains information on the number of months enrolled—both full-time and part-time—prior to exiting postsecondary education, the reason underlying individuals' exit decisions, characteristics of the institutions individuals attended, detailed demographic and other background characteristics, as well as the later-life measures of political participation.

The first step in this analysis involves restricting the analytic sample to individuals who entered postsecondary education and exited prior degree attainment. The variable of interest in the analysis is a measure of the months of full-time enrollment prior to exiting postsecondary education; individuals who were enrolled part-time prior to exiting are excluded from the estimation sample. This provides an analytic sample of approximately 2000 individuals. The most important control variable in the model is a measure of the reason for exiting postsecondary education. This information, along with the measures of political participation, is combined into the following general model:

$$P_{i2001} = \beta M_i + \boldsymbol{\gamma R_i} + \varepsilon_i \qquad (5\text{-}6)$$

where *P* represents one of four measures of political participation taken in 2001: being registered to vote, voting in the 2000 presidential election, corresponding with an elected official, and participating in "political activities" such as campaigning, contributing money, and displaying a bumper sticker or yard sign, among others. In addition, *M* represents the months of full-time enrollment prior to exiting postsecondary education, which ranges from one to approximately 50

months. Finally, $\boldsymbol{R}$ is a vector of variables indicating the primary reason that an individual left postsecondary education.

To assess whether the results of this relatively parsimonious model are robust to the inclusion of measures of individual and institutional context, a second set of models are estimated. This set of models can be generally written as:

$$P_{i2001} = \beta M_i + \boldsymbol{\gamma R_i} + \boldsymbol{\delta C_i} + \boldsymbol{\rho X_i} + \varepsilon_i \quad (5\text{-}7)$$

where the first three terms of this model are identical to those in equation 5-6.[56] The $\boldsymbol{C}$ term represents a vector of institutional characteristics, including institutional control and sector, the state in which it is located, enrollment, enrollment squared, the percentage of the student body that is minority, the urbanicity of the campus, and the amount of tuition and fees charged. The $\boldsymbol{X}$ term represents a vector of individual background characteristics, including satisfaction with their postsecondary institution, an individual's marital status, parental marital status, mother's education, father's education, sex, an individual's score on an index measuring dropout risk, disability status, home ownership status, socioeconomic advantage, and measures of academic and social integration into their postsecondary institution.

Restricting the analytic sample to individuals who exited postsecondary education prior to degree attainment—but vary in the amount of time they were enrolled full time prior to doing so—mitigates potential concerns of unobservable characteristics biasing the results on the educational attainment measure. Such concerns are even further mitigated by the "reason" fixed effects contained in the model; their inclusion effectively results in a comparison of the political

[56] In addition to these linear probability models, logit models were also estimated. The results of the logit models, which are substantively similar, are available from the author upon request.

participation of individuals who exited postsecondary education for identical reasons, just after different lengths of time. Mitigation of these concerns results in a strong empirical test of the hypothesis that completing interim years of education at the postsecondary level will have little effect on an individual's level of political participation.

5.7.4. Educational Milestone-Postsecondary Level

The final empirical analysis compares the participation-related effects of completing one educational milestone—graduating with a bachelor degree—relative to the effects of completing a different, arguably less advanced postsecondary milestone—earning an AA degree.[57] Ideally, the BPS data would allow estimation of the effect of completing a postsecondary milestone relative to having an identical amount of education, but not completing the milestone. Unfortunately, such an analysis is not possible given the structure and content of the dataset. Despite the inability to conduct the ideal analysis, it is still valuable and informative to compare the relative participation-related effects of completing two educational milestones, as it will provide further insight into the heterogeneous effects of educational attainment on political participation. However, the coefficient estimates resulting from this analysis will have a different interpretation from those in the analysis estimating the effect of completing an educational milestone at the secondary level. Specifically, the estimates from the earlier analysis should be interpreted as the effect of graduating from high school, relative to having an identical amount of education and not graduating. The estimates in this analysis should be interpreted as the effect of earning a bachelor degree *and* completing the two additional years of education required to do so, relative to earning an associate degree.

[57] The hierarchy of educational attainment milestones is generally considered to be 1) high school graduation, 2) associate degree completion, 3) bachelor degree completion, 4) and graduate or professional degree completion.

The first step in estimating the participation-related effects of bachelor degree attainment involves identifying all individuals who earned an associate degree or a bachelor degree prior to the 2000 election; approximately 8,000 individuals in the sample meet this criterion. In an analysis such as this, a persistent concern is the potential that individuals who earn a bachelor degree are different from individuals who earn an associate degree–the standard selection bias problem. Two approaches are used to address these potential concerns. First, the group of bachelor degree recipients is restricted to individuals who earned their degree at institutions that are deemed "least selective" under the Carnegie classification system; this eliminates individuals who earned their degrees at "more selective" or "highly selective" institutions and, in doing so, hopes to reduce bias concerns.

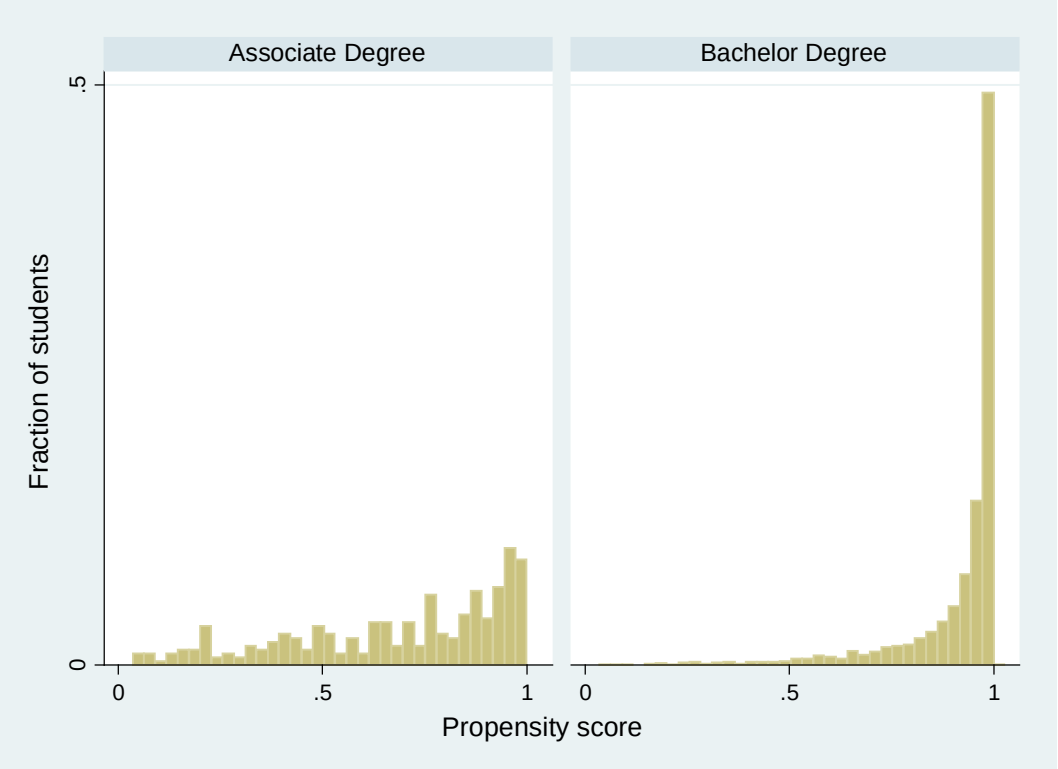
In addition to the sample restriction described above, an inverse probability of treatment weighting scheme—similar to that employed in the high school graduation analysis—is employed. As in the earlier analysis, the first step of this process involves estimating a logistic regression model of bachelor degree receipt and using the results to estimate the probability of receiving a bachelor degree—the propensity score. The logit model used to estimate the propensity score can be written as:

$$\Pr(B_i = 1) = \text{logit}^{-1}(\boldsymbol{\gamma X_i} + \boldsymbol{\psi C_s} + \boldsymbol{\rho S_i}) \quad (5\text{-}8)$$

where the $\boldsymbol{X}$ term represents a vector of observable student and family characteristics, $\boldsymbol{C}$ is a vector of measures of students' high school performance and characteristics of their high school, $\boldsymbol{S}$ represents a vector of state fixed effects, and $\text{logit}^{-1}(x) = e^x/(1+e^x)$. Below, Figure 5-4 presents histograms of the estimated propensity scores for two groups—those who received an associate degree and those who received a bachelor degree. The figure reveals that the estimated

propensity scores are distributed fairly evenly across the group of individuals who earned an associate degree. This stands in contrast to the distribution of propensity scores in the group of individuals who earned a bachelor degree; the estimated propensity scores are concentrated above 0.75, thus demonstrating the limited overlap in the sample; the IPTW procedure will serve to improve the overlap.

Figure 5-4. Distribution of Estimated Propensity Scores: By Bachelor Degree Receipt Status



As in the earlier analysis, the following equation is used to construct the weights:

$$\widehat{\omega}_i(b_i, x_i) = \frac{b_i}{\hat{e}(x_i)} + \frac{1-b_i}{1-\hat{e}(x_i)} \quad (5\text{-}9)$$

where *i* indexes students, *b*=1 if an individual earned a bachelor degree and 0 if they earned an associate degree, and $\hat{e}(x)$ is the estimate of the propensity score. These weights were then used in the estimation of the following weighted linear probability model:

$$P_{i2001} = \beta B_i + \boldsymbol{\delta C_i} + \boldsymbol{\rho X_i} + \varepsilon_i \quad (5\text{-}10)$$

where ***P*** represents the four participation outcomes described in the previous section, *B* is an indicator for bachelor degree attainment, and the ***C*** and ***X*** terms represent vectors of institutional and individual background characteristics, respectively. The specific contents of these vectors were described above. The estimates of β represent the coefficients of interest—the effect of earning a bachelor degree relative to an associate degree.

5.8. Results-Causal Heterogeneity in Attainment-Related Effects of Education

Tables 5-3 to 5-5 present coefficient estimates and standard errors for the two attainment measures—completing tenth grade and completing eleventh grade—in equations 5-1 and 5-2.[58] Specifically, Table 5-3 presents results for the 1984 political participation outcomes—when respondents were approximately age 20—while Table 5-4 presents results for 1986 participation outcomes and Table 5-5 provides estimates for 1988 and 1992 outcomes. In all tables, completion of nine years of formal schooling serves as the reference category for the estimates.

[58] Full model results are available upon request.

Table 5-3. Coefficients and standard errors for attainment measures: 1984 outcomes

Attainment Measure	Registered to Vote-1984	Vote any nonpresidential election-1984	Vote presidential election-1984
	Specification 1 (Eq. 1)		
Attain 10	0.052	0.000	0.032
	(0.052)	(0.042)	(0.048)
Attain 11	0.045	0.037	0.067
	(0.056)	(0.045)	(0.053)
N	1786	1770	1599
	Specification 2 (Eq. 2)		
Attain 10	-0.018	-0.032	-0.013
	(0.046)	(0.039)	(0.047)
Attain 11	-0.002	0.010	0.000
	(0.051)	(0.044)	(0.051)
N	1221	1213	1085

Note: Robust standard errors in parentheses below point estimates. * p<.10; **p<.05; ***p<.001

In Table 5-3, the results from estimation of equation 5-1 provide little indication that, relative to completing nine years of schooling, students who finish their sophomore or junior years of high school are more likely to register to vote and cast a ballot at age 20. Although the point estimates are generally positive and the marginal effects are in the range of three to seven percentage points, none are statistically significant. The results from equation 5-2, which controls for an individual's skill level and socioeconomic status, provide even stronger evidence that completing an interim year of secondary education has no discernible effect on an individual's political participation; the point estimates are all insignificant and many are actually negative. In general, the results presented in Table 5-3 indicate that individuals who complete ten or eleven years of formal schooling did not vote—or register to vote—at significantly greater

rates than individuals who completed nine years of formal schooling. Furthermore, there is no observable difference in the participation rates of individuals who completed ten versus eleven years of formal schooling.[59]

Table 5-4. Coefficients and standard errors for attainment measures: 1986 outcomes

Attainment Measure	Registered to Vote-1986	Vote any election-1986	Political Discussion Index-1986	Political Participation Index-1986
	Specification 1 (Eq. 1)			
Attain 10	0.059	0.039	-0.017	-0.091
	(0.050)	(0.047)	(0.118)	(0.115)
Attain 11	0.062	0.092*	-0.032	0.023
	(0.056)	(0.053)	(0.128)	(0.130)
N	1602	1600	1466	1584
	Specification 2 (Eq. 2)			
Attain 10	0.052	-0.018	-0.185*	-0.112
	(0.051)	(0.049)	(0.108)	(0.095)
Attain 11	0.065	0.028	-0.027	0.005
	(0.056)	(0.053)	(0.125)	(0.099)
N	1087	1085	1004	1068

Note: Robust standard errors in parentheses below point estimates. * p<.10; **p<.05; ***p<.001

Similar results are observed in Table 5-4, which presents results for four 1986 participation outcomes—being registered to vote, voting in any election in 1986, and the political discussion and participation indexes that were described in detail in Chapter 4. As was the case in Table 5-3, estimation of equation 5-1 returns little evidence of a positive relationship between educational attainment and voting-related behavior. Individuals who complete eleven years of

[59] Formal tests of differences in these parameter estimates are available upon request.

education are estimated to be about nine percentage points more likely to vote in any election in 1986, but this estimate is only statistically significant at $p<.10$; the point estimate for completing ten years of education is smaller and insignificant. Similarly, for being registered to vote in 1986, the estimated marginal effects for completing ten and eleven years of schooling are in the range of six percentage points, but do not reach statistical significance. However, even these slight indications of a positive relationship between educational attainment and voting-related behavior disappear after controlling for an individual's skill level and her socioeconomic status. as the results from estimation of equation 5-2 demonstrate. Finally, neither specification provides any evidence of a positive relationship between an individual's educational attainment and his scores on the political discussion or participation indexes; if anything, there may actually be a negative relationship. On the whole, the results in Table 5-4 are consistent with those in Table 5-3 and provide further evidence that completion of an interim year of secondary education has little effect on an individual's political participation.

Table 5-5. Coefficients and standard errors for attainment measures: 1988 and 1992 outcomes

	Vote presidential election-1988	Registered to Vote-1992	Vote any election-1992
	Specification 1 (Eq. 1)		
Attain 10	-0.039	0.039	-0.028
	(0.059)	(0.064)	(0.047)
Attain 11	-0.075	0.020	-0.003
	(0.064)	(0.069)	(0.050)
N	991	997	1001
	Specification 2 (Eq. 2)		
Attain 10	-0.105*	-0.127**	-0.122**
	(0.063)	(0.064)	(0.052)
Attain 11	-0.058	-0.071	-0.122**
	(0.069)	(0.070)	(0.056)
N	674	680	682

Note: Robust standard errors in parentheses below point estimates. * p<.10; **p<.05; ***p<.001

The results in Tables 5-3 and 5-4 demonstrate that completing an interim year of secondary education has no effect on an individual's political participation when they are in their early 20s. Table 5-5 indicates that a similar conclusion holds when individuals are in their mid to late 20s. Estimation of equation 5-1 reveals no significant differences in the voting-related behavior of individuals who complete ninth versus tenth versus eleventh grade. Interestingly, estimation of equation 5-2, which controls for an individuals socioeconomic status as well as their 10^{th} grade reading and civics achievement scores, indicates that individuals who complete 10^{th} grade are actually significantly less likely to participate in each of the three activities than individuals who only completed ninth grade, although the substantive magnitudes of these

differences are fairly small. The differences between completing ten and eleven years of schooling are not statistically significant.

Taken together, the results presented in Tables 5-3 to 5-5 provide strong empirical support for the hypothesis that completing interim years of secondary education will have little effect on an individual's later-life political participation. Indeed, the theory holds that completing educational milestones is what truly matters for increasing political participation. The next set of results assesses whether this proposition is corroborated empirically.

In contrast to the null effects of completing an interim year of secondary education, Table 5-6 demonstrates that completing a significant educational milestone—high school graduation—has a positive and significant effect on the probability of participating in a variety of political activities; these effects are detected at multiple points in time. Among individuals who failed to meet all relevant math and science credit requirements, those who were allowed to graduate were over 12 percentage points more likely to vote in the 1992 presidential election than individuals who were not permitted to graduate. Similarly, they were over 11 and 12 percentage points more likely to have voted in the 1994 midterms and be registered to vote in 1994, respectively.

Table 5-6. Coefficients and standard errors of variable indicating diploma receipt, by outcome

Variable	Vote presidential election-1992	Registered to vote 1994	Voted 1994 midterm elections	Vote presidential election-1996	Registered to vote 2000	Vote any non-presidential election-2000
Diploma	0.126***	0.125***	0.116***	0.131***	0.104***	0.074***
	(0.028)	(0.029)	(0.026)	0.030	0.026	0.028
N	1541	1596	1597	1552	1562	1570

Note: Robust standard errors in parentheses below point estimates. * p<.10; **p<.05; ***p<.001

The fourth, fifth, and sixth columns of Table 5-6 demonstrate that the positive participation-related effects of graduating from high school are not confined to outcomes measured immediately after graduation. Individuals who were allowed to graduate without meeting all requirements were over 13 percentage points more likely to vote in the 1996 presidential election than their peers who failed to meet credit requirements and were prevented from graduating. In addition, diploma recipients were over 10 percentage points more likely to be registered to vote in 2000 and over 7 percentage points more likely to have voted any nonpresidential election in 2000. All of these estimates are highly statistically significant.

The results presented in Table 5-6 provide strong empirical support for the hypothesis that completion of an educational milestone—high school graduation in this case—will have a positive effect on later-life political participation. Coupled with the earlier conclusion that completing an interim year of secondary education has no discernible effect on political participation, these results demonstrate that the effects of educational attainment—at least at the secondary level—are heterogeneous in nature. The results presented in the following paragraphs will reveal whether similar findings are observed at the postsecondary level.

Results from the first postsecondary analysis, which examines whether completion of an interim month of postsecondary education has any effect on an individual's political participation, are wholly consistent with the results from the analogous analysis at the secondary level. Specifically, the results in Table 5-7 below indicate that completing an interim month of postsecondary education has no effect on an individual's political participation.[60]

[60] Full model results are available upon request.

Table 5-7. Coefficients and standard errors for attainment measure, by outcome

Attainment Measure	Registered to Vote-2001	Voted in 2000 Presidential Election	Corresponded Elected Official-2001	Participation in Political Activities-2001
	Specification 1 (Eq. 6)			
Months enrolled full time	-0.000	-0.003	-0.002*	0.001
	(0.001)	(0.002)	(0.001)	0.001
N	2044	2042	2116	2113
	Specification 2 (Eq. 7)			
Months enrolled full time	-0.000	-0.001	-0.001	-0.000
	(0.001)	(0.002)	(0.001)	(0.001)
N	1817	1815	1861	1858

Note: Robust standard errors in parentheses below point estimates. * p<.10; **p<.05; ***p<.001

For three of the participation outcomes—being registered to vote, voting in the 2000 presidential election, and participating in political activities—the results from both specification 1 and specification 2 (equations 5-6 and 5-7, respectively) are neither substantively nor statistically significant; all point estimates are very close to zero. For the fourth participation outcome—corresponding with an elected official—the point estimate on the attainment measure is actually negative and significant, although substantively small; completion of an additional ten months of postsecondary education, about one academic year, is estimated to reduce the probability of corresponding with an elected official by about two percentage points. However, this small, negative estimate fades to insignificance in specification 2, which controls for institutional and individual characteristics.

As a whole, the results in Table 5-7 provide strong evidence that completion of an interim month of postsecondary education has no effect on political participation, at least in the short

term. This finding mirrors the results from the analogous analysis at the secondary level and, together, they provide strong empirical corroboration of both the general hypothesis of heterogeneity in the participation-related effects of education and the more specific conjecture that completing educational milestones will have a larger effect on an individual's later-life political participation than completing interim intervals of education, which is likely to have little effect.

Table 5-8 presents the results of the final empirical analysis, which estimates the effect of bachelor degree attainment, relative to associate degree attainment, on four political participation outcomes: being registered to vote in 2001, voting in the 2000 presidential election, corresponding with an elected official, and participating in political activities, such as campaigning, contributing money, and displaying a bumper sticker or yard sign.[61]

Table 5-8. Coefficients and standard errors for attainment measure, by outcome

Attainment Measure	Registered to Vote-2001	Voted in 2000 Presidential Election	Corresponded Elected Official-2001	Participation in Political Activities-2001
Bachelor degree	0.060**	0.090**	-0.014	-0.030
	(0.025)	(0.042)	(0.032)	(0.001)
N	1657	1656	1676	1676

Note: Robust standard errors in parentheses below point estimates. * p<.10; **p<.05; ***p<.001

The results indicate that relative to earning an associate degree, completion of a bachelor degree has a positive and significant effect on voting-related political participation. Specifically, individuals who earn a bachelor degree are estimated to be about six percentage points more likely to have been registered to vote in 2001 and about nine percentage points more likely to

[61] Full model results available upon request.

have voted in the 2000 presidential election than their peers who earned an associate degree. Interestingly, bachelor degree attainment is estimated to have no significant effect on either of the other two participation activities—corresponding with an elected official and participating in political activities—at least relative to associate degree attainment.

Considered together, the results presented in Table 5-8 provide substantial support for the theories and hypotheses that this chapter was designed to test. Specifically, the results further demonstrate that completing educational milestones has a positive effect on political participation, at least voting-related participation. Second, when considered in concert with the findings of previous analyses, Table 5-8 presents even further evidence of heterogeneity—systematic heterogeneity—in the effects of educational attainment on political participation. The implications of these results, as well as other interesting patterns and findings, are discussed in the concluding section to this chapter.

5.9. Discussion and Conclusion

This chapter set out to accomplish two goals. First, it purported to test the theoretical proposition that the attainment-related effects of education operate by way of greater resource availability resulting from increased socioeconomic status. Second, the chapter was designed to assess whether the attainment-related effects of education on political participation are heterogeneous in nature. The analyses presented above demonstrate that these two goals were unquestionably met. The results of these analyses clearly have implications for the theoretical framework that motivated their design and execution, but they also have important implications for research—both past and future—as well as policy. The broad implications of each set of analyses are discussed in turn below.

5.9.1. Theoretical Pathway for Attainment-related Effects of Education

As described in previous chapters, scholars have long theorized about the specific mechanisms through which education, typically operationalized as educational attainment, affects political participation (Wolfinger and Rosenstone 1980; Rosenstone and Hansen 1993; Verba, Schlozman, and Brady 1995; Nie, Junn, and Stehlik-Barry 1996). Although the existing theoretical accounts differ in their details, they all hypothesize—in one manner or another—that the effects of education operate through the mechanism of increased socioeconomic status. However, direct empirical tests of this theoretical conjecture have been rare. In addition, as reviewed in the early chapters of this project, the empirical tests that do exist have a number of shortcomings related to data, measurement, and methodology.

Three features of the empirical test of the theorized causal pathway presented in this chapter help avoid many of the shortcomings of previous research. First, by drawing on data from the 1979 cohort of the National Longitudinal Survey of Youth the analysis was able to employ higher quality empirical measures of the theoretical concepts—including educational attainment, socioeconomic status, personal and social resources, and political participation—than those that have been used in earlier studies. Second, the panel nature of the NLSY79 data allow for the assembly of these measures into an empirical model with a logical temporal ordering. Finally, the analysis rests on a methodology—structural equation modeling—that is well suited to empirically testing theorized causal pathways and processes.

Of course, the innovations and improvements over prior approaches do not render this analysis flawless. Like any nonexperimental analysis, this one is susceptible to issues of endogeneity and omitted variable bias, although the temporal ordering of the measures and the

rich set of control variables contained in the model were designed to mitigate such concerns. However, considered as a whole, the analysis presented in this chapter represents the most direct and rigorous empirical test of a theoretical framework describing the relationship between educational attainment and political participation to date.

The results of the analysis—presented in Table 5-2 above—are highly consistent with the theoretical framework. Specifically, the results demonstrate that an increase in educational attainment results in increased socioeconomic status, which provides individuals access to greater levels of personal and social resources that facilitate political participation. So what are the implications of these results? At the most basic level, they provide support for an important dimension of the conceptual model developed in Chapter 2. Specifically, the results provide us with a clearer picture of one of the mechanisms through which educational attainment results in greater levels of political participation. In doing so, the results advance our theoretical understanding of one of the seminal topics in the American politics literature.

Although the results of the empirical analysis advance our understanding of the relationship between educational attainment and political participation, they also raise additional questions and identify areas for further research. Specifically, in addition to demonstrating that educational attainment affects political participation through the mechanisms of increased SES and greater resource availability, the results in Table 5-2 also indicate that the direct path from educational attainment to political participation is positive and significant. This result strongly suggests that there is at least one additional mechanism through which educational attainment results in greater levels of political participation. The conceptual framework developed in Chapter 2 hypothesizes increased levels of knowledge and skills to be one potential additional

mechanism, but the contents and design of the datasets employed in this project did not permit a direct empirical test of this conjecture. Consequently, this topic is a natural candidate for future inquiry. Similarly, there may be other mechanisms through which educational attainment positively affects political participation that are wholly absent from the conceptual framework; this possibility should be explored—both theoretically and empirically—in future research.

Along with implications for our understanding of the relationship between educational attainment and political participation—as well as past and future research relevant to that understanding—the results presented in Table 5-2 also have implications for policy, although they are perhaps more nuanced than they initially appear. The apparent implication of this analysis is that increased attainment levels will result in greater levels of political participation. However, previous work has hypothesized—and provided some evidence in support of the hypothesis—that the effects of educational attainment on political participation operate in a relative manner (Nie, Junn, and Stehlik-Barry 1996; Campbell 2009). That is, it is not an individual's absolute level of educational attainment that is relevant for their political participation, but their location in the distribution of educational attainment in their local community. The implicit logic behind this hypothesis is that political participation is zero-sum in nature and that attainment gains for one individual or group that increases their participation—via the increased socioeconomic status bestowed by the greater attainment levels—will crowd out participation by individuals or groups whose attainment levels remain static. If this line of reasoning is accurate, then increased educational attainment in the population will not result in greater levels of political participation. As noted earlier, there is some empirical evidence in support of this theory.

There are several reasons, however, to suspect that the effects of educational attainment on political participation do not solely operate in a relative manner. First, it is unlikely that political participation is zero-sum in nature. If it were, we should not expect to observe significant variation in participation across time and space. The fact that we do observe such variation—across multiple activities—suggests that political participation is not a zero-sum activity. Second, the logic supporting the theory of relative effects only holds if educational attainment operates solely through the mechanism of increased socioeconomic status. Although this analysis presents evidence that the effects of attainment do operate through this mechanism, it also presents evidence that the attainment-related effects operate through additional mechanisms; the direct path from educational attainment to political participation is positive and significant in the SEM. If these additional effects operate through increased knowledge and skills—as theorized in the conceptual framework—it becomes less plausible that the effects of educational attainment on political participation operate in a wholly relative manner; individuals with greater skill levels are unlikely to crowd out individuals with lower skill levels.

Assuming the participation-related effects of educational attainment operate, in part, in an absolute manner—thus providing educational attainment with the potential to increase political participation—it should be noted that increased attainment is only likely to increase political participation if the induced attainment increases occur at the educational milestones. That is, policies must induce high school graduation or bachelor degree attainment to result in greater levels of political participation.

However, regardless of whether the participation-related effects of educational attainment operate relatively or absolutely—and irrespective of the levels at which any attainment increases

occur—there is little doubt that increased attainment levels would be beneficial for society. Research in other disciplines and policy areas has demonstrated that increasing attainment levels would have positive effects on a wide variety of social and economic outcomes; any increases in political participation induced by greater attainment levels would simply be an added benefit.

5.9.2. Heterogeneity

A fairly large body of existing work has focused on determining whether educational attainment has *a* causal effect on political participation. As reviewed in earlier chapters, these studies reach varying conclusions; most find evidence of a positive causal effect of attainment on political participation, but others do not. However, by paying little attention to the level of education at which the effect is purportedly identified, these studies implicitly assume homogeneity in any effect of educational attainment on political participation. Drawing on the sociological literature on status attainment, this chapter provides the basis for an expectation of heterogeneity in the effects of education on political participation. As described above, the status attainment literature emphasizes the importance of completing educational milestones for increasing socioeconomic status. Because the first analysis demonstrated that increased socioeconomic status is a mechanism through which educational attainment affects political participation, it is reasonable to expect that completing educational milestones—such high school graduation or bachelor degree attainment—will have a larger effect on political participation than completion of interim years of education, which may have no effect at all. This hypothesis was systematically and rigorously tested in a series analyses presented above and the results were fully consistent with the theory; completion of educational milestones was

shown to have a positive effect on political participation while completion of interim years of education was found to have no effect.

These results have several implications for prior research. First, and most obviously, they demonstrate that the effects of educational attainment on political participation are heterogenous in nature. This implies that the search for *a* causal effect of education on political participation that dominated the prior literature ranged from, at best, blunt to, at worst, misguided. Perhaps more importantly, recognizing the reality of causal heterogeneity may be able to help reconcile the discrepant findings in prior studies. The studies that purport to identify the potential effects of educational attainment on political participation at educational milestones, such as Sondheimer and Green (2010), tend to find positive results while those studies that find null effects primarily rely on identification at interim years of education (Tenn 2007; Kam and Palmer 2008). Although alignment between the results of previous studies and the level of the education system at which the effect is identified is not perfect, recognition of causal heterogeneity undoubtedly brings a dose of much-needed clarity to the issue. In doing so, the results emphasize the importance of explicitly identifying the counterfactual of the effect being estimated.

Sondheimer and Green (2010) present perhaps the most convincing research design for estimating the causal effect of high school graduation on political participation. Consistent with the results presented in this chapter, they find report positive results. The magnitude of their results, however, is far larger than those presented above. Specifically, they estimate high school completion to increase the probability of turning out to vote by fifty percentage points, a magnitude that is nearly unheard of in the political science or policy evaluation literature. In

contrast, the results presented in this chapter estimate high school graduation to increase the probability of turning out to vote by 7-13 percentage points, or about a fifth of the size of Sondheimer and Green's (2010) results. Future research should attempt to identify factors underlying results of such discrepant magnitudes.

Although the analyses employ compelling designs for identifying the various effects of educational attainment on political participation, they draw on relatively limited and specialized samples. For example, the analyses that identify the effect of completing interim years of education draw on samples of individuals who dropped out of high school and who entered postsecondary education but exited prior to degree attainment. These specialized samples permit identification of the various causal effects, but in doing so they require a trade off of external validity; it is unclear whether the results generalize to a more representative population or to a different specialized sample of different composition. Future research would do well to explore this issue.

The results presented in Tables 5-6 and 5-8 demonstrate that completion of educational milestones has a positive effect on political participation, at least voting-related participation. Interestingly, high school graduation is estimated to have a larger effect than bachelor degree completion. This is particularly interesting given the composition of the two estimands. Specifically, the high school graduation coefficient represents the estimated effect of graduating from high school relative to having essentially the same amount of education, but not receiving a diploma; it is the effect of receiving a piece of paper. In contrast, the effect of bachelor degree attainment is estimated relative to earning an associate degree. The estimate represents the effect of receiving a college diploma *and* completing the two additional years of schooling required to

receive that diploma. The fact that the estimate of bachelor degree attainment also includes the completion of two additional years of education provides a reasonable basis for expecting that the effect of bachelor degree attainment may be larger than the effect of high school graduation. However, the exact opposite result is observed in Tables 5-6 and 5-8. Additional theoretical and empirical research may be able to shed light on why this is the case. Similarly, future research could usefully explore the effects of completing an additional educational milestone—graduate and professional degree completion—that was not examined in this chapter.

Finally, it is notable that completion of a postsecondary education milestone was only found to have a positive effect on voting-related behavior; the effects on other outcomes, such as participation in "political activities" and corresponding with an elected official were null. Additional research is needed to understand why completion of educational milestones only appears to have effects on voting-related political participation. In a similar vein, the only participation-related measures in the dataset used to identify the effect of high school graduation were voting-related in nature. Further research would do well to explore the effects of high school graduation on other participation outcomes and contrast the results with the effects of completing postsecondary milestones.

Although the analyses of causal heterogeneity raised nearly as many questions as they answered, the results represent an important contribution to a body of literature that possesses a number of discrepancies and unresolved questions. By no means do the theoretical insights, and the accompanying empirical results, presented in this chapter bring perfect clarity to all unresolved questions in the literature. They do, however, advance our understanding of the relationship between educational attainment and political participation. The analyses also

provide examples of several approaches that can be usefully employed to rigorously test hypotheses derived from theoretical insights. The results in this chapter represent important advances, but as demonstrated by the discussion above, there is clearly further progress to be made.

Chapter 6. Bringing it All Together

6.1. Project Overview and Summary

This project set out with the overarching goal of conducting one of the most comprehensive and rigorous analyses—both theoretical and empirical—of the relationship between education and political participation. The preceding chapters demonstrate that this goal was accomplished; guided by a theoretically-based conceptual model, the project uses a variety of research designs and several analytical techniques to explore multiple aspects and dimensions of the relationship between education and political participation.

The opening chapter of this project reviewed the existing theoretical and empirical literature on the relationship between education and political participation. Theoretical exploration of the potential relationship between these two factors extends back to the writings of Plato and Aristotle. Their views on the topic clearly inform more recent theoretical treatments of the relationship between education and democratic citizenship, such as those by John Dewey and Amy Gutmann. Empirical scholars have drawn on these purely theoretical accounts to develop theories of action for the relationship education and political participation; that is, they purport to identify the general mechanisms through which education exerts its effect. This work has produced two primary schools of thought. The first theory of action considers education to be a resource that lowers the cost of participation; education imbues individuals with skills,

knowledge, and social networks that facilitate political participation. The second line of thought defines education as a sorting mechanism that bestows status and efficacy upon individuals, which makes them more likely to participate in the political process. A good deal of empirical support has been marshaled in support of each of these views, but both the empirical evidence and underlying theory have several limitations. More specifically, the chapter identifies three primary limitations: 1) The routine conflation of education and educational attainment, 2) A general failure to consider the possibility of causal heterogeneity, and 3) A relatively weak basis for the causal claims that have been made in previous work.

Recognizing these three limitations of existing work, the second chapter draws on literatures from multiple disciplines to develop a conceptual model of the relationship between education and political participation. In doing so, it identifies two mechanisms through which the effects of education are hypothesized to affect political participation: 1) Increased levels of knowledge and skills, and 2) Increased resource availability attributable to heightened socioeconomic status. As in previous work, educational attainment is theorized to affect each of these factors. However, contrary to previous work, this project recognizes the reality that education is multidimensional in nature; education is not simply the number of years of formal schooling completed. Consequently, factors such as educational policies, practices, and contexts are theorized to affect an individual's knowledge and skill level as well as his or her educational attainment. Furthermore, the framework allows educational attainment to not only affect, but also be affected by, an individual's knowledge and skill levels. Finally, underlying the whole framework is the consideration of causal heterogeneity, which is theorized to occur along several dimensions, including 1) the mode of political participation, 2) the level of educational

attainment, 3) the level of knowledge and skills, and 4) the socioeconomic characteristics of individuals.

The three subsequent chapters present a series of systematic and rigorous empirical tests of the conceptual model presented in Chapter 2. Chapter 3 presents the first of these analyses, which assesses the hypothesis that educational policy, practice, and context affect civic knowledge and skill acquisition. Using a variety of empirical approaches—including difference-in-differences analysis, inverse probability of treatment weighting coupled with regression adjustment, and multiple sensitivity analyses—the results demonstrated that the amount of civics instruction received by students has a positive effect on civics achievement; these positive effects were detected at the 4^{th}, 8^{th}, and12^{th} grade levels. Additionally, the results revealed that the opportunity to participate in applied civic activities—student government, mock trial, and debate—can result in higher levels of civic knowledge and skills among 4^{th} and 8^{th} grade students. However, the data also indicate that civics high school graduation requirements have no effect on the level of civic knowledge and skills of 12^{th} grade students. Considered as a whole, the results presented in Chapter 3 clearly demonstrate that educational policy, practice, and context can have an effect on students' civic knowledge and skills levels, but that not all policies or practices have a positive impact.

Although civic knowledge is an important end in and of itself, it may also serve as a means to an even more essential end—effective participation in democratic society. In that vein, Chapter 4 analyzed how various dimensions of knowledge and skills affect individuals' later-life participation in the political process. Drawing on data from the National Assessment of Adult Literacy as well as the High School and Beyond dataset, the analyses explore how skills such as

prose literacy, document literacy, quantitative literacy, reading ability, vocabulary skills, and civic knowledge affect participation in the political process. The results presented in this chapter make clear that skills are very important determinants of political participation; strong, positive relationships were detected in both bivariate and multivariate settings, and across multiple skill dimensions, acts of political participation, and time periods. Put simply, the analyses in Chapter 4 demonstrate that skills matter.

Whereas the first two empirical chapters focused on analyzing how education affects political participation through the mechanism of increased knowledge and skills, the final empirical chapter explores the attainment-related effects of education on political participation. Specifically, Chapter 5 proceeds in two parts. The first part of the chapter tests the theoretical proposition that the attainment-related effects of education operate by way of greater resource availability resulting from increased socioeconomic status. Using a structural equation modeling approach and drawing on data from the 1979 cohort of the National Longitudinal Survey of Youth, the results clearly indicate that the attainment-related effects of education operate through the proposed mechanism. Based on hypotheses with strong theoretical backing, the second part of Chapter 5 assesses whether the attainment-related causal effects of education are heterogeneous in nature. Consistent with the hypotheses, the results demonstrate that completion of educational milestones—high school graduation and bachelor degree attainment—do indeed have a positive effect on political participation while completing interim years of schooling have no effect at all.

Considered as a whole, the results of the empirical analyses presented in Chapters 3-5 are remarkably consistent with the hypotheses derived from the conceptual model presented in

Chapter 2. This consistency is important, as it provides a measure of validation to the theoretical framework and allows us to learn several valuable lessons about the relationship between education and political participation; the following section outlines a number of these lessons.

6.2. Lessons Learned

Through the interplay of the development of the conceptual model and the systematic empirical testing of that model, several lessons relevant to understanding the relationship between education and political participation emerge from this project. The following sections discuss four of the most important lessons: 1) Distinguishing education from educational attainment, 2) Recognizing the existence of heterogeneity in the effects of education, 3) Understanding the role of skills in influencing political participation, and 4) The importance of focusing on specific mechanisms.

6.2.1. Distinguishing Education from Educational Attainment

In what is perhaps the most important lesson emerging from this project, the theoretical and empirical analyses demonstrate the consequence of making the distinction between educational attainment and education. Educational attainment—the number of years of formal schooling completed by an individual—is but one of many dimensions of education. This reality, however, is not readily discernible from existing literature studying the relationship between education and political participation. As described in earlier chapters, previous studies on the topic define education—either implicitly or explicitly—to consist of the number of years of formal schooling completed; existing work conflates education and educational attainment.

This project did nothing to dispel the notion that educational attainment is an important aspect of education, and thus a consequential influent of political participation. Indeed, the

analyses presented in Chapter 5 indicate that educational attainment results in increased socioeconomic status, which provides increased access to personal and social resources that result in greater political participation. Additionally, the positive and significant direct path from educational attainment to political participation in the structural equation model suggests the presence of another mechanism through which educational attainment exerts its effects. Together, the results of the analyses in Chapter 5 make clear that educational attainment needs to occupy an important role in any analysis of the relationship between education and political participation.

However, in addition to reinforcing the importance of educational attainment, this project illustrates that other dimensions of education have a strong impact on political participation. In doing so, it demonstrates that additional components of education need to be included and analyzed in any study of the relationship between education and political participation that purports to be comprehensive in nature. In particular, the empirical analyses in Chapter 3 demonstrate that educational policy, practice, and context—specifically civics instruction, coursetaking, and exposure to applied civic activities—can have a positive effect on an individual's level of civic knowledge and skills. These results are consistent with the findings of research in other subject areas, which demonstrate that educational policies and practices often have very large impacts on outcomes such as student achievement and attainment—factors that the empirical analyses in this project have been shown be important determinants of political participation.

In demonstrating that educational policy, practice, and context are important determinants of educational outcomes that influence later-life political participation, this project implies the

consequence of their exclusion from an analysis of the relationship between education and political participation. Specifically, by excluding such factors—and thus implicitly restricting the definition of education to years of formal schooling completed and assuming it to be exogenous—previous work has painted an incomplete portrait of the relationship between education and political participation; previous work has painted a black and white picture while the true landscape is one with many magnificent colors.

6.2.2. Causal Heterogeneity

Prior studies have generally attempted to estimate *the* causal effect of education—generally defined as years of formal schooling completed—on political participation. This project, in contrast, recognizes the possibility of heterogeneity in the effects of education, a possibility that is confirmed in several of the empirical analyses; confirmation of such heterogeneity represents a second important contribution of this project.

Results from the empirical analyses indicate that heterogeneity in the effects of education on political participation occur along several dimensions. First, and on a very basic level, by defining education to be multi-dimensional in nature—and then separately estimating the effects of each dimension—this project implies causal heterogeneity across the different dimensions of education. Recognizing that education is not a single monolithic entity, but a complex collection of skills, relationships, and experiences—and then empirically examining the effects of each on participation-related outcomes—effectively serves as recognition of heterogeneity.

Along with recognizing causal heterogeneity across dimensions of education, this project provides important evidence of heterogeneity within one of the most visible dimensions of education—educational attainment. Specifically, resting on hypotheses with strong theoretical

undergirding, the results in Chapter 5 demonstrate that completing education milestones—high school graduation and bachelor degree attainment—positively affect voting-related participation outcomes while completion of interim years of education have no such effect. Such a finding represents the first systematic empirical evidence of heterogeneous attainment effects, evidence that has the potential to help reconcile the disparate findings of previous studies.

In addition to heterogeneity within and across domains of education, there is also evidence of causal heterogeneity across modes of participation. In many cases, the effects of education on voting-related behavior differ from its effects on other modes of participation, such as political discussion or more active forms of participation, including donating money or campaign engagement. Although the underlying source of this heterogeneity is not fully clear, acknowledging its existence is the first step on the road to securing a superior understanding.

Finally, the analyses present some preliminary evidence of causal heterogeneity across sample members with various demographic characteristics. For example, results presented in Chapter 3 indicate that the effect of high school civics coursetaking is nearly twice as large for students who took the minimum number of civics courses required to graduate from high school, relative to a nationally-representative sample of students. Although several other comparable examples emerge throughout the empirical analyses there is clearly more work to be done in this area.

The recognition of heterogeneity is inherently valuable for its provision of a more nuanced and complete understanding of the relationship between education and political participation, but it also has important implications for past and future research. The primary implication for past research was noted above; systematic heterogeneity in the causal effects of

educational attainment on voting-related participation may help reconcile the disparate findings of past research. Going forward, the existence and prevalence of causal heterogeneity demonstrates the importance of explicitly stating the research question and associated estimand. For example, instead of purporting to estimate the effect of education on political participation—as several studies have claimed to do—it would be advisable to explicitly state that the study is estimating the effect of educational attainment on political participation and then go on to state the level of education at which the effect is identified, the composition of the sample over which the effect is estimated, and the specific type of political participation that serves as the outcome. Such specificity has the potential to reduce confusion and provide a clearer understanding of the relationship, considered broadly, between education and political participation.

6.2.3. The Role of Skills

A third lesson emerging from this analysis is the important role that skills occupy in determining an individual's level of political participation. Scholars have long theorized that skills are important influents of participation—and that education is responsible for much skill development—but empirical evidence in support of this theoretical proposition has been surprisingly scant. By drawing on datasets that contain high-quality measures of several skill dimensions, the analyses in this chapter were able to provide a basic empirical corroboration of existing theoretical conjectures.

Given that skills have shown to be important determinants for a wide variety of social and economic outcomes, it should come as little surprise that they are also important determinants of political outcomes. However, we lack a comprehensive and detailed understanding of the relationship between skills and political participation, particularly when

considered relative to our understanding of the relationships between skills and outcome domains. As described in greater detail in the following section, one of the most fruitful avenues of future research involves gaining a more comprehensive, detailed, and thorough understanding of the relationship between an individual's skill set and his or her participation in the political process.

6.2.4. Focusing on Mechanisms

To this point, the insights drawn from this project have been primarily empirical ones that may have theoretical implications. In contrast, the final lesson is primarily a theoretical one that may have empirical implications. As summarized in the opening section of this chapter, there are two primary schools of thought regarding the relationship between education and political participation: 1) Education as a resource and 2) Education as a sorting mechanism. Instead of taking this debate at face value—and then siding with one school of thought over the other—this project largely ignores it and instead refocuses attention on empirically testing the specific mechanisms through which education is theorized to exert its effects.

In recasting this issue, the project does not consider educational operating as a resource or a sorting mechanism to be an either/or proposition. Consider the following example as an illustration: By influencing individuals' socioeconomic status, educational attainment is clearly theorized to operate as a sorting mechanism. However, this sorting alone is not sufficient to result in increased levels of political participation; it is the increased resources available to the sorted individuals that ultimately result in greater political participation and these resources would not have been available to individuals had they not achieved higher levels of educational attainment. Thus, education is theorized to simultaneously operate as both a sorting mechanism

and a resource in this project, but it is the focus on the full mechanism that is the most important focus of this project.

By refocusing attention from the existing debate over education as a resource versus sorting mechanism to the specific mechanisms through which education exerts effects on political participation, this project demonstrates the comparative advantages of explicitly analyzing mechanisms. Specifically, the theoretical and empirical analyses in this project illustrate that we can gain a much more thorough and concrete understanding of important relationships when we perform rigorous tests of concrete hypotheses than when we engage in broad theoretical debates over quite general concepts. Theoretical debates are undeniably important, but it is the results of empirical tests of concrete hypotheses derived from those debates that serve to most effectively advance knowledge.

6.3. Going Forward

This project has clearly made substantial progress in advancing our understanding of the relationship between education and political participation. Such advancement, however, by no means implies that our understanding of the relationship between education and political participation is complete. Indeed, as detailed below, there are several avenues of additional research that could further improve our understanding of this important relationship. Specifically, future research would do well to devote additional consideration to: 1) Exploring the potential effects of additional educational policies, practices, and context on participation-related outcomes, 2) Further analysis of the relationship between individuals' skill sets and their levels of political participation, 3) Studying the possibility that the participation-related effects of educational attainment operate through mechanisms in addition to the one analyzed in this

project, and 4) Identifying additional data that will yield greater understanding of the relationship between education and political participation. Each topic is discussed in turn below.

6.3.1. Additional Policies, Practices, and Contexts

A primary contribution of this project involves recognizing the multi-dimensional nature of education. This recognition that provides the basis for exploring the role that educational policy, practice, and context play in increasing knowledge and skill levels, which in turn influence political participation. Specifically, Chapter 3 analyzed the effects three primary policies and practices: 1) Civics graduation credit requirements, 2) Civics coursetaking and instructional time, and 3) Opportunity to participate in applied civic activities. Although these three policies and practices are undeniably important to examine, they are hardly the only ones that could influence political participation through the mechanism of increased knowledge and skills; they are but a small sampling of the universe of policies, practices, and contexts that could do so. Future inquiry should assess the relevant effects of other prominent policies, practices, and contexts. For example, studies could examine whether the characteristics of a student's teacher—such as years of experience or education level—affect civic knowledge and skill acquisition. Similarly, it would be useful to analyze whether the characteristics of a student's peers affect outcomes of interests. These topics represent just a couple of the dozens of possible avenues for fruitful future analysis.

Chapter 3 was wholly devoted to analyzing how educational policy, practice, or context affect civic knowledge and skill acquisition, which is one of the mechanisms through which the effects of education are theorized to operate. Readers may note, however, that no analysis explored the effect of educational policy, practice on context on educational attainment, which—

through its effects on socioeconomic status—is the other mechanism that education is hypothesized to operate. It is important to note that this connection was not explored not because it was theorized to be unimportant. Quite to the contrary, these relationships were not explored because an extensive body of literature demonstrates that policy, practice, and context are important determinants of educational attainment. For example, Rumberger (1995; 2008; 2011) demonstrates that educational practice and context is a very important determinant of high school persistence. Several studies have shown that alternative schooling delivery policies—school vouchers and charter schools to name two—can result in greater rates of high school graduation (Wolf et al. 2009; Cowen et al. 2012; Booker et al. 2011). Similarly, at the postsecondary level, a number of analyses illustrate that tuition and financial aid policies affect persistence, and thus educational attainment (Dynarksi 2000; 2008; Bettinger 2004; Kane 1994). These examples represent a small selection of factors that have been demonstrated play a role in determining educational attainment. Overall, though, it is clear that policy, practice, and context affect educational attainment, and this fact is much better illustrated by the vast extant literature on the topic than it could be through a chapter in this project.

6.3.2. The Role of Skills

Empirical confirmation of the fact that skills are an important determinant of individuals' political participation represents a major contribution of this project. However, as noted in Chapter 4, the analyses of the relationship between skills and participation left some questions unanswered and even raised others.

Perhaps the most interesting question left unanswered concerns the specific skill dimension or dimensions that most strongly affect levels of political participation. Although the

datasets undergirding the analyses contain high-quality measures of several skill dimensions, a major limitation of the NAAL data is the inability to estimate the effects of multiple skill measures simultaneously. However, even using the HS&B data, where simultaneous estimation of the skill measures is not an issue, it is difficult to discern one skill dimension being a more influential determinant of political participation than any other. There is some indication that reading skills are important determinants of voting in presidential elections, but such a conclusion should not be drawn with any reasonable amount of certainty. Similarly, there is some evidence that civic knowledge/skills are the most important skill dimension affecting political discussion with a wide variety of groups, as well as voting in nonpresidential elections. Such propositions need much more evidentiary support, however, before they are to be believed with a reasonable degree of certainty. Attempting to better discern which skill and knowledge dimensions are the most important for participation in various participation activities is clearly an area ripe for additional research.

A second remaining question concerns the functional form of the relationship between skill levels and political participation. Chapter 2 presented a preliminary basis for an expectation of nonlinearity in the relationship between these two factors, but this expectation was not corroborated empirically by the HS&B data; the structure of the NAAL dataset did not allow inclusion of nonlinear terms in the statistical model. Finally, although this project examined the relationships between several skill dimensions—more than any other previous study—and political participation, the possibility remains that still other skill dimensions are important determinants of political participation; this possibility could usefully serve as the basis of further inquiry on the topic.

In light of the discussion to this point, it is important to make clear that future research on the relationship between skills and political participation should not be restricted to empirical and methodological inquiry. Indeed, thoughtful and detailed theorizing could potentially represent the most valuable addition to the literature; a well-developed theoretical framework regarding the relationship between skills and political participation would provide beneficial guidance to future empirical inquiry on the topic.

6.3.3. Effects of Educational Attainment Through Additional Mechanisms

Results presented in Chapter 5 provide strong evidence that, as hypothesized, educational attainment affects political participation by increasing socioeconomic status, which provides individuals with greater access to personal and social resources that facilitate participation. However, the results also provide indications that educational attainment may affect political participation through other mechanisms. Specifically, in addition to the causal pathway described above, the structural equation model estimated in Chapter 5 includes a direct path from educational attainment to political participation. The fact that this direct path is estimated to be positive and significant suggests the presence of another causal pathway.

The conceptual model presented in Chapter 2 contains a second pathway through which educational attainment is theorized to affect political participation. Specifically, educational attainment is hypothesized to increase knowledge and skills, which result in greater levels of political participation. Although the NLSY79 dataset has many advantages, it did not contain any adult-level skill measures that would permit a direct empirical test of this conjecture. In the future, it would be valuable to locate—or develop—a dataset with the contents required to conduct a direct and rigorous empirical test of this hypothesis. Such contents would include

high-quality measures of educational attainment, skills, and political participation, along with a rich set of background characteristics, which would ideally include demographic characteristics, socioeconomic status, and measures of individuals' schooling experiences, among others.

In addition to empirically testing the hypothesis that educational attainment affects political participation through the mechanism of increased knowledge and skills, future research should also consider—both theoretically and empirically—whether educational attainment affects political participation through additional mechanisms. Literatures in sociology, economics, education, and other fields could provide a useful basis for further exploration of this topic.

6.3.4. Additional Data

This project drew on a broad array of datasets—most of which are not commonly used in the political science literature—to perform the empirical analyses presented in the three preceding chapters. However, the data marshaled for this project did not permit the execution of every conceivable empirical test; datasets with certain features would permit the conduct of additional empirical tests that would further contribute to our understanding of the relationship between education and political participation.

The previous section outlines the contents of one hypothetical dataset that would permit testing the hypothesis that educational attainment increases knowledge and skills, which would in turn affect political participation. Potentially more useful, however, is a data set that contains extensive information on the policies, practices, and contexts under which an individual was educated, a rich set of background characteristics, adult-level skill measures, and data on later-life political participation. Such a dataset would facilitate direct empirical testing of the full

causal pathways laid out in the conceptual model. For example, a dataset with the contents described above would permit testing of the hypothesis that policy, practice, and context affect knowledge and skill acquisition, which, in turn, affects political participation. Similarly, guided by the development of new theory regarding the relationship between skills and political participation, a dataset containing a number of high-quality and flexible skill measures—along with additional components—would allow us to gain a better understanding of their influence on political participation.

Overall, the data employed in this project facilitated one of the most comprehensive and rigorous analyses of the relationship between education and political participation. However, as is the case with nearly all research, the location or development of additional data—containing the features identified above—would facilitate additional analyses that could provide even further insight into this important relationship.

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