Addressing Political Inequality:

The Role of Formal Education and Information Campaigns

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Abstract

One of the biggest political challenges facing modern Western democracies is political inequality. The gap between the political haves and the have nots is pervasive and even widening. Across developed democracies, socio-economically disadvantaged citizens participate less in politics compared to their more advantaged counterparts. From democratic theory to contemporary public policies, education has been identified as one of the main ways to ensure adequate preparation of democratic citizens and to promote equality of opportunity in politics. However, empirical evidence on the actual democratic benefits of formal and voter education remains mixed. It is the central argument of this dissertation that education has a causal effect on political participation, and that this effect might not be general, but conditional. Indeed, there are strong theoretical and empirical reasons to believe that the democratic benefits of formal education and voter education will vary across social groups. So the question addressed by this dissertation is: can formal education and voter education campaigns close the participation gap between advantaged and disadvantaged citizens?

In the first article, I investigate the causal and conditional effect of formal education on electoral participation in Canada. I use a propensity score weighting analysis with a longitudinal dataset to evaluate whether the effect of university education on electoral participation varies for individuals coming from advantaged or disadvantaged family backgrounds. The findings show that education has a causal effect on electoral participation, for both the advantaged and the disadvantaged. While the participation-enhancing benefits of education tend to be larger for disadvantaged youth, university education does not close the participation gap between socio-economically advantaged and disadvantaged individuals.

In the other two articles, I examine a new type of web information campaign, Voting Aid Applications (VAA). So in the second article, I investigate the effects of a VAA on the political engagement and electoral participation of citizens with varying levels of education. Building on political behaviour research, communication theory, and social psychology, I test alternative hypotheses about the differential effects of VAAs with an innovative randomized field experiment design. The results confirm that the VAA can inform and engage the public. However there is no significant effect on electoral participation. While higher educated users of the VAA learn most from this voting app', the lower educated users become more interested in the elections and more motivated to vote. Thus, across political outcomes, the VAA both decreases and increases political inequalities between privileged and underprivileged citizens

In the third article, I specifically examine whether VAAs influence citizens' electoral decisions. I use a randomized field experiment to evaluate the effect of the Vote Compass on users' electoral preferences during the 2014 Quebec provincial election. The results show that users of the VAA are more likely to form an electoral preference, but this is only the case among thirty-year olds, higher educated, and more politically interested users. At the same time, using a VAA does not affect preferences on Election Day and only impacts party preferences of voters in the short term: the politically uninterested and the older users are more likely to change their party preferences, whereas the thirty-year olds and the politically interested users are less likely to change their initial party preference. Furthermore, the type of recommendation received from the tool does not affect users' vote choice. So contrary to what some have feared, VAAs do not lead to vote switching.

Résumé

L'inégalité politique est un des plus grands défis des démocraties occidentales modernes. L'écart entre les privilégiés de la politique et les défavorisés de politique est endémique et continue de s'aggraver. À travers les démocraties développées, les citoyens socio-économiquement défavorisés participent moins en politique que leurs homologues plus favorisés. De la théorie démocratique aux politiques publiques contemporaines, l'éducation a été identifiée comme la façon la plus importante d'assurer une préparation adéquate des citoyens démocratiques et de promouvoir l'égalité des chances en politique. Cependant, les preuves empiriques sur les bienfaits réels de l'éducation formelle et de l'éducation électorale restent mitigées. L'argument central de cette thèse doctorale est que l'éducation a un effet causal sur la participation politique, et que cet effet n'est pas nécessairement général, mais conditionnel. En effet, il existe de bonnes raisons empiriques et théoriques de croire que les bienfaits démocratiques d'une éducation formelle et de l'éducation électorale varieront selon les groupes sociaux. Le question posée par cette thèse est donc la suivante: est-ce que l'éducation formelle et l'éducation électorale peuvent aider à refermer l'écart de participation entre les citoyens favorisés et défavorisés?

Dans le premier article, j'examine l'effet causal et conditionnel de l'éducation formelle sur la participation électorale au Canada. J'utilise une analyse basée sur la pondération par le score de propension avec une base de données longitudinale pour évaluer si l'impact de l'éducation universitaire sur la participation électorale varie pour les individus provenant de milieux familiaux favorisés ou défavorisés. Les conclusions montrent que l'éducation à un effet causal sur la participation électorale, tant pour les citoyens défavorisés que les privilégiés. Bien que les bienfaits sur l'augmentation de la participation soient plus importants chez les jeunes

défavorisés, l'éducation universitaire ne comble pas l'écart de participation entre les individus socio-économiquement favorisés ou défavorisés.

Dans les deux autres articles, j'examine un nouveau type de campagne d'information sur le web, les Applications d'Aide aux Électeurs (AAEs). Ainsi, dans le deuxième article, j'examine les effets d'une AAE sur l'engagement politique et la participation électorale des citoyens avec des niveaux d'éducation variés. En me basant sur la recherche du comportement politique, la théorie de la communication et la psychologie sociale, je teste différentes hypothèses sur les impacts différentiels des AAE avec un design expérimental innovant, sur le terrain et avec randomisation. Les résultats confirment que l'AAE peut informer et susciter l'intérêt du public. Par contre, on ne constate aucun effet significatif sur la participation électorale. Alors que les utilisateurs plus éduqués de l'AAE font le plus de gains en connaissances politiques, les utilisateurs moins éduqués deviennent plus intéressés par les élections, et plus motivés d'aller voter. Ainsi, à travers différents les résultats politiques, les AAE contribuent aussi bien à diminuer qu'à augmenter les inégalités politiques entre les citoyens favorisés et défavorisés.

Dans le troisième article, j'étudie précisément si les AAE influencent les décisions électorales des citoyens. J'utilise une expérience sur le terrain pour évaluer les effets de la Boussole Électorale sur les préférences électorales des utilisateurs, durant l'élection provinciale au Québec en 2014. Les résultats démontrent que les utilisateurs des AAE sont plus enclins à former une préférence politique, mais seulement les utilisateurs dans la trentaine, plus éduqués, et plus intéressés par la politique. En même temps, l'utilisation de l'AAE ne change pas l'opinion des gens le jour du scrutin, et n'a qu'un effet à court terme sur les préférences politiques des électeurs: ceux qui sont plus âgés et ceux qui sont moins intéressés par la politique sont plus portés à changer leurs préférences de parti, alors que ceux âgés dans la trentaine et ceux intéressés par la politique sont moins susceptibles de changer leur préférence de parti initiale. De

plus, le type de recommandation reçue de cet outil n'affecte pas le choix de vote. Donc contrairement à ce que certains craignaient, les AAE ne mènent pas à des changements de vote.

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This dissertation has been a long but extraordinarily enriching process. On this long journey, I have benefited from the support, advice and incredible intelligence of a number of people. First and foremost, my supervisor, Dietlind Stolle. When I met Dietlind, I was doing my Masters and was a hundred percent sure I did *not* want to do a PhD. Then, after working with her on several research projects, I discovered how much "fun" doing research could be. She showed me that research could address important questions, speak to salient societal issues, and contribute to policies and programs implemented in the real world. Dietlind showed me that through scientific research, academia could also be part of important societal debates and contribute to social and political innovations. She is truly an inspiration to me, both in how she does research and how she lives: with dynamism and enthusiasm. She has been an amazing supervisor: making sure I had the necessary financial support to conduct my studies and research, and giving me extensive feed back on my work. I feel forever indebted to her for all the amazing opportunities to learn that she has provided me, which have helped me grow both intellectually and personally.

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Chapter 1: Introduction

"The existence of equality is a fundamental premise of democracy" (Dahl 2006, ix). Democracy in fact relies on the fact that citizens can freely and equally participate in politics, to voice their concerns, shape public policy and select representatives. However the democratic ideal of equal citizenship is under threat. The gap between the political haves and the have nots is pervasive and even widening. Participation inequalities represent one of the biggest challenges for contemporary democracies (APSA 2004, Dahl 2006).

1. Political Inequality

Political equality refers to the principle that citizens have an equal voice in public decisions (Verba 2003, Dahl 2006). One way citizens exert political authority and get their voices heard is through political participation. Political participation refers to actions undertaken by organizations and citizens that have "the intent or effect of influencing government action— either directly by affecting the making or implementation of public policy or indirectly by influencing the selection of people who make those policies" (Schlozman, et al. 2012, p.10), as well as actions that aim to bring societal change by influencing the public directly or other non-institutional agents in society. There are many forms of political participation, such as contacting public officials, boycotting products for ethical or political reasons, making donations to campaigns, giving time for a social cause, and engaging in political protest. But the vote is a unique political act, not only because its output determines who governs, but because of its equal principle of 'one person, one vote' (Verba, et al. 1995).

Participation conveys information about citizens' interests, needs and preferences. So when people do not engage in the political process, it is much less likely for democratically elected representatives to hear or care about their issues, and to respond to their needs. There is in fact extensive research suggesting that not all citizens have equal influence in the political

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process (Bartels 2008, Gilens 2012). Furthermore, we know that such inequalities in participation are not equally distributed across the population. Indeed, participation inequalities reflect and reinforce salient cleavages within the broader society, especially as they relate to socio-economic status.

Unequal Political Voice: The Socio-Economic Bases of Participatory Inequalities

Across developed democracies, citizens with lower levels of socio-economic resources participate less in politics. A wealth of evidence shows that those who are the most at risk of not voting are the citizens from lower socio-economic status (SES) backgrounds, those who have lower levels of income and education, and lower occupational status (Wolfinger and Rosenstone 1980, Leighley and Nagler 1992, Rosenstone and Hansen 1993, Blais, et al. 2004, Gallego 2007, Jacobs and Skocpol 2007, Bartels 2008, Gallego 2009, Soss and Jacobs 2009, Gallego 2010, 2014). The most affluent and better-educated citizens are more participative in numerous ways, from voting to protesting, contacting public officials, donating and more (Verba and Nie 1972, Verba, et al. 1995, Verba, et al. 1997, Putnam 2000, Van Aelst and Walgrave 2001, Campbell 2006, Teorell, et al. 2007). But it is widely recognized that educational attainment is the SES measure that has the most consistent association with political engagement (Nie, et al. 1996), and that citizens who do not obtain post-secondary education are less likely to be politically engaged than the higher educated ones (Jarvis, et al. 2005, Zaff, et al. 2009).

There is also evidence that participatory gaps between social classes are increasing, and notably between the educated and the less educated (Blais, et al. 2004, Gallego 2010, Putnam, et al. 2012, Snellman, et al. 2015). Those who fail to attain higher education are falling further behind their educated counterparts. Burden (2009) shows that while the 'participatory value' of university education has remained stable in the United States, the 'participatory value' of lower

levels of education has plummeted. This is also the case in Canada where turnout rates of lower educated youth have been steadily declining since the 1960s, while rates among university educated youth have remained relatively stable (Gidengil, et al. 2003, Blais, et al. 2004).

Several changes in the social, political and economic context of modern societies may help to explain why less advantaged citizens and especially the lower educated are dropping out of politics. First, the traditional organizations of mobilization, like unions and churches (Rosenstone and Hansen 1993), have lost some of their influence and cannot perform their role effectively anymore (Verba, et al. 1995, Gray and Caul 2000). Even political parties' capacity to mobilize voters has weakened, due to a weakening of partisan identification and increasingly negative feelings toward parties (Dalton and Wattenberg 2002, Gidengil, et al. 2002, Kittilson 2005). They now mostly target and mobilize habitual voters – who are generally older, educated and interested (Wattenberg 2000). Secondly, with the rise of the knowledge economy, education has become a more salient source of human capital and a more discriminating factor in life chances, income prospects and social status (Olssen and Peters 2005).

The rising inequalities in participation across social groups have dramatic implications for democracies. If the citizens who are active in politics do not have the same concerns as those who are not active, then governments and political institutions will only hear about a partial set of societal needs. Having only a partial and biased overview of what the population needs, decision-makers are likely to respond to citizens' demands with equally partial and biased programs and policies. So *who* participates has important implications for who gets represented and who gets what from politics. There is plenty of evidence showing that voters and non-voters, participants and non-participants, are different in terms of needs, interests and policy preferences (Verba, et al. 1995, Gilens 2005, Bartels 2008, Enns and Wlezien 2011, Schlozman, et al. 2012). "Unequal

political voice matters because the advantaged convey very different messages to government officials than do average citizens or those who are the least well off" (APSA 2004, p11).

Unequal Opportunity: The Generational Bases of Participatory Inequalities

Beyond the evidence of group differences in participation and their impact on public policy and democratic responsiveness, lies another democratic threat. Inequalities in participation are inherited from families and passed on from one generation to the next.

The socialization literature has established that people learn politics in different contexts and under the influence of multiple societal actors. Scholars may disagree on the primacy of the family in pre-adult political learning, but the influence of family characteristics on the political development of youth is established. Most notably, the influence of parental SES on youth political development is well documented. Children from socio-economically advantaged families are usually more participative, tolerant, interested, efficacious, informed, and volunteer more (Jennings and Niemi 1974, Beck and Jennings 1982, Mustillo, et al. 2004, Jennings, et al. 2009).

The influence of parental SES on participation is essentially based on parents' education (Verba, et al. 2005). As seen on Figure 1.1, the influence of parental education operates through processes of social stratification (causal path 1) and social learning (causal path 2) (Beck and Jennings 1982, Verba, et al. 2005). In the first causal pathway, parental education has an indirect effect on children's political participation, through children's educational attainment. Parents with higher levels of education are likely to lead their children to gain high levels of formal education (Flouri and Buchanan 2004, Sandefur, et al. 2006, Hertz, et al. 2007). In turn, an individual's level of education affects the participatory factors of resources, recruitment and psychological engagement (Verba, et al. 1995). So higher educated parents are more likely to raise children who pursue higher education and who can accumulate social, economic and

psychological resources that facilitate their participation in politics. Secondly, parental education has an effect on children's participation through the family's political environment. Higher educated parents tend to be more politically informed, interested and active, and are thus more inclined to provide a politically stimulating environment to their children (Verba, et al. 2003). As higher educated parents discuss politics at home and expose their children to their own experiences of political participation, these children learn politics at home. They are thus more likely to develop civic skills, interest and motivation to take part in politics, and to insert themselves in politically engaged networks, compared to children from less educated families (Beck and Jennings 1982, Campbell, et al. 1986, Andolina, et al. 2003, Verba, et al. 2005, Neundorf, et al. 2013). While it is recognized that other factors may come into play in the transmission of political traits in the family (such as genetic factors, Fowler, et al. 2008), parental education is an important "engine for the transmission of political activity from generation to generation" (Verba, et al. 2005, p. 98).

Figure 1.1 – The Intergenerational Transmission of Political Participation: Paths of Influence of Parents' Characteristics on an Individual's Participation
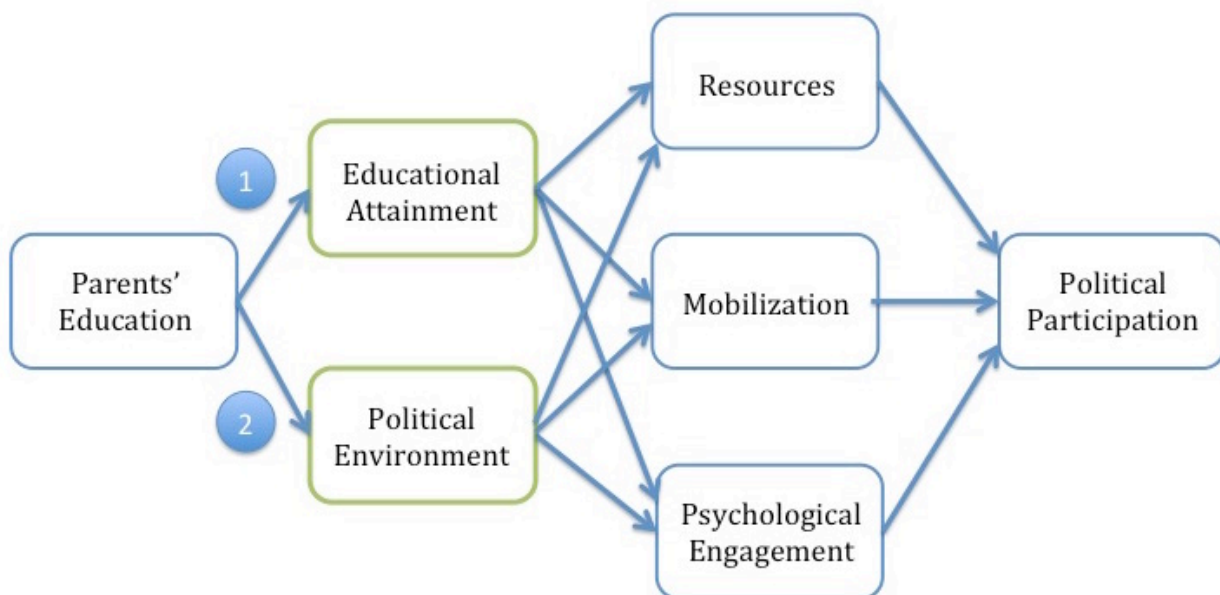
This has important implications for democratic life as early experiences and political socialization have lasting effects. Indeed, the literature on political socialization shows that family background affects adult levels of engagement and participation. So not only do those coming from higher SES families tend to be more politically interested, engaged and active than children from low SES families, but they remain so throughout life (Prior 2010, Neundorf, et al. 2013, Neundorf, et al. 2015). And so as inequalities in participation between social groups are transmitted through generations and persist over a lifetime, democratic politics is far from being "a level playing field" (Verba, et al. 2005, p. 107, Brady, et al. 2015).

Can we Do Anything About it?

In the face of this picture of pervasive, durable and consequential inequalities, the question arises: can we do anything about it? Can we break the individual and inter-generational cycles of political inequality? And if so, how?

Is There Room for Change? Openness to Non-Family Influences Later in Life

Even if the political socialization literature documents strong family influences on political development, they do not completely determine adult political participation. In fact, as more explanatory factors are considered, the impact of family characteristics on individual levels of participation weakens (Verba, et al. 2005, p104). Moreover, an individual's own level of educational attainment has more impact on participation than does family socialization (Ibid). So while there is a clear pattern of association between parents' and children's social and political characteristics, other non-family influences matter for political development and participation as well, such as schools, civic education, social networks and political events (Beck and Jennings 1982, Sears and Valentino 1997, Galston 2001, Jennings 2002, Zuckerman 2005). Several scholars have shown that indeed, factors outside of the family home affect political development,

and may be particularly important for those who are not socialized in an advantaged and politically stimulating environment.

Jennings and colleagues (2009) and Neundorf and colleagues (2013) study the political development of individuals as they move through life, from the family context into adulthood. Jennings and colleagues show that children from politicized families are more likely to adopt their parents' political views and predispositions, and experience more continuity in political characteristics in adulthood, compared to children from less politicized families. Neundorf and colleagues, also show that children in politicized families develop higher levels of political interest, and that these remain relatively stable in adulthood, compared to children from less politicized families. Both show that family socialization leaves a durable imprint on individual's political traits, but more so for those from higher SES and politicized families. Indeed, those who do not inherit a strong political basis from their parents tend to update their beliefs and are more susceptible to change in adulthood. So parental socialization conditions individuals' political development and susceptibility to the influence of non-family factors. "Those whose socialization in childhood is weak show much more instability well into their adult years. They exhibit a delayed pattern of political development, one where crystallized positions are slow to develop, one more susceptible to influences outside the childhood home" (Jennings, et al. 2009, p796).

This argument of differential political development is supported by the findings of Campbell (2008) and Neundorf and colleagues (2015). They both show that civic education has almost no effect on children from advantaged and politicized families, while it has a substantial impact on their less advantaged counterparts. So even if some individuals were not socialized to be active in politics by their parents and are at a political disadvantage early in life, they may nonetheless catch up with the advantaged ones later in life. Thus, non-family factors, like civic education, can compensate for family disadvantage and close the political gaps between

individuals from advantaged and disadvantaged backgrounds.

As individuals from advantaged and politicized families have already developed relatively high levels of interest and engagement at a young age, they tend to be less influenced by non-family factors (i.e. there is less room for change at the top). Alternatively, individuals who are raised in lower SES and less politicized families do not inherit high levels of political engagement from their parents and are more likely to be influenced by non-family factors. In spite of influential and unequal parental influences, there is room for change and influences in adolescence and adulthood, and more particularly among the socio-economically disadvantaged.

Possible Avenues of Political Action: Public Policy and Campaigns

While young people learn politics in the family, their political development does not stop on the doorstep of the family home. Children also learn politics at school (Andolina, et al. 2003). Governments, through public policy, have pushed forward programs of public education, trying to stimulate both formal education (or schooling) and democratic education (or civic education). In fact, there is a strong belief in democratic theory and public policy that education impacts democratic citizenship and that the educational system has a role to play in the political development of citizens and the promotion of equality of opportunity (Gutmann 1987, Page and Simmons 2000, Hacker, et al. 2007, Jacobs and King 2009). In fact, there is evidence that service learning programs in school, open class discussions, student governments and civics courses can help develop a sense of civic duty, civic and communication skills, knowledge about politics and institutions among students and provide opportunities to be engaged (Beck and Jennings 1982, Torney-Purta and Richardson 2003, Torney-Purta, et al. 2007, Campbell 2008). Programs of civic education can thus provide meaningful ways to promote democratic citizenship and to equip future citizens to be active in society as they grow up (Torney-Purta 1997, Galston 2001).

But political learning does not stop in adolescence nor is it limited to school benches (Highton and Wolfinger 2001). In fact, adults encounter various opportunities to learn and gain experience about politics through the different stages of their life (Gutmann 1987, Campbell 2006). Even if there is strong evidence to show that political predispositions are established early in life and individuals are most affected by political events during their formative years (Jennings 2002), there is also evidence to show that adults can learn from their political context and increase their political engagement and participation. For example, parents have been shown to be influenced by their children, especially when the children are enrolled in civic education programs (McDevitt and Chaffee 2002). Also, when individuals immigrate in adulthood they may be affected by the new political context they are exposed to and adjust their political behaviour in consequence (White, et al. 2008, Wass, et al. 2015).

Political events, like elections and information campaigns, can stimulate the political environment of individuals and represent opportunities for adult learning (Iyengar and Simon 2000). These exogenous changes in the political context may affect different aspects of individuals' political engagement and participation. Indeed, information campaigns can: increase individuals' levels of knowledge about candidates and political parties, cognitively engage citizens, and ultimately foster political participation (Gelman and King 1993, Rosenstone and Hansen 1993, Kam 2006, Nadeau, et al. 2008, Lenz 2009, Matthes and Marquart 2015).

So "one way to break the cycle of self-perpetuating political inequality is through politics itself " (Verba, et al. 2005, p110). First, politics as embodied by public policies and governmental action can lead to the creation and implementation of programs that aim to foster democratic citizenship, while also diminishing social and political inequalities, by targeting programs to those in need (Page and Simmons 2000, Jacobs and King 2009). As noted earlier, public policies aimed at increasing educational attainment have played a prominent role in relation to

democratic citizenship. Secondly, politics understood as political events and stimulating political environments can have an impact on participation and political inequalities. Elections are an important moment in democratic life, providing not only an opportunity for citizen participation through voting, but also a salient context for citizens to learn about politics. In this sense, information campaigns during elections provide a means to educate citizens about politics and to stimulate their political development (Delli Carpini and Keeter 1996, Kam 2006). So the question addressed by this dissertation is: can formal education and voter education campaigns close the participation gap between advantaged and disadvantaged citizens?

2. The Education-Participation Nexus

The Causal Effect of Education on Political Participation

In political science, one of the most important convictions is that higher education is a key determinant of political participation. Attending tertiary education, and more specifically university, is said to have a positive and lasting effect on political participation (Nie, et al. 1996, Verba, et al. 2005, Gallego 2010). Education is seen as "the prime factor in most analyses of political activity" (Verba, et al. 1995, p433).

The conventional view is that formal education is a major cause of participation. It is believed to help develop resources, skills, values and politically relevant social networks that work to decrease the costs of participation and increase its benefits. This is illustrated in Figure 1.1 by the links running from individual educational attainment through resources, psychological engagement, and social mobilization to political action. The Absolute Education Model and the Relative Education Model refer to different mechanisms, but both agree on the idea that education causally affects political participation (Persson 2015). On one hand, the Absolute Education Model posits that formal education works through the development of resources (like

cognitive skills and civic skills) and psychological engagement (like political knowledge and interest) (Wolfinger and Rosenstone 1980, Verba, et al. 1995, Gallego 2010). On the other hand, the Relative Education Model posits that educational advancement favours participation through social positioning. In this sense, education helps individuals insert themselves higher in the social hierarchy and in politically and economically rich networks, which facilitates their recruitment into participation (Rosenstone and Hansen 1993, Nie, et al. 1996).

Whereas many empirical studies have documented this positive association between levels of formal education and political participation (Verba and Nie 1972, Wolfinger and Rosenstone 1980, Blais, et al. 2004, Gallego 2010), in recent years, scholars have questioned the causal power of education (Kam and Palmer 2008, Berinsky and Lenz 2011, Persson 2014). The main criticism with regards to these two education models is that they are based on cross-sectional studies and thus cannot properly address causation. The relationship between education and participation could in fact be spurious, if pre-adult socialization and characteristics determine both educational attainment and political participation. It is in fact possible that personality characteristics and genetic factors are responsible for both educational attainment and participation outcomes (Hauser 2000, Fowler, et al. 2008). So the endogeneity of educational choices is a major issue in the investigation of the participatory benefits of formal education.

The same problem of endogenous choice, or self-selective exposure, applies to the study of information campaigns (Pianzola 2014). Individuals who are more educated, politically interested and knowledgeable tend to consume more political information, just as they tend to participate more in politics (Shah, et al. 2001, Schlozman, et al. 2010), compared to their less educated counterparts. It is thus difficult to assess the causal effect of information campaigns on

participation, and it becomes problematic to see how information campaigns may affect the gaps between advantaged and disadvantaged citizens.

The first contribution of this dissertation is methodological as well as substantive. First, by using a propensity score analysis, I control for the selection process into university education and get closer to a causal assessment of the effect of education on participation. While other scholars have used this type of statistical technique to limit the endogeneity with respect to education, I go a step further in limiting the problem of confounding unobservables by 'matching' individuals within SES groups. Secondly, I use a randomized field experiment design to evaluate the impact of an information campaign. By offering randomized access to a voter information tool called the Vote Compass, I circumvent the endogeneity of information consumption and measure the impact of information on users' political participation.

The second contribution of this dissertation is the investigation of the mechanisms underlying the education effect. I do so by assessing whether this information application has an impact on political knowledge and interest. While political knowledge and political interest are significant democratic outcomes in themselves (Delli Carpini and Keeter 1996), they are further important as influential predictors of political action (Verba, et al. 1995).

The Causal Effect of Education on Political inequalities

Studies that have investigated the causal effect of formal education on participation have displayed mixed results, some finding no effect (Berinsky and Lenz 2011, Persson 2014) and some finding positive effects (Dee 2004, Sondheimer and Green 2010, Henderson and Chatfield 2011, Mayer 2011, Dinesen, et al. 2016). However, these studies made the implicit assumption that the effect of education on participation is homogeneous (across social groups). So while they controlled for selection into education, they assumed that education impacts the political

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participation of all equally. But it is in fact highly unlikely that individuals from different backgrounds, who have experienced different types of political socialization and have different levels of resources, would react in the same way to a treatment.

So the third contribution of this thesis comes from its consideration of the differential effect of education across SES groups. Beyond the question of 'who accesses education and why', I ask whether education has the same *impact* for all. I argue that not all university students will reap the same political benefits from their educational experience. I build on several theories to develop this argument about the heterogeneity of educational treatments.

On the one hand, cultural class theorists and several sociologists argue that schools work to reproduce social stratification, leading children from advantaged families to get further ahead in life (Bourdieu 1977, DiMaggio 1982, Lareau 2000). They show that individuals from socio-economically advantaged backgrounds have more cultural capital and can better navigate the educational system, compared to lower SES students who have less cultural capital and are not as efficient in using educational resources and services (Hansen and Mastekaasa 2006, Collier and Morgan 2008, Calarco 2011, 2014). So youth from advantaged families, who are more likely to attend university in the first place, tend to be the ones to benefit the most from this education, compared to youth from disadvantaged families who also attend university. So from this perspective, it is expected that gains in education will lead to increasing inequalities between the socio-economically advantaged and the disadvantaged. This is the 'acceleration hypothesis' (Campbell 2008), as illustrated by Figure 1.2.

On the other hand, the developmental literature argues that education may compensate for lack of resources and political socialization in the family. Individuals raised in lower educated families are more likely to be raised by parents who vote less, to be less exposed to high status social networks and politically engaged role models, and to be offered fewer politically relevant

resources in their formative years. However, the skills and socio-political resources provided through formal education might compensate for these pre-adult gaps, and formal education could thus represent an important and politically consequential transition in the life of disadvantaged individuals. Thus, youth from disadvantaged families, who are less likely to attend university, would be the ones to benefit the most from this education, compared to youth from advantaged families who also attend university. From this perspective, then, it is expected that gains in education will lead to decreasing inequalities between the socio-economically advantaged and the disadvantaged. This is the 'compensation hypothesis' (Campbell 2008), as illustrated by Figure 1.3.

In the case of information campaigns, two other theoretical models lead us to expect different learning outcomes from VAAs, for advantaged and disadvantaged users. First, along the lines of rational choice theory, it is posited that the disadvantaged will benefit the most from the VAA, thus narrowing the gaps between lower and higher SES citizens (Figure 1.3). As information acquisition and processing are costly, individuals will only engage in these activities if the benefits outweigh the costs (Downs 1957, Aldrich 1993). High information costs can therefore lead to political inactivity (Aldrich 1993, Delli Carpini and Keeter 1996). Accordingly, the VAA's provision of simple and structured information should reduce information costs and lead to an increased likelihood of political participation. But as advantaged citizens are more likely to already have the interest, motivation, and information necessary for participation (Wolfinger and Rosenstone 1980, Verba, et al. 1995, Delli Carpini and Keeter 1996), it is unlikely that VAAs will change these levels significantly. However, for less educated citizens, who are generally less knowledgeable about politics and less politically active, the information offered by VAAs could have a substantial impact on their levels of engagement and participation. Thus VAAs' voter education effects could decrease inequalities between SES groups (Figure 1.3).

Figure 1.2 – Acceleration Effect
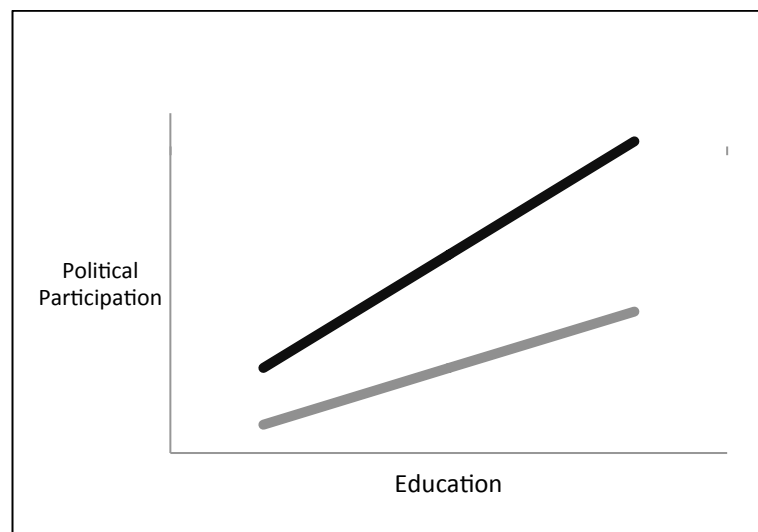
Figure 1.3 – Compensation Effect
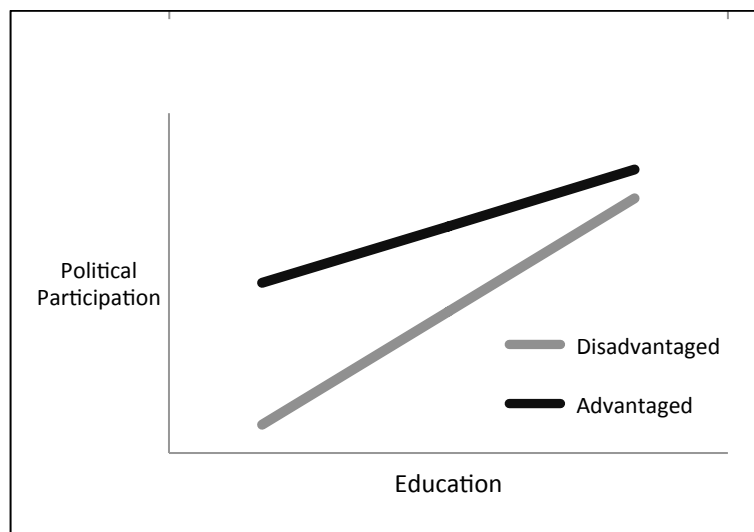
Figure 1.4 – Equal Null Effect
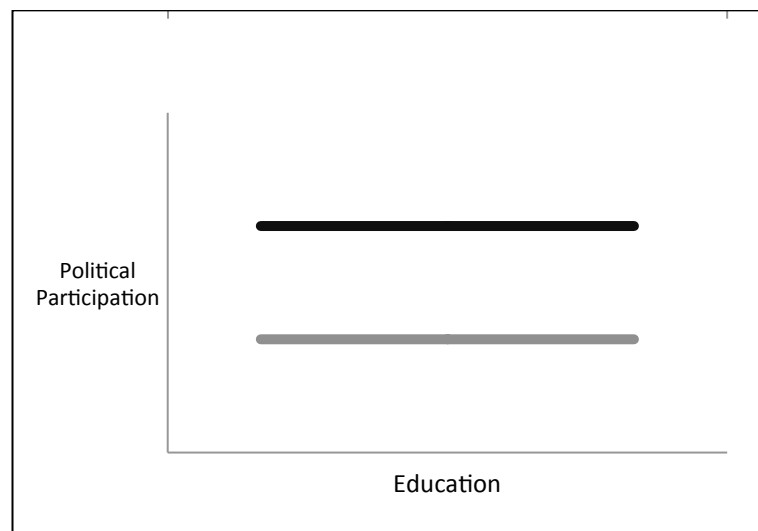
Figure 1.5 – Equal Positive Effect
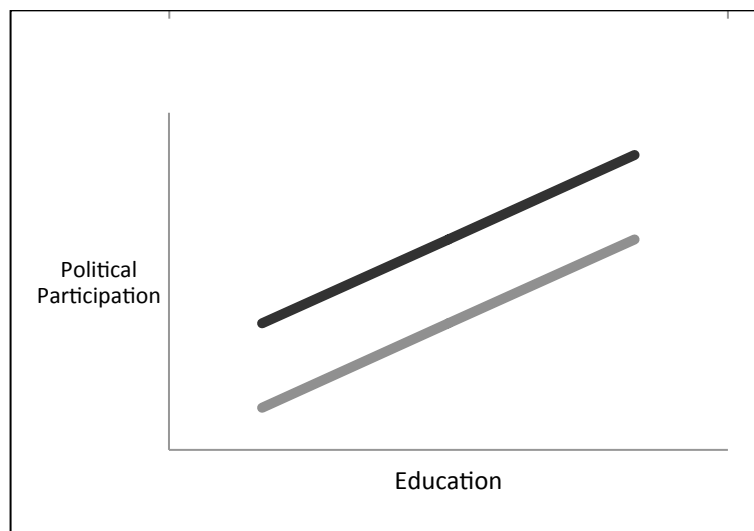
Alternatively, political psychology offers a different perspective on information processing and its impact on political engagement and participation. In this perspective, the effect of media use is argued to vary according to individual characteristics, notably education, political experience and cognitive abilities (Zaller 1992, Krause 1997, Valentino, et al. 2004, Xenos and Moy 2007). So advantaged citizens, who tend to have higher levels of education, better cognitive

and communication skills, and more political experience, will be more efficient in processing and using political information, while lower educated individuals would be less efficient and not gain much from VAA use. Accordingly, higher educated individuals should benefit most from the VAA, increasing political inequalities between the haves and have nots (Figure 1.2).

The objective of this dissertation is to ascertain the effect of education on political inequalities between lower and higher SES individuals. I first assess whether or not formal education and the VAA voter education have positive political effects (in contrast to null effects, as illustrated by Figure 1.4). But more importantly, I estimate who benefits most from these two types of education, and assess whether these types of education have acceleration effects (Figure 1.2) or a compensation effects (Figure 1.3) (in contrast to the possibility of homogeneous positive effects among the two groups, as illustrated by Figure 1.5).

3. Conclusion

Many social science fields consider the impact of education on different life outcomes, and evaluate how education policies and programs can limit inequalities of opportunity and promote upward mobility. For example, economists have studied the income externalities of university education, and considered how higher degrees may bring extra benefits to individuals raised in working class and under-privileged families (Card 1995, Brand and Xie 2010). But the purpose of education is not just to bring individual and economic benefits; it also intended to create collective and democratic value.

By understanding the impact of different types of education on political engagement and participation, and by ascertaining which social groups benefit most, this dissertation also aims to contribute to public policy. First, funding of education usually represents one of the biggest budgetary envelopes of democratic governments. This thesis aims to contribute to the social

science literature that assesses which levels of education and types of content matter for promoting active citizenship. Globally, this knowledge of the various individual and collective externalities of education can inform the development and funding of education policies. Secondly, the evaluation of the relatively new campaign tool called Voting Aid Applications (VAAs) can inform strategies of dissemination and the development of effective information campaigns. In fact, understanding what kind of effects VAA education has for which kind of users may help tailor and target this information device for those most in need.

This dissertation further contributes to the literatures on the causal impact of education and on VAAs by extending the geographical scope to a new case: Canada. Up to now, VAA studies have exclusively focused on European countries. This dissertation offers the first study in a North American context. Additionally, studies on the causal effect of education on political engagement have focused on European countries or the United States. Since we know that the effect of formal education on participation and the utility of information campaigns vary across institutional contexts (Milligan, et al. 2004, Gallego 2010), it is important to study these educational effects in different national contexts.

While political participation may be operationalized and studied through various forms of political action, this dissertation focuses on electoral participation. The first reason for this focus is the core importance of electoral participation in representative democracies. Through their vote, citizens can exert political influence on representatives and government. The second reason, in line with the focus on equality, is that "the vote is unique among political acts in that there is mandated equality in political input: we each get only one" (Verba, et al. 2005, p99).

4. Structure of the Dissertation

This dissertation follows an article-based structure. Each of the three subsequent chapters is a full-article in itself.

Who Benefits from Higher Education? The Political Participation of (Dis)Advantaged Citizens

The first chapter takes up the question of the causal and differential effect of university education on electoral participation. While recent quasi-experimental and longitudinal studies have revisited the causal relationship between education and participation, they have produced contradictory findings and have only considered the possibility of a homogeneous effect of education. I argue that university education has a causal effect on political participation, but conditional on families' socio-economic background. I apply a Propensity Score Weighted analysis to the National Longitudinal Study of Children and Youth to control for *access* to university education (i.e. selection into education) and assess the *impact* of education (i.e. the direct and independent effect of education) across socio-economic groups. The findings show that education has a causal effect on electoral participation, for both the advantaged and the disadvantaged. While the participation-enhancing benefits of education tend to be larger for disadvantaged youth, they do not confirm the compensation hypothesis. University education does not close the participatory gap between advantaged and disadvantaged individuals.

Information Campaigns and (Under)Privileged Citizens: An Experiment on the Differential Effects of a Voting Aid Application

The second chapter assesses the different effects of a Voting Aid Application on political engagement and electoral participation, for socio-economically advantaged and disadvantaged users. Past research has established the importance of campaigns in informing and educating

citizens, and ultimately strengthening participatory democracy. While the Internet has increased the possibilities for large-scale information campaigns and eased access to political information, it is still debated whether online campaigns are effective in stimulating political interest and participation among the general public. The issue is not only one of *access*, but also of the *use* of information. Investigating the overall effects of campaigns obscures the fact that citizens may not use information in the same way or reap the same political benefits. Hence, I examine the conditional effects of a web information campaign, the Voting Aid Application (VAA), on the political engagement and electoral participation of citizens with varying levels of education. By investigating who benefits most from using these apps, I evaluate whether VAAs reinforce patterns of unequal participation or mobilize new people to participate in politics. Building on political behavior research, communication theory, and social psychology, I study the differential effects of VAAs with an innovative randomized field experiment design. The results confirm that the VAA can inform and engage the public. However there is no significant effect on electoral participation. While higher educated users of the VAA learn the most from this voting app, lower educated users become more interested in the election and more motivated to vote. Thus, across political outcomes, the VAA both decreases and increases political inequalities between privileged and underprivileged citizens.

The Impact of Voting Aid Applications on Electoral Preferences: A Field Experiment in the 2014 Quebec Election

The final chapter evaluates whether VAAs impact electoral choice. Voting Aid Applications (VAA) provide non-partisan and interactive information during election campaigns, and match users' policy demand with the political supply of parties. Thus, VAAs educate users on various factors related to the voting decision and decrease the costs of voting. But do VAAs actually

influence citizens' electoral decisions? Do they help the undecided to form political preferences, or lead the decided to change their vote choice? In this study, I use a randomized field experiment to evaluate the effect of the Vote Compass on users' electoral preferences during the 2014 Quebec election. The results show that users of the VAA are more likely to form an electoral preference, but this is only the case among thirty-year olds, higher educated, and more politically interested users. At the same time, using a VAA does not change people's minds on Election Day, and the type of recommendation received from the VAA does not affect their vote choice. So contrary to what some had feared, VAAs do not lead to vote switching. However, this information 'app' tends to reinforce the gap between the more and less politically sophisticated citizens, as the former are most able to learn from the VAA.

Chapter 2: Who Benefits from Higher Education? The Political Participation of (Dis)Advantaged Citizens

Abstract:

In democratic theory and public policy, formal education is considered to be one of the main ways to develop democratic citizenship. Across Western democracies, there is a wealth of evidence showing that individuals with higher levels of education participate in politics at higher rates compared to their less educated counter-parts. So the conventional view is that education provides the necessary resources and skills to be politically active, and that education is a cause of participation. Additionally, education is believed to be "the great equalizer" and a means of social mobility. However, political science research has offered only mixed evidence on the causal effect of education, and no study has yet assessed how its impact compares for individuals from lower and higher status families. So two questions remain unanswered. Does education really have participation-enhancing benefits? And if so, do they apply to all equally? It is the central argument of this study that university education has a causal effect on political participation, but conditional on families' socio-economic background. I use a Propensity Score Weighted analysis with the National Longitudinal Study of Children and Youth to investigate the causal and differential effect of education on participation, by controlling for *access* to university education (i.e. differential selection into education) and *impact* (i.e. differential direct effect of education). The findings show that education has a causal effect on electoral participation, for both the advantaged and the disadvantaged. While the participation-enhancing benefits of education tend to be larger for disadvantaged youth, university education does not close participation gaps between socio-economically advantaged and disadvantaged individuals.

1. Introduction

In democratic theory and public policy, formal education and schooling are generally considered to have a central role in the development of democratic and engaged citizenship. While many cross-sectional studies have established a positive relationship between individuals' formal education and political participation (Wolfinger and Rosenstone 1980, Verba, et al. 1995, Gallego 2010), more recent quasi-experimental and longitudinal studies have questioned this relationship and set out to test the causality of this relationship (Kam and Palmer 2008, Sondheimer and Green 2010, Berinsky and Lenz 2011, Henderson and Chatfield 2011, Mayer 2011, Persson 2014). However, these causal studies have produced contradictory findings, and so the debate on the political effect of education continues.

One of the limits of earlier studies lies in their causal evaluation of the 'general' effect of education for the entire population. Their underlying assumption is that once we control for the endogeneity of educational choices, the effect of education will be the same for all individuals. However, individuals differ not only in terms of their background characteristics and propensity to attend higher education, but also in how they react to life experiences. In fact, several studies have shown that individuals from different family backgrounds do not benefit equally from formal education, in terms of either earnings or civic participation (Card 1995, Brand 2010). Thus, it is the central argument of this study that higher education differentially affects individuals coming from socio-economically advantaged and disadvantaged families.

The question about the causal effect of education on citizen participation is a serious concern for the field of political behavior, as well as for public policies. First, education is believed to be the single most determining factor of political behavior (Verba, et al. 1995). Additionally, education is a widely used control in most behavioral analyses. So knowing whether the causal effect of education is real, will lead us to understand what influence we account for. Are we

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measuring a true causal influence of education on participation? Or is education just a proxy for socio-economic status or cognitive abilities? Secondly, education is believed to be 'the great equalizer' that diminishes inequalities in a myriad of life outcomes, like earnings and health (Card 1995, Li, et al. 2012). So if there is evidence that education's effect on participation is conditional, based on families socio-economic background, public policies aiming to diminish participatory inequalities may develop more targeted programs to provide better access to education and sustain the educational attainment of specific social groups. Given the theoretical and policy implications, ascertaining the causal effect of education calls for further investigation.

In this study, I take a different approach to the causal analysis of the link between formal education and political participation, and move one step further than previous causal analyses. Instead of just accounting for *access* to education (by controlling for self-selection in higher education), I further consider whether the *impact* of education is the same for all individuals. Additionally, this paper contributes to the study of the causal effect of education by extending the scope of prior studies, both geographically and in time. While past studies have almost exclusively focused on individuals born between the 1940's and the 1980's in the United States and Europe, I use the National Longitudinal Study of Children and Youth (Statistics-Canada 2010) to evaluate the effect of university education among contemporary Canadian youth. The question is whether different socio-economic groups obtain the same democratic benefits from higher education and whether higher education diminishes participatory inequalities.

2. The Education-Participation Nexus

The Effect of Education Questioned: Education as a Cause or as a Proxy?[1]

In political behavior research, one of the most important lines of investigation is the identification of factors that impact political participation. And one of the most important convictions held in this literature is that education is the most determinant factor of participation. Post-secondary education, and more specifically university education, is said to have a positive and lasting effect on political participation (Wolfinger and Rosenstone 1980, Verba, et al. 1995, Gallego 2010). The conventional view is that education is a major cause of participation. It is believed to develop resources, skills and values that work to decrease the costs of participation and increase its benefits. On one hand, the Absolute Education Model (Persson 2015) posits that formal education works through the development of cognitive skills and political resources, like political knowledge, civic skills and political interest (Wolfinger and Rosenstone 1980, Rosenstone and Hansen 1993, Verba, et al. 1995, Delli Carpini and Keeter 1996). On the other hand, the Relative Education Model posits that educational advancement favors participation through social positioning. In this sense, education helps individuals insert themselves higher in the social hierarchy, in politically and economically rich networks, which facilitates their recruitment into participation (Nie, et al. 1996, Persson 2011, 2012). These two models refer to different mechanisms, but both agree on the idea that education causally affects political participation.

The main criticism with regards to these models is that they are based on cross-sectional evidence and thus cannot properly address causation. The relationship between education and participation could in fact be spurious: some factors could be driving both individuals'

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[1] Kam and Palmer 2008.

educational attainment and their political participation, and education would only be a proxy for some pre-adult factors. For example, parents' socio-economic status or personality characteristics affect both educational attainment and participation (Beck and Jennings 1982, Hauser 2000). In consequence, the endogeneity of educational choices is a major issue in the assessment of the effect of education.

More recent studies have thus employed different methodologies and statistical techniques to overcome the issue of endogeneity of educational choices and assess causality more precisely. Dee (2004) and Milligan and colleagues (2004) have used instrumental variable approaches to create exogenous changes in the levels of schooling and study the civic and political returns of educational attainment. Dee uses the geographical distance to a higher education institution as the instrument and finds that education in the United States has large and significant effects on voter participation. For their part, Milligan and colleagues use increased length in compulsory schooling and changes in child labor laws as instruments and find a strong link between education and the probability of voting in the United States, but not in the United Kingdom. Berinksy and Lenz (2011) also use an instrumental variable approach with a natural experiment in the American context. The natural experiment is based on the fact that, at the same time that military induction rates increased with the Vietnam draft, educational deferment procedures changed, which led to a rapid increase in educational enrolment (i.e. draft eligible youth had a strong incentive to use educational deferment, and avoid being drafted). They compare the electoral participation of male citizens who did go to university in this period, to those who did not attend university, and they find no effect of education on the probability of voting.

Kam and Palmer (2008), Henderson and Chatfield (2011), Mayer (2011) and Persson (2014) all use matching methods to control for the selection process into education, which

mimics an experimental set-up with panel data. To limit the problem of confounding factors, they identify similar individuals based on a set of individual and family characteristics that are known to impact both educational attainment and political participation, and create control and treatment groups based on education levels. When comparing among similar individuals, some with university degrees and some without such degrees, Kam and Palmer find no significant differences in their levels of participation and conclude that there is no causal effect of education on participation in the United States. However, Henderson and Chatfield, and Mayer, both analyze the same data used by Kam and Palmer with another estimation technique, and find a positive effect of university attendance on political participation. Persson also uses a matching analysis to investigate the effect of university graduation on various forms of participation in the United Kingdom, and finds no significant effect.

Finally, Dinesen and colleagues (2016) use the strongest quasi-experimental design with a twin study to examine the causal link between education and participation in three countries. They focus on monozygotic twins to control for pre-university predispositions and experiences (as they share the same genetic and family background) and are thus able to limit the problem of confounders. So by looking at differences in education among twins, in relation to their levels of participation, they find participation-enhancing benefits of high school graduation in Denmark and of years of education in the United States.

Despite refined and complex methodologies, most of these studies produce contradictory findings and cannot agree on the (non-)existence of a general effect of education on political participation. Some support the view of education as a cause, while others find evidence that education is only a proxy. Several reasons may explain this patchwork of results.

For one, education is operationalized differently across studies. While Dee, Berinsky and Lenz, and Henderson and Chatfield use university attendance; Persson uses university

graduation; Milligan and colleagues, and Sondhemeir and Green use high school graduation; Pelkonen uses the length of primary education; Siedler uses the length of secondary education; Kam and Palmer both use university attendance (for the analysis of the Political Socialization Panel Study) and university graduation (with the High School and Beyond Study); Mayer uses three levels of post-secondary education (i.e. non-vocational and vocational non-collegiate post-secondary education, and university attendance) and so do Dinesen and colleagues (i.e. years of education, university degree and high school degree). Even those who use the same operationalization of education still find contradictory evidence. The only systematic finding is that university graduation has no causal effect on participation (Kam and Palmer 2008, Persson 2014, Dinesen, et al. 2016).

Secondly, all studies have investigated the causal link between education and participation in the United States or in Western European countries. Milligan and colleagues (2004) and Persson (2014) examined the impact of education in UK and find no significant effect on political participation. Siedler (2010) finds no effect in West Germany. Pelknonen (2012) only finds an effect on petition participation in Norway. Dinesen and colleagues (2016) also consider the participatory benefits of different educational levels in Denmark and Sweden, and they only find an effect of high school graduation on participation in Denmark. So while most studies in the US find a causal effect of education on participation[2], there is no clear evidence of such a link in Europe. There is in fact a strong possibility that the effect of education is context dependent and that some of the variation in results may be due to variation in institutional and electoral contexts (Milligan, et al. 2004, Gallego 2010). It is thus important to further extend the scope of investigations outside of the United States and Europe to try to confirm the patterns observed up

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[2] Out of the eight studies that looked at the effect of education on participation in the United States, six found a positive effect, and two of these studies used the strong methodological designs of randomized experiments and twin studies (Dee 2004, Milligan, et al. 2004, Sondheimer and Green 2010, Henderson and Chatfield 2011, Mayer 2011, Dinesen, et al. 2016).

to now, and see if the participation-enhancing benefits of education apply to the United States or to other national contexts as well. In consequence, I examine the causal link between education and participation in Canada, for which prior studies have documented a strong effect of education on turnout (Blais, et al. 2004), one that is comparable to the effect found in the United States (Gallego 2010, p243).

Thirdly, the studies have used various operationalizations of political participation. Some have examined the effect of education on participation more generally, using indexes of participation (such as Kam and Palmer 2008, Mayer 2011, Henderson and Chatfield 2011, Dinesen et al. 2016). However, many authors recognize the specificity of different participation acts and that education may impact various political acts in different ways, or to a different degree. In consequence, many have investigated the effect of education on participation acts separately, would it be on participation through petitions (Kam and Palmer 2008, Mayer 2011, Persson 2014, Siedler 2010), demonstrations (Kam and Palmer 2008, Mayer 2011, Persson 2014, Siedler 2010), contacting public officials (Kam and Palmer 2008, Mayer 2011, Persson 2014), attending meetings (Kam and Palmer 2008, Mayer 2011, Persson 2014), or other forms of campaign work and group membership (Kam and Palmer 2008, Mayer 2011, Siedler 2010). But the majority of the causal studies have focused on electoral participation (Kam and Palmer 2008, Dee 2004, Milligan et al. 2004, Sondheimer and Green 2010, Berinsky and Lenz 2011, Mayer 2011, Persson 2014, Pelkonen 2012, Siedler 2010). In fact, electoral participation is a central form of political participation in all representative democracies, which allows for a better comparison of findings on the effect of education across national contexts. Another reason for us to study voting is related to our focus on equality. Unlike other political acts, "the vote is unique (...) in that there is mandated equality in political input: we each get only one" (Verba, et al. 2005, p99).

The Effect of Education Reconsidered: A Compensation or Acceleration Effect?

All the above causal studies have worked to circumvent the issue of selection into education by controlling for pre-treatment heterogeneity: through methodological manipulations, they have corrected for background differences in the university and non-university groups and created groups of individuals with similar characteristics, to evaluate the difference in political participation among otherwise 'similar individuals' who do and do not attain higher education. However, their focus has been solely on the heterogeneity of educational choice and they have assumed that once this is taken into account, the effect of education on participation is homogeneous. But beyond the question of who gets education and why, we should investigate whether education has the same impact for all. In other words, once people attend university, do all individuals reap the same participatory benefits from their educational experience? Or, are some individuals benefiting more?

In the current study, I move beyond the scope of prior causal studies and consider how the effect of education may vary across socio-economic status groups. The socialization literature has established that the political development of youth varies across family backgrounds, and most notably based on parental socio-economic status (SES). The influence of parental SES on children's political participation is based in the parents' education and operates through processes of social stratification and social learning (Beck and Jennings 1982, Verba, et al. 2005, Jennings, et al. 2009). Higher educated parents tend to raise children who pursue higher education and tend to offer their children more politically stimulating environments, which all work to help their offspring accumulate social, economic and psychological resources that facilitate their participation in politics (Beck and Jennings 1982, Flouri and Buchanan 2004, Sandefur, et al. 2006). Inequalities in participation between social groups are thus transmitted and reproduced through generations and persist over a lifetime. And thus, democratic politics is

far from being "a level playing field" (Verba, et al. 2005, p107). While pre-adult socialization is a strong determinant of adult participation, other factors outside the family home can still impact an individual's life and political development (Campbell 2008, Jennings, et al. 2009). So the question is: can higher education diminish systematic inequalities and be a means of political mobility?

Two strands of research support the idea that education has a causal impact on various life outcomes, and both further assert that the effect of education will not be equal across social groups. However, these two theoretical perspectives focus on different factors to explain the heterogeneous effect of education and have opposing expectations about who may benefit most from higher education.

First, cultural class theorists and sociologists expect advantaged youth to be the ones to benefit the most from higher education. In their perspective, schools work to reproduce social stratification, leading children from advantaged families to get further ahead in life (Bourdieu 1977, DiMaggio 1982, Lareau 2000). For example, Calarco shows how children from different social classes adopt divergent classroom behaviors (Calarco 2011, 2014). She shows that middle-class children ask more help from their teacher and when they do so they use more efficient strategies, compared to working-class children. As a result, middle-class children receive more help from teachers, wait less for this help and are thus more successful in completing assignments. Calarco concludes that based on prior cultural capital inherited from their parents, middle class children are able to re-create their advantage in the classroom and reap higher benefits from their educational environment. The work of Nie and Hillygus (2001) and Hillygus (2005) supports this perspective by acknowledging that post-secondary education may indeed enhance and reinforce prior levels of resources, like verbal skills. Thus, advantaged youth are better equipped culturally and better able to use educational resources, and so they can further

build their life advantages through formal education. As a result, educational institutions tend to reproduce or even reinforce social class inequalities. So youth from advantaged families, who are more likely to attend university, would be the ones to benefit the most from this education, compared to youth from disadvantaged families who also attend university (Hansen and Mastekaasa 2006, Collier and Morgan 2008). So from this perspective, it is expected that the effect of education will be larger for advantaged youth, which will lead to increasing inequalities between socio-economically advantaged and disadvantaged groups. This is the acceleration hypothesis (Campbell 2008).

Another set of literature supports the idea of a heterogeneous effect of education, but leads to the opposite expectation. The life course literature tends to support the idea that various groups of the population may differentially benefit from education. Several studies actually show that post-secondary education has distinct effects for individuals in different life course trajectories; that is for individuals who accumulate various types of social and economic advantages in their life, versus individuals who accumulate several types of disadvantages[3]. The developmental literature points out that individuals from lower educated and poorer families tend to experience more risks and life disadvantages of various kinds, and that these disadvantages tend to accumulate and persist throughout life (Schoon, et al. 2002, Pacheco and Plutzer 2007, 2008, Groulx 2011, Lundberg 2013). So individuals raised in lower educated families are more likely: to be raised by parents who vote less; to be less exposed to high status social networks and politically engaged role models; and to be offered fewer politically-relevant resources in their life. However, the skills and socio-political resources provided through formal

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[3] These social and economic *disadvantages*, which tend to affect negatively both educational attainment and political participation, can be seen through different types of indicators: poor neighbourhood quality and safety; local organizations and schools being more oriented towards providing basic services and skills, rather than favouring civic skills and participation; less exposure to political role models and mentors; experience of higher residential mobility; more exposure to risky social behaviours; lower school quality and safety; social networks with less professional and political expertise (Granovetter 1983, Highton 2000, Lin 2000, Schoon, et al. 2002, Horvat, et al. 2003, Chiu and Khoo 2005, Pacheco and Plutzer 2008, Zaff, et al. 2009, Groulx 2011, Schoon and Cheng 2011).

education might compensate for these pre-adult gaps. As a result, formal education will be consequential for the political participation of disadvantaged individuals. Sondheimer and Green (2010) provide strong causal evidence for this possibility. In their study, they analyze one quasi-experiment and two randomized experiments with educational programs intended to increase high school graduation rates among socio-economically disadvantaged children. Using validated turnout, they find a causal effect of high school graduation on electoral participation in adulthood.

Conversely, for individuals raised in more educated families, they are more likely to be exposed to politically active parents, politicized role models, resource-rich networks, and more (Beck and Jennings 1982, Janoski and Wilson 1995). So the advantaged are already likely to have relatively high levels of politically relevant skills and resources, and education might not add much to these. Accordingly, there could be a ceiling effect of education for advantaged groups, and education would be relatively less consequential for them. On the other hand, while disadvantaged youth are less likely to attend university, they would tend to benefit the most from higher education in terms of political participation, compared to more advantaged youth. Thus the effect of education will be larger for disadvantaged youth, and as a consequence, participatory inequalities between the advantaged and the disadvantaged will be reduced. This is the compensation hypothesis (Campbell 2008).

Several empirical studies tend to support the compensation hypothesis and show that individuals from lower socio-economic backgrounds gain more from education, in terms of political participation, than those from higher socio-economic backgrounds. For example, Campbell (2008) provides evidence that civic education programs have a stronger effect among lower SES adolescents. He shows that an open classroom climate tends to narrow the gap in the intention to vote between low and high SES adolescents. Neundorf and colleagues (2015) also document that civic education in school helps to compensate for a lack of parental political

socialization. They present evidence that the amount of formal civic education and the frequency of group projects influence the political engagement of children from less political families to a greater extent. Pacheco and Plutzer (2008) also find two-year universities to have particularly positive effects for the electoral participation of disadvantaged youth, compared to other more advantaged youth. However, these studies are based on cross-sectional data and are thus limited in their ability to determine the causal effect of education on participation gaps.

While no political behaviour study has causally assessed the heterogeneity of the effect of education on political participation, studies in economics and sociology provide causal evidence of the heterogeneous effect of education on diverse sets of outcomes, which supports the compensation hypothesis (Hout 2012). For example, studies using the instrumental variable method and propensity score analyses have shown that the economic returns to education are higher among individuals raised by lower-educated parents and among individuals who have lower probabilities of attending university (Card 1995, Brand and Xie 2010)[4]. Thus, formal education has the potential to reduce gaps in earnings between individuals raised in lower and higher socio-economic families. Additionally, Brand (2010) uses a propensity score analysis to show that civic returns to university education are higher among individuals who have lower probabilities of attending university. Although lower SES individuals are less likely to attain a university education, when they do go to university, it has a stronger impact on their level of volunteering, compared to higher SES youth.

So what kind of participation-enhancing benefits of education can we expect to find among social groups? Based on the theoretical expectations of a differential effect of education

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[4] Siedler (2010) also considered the heterogeneity of the effect of education on democratic citizenship and finds no significant effect of one extra year of secondary schooling for individuals from disadvantaged families. However this study considers only the father's characteristics to define parental background, and only estimates the effect of education among a restricted sample of lower educated fathers and lower occupation fathers, thus failing to consider how the effect of education *compares* among advantaged and disadvantaged families.

and the empirical evidence showing generally higher educational benefits for the disadvantaged, I expect that university education will have a stronger effect on the electoral participation of disadvantaged youth, compared to youth from more advantaged families. So education will have a compensation effect, which will lead to a decrease in participatory inequalities.

3. Methodology and Data

The data

The main challenge in examining the causal link between education and participation is that we cannot experimentally manipulate how much formal education individuals receive. Thus, like other studies, I rely on observational panel data to establish which factors are causally prior, and thus most likely to have an independent effect on political participation.

I use the National Longitudinal Study of Children and Youth (NLSCY) (Statistics-Canada 2010), which is an eight wave panel study that started surveying parents in 1994, when children were 0 to 11 years-old[5]. This dataset includes numerous and diverse measures about youth and their families[6]. The multiple NLSCY questionnaires administered to parents provide objective measures of youth's background and childhood characteristics, and allow us to avoid relying on respondents' perceptions of family context and parental characteristics. Children and youth were also surveyed (starting at the age of 10), and provide information about their social environment, civic participation, and educational attainment. While the first wave of surveys included 25,000 children, the sample of youth that were old enough to answer questions on electoral participation

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[5] The starting point for the NLSCY design was the household. Households were selected through the Labour Force Survey and the National Population Health Survey. In total, 15,579 households were selected to participate in the NLSCY. Out of these selected households a response was obtained for 13,439, which results in an overall response rate of 86.3%. Children between the ages of 0 and 11 were then randomly selected in the households.
[6] While there is a large number of indicators about children and their families in the NLSCY, there was no measure for parents' political participation.

(i.e. the outcome)[7] in the last wave is n=4,223[8]. In this sample, there is no data missing on measures of youth educational attainment (i.e. the treatment)[9] and parents' average education (i.e. the condition). However several measures of youth's childhood and adolescence factors had missing values due to item non-response, which limited the sample for the final analysis to 2,677 individuals[10].

Variables of Interest: Outcome, Treatment and Condition

Two dependent variables are used in the analyses of respondents' electoral participation. They measure whether 20 to 25 year-old respondents voted in the last federal election they were eligible for (coded 0 if they did not vote and 1 if they did vote) and voted in the last provincial election they were eligible for (also coded 0 or 1). Voting behavior is a self-reported measure from the last wave of the NLSCY (Cycle 8)[11].

Respondents' level of formal education is used as the treatment in the analysis. It is measured with a dichotomous variable: university education (coded 1 for youth who attended

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[7] Questions related to politics were asked only to youth aged 20 to 25 years old.

[8] The general response rate for the 18 to 25 years old in Wave 8 is 59.8% (relative to the total sample in Wave 1). Nonresponse and attrition was more common among individuals from lower educated families, than among families with higher levels of education. As individuals from lower educated families usually have a lower propensity to be university students and to be politically engaged, there may be a downward bias on the estimate of the effect of education in this group, while there could be an upward bias in the group with higher educated parents. In this sense, there is a possibility that the difference in the effect of education between the two groups is underestimated in the dataset.

[9] Youth attending university are compared to non-university educated youth who have at least completed high school.

[10] The large number of missing data is a limit for this analysis, as it is for other long-term panel studies. In the IPTW analysis I use only respondents for whom there are values for all variables. The results are thus conditional on the pattern of attrition and item non-response that was usually higher among the lower educated families. The only variable with the proportion of missing values exceeding 20% is the Math test score. For this variable, values were imputed based on the average math test score, within the group of lower parental education and then within the group with higher educated parents.

[11] A problem with self-reported measures is that individuals tend to over report their participation in elections. The issue of over-report in voting is common to all survey-based studies. This tendency is usually more pronounced among educated respondents, which may lead to an over-estimation the influence of education on voting, but as levels of participation are usually already higher among this group (compared to the lower educated), this measurement issue is unlikely to affect substantively the analysis of the impact of education on voting (Belli, et al. 2001, Bernstein, et al. 2001).

university or received a university degree, and 0 for those who completed high school and/or achieved some non-university post-secondary education). In the sample, 33% of youth attended a university institution. There are several reasons that warrant the choice of university attendance as the treatment (Henderson and Chatfield 2011), rather than university graduation. First, many studies have pointed to stark differences in levels of political participation between those who have at least some university education and those who don't, showing that university is the important level of education to consider in the study of participation (Blais, et al. 2004, Gallego 2009). Secondly, attending university, rather than graduating from university, would seem to be the important factor in terms of transitions in life (Kam and Palmer 2008). While it may be assumed that those who graduate would be likely to have acquired more cognitive skills than the attendees (Persson 2014), it is nonetheless arguable that attending university exposes individuals to political information, civic norms, social interactions and recruitment demands that they would not have experienced otherwise, and that are likely to impact participation (Nie, et al. 1996, Johnson 2004, Hout 2012). Thirdly, in the Canadian context, while 25.9% of Canadians aged 25 to 64 have at least a bachelor degree, another 5% of adult Canadians report having some university education or a university certificate (National Household Survey, Statistics Canada 2011). So when considering all types of university enrolment, almost a third of the Canadian population has attended university for some time. Finally, given that respondents of the NLSCY who are 20 to 25 years old are likely to be still in school[12], and given that there are inequalities in length of time between high school graduation and the start of postsecondary education based on parents' education (i.e. youth from lower educated families start programs later in life)[13], it would substantially limit the number of respondents who received the treatment

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[12] In Canada, in 2007, 65% of university students were aged 17 to 24 years old (Statistics Canada, 2010).
[13] Data from the Youth in Transition Survey show that youth whose parents were postsecondary graduates themselves tended to go immediately on to postsecondary education after graduating from high school (with an

if 'university degree' was used as the treatment, and it would also limit our ability to investigate differential processes across different family backgrounds.

Parental education is also a key variable in the analysis, as it is a central determining factor for children's educational attainment, political participation, and the accumulation of life (dis)advantages (Nie, et al. 1996, De Broucker 2005, Verba, et al. 2005, Pacheco and Plutzer 2008, Schoon and Cheng 2011) and is expected to be the condition that moderates the effect of education on participation. Parental education is an indicator of family socio-economic status. Given that both parents' education matter for children and are usually highly correlated (Flouri and Buchanan 2004), the average of both parents' highest level of completed education is used in the analysis (Verba, et al. 2003, Neundorf, et al. 2015). It is coded 0 if the average of both parents' education levels falls below the sample median and is coded 1 if it is above the sample median[14]. In the sample, there is indeed evidence that youth from lower educated families tend to accumulate life disadvantages, while youth from higher educated families tend to accumulate life advantages. For example, respondents from high SES families: are more likely to be part of two-parent families, to live in a safe neighbourhood and in a house owned by the parents, and are more than twice as likely to attend private schools and university institutions[15].

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average of 3 months between high school graduation and the start of the post-secondary education program), while those who had parents whose highest level of education was high school had longer gaps (with an average of 14 months between high school graduation and the start of the post-secondary education program) (Statistics Canada, 2011).

[14] If one of the parents' education level was missing (or in the case of single parent families), the average level of education represents: the education level of the parent responsible for the primary care of the child. The median level for parents' education in the NLSCY sample is: some non-university post-secondary education.
[15] These differences are the results of two-sample t-tests and were all statistically significant at the 99% level.

Table 2.1 - Electoral Participation of University Educated and Non-University Educated Youth, by Categories of Parental Education
(population weighted means with bootstrap standard errors in parentheses)

Youth education	Federal election			Provincial election		
	LOW Parental Education	**HIGH Parental Education**	Diff. b	**LOW Parental Education**	**HIGH Parental Education**	Diff. b
No University	0.37 (0.02)	0.52 (0.02)	***	0.39 (0.02)	0.50 (0.02)	***
N	1889	993		1862	915	
University	0.60 (0.03)	0.63 (0.02)	-	0.58 (0.03)	0.60 (0.03)	-
N	556	845		548	826	
Diff. a	***	***		***	***	

Difference a: Significance level of differences in electoral participation between university educated and non-university educated youth, within advantaged or disadvantaged families (as defined by parental education).
Difference b: Significance level of differences in electoral participation between advantaged and disadvantaged families, for youth with the same level of education (less than university or university education).
Significance levels: * p < .05 - ** p < .01 - *** p < .001

Table 2.1 further displays differences in youth electoral participation, by youth education levels and across categories of parental education[16]. First, as expected, youth political participation is higher among university educated youth, than among youth with lower levels of education (as shown by the difference in participation rates between the first and second row). The differences in electoral participation between university and non-university educated youth are always highly statistically significant, in the context of both provincial and federal elections, and within all types of families (see Difference a, in the last row of Table 2.1). Secondly, and most

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[16] While Table 2.1 presents weighted participation rates, it has to be noted that the sample's average participation in the federal election is 47.4%. This rate is in line with the past decades' rates of participation among young Canadians aged 18 to 24 year olds (i.e. between 37.3 and 44.8%, Canada 2011). So as in other observational studies, we have some indication of over-reporting of voting in the NLSCY sample.

interestingly, the differences in participation between non-university youth are highly statistically significant between the two types of families (as shown by Difference b, in the first row), but this difference between families becomes insignificant when youth gain some university education (as shown by Difference b, in the second row). Hence, it appears that the gaps in participation between lower and higher SES youth are substantially reduced when youth go to university.

Analytical Strategy: Propensity Score Weighting Analysis

In evaluating the effect of education on participation, we run into the problem of non-random assignment. University attendance is not random, and some sets of characteristics make individuals more (or less) likely to attend university. The problem is that these characteristics also tend to be tied to the outcome of political participation. In this case, parents' education is known to determine both university attendance and political participation. This causal inference problem can lead to biased and inconsistent statistical estimates. Thus, I use a propensity score weighting method to deal with this issue of non-random assignment to university. This propensity score analysis allows me to control for the influence of parental education and a host of pre-adult factors, and to isolate the effect of education on participation.

The Inverse Propensity Score Weighting (IPTW) analysis permits the causal effect of a treatment to be evaluated in the absence of randomized experimental data. This method uses the inverse probability of treatment assignment as a weight in a multivariate outcome analysis. In this sense, "propensity score weighting takes a differential amount of information from each participant depending on the participant's conditional probability of receiving the treatment" (Guo and Fraser 2015, p239). This method accomplishes the same goal of balancing data as other matching analyses, while having the advantage of retaining more study participants in the

outcome analysis (compared to exact matching, for example). So unlike matching that seeks to match similar individuals (who received the treatment or not) and discards many individuals from the analysis, the weighting method retains all individuals and adjusts the information used from each based on their propensity of getting the treatment (i.e. some individuals have more weight in the analysis and some have less). As the main objective of this study is to compare the effect of education across different groups of individuals, it is important to retain as many respondents as possible and to use the IPTW method for that purpose. The inverse probability of treatment weight corrects selection bias, and provides an estimate of the sample average treatment effect (i.e. the effect of education) that is the weighted average of the difference between observed and potential outcomes.

An important assumption of this method is unconfoundedness, or the conditional independence assumption, which requires that treatment participation and treatment outcomes are independent on a set of observable characteristics. In other words, it is assumed that observables can account for the selection process, while unobservables play no role in the treatment assignment. If the IPTW achieves good balance, we should not observe differences between the treatment and control groups on the covariates (i.e. between non-university and university educated respondents), and then we gain more confidence that any difference observed in the outcome (between the treated and the non-treated groups) is due to the treatment (Diamond and Sekhon 2005). However, because of the limits of observational data, it is still a possibility that the assumption of unconfoundedness is violated, even after reweighting (on IPTW) and comparing treatment and control groups. But the strategy of implementing IPTW *within* groups defined by parental education strengthens causal inference by limiting the problem of unobservables. As parental education is the initial and determining factor of paths of (dis)advantages, it will adequately split populations between those who tend to accumulate

advantages through life, and those who tend to accumulate disadvantages. So even if we cannot observe all individual characteristics since childhood, developmental theory informs us that these characteristics will tend to take a similar range of values among the advantaged (i.e. youth with higher educated parents), and among the disadvantaged (i.e. youth with lower educated parents). This procedure helps to limit the problem of potential confounding factors, which have undermined previous causal studies, and allows me to be more confident that the assumption of unconfoundedness is sustainable.

The choice of covariates to be included in the IPTW analysis is guided by two criteria. First, these background characteristics should be determining factors of both the treatment (education) and the outcome (participation). Secondly, this choice should be informed by theory. In terms of educational attainment, two broad types of factors determine the decision to pursue higher education: family factors (i.e. parents' education, educational norms and values, family structure, household income) and individual factors (cognitive abilities, school experiences, personality characteristics) (Ermisch and Francesconi 2001, Flouri and Buchanan 2004, Sandefur, et al. 2006, Gregory and Huang 2013, Lundberg 2013). In political science, the Resource Model, Civic Voluntarism Model and socialization theory demonstrate that a variety of family and individual factors influence political participation, such as: the family's socio-economic status, parental political socialization, peer networks, schools and civic organizations, personality and cognitive abilities (Nie, et al. 1996, Putnam 2000, McClurg 2003, Scheufele, et al. 2004, Bekkers 2005, Nickerson 2008, Gallego and Oberski 2012). The full list of family and individual covariates related to both education and participation that are used in the estimation of the propensity scores are displayed in Table 2.2. All covariates[17] are measured from the first five waves of the NLSCY, before youth turn 16 years old, so that they are causally prior to

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[17] Further information about the covariates is available in the Appendix.

treatment and outcome measures. This table shows that there are differences in the majority of covariates between the university educated and non-university educated youth, both in families with higher and lower levels of parental education. This indicates that youth who go on to university and youth who do not pursue higher education studies were already different in their childhood and adolescence, in terms of family and individuals characteristics. In consequence, it shows the importance of controlling for pre-adult characteristics and the need to balance the covariates in order to assess the effect of education on participation, independently of these prior differences.

The analysis proceeds in three steps. First, propensity scores and the inverse probability of treatment weights are calculated for the low and high parental education groups separately. Secondly, balance on the covariates is assessed within each of the two parental groups. Finally, logistic regressions, weighted by the inverse probability of treatment weight, are used to estimate the effect of education on participation. An interaction between youth's education level and parents' education level is included to estimate the difference in the effect of education on participation across family SES background, and obtain the average treatment effect of education for advantaged and disadvantaged youth.

Table 2.2 – Descriptive Statistics for the Covariates: Means and Standard Deviation in Parentheses.

	LOW parental education			HIGH parental education		
	Less than University Education (*Control*)	University Education (*Treatment*)	**Group Mean**	Less than University Education (*Control*)	University Education (*Treatment*)	**Group Mean**
Childhood						
Female	0.61	0.72	**0.65**	0.44	0.56	**0.51**
	(0.49)	(0.45)	(0.48)	(0.50)	(0.50)	(0.50)
Mother education	2.26	2.40	**2.31**	4.20	4.74	**4.48**
	(0.97)	(0.92)	(0.95)	(1.20)	(1.22)	(1.24)
Father education	2.21	2.33	**2.25**	4.47	4.85	**4.66**
	(1.02)	(0.99)	(1.01)	(1.22)	(1.23)	(1.24)
Single family status	0.02	0.01	**0.01**	0.01	0.01	**0.01**
	(0.12)	(0.12)	(0.12)	(0.12)	(0.09)	(0.10)
Number of siblings	1.36	1.39	**1.38**	1.47	1.48	**1.47**
	(0.86)	(0.88)	(0.87)	(0.87)	(0.99)	(0.93)
Participation in Clubs	0.77	0.80	**0.78**	0.93	1.01	**0.97**
	(1.05)	(1.02)	(1.04)	(1.08)	(1.11)	(1.10)
Household Income	46,197	49,825	**47,420**	61,491	71,856	**66,803**
	(22,001)	(23,004)	(22,400)	(29,948)	(34,183)	(32,588)
Prosocial behavior	12.90	13.10	**12.97**	12.84	13.09	**12.97**
	(3.41)	(3.52)	(3.45)	(3.65)	(3.50)	(3.57)
Parents' expectation about educational attainment	4.46	4.69	**4.54**	4.58	4.83	**4.71**
	(1.01)	(0.80)	(0.95)	(0.85)	(0.59)	(0.74)
Discussions about school	6.21	6.25	**6.22**	6.38	6.38	**6.38**
	(1.11)	(1.09)	(1.10)	(1.00)	(1.04)	(1.02)
Discussions about friends	5.41	5.39	**5.41**	5.46	5.53	**5.50**
	(0.86)	(0.87)	(0.86)	(0.86)	(0.81)	(0.83)
Adolescence						
Participation in School clubs	2.14	2.47	**2.25**	2.24	2.51	**2.38**
	(1.51)	(1.51)	(1.52)	(1.53)	(1.46)	(1.50)
Household Income	6.85	7.13	**6.95**	7.78	8.15	**7.97**
	(1.80)	(1.74)	(1.78)	(1.42)	(1.28)	(1.36)
Friends' encouragement	1.32	1.38	**1.34**	1.32	1.39	**1.36**
	(0.87)	(0.85)	(0.86)	(0.86)	(0.81)	(0.83)
Family dysfunction score	8.80	8.74	**8.78**	8.67	8.13	**8.39**
	(4.55)	(4.56)	(4.55)	(4.80)	(4.96)	(4.89)
Math test score	591.00	618.40	**600.24**	603.47	630.21	**617.17**
	(54.63)	(65.40)	(59.87)	(64.09)	(61.63)	(64.22)
Sample size	713	363	**1076**	507	533	**1040**

4. Results

The first step of the propensity score analysis is the estimation of propensity scores (p) in the low parental education group (LPE) and the high parental education group (HPE). To that end, I perform logistic regressions with the full set of covariates to determine assignment to treatment (i.e. university education) and obtain the propensity scores (i.e. the predicted probability of attending university). In a second step, the estimated propensity scores are used to compute the 'average treatment effect sampling weight' for each subgroup. This weight is simply $1/p$ for a respondent who attends university and $1/(1-p)$ for a respondent who did not attend university[18].

Figure 2.1 - Covariate imbalance for the Low Parental Education group *before* weighting on the propensity score (Unmatched) and *after* weighting on the propensity score (Matched) (Standardized percentage bias for each covariate).

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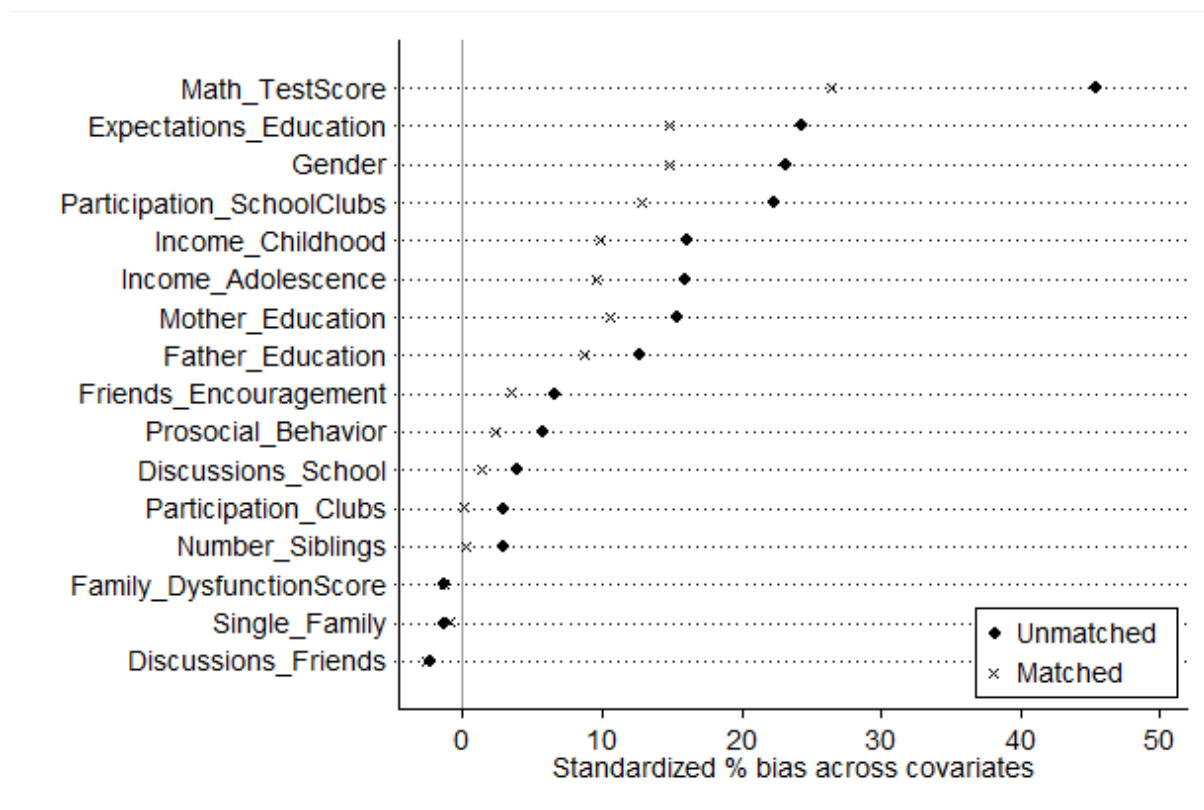
[18] These weights are further normalized.

Figure 2.2 - Covariate imbalance for the High Parental Education group *before* weighting on the propensity score (Unmatched) and *after* weighting on the propensity score (Matched)
(Standardized percentage bias for each covariate)
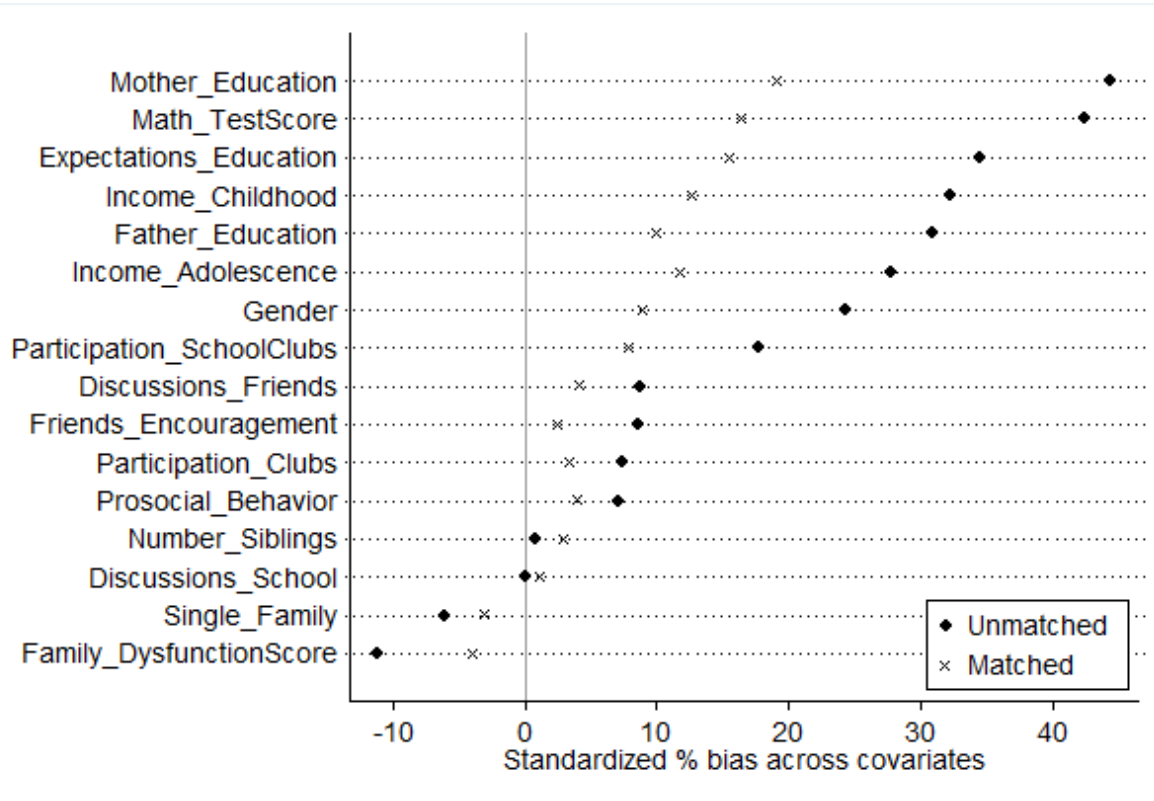
The second step in the propensity score analysis is to assess the balance, i.e. to see whether the IPTW successfully adjusted for observed selection bias. The inspection of balance tests[19] shows that imbalances in covariates between university and non-university youth were substantially diminished through propensity score weighting, even if not completely removed[20]. Figures 2.1 and 2.2 provide a visual display of the balance in covariates, in the LPE and HPE groups. These graphs show that covariate differences were substantially decreased. In fact, the

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[19] The balance tests are performed with the commands *pstest* and *pbalchk* in Stata. To gain efficiency in the IPTW, the balance is assessed for the sample of individuals who have a propensity score superior to 0.1 and inferior to 0.9 (N=2,116 for the outcome of federal electoral participation and N=2,082 for provincial electoral participation).

[20] I further consider the three criteria suggested by Rubin (2001) to evaluate the quality of covariates' balance. Following Rubin's recommendations, I observe that the regression adjustments performed in the LPE and HPE groups are adequate as: the difference in the means of the propensity scores in the two groups being compared is small and not statistically significant for the majority of covariates; the ratio of the variances of the propensity scores in the two groups is close to one; and, the ratios of the variances of the residuals of the covariates after adjusting for the propensity score are close to one.

IPTW standardized difference between treatment and control groups is close to or under 0.1 for

the majority of variables (i.e. labeled as 'matched' standardized differences and depicted with x's

in the graphs). Table 2.3 further shows that most imbalances that were statistically significant

have been removed with the adjustment based on the inverse probability of treatment weight.

Table 2.3 - Balance on the Covariates: Statistical Significance Level of the Difference in the Covariates between University and Non-University Educated Youth, in the Unprocessed Sample and in the IPTW Processed Sample, for the Two Parental Education Groups.

	LOW parent education		HIGH parent education	
	Initial sample (non-weighted)	Weighted by the IPTW	Initial sample (non-weighted)	Weighted by the IPTW
Childhood				
Female	0.000	0.024	0.000	0.188
Mother's education	0.009	0.114	0.000	0.389
Father's education	0.026	0.183	0.000	0.145
Single family status	0.416	0.898	0.161	0.586
Number of siblings	0.327	0.968	0.451	0.665
Participation in clubs	0.326	0.978	0.118	0.610
Household income	0.006	0.158	0.000	0.099
Prosocial behavior	0.184	0.718	0.125	0.567
Parents' expectation about educational attainment	0.000	0.013	0.000	0.003
Parents talk about school	0.272	0.960	0.498	0.834
Parents talk about friends	0.361	0.914	0.079	0.491
Adolescence				
Participation in school clubs	0.000	0.054	0.002	0.383
Household income	0.007	0.137	0.000	0.058
Friends' encouragement	0.156	0.597	0.085	0.296
Family dysfunction score	0.423	0.842	0.036	0.579
Math test score	0.000	0.001	0.000	0.022

Significant differences remain between university and non-university educated youth only

in terms of gender, parental expectations and math test scores in the LPE group, and in terms of

parental expectations and math test scores in the HPE group[21]. However, this does not jeopardize the outcome analysis. "The goal of matching [and other approaches to reducing model dependence, like weighting] and our specific nonparametric pre-processing approach in particular is to adjust the data prior to the parametric analysis so that (1) the relationship between [the treatment] and [covariates] is eliminated or reduced and (2) little bias and inefficiency is induced" (Ho, et al. 2007, p211). The matching or weighting output should not be judged only on the balance of covariates, but should also consider the number of observations retained from the pre-processed data set. In fact, inexact matching, like IPTW, sacrifices some bias reduction for the increased efficiency gained from keeping more observations in the analysis. Ho and colleagues (2007) argue that "if we lose some opportunity for bias reduction, we do so only in the pre-processing stage; the researcher's second-stage parametric analysis still has a chance to eliminate the remaining bias" (p212). So in the last step of the analysis, the remaining covariate imbalances will be controlled for in the logistic regressions.

The final step of the propensity score weighted analysis is the outcome analysis, where logistic regressions are weighted by the inverse of the probability of treatment weight[22] (IPTW). Table 2.4 presents the results from four IPTW logistic regressions modelling participation in the federal elections and in the provincial elections[23]. Model 2 controls for the covariates that still showed significant differences between the university educated and non-university educated

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[21] More than 90 specifications of the logistic regressions models for treatment allocation were tried, for both the LPE and the HPE groups, to calculate propensity scores and the inverse probability of treatment weights. These different specifications were based on the addition/removal of other covariates, the inclusion of higher order terms for some covariates, and the inclusion of interaction terms between covariates. I thus believe that I have attained the highest level of bias reduction possible with the data at hand (Ho, et al. 2007).

[22] A new weight is created for the whole sample, based on the inverse probability of treatment weights for the low and high parental education groups.

[23] The same analyses were performed with the longitudinal non-funnel weights of the NLSCY (provided by Statistics Canada), which correct for sampling and non-response. The population estimates obtained proved to be very similar to the sample estimates in terms of the size the coefficient (i.e. the differences in logistic regression estimates in the NLSCY *sample* versus the *population* estimates never exceeded 3-4% of change) and levels of statistical significance. Thus we only present the analyses for the sample.

youth (i.e. between the control and treatment groups), but the results do not change substantively.

Table 2.4 – Results of Four Logistic Regressions Weighted by the Inverse Probability of Treatment Weight (Beta Coefficients and Standard Errors in Parentheses)

	Vote Federal elections		Vote Provincial elections	
	Model 1	**Model 2**	**Model 1**	**Model 2**
Youth Education	0.69***	0.66***	0.58***	0.59***
	(0.13)	(0.14)	(0.14)	(0.14)
Parent Education	0.41***	0.35*	0.31*	0.31*
	(0.13)	(0.14)	(0.13)	(0.14)
Youth Education	-0.22	-0.22	-0.29	-0.29
* Parent Education	(0.19)	(0.19)	(0.19)	(0.20)
Imbalanced covariates				
Math test score		0.00		0.00
		(0.00)		(0.00)
Parental Expectation		0.02		-0.22
		(0.13)		(0.15)
Female		-0.17		-0.02
		(0.25)		(0.25)
Constant	-0.25**	-1.72	-0.13	-0.37
	(0.08)	(1.24)	(0.08)	(1.25)
N	2116	2116	2082	2082

Significance levels: * p < .05 - ** p < .01 - *** p < .001

The coefficients for youth education and parental education are consistently positive and statistically significant, showing that individual levels of education as well as family levels of education tend to boost electoral participation[24]. Obtaining a university education generally increases young people's electoral participation by +17% points at the federal and +14% points at the provincial level. The coefficient for the interaction term between youth and parents'

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[24] The results of simple logistic models (i.e. not weighted by the inverse probability of treatment weight) display larger coefficients and higher levels of significance for youth education (federal: ß=0.87, p=0.000 – provincial: ß=0.82, p=0.000), parent education (federal: ß=0.46, p=0.000 – provincial: ß=0.44, p=0.000) and the interaction term (federal: ß=-0.27, p=0.052 – provincial: ß=-0.39, p=0.004). This indicates that the bias in the statistical estimates was effectively reduced through the implementation of the IPTW.

education is consistently negative across the four models, which indicates that the effect of individual youth education is smaller among the HPE group than the LPE group. While the interaction effect is not statistically significant, we need to inspect the marginal effect of youth education on participation to obtain the Average Treatment Effect (ATE) of university education on electoral participation, among youth from lower educated families and among youth from higher educated families (Berry, et al. 2010). The contrasts of the weighted predicted averages of participation among university educated youth (i.e. the treated group) and non-university educated youth (i.e. the control group) provide the estimates for the ATEs of university education.

Figure 2.3 confirms that the ATE of youth university education on electoral participation is positive for all groups of parents (both the LPE group in light grey and the HPE group in dark grey), and for both federal and provincial elections. Controlling for pre-university characteristics, I find that university education increases participation in the federal elections by 17% points for disadvantaged youth and 11% points for advantaged youth. Results are similar in the provincial context, where university education increases electoral participation by 14% points for disadvantaged youth and 7% points for advantaged youth. These substantial and statistically significant effects confirm that formal education has a causal effect on electoral participation in the Canadian context.

The effect of university education is larger among the low parental education group: +6% points in federal electoral participation, and +7% points in provincial electoral participation (i.e. the effect of education on provincial participation is twice as large in the disadvantaged group, compared to the advantaged). However, Figure 2.3 shows that the confidence intervals for the effect of education for the two groups overlap, and so the difference in the effect between the LPE

and HPE groups is not statistically significant. So while the differential effect of youth university education on participation has the expected direction, this difference in effects falls short of statistical significance and the hypothesis of a compensation effect of education is not confirmed. University education does not prove to benefit the disadvantaged significantly more than the advantaged in terms of electoral participation.

Figure 2.3 - Estimated Average Treatment Effect of University Education on Electoral Participation in the Federal and Provincial Elections, in the Low Parental Education group (LPE) and in the High Parental Education group (HPE) - Based on Inverse-Probability Weighted Analysis
(with 95% Confidence Intervals).
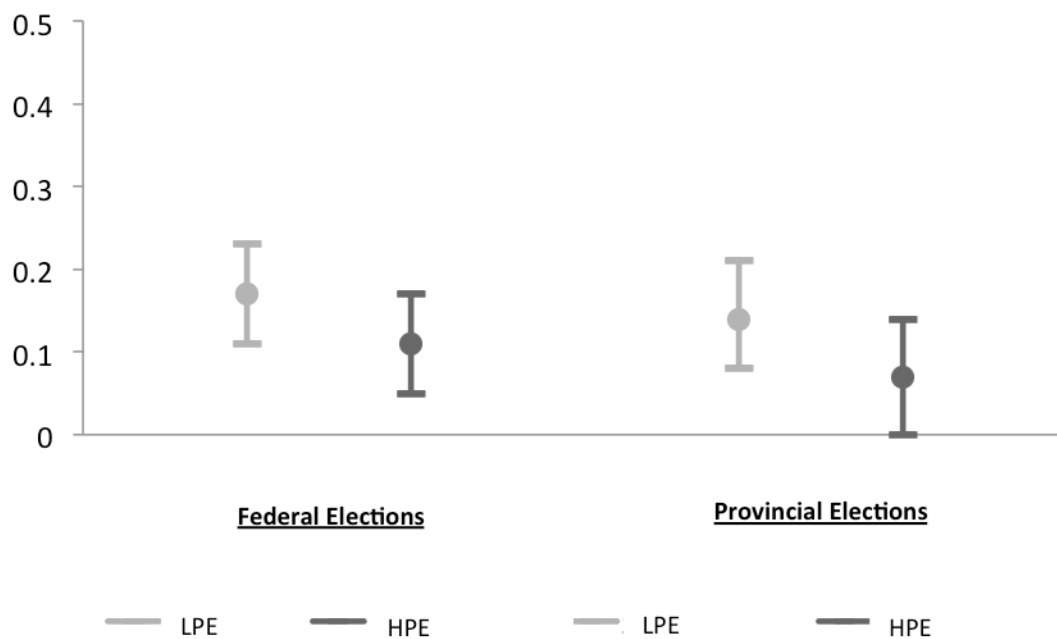
5. Conclusion

Many disciplines are interested in the causal effects of education on a variety of life outcomes, like health, economic earnings, criminal behavior and family building. Political science is no exception in that sense, and many political theorists and empiricists have discussed the democratic benefits of formal education. However, relatively few political studies have

empirically assessed the causal effect of education on political participation, and up to now none of these studies have considered the possibility that formal education might offer differential benefits to different social groups.

In the current study, I investigated the differential and causal effect of education on political participation by paying specific attention to differential *access* to higher education (i.e. heterogeneity of selection into education) and the differential *impact* of education (i.e. heterogeneity of the effect of education). The key to studying the causal effect of formal education on political participation is making the best of observational panel data, given the infeasibility of experimentally manipulating the allocation of educational attainment to individuals. I used a propensity score weighting analysis to control for the childhood and family influences on youth's educational attainment and political participation, and am thus able to offer an estimate of the effect of education on participation that is purged of parental influences (i.e. parental transmission of SES and of participation to their children). The results of the IPTW regression analyses provide evidence of a positive causal effect of education on electoral participation. This causal effect is observed among individuals from both disadvantaged and advantaged families, and both in the federal and provincial electoral contexts. However, the results do not provide conclusive evidence of the heterogeneity of the effect of education on electoral participation. Although disadvantaged youth tend to benefit more from university education than advantaged youth, this difference in is not statistically significant. While this finding is in line with the compensation hypothesis, it does not confirm that university education can close the participatory gap between the haves and the haves not.

This study advances our conceptualization of the effect of education on political participation by controlling for more than selection bias and considering the heterogeneity of the education effect. It nonetheless encounters some limits. First, although I postulate that the

implementation of the IPTW among the low and high SES separately helps to further limit the problem of unobserved confounders, there is still a possibility that some unmeasured factor influences both education and participation, or that it would influence one of the SES groups more than the other. However, all panel data face this issue and cannot realistically measure all life circumstances and individual characteristics. Secondly, the effect of education is estimated on only one form of political participation. However, we know that the explanatory factors for voting may not be equally informative about other forms of participation (Verba, et al. 1995), and other causal studies have in fact found varying effects of education across forms of participation (Kam and Palmer 2008, Mayer 2011). Depending on the mechanism(s) explaining the effect of formal education on political participation (for example the enhancement of cognitive capacities, the enrichment of verbal and writing skills, or the development of organizational skills), some forms of participation may be more impacted by educational attainment than others. In this sense, it would be important to estimate and compare the causal effect of education on other forms of political action, such as political consumerism and protest participation, which require varying degrees of cognitive skills and organizational aptitudes from citizens. Finally, only one level of education is considered: university education. However, there are grounds for believing that different types of education matter for different social groups. In fact, it is possible that given varying expectations of educational attainment across social classes, completing high school would represent a big life transition among disadvantaged families, whereas this would be taken for granted in advantaged families and only university degrees would prove to be important transitions in life for them. Future research should thus investigate the participation-enhancing benefits of different levels of educational attainment for various social groups.

This study contributes to the field of political behaviour by extending the investigation of the causal effect of education to another national context, outside of the United States and

Europe. The results show that formal education also has a direct and independent effect on electoral participation in the Canadian context, both at the federal and provincial level. So this study supports prior research that provided evidence of 'education as a cause' of participation (Henderson and Chatfield 2011, Mayer 2011). However, this study went a step further in its investigation of the effect of education and considered how the impact of education varies across socio-economic backgrounds. The results show that education has a positive causal effect on the electoral participation of both disadvantaged and advantaged individuals. This effect tends to be stronger among the disadvantaged, but it is not significantly different from the effect among the advantaged. So it does not seem that formal education, on its own, can close participatory gaps. Higher education is not a silver bullet solution for unequal participation rates, as some would like to believe. Future research should investigate why the effect of education on political participation does not vary more substantially across SES groups. The next question to address then is then, how does the effect of education on participation work in different social groups? One possibility is that the social and civic quality of the educational experience varies for low and high SES groups. Prior research has found that students from different social groups may in fact use educational resources differently (Calarco 2011) and develop civic skills at different rates (Campbell 2008). Alternatively, the absence of a compensation effect could be due to the counter-effect of other life circumstances. While the current analysis controlled for family background and SES in childhood, in order to isolate the effect of individuals' education on participation, it did not consider the individuals' adult social and socio-economic circumstances. It is possible that lower SES youth develop individual resources and skills (i.e. obtain high or higher political returns to education), but that the application of these skills in political action is impeded or limited by their social context. As political participation is not an individual act and takes place in a social context (Zuckerman 2005), the different social contexts and life circumstances of

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(dis)advantaged individuals may either amplify or suppress the individual benefits gained from education (Campbell 2009). So studying the role of social networks in conjunction with individual educational experiences would allow us to further qualify (or discriminate between) the different hypotheses explaining the effect of formal education: education as developing individual skills and resources (i.e. the absolute model of education) and education as developing the social position and context of the individual (i.e. the relative model of education).

Many scholars in the field of political behaviour have focused their work on participatory inequalities, and tried to evaluate solutions to narrow the gaps between the 'haves' and the 'have-nots'. The fact that socio-economic (dis)advantage translates into unequal political influence violates the democratic ideal of political equality (Lijphart 1997, Bartels 2008). Evidence of the participation-enhancing benefits of education for various social groups should incite policymakers to promote access to education in order to foster political participation, or at least prevent turnout from declining even more (Blais, et al. 2004, Milligan, et al. 2004). While education may not be a silver bullet solution to reduce participatory inequalities, it still proves to be important to ensure adequate access to formal education to sustain democratic citizenship.

Chapter 3: Information Campaigns and (Under)Privileged Citizens: An Experiment on the Differential Effects of a Voting Aid Application

Abstract:

Whereas the preceding chapter investigated the causal and differential effect of university education on political participation and participatory inequalities, this chapter examines the democratic benefits of another type of education: voter education during an election. Indeed, voter education and information campaigns are key elements of elections, and provide citizens with a substantive opportunity to learn about politics. Past research has established the importance of campaigns in informing and educating citizens, and ultimately strengthening participatory democracy. While the Internet has increased the possibilities to disseminate information campaigns and eased access to political information, it is still debated whether online campaigns are effective in stimulating political interest and participation among the general public. The issue is not only one of *access*, but also of *use* of information. The investigation of main effects of campaigns obscures the fact that citizens may not use information in the same way and reap the same political benefits. In this study, I examine the conditional effects of a new type of web information campaign, Voting Aid Applications (VAA), on the political engagement and electoral participation of citizens with varying levels of education. By investigating who benefits most from using these apps, I evaluate whether VAAs reinforce patterns of participation or mobilize new people in politics. Building on political behavior research, communication theory, and social psychology, I study the differential effects of VAAs with an innovative randomized field experiment design. The results confirm that the VAA can inform and engage the public, but there is no significant effect on electoral participation. While higher educated users of the VAA learn most from this voting app', the lower educated users become more interested in the elections and more motivated to vote. Thus, across political outcomes, the VAA both decreases and increases political inequalities between privileged and underprivileged citizens.

1. Introduction

Citizens' low levels of political information and participation are a cause for concern across many democracies (Verba, et al. 1995, Delli Carpini and Keeter 1996, Gallego 2010). In that context, information campaigns become important, as they can help inform, educate, and engage citizens (Iyengar and Simon 2000, Kam 2006).

For some, the rise of new information communication technologies (ICTs) promises new avenues to inform the public and stimulate citizens' engagement. But while political information is clearly more accessible, it is not clear how citizens respond to information available on the web. In fact, the literature displays contradictory findings on the political effects of ICTs (Delli Carpini 2000, Bimber, et al. 2015). One reason for this is rapid technological developments, which make ICTs a 'moving target'. As the characteristics and the interactivity of information format constantly change, we continually require renewed studies on their effects among the citizenry (Althaus and Tewksbury 2000).

But beyond issues of access and levels of information, democracy further requires that citizens are equally able to take part in the political process (Dahl 1971, Verba, et al. 1995). However, evidence shows that across developed democracies, the gap between the political 'haves' and the 'haves not' is pervasive (Rosenstone and Hansen 1993, Gallego 2010). In fact, socio-economically disadvantaged citizens tend to be less knowledgeable about the political process, less interested in politics and also vote at lower rates than their more advantaged counterparts (Verba, et al. 1995, Delli Carpini and Keeter 1996, Blais, et al. 2004). Political inequality is thus one of the biggest challenges that Western democracies are facing.

In the present study, I examine the political effects of a relatively new information campaign tool called Voting Aid Applications (VAAs). They appeared in Europe in the early 2000s to inform and educate citizens during electoral campaigns. These interactive political 'apps' are

now easily accessible on smart phones and mobile devices, and are attracting millions of users across dozens of countries (Marschall 2014). While versions of VAAs are multiplying and becoming increasingly popular among various electorates, we still don't know much about their political effects. Initial studies tend to show that VAAs mobilize citizens to vote (Mykkanen and Moring 2006, Marschall and Schultze 2012), but they do not tell us if this effect is truly causal, or how VAAs might mobilize citizens. So, as a first step toward understanding the effects and mechanisms of VAAs, this study causally assesses their effects on political interest, knowledge, and electoral participation. Furthermore, most VAA studies failed to consider users' background characteristics (with the exception of Vassil 2011), so this study investigates whether VAAs have differential political effects for citizens with varying levels of formal education. Ultimately the question is: Who benefits from these apps, and in what ways?

There are in fact strong empirical and theoretical reasons to believe that the use of VAAs would not benefit all citizens equally. On the one hand, research in the fields of communication and political behavior advance an instrumental approach, where simple and accessible information would be of most benefit to individuals with lower levels of political resources (Eveland Jr and Scheufele 2000, Bimber 2001). On the other hand, political and cognitive psychology advance that individuals with more cognitive abilities are more skilled at processing new information and using it for political participation (Zaller 1992). In the first perspective, it is expected that VAAs would have a leveling effect and reduce political inequalities; in the second perspective, VAAs would lead the resource-rich to get richer and political inequalities to endure.

This study tests these two explanations with an experimental design. By offering randomized access to a VAA in a naturalistic setting, I evaluate whether usage of this VAA has a differential effect on the political engagement and participation of individuals with different levels of education. The findings confirm that VAAs offer different political benefits to more or

less educated individuals. Using the VAA tends to stimulate the interest and motivation to vote of lower educated citizens; however, in line with theories of information processing, higher educated citizens are the ones who learn more from this app.

2. Electoral Participation, Political Engagement and the Educational Divide

A wealth of evidence shows that those who are the most at risk of not voting are the citizens from lower socio-economic status, those who have lower levels of income and education, and lower occupational status (Wolfinger and Rosenstone 1980, Rosenstone and Hansen 1993, Verba, et al. 1995, Jacobs and Skocpol 2007, Bartels 2008). It is further recognized that educational attainment is the SES measure that has the most consistent impact on political engagement (Nie, et al. 1996), and that citizens who do not obtain post-secondary education are less likely to be politically engaged than higher educated citizens (Jarvis, et al. 2005, Zaff, et al. 2009). While the causal power of education is still debated (Kam and Palmer 2008), it is generally believed that formal education helps to develop political engagement (interest, knowledge, efficacy), skills (civic, cognitive, and communicative) and democratic values (civic duty) that work to decrease the costs of participation and increase its benefits (Wolfinger and Rosenstone 1980, Rosenstone and Hansen 1993, Verba, et al. 1995, Delli Carpini and Keeter 1996, Hillygus and Nie 2001). It is also argued that educational advancement favors participation by helping individuals insert themselves higher into the social hierarchy, in politically and economically rich networks, which in turn facilitates their recruitment into participation (Nie, et al. 1996). Thus, those who fail to attend post-secondary education will not develop their skills, political engagement, and social networks to as high a degree and will thus be disadvantaged in the political process compared to those who attain higher education.

While many studies assess the effect of information and mobilization campaigns on the general population, or among university students who are less in need of information and mobilization (Green and Gerber 2001, Hooghe, et al. 2010), several scholars have argued for increased attention toward disadvantaged groups of citizens in order to understand how to raise or equalize levels of participation (Jarvis, et al. 2005, Zaff, et al. 2009, Gallego 2010). In the fields of communication and political psychology, studies have paid more attention to individual characteristics and how they may influence information processing. And the evidence shows that use of information does vary along the lines of education, political sophistication, political interest, and awareness (Zaller 1992, Krause 1997, Eveland Jr and Scheufele 2000, Lau and Redlawsk 2006).

The contemporary socio-political and informational contexts make it even more important to pay specific attention to the lower educated group of citizens. First, traditional organizations that used to inform and mobilize citizens, like unions and churches, have lost some of their influence (Rosenstone and Hansen 1993, Gray and Caul 2000). Even political parties' capacity to mobilize voters has declined, due to a weakening of partisan identification and negative feelings toward parties. They now mostly target habitual voters – who are generally older, educated, and interested citizens (Wattenberg 2000). Secondly, the media context with information overload represents a cost for citizens in terms of sorting political information from other distractions, and in making a political decision (Speier, et al. 1999). But this cost may be even more acute for individuals with less education and cognitive capacities (Eppler and Mengis 2004).

In this context, the provision of simple, structured and non-partisan information, through a Voting Aid Application, can potentially lead less educated citizens to be more engaged with

politics and assist them in making a political decision. This could ultimately increase their propensity to vote and reduce the participation gap between the haves and the have nots.

3. VAAs, Information Campaigns and Political Engagement

The Web offers new opportunities to develop and disseminate communication tools that inform and mobilize citizens in a cost effective way. In fact, in the past decades, more institutions and mobilizing agents have used Information and Communication Technologies to reach potential voters or participants, and more people use the Internet as their main source of information (Delli Carpini 2000, Lance Bennett, et al. 2008). But empirical research provides conflicting evidence about the Internet's effect on political engagement. While some have argued that ICTs' social and entertainment uses would distract citizens from public affairs and be detrimental to citizens' engagement (Putnam 2000), most of the evidence shows a positive effect of Internet use on political engagement and participation, especially when the effect of online news or campaign information is considered (Shah, et al. 2005, Gil de Zúñiga, et al. 2012, Bimber, et al. 2015). Questions nonetheless remain about how consistent, large, and significant these effects are, and what the causal paths are between online news and participation (Boulianne 2009). Also, evidence remains mixed in regards to the Internet's ability to mobilize new people in politics (Delli Carpini 2000, Krueger 2002, Ward, et al. 2003, Xenos, et al. 2014), and its propensity to further facilitate the participation of those already interested and active in politics (Best and Krueger 2005, Bimber, et al. 2015, van Deursen, et al. 2015).

Research on VAAs suggests that they have a positive effect on electoral participation, but estimates of this effect vary widely. Some studies find that from 10 to 60% of users report that using the VAA motivated them to vote, and others estimate that the use of VAA increased general turnout by 3, 5 or 14 percentage points, depending on the study and country (Mykkanen and

Moring 2006, Marschall and Schultze 2012). However, due to causal inference issues, these studies are limited in providing evidence of the main and conditional effects on political participation. First, most of these studies rely on surveys with non-representative samples of VAA users. Individuals who choose to use VAAs tend to be more educated, politically informed, and interested (Marschall 2014). In addition, the users who decide to answer the follow-up survey may be the more enthusiastic and convinced about the value of the VAA (Garzia and Marschall 2012). An experimental design based on random assignment to VAA use, coupled with a panel survey, would provide an adequate analysis of the causal effect of VAAs. There are only few experiments on VAAs' political behavior effects (Vassil 2011, Enyedi 2015), and these studies also suffer from exposure or selection biases.

Furthermore, studies on VAAs have almost exclusively focused their attention on vote choice and electoral participation. While these 'apps' are assumed to inform citizens about political parties, to raise interest in political issues, and to stimulate citizens' reflection on their upcoming electoral decision, we do not know if these assumptions actually materialize. If VAAs have an impact on political interest and knowledge, it would be a positive democratic outcome in itself, testifying of VAAs' ability to foster a more informed and interested citizenry. But political interest and knowledge are additionally important, as they are determining factors of political participation. In fact, the Civic Voluntarism Model would hypothesize an indirect effect of VAAs on participation, through the development of political knowledge, interest, and efficacy (Verba, et al. 1995). So, learning about the effects of VAAs on different dimensions of political engagement would fill a gap in the literature on the democratic benefits of VAAs, and further advance our understanding of the possible mechanisms driving the effects of VAA use on participation.

Research on VAAs further fails to take into account the background of users. While communication research has shown that background characteristics help explain how people

process and use information, few studies consider the heterogeneous effects of VAAs across user profiles (Vassil 2011, Alvarez, et al. 2012). It is the central argument of this study that information campaigns, and this web application more specifically, do not work the same way for lower and higher educated users. Both the instrumental and psychological approaches support this argument. However, they diverge in their object of focus and on the expected direction of the political effects of VAAs. On the one hand, the instrumental approach focuses on the information format and its utility in decreasing costs of information and participation. It predicts that less educated citizens will benefit most from the simple and structured information provided by VAAs, which will lead to a narrowing of gaps in political engagement and political participation. On the other hand, the psychological approach focuses on the user and on his or her ability to process information. It predicts that the better educated are more equipped and skilled to process *any* kind of information, and so they will benefit the most from VAAs' information, which will work to maintain or even increase political inequalities based on education.

The instrumental approach is mostly inspired by Rational Choice theory. In this perspective, the acquisition and processing of information has a utility. But as information acquisition and processing are costly (i.e. in terms of time and effort), individuals will only engage in these activities if the benefits outweigh the costs (Downs 1957, Aldrich 1993). Behavioral studies have shown that information is an important element in the decision to participate, be it in terms of knowing how and where to participate, or monitoring the government, identifying parties and candidates in an election, and more (Wolfinger and Rosenstone 1980, Rosenstone and Hansen 1993). Thus, high information costs can lead to political inactivity (Aldrich 1993, Delli Carpini and Keeter 1996). In this sense, the reduction of the costs of information acquisition and processing should lead to an increased likelihood of political participation. And this is exactly what VAAs do: they decrease the costs of both acquiring

and processing political information during electoral campaigns (Garzia 2010). First, they decrease the costs of information acquisition by aggregating the content of parties' political platforms and by compiling information about key political issues at the core of the electoral debates. Secondly, VAAs decrease the costs of information processing by synthesizing and structuring this political information. One way they do this is by offering several visual summary measures of the proximity of parties to a person's general position in the political landscape. These are basically summary measures of the match between citizens' demands (i.e. their positions on a variety of issues) and political parties' offers (i.e. party stands on the same issues)[25]. Thus VAAs could generally help increase political participation.

But as educated people are more likely to already have the interest, motivation, and information necessary for participation (Wolfinger and Rosenstone 1980, Verba, et al. 1995, Delli Carpini and Keeter 1996), it is unlikely that VAAs' simple and structured information would add much to their initial levels of political engagement. In this sense, higher educated individuals who use these apps would face a ceiling effect (Ettema and Kline 1977, Eveland Jr and Scheufele 2000). However, for less educated citizens, the VAAs' interactive and synthesizing format could represent a meaningful way to boost their initially low levels of knowledge of parties, interest in political issues, and interest in political information (Bimber 2001). In fact, several communication studies show that simpler information content can advantage lower educated individuals, notably in terms of political knowledge (Neuman, et al. 1992, Kwak 1999, Eveland Jr and Scheufele 2000).

Political psychology offers a different perspective on information-processing and its link to political engagement. While the instrumental approach is based on individuals' initial levels of

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[25] See the Appendix for images of the VAA used in the study: welcome page, issue questions, and results' page.

political engagement, the psychological argument is based on individuals' cognitive and communication skills.

This alternative explanation for the political effects of VAAs focuses on how individuals process political information, and how this feeds into political engagement and participation. It is argued that the effect of media use varies according to individual characteristics, notably political experience and cognitive abilities [26] (Zaller 1992). This perspective is supported by the knowledge gap literature, which posits that differences in cognitive and communication skills are a key factor of explanation for the knowledge gaps between high and low status individuals (Tichenor, et al. 1970). Those who have more cognitive and communication skills and who are more politically experienced, will be more efficient in processing and using political information, and will thus learn more about politics (Eveland 2001, Eveland, et al. 2003). Evidence shows that citizens with higher levels of formal education tend to be more politically sophisticated, politically aware, and more endowed with cognitive and communication skills (Converse 1962, Zaller 1992, Delli Carpini and Keeter 1996, Hillygus and Nie 2001). So, higher educated individuals should be efficient in processing new political information and should gain more from using the Vote Compass, while the lower educated individuals would be less efficient and not gain much from VAA use.

4. Research Questions

Both the instrumental and psychological approaches lead us to expect that VAAs work differently for lower and higher educated citizens, and that their political effects should differ significantly for these two groups. Based on the relevance of both theoretical perspectives and the lack of clear empirical evidence on the pattern of this differential effect, I propose three

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[26] However, different concepts are used to define these abilities: education, political awareness, sophistication, interest (Luskin 1990, Zaller 1992, Krause 1997, Valentino, et al. 2004, Xenos and Moy 2007).

research questions to guide the analysis of the effect of the VAA on inequalities in political interest, knowledge and participation.

On one side, the instrumental explanation posits that the use of the Vote Compass will have a positive effect on political knowledge and interest for the less educated citizens who use it (compared to lower educated non-users), while it will have no effect or a small effect for the more educated citizens who use it (compared to the higher educated who do not use it). On the other side, the psychological explanation argues that higher educated individuals generally display more awareness to politics and more motivation to learn (Zaller 1992, Cacoppio, et al. 1996), and so using the Vote Compass will lead them to be even more interested and to learn more about politics (compared to similarly educated non-users), while less educated users of the Vote Compass will not become more knowledgeable or interested (compared to less educated non-users). So, to what extent does the VAA affect gaps in knowledge between the more and less educated users? (RQ1) And how much does the VAA affect inequalities in political interest based on education? (RQ2)

Secondly, the Civic Voluntarism Model informs us of the importance of political knowledge, information, and interest in stimulating political participation (Verba, et al. 1995). So, in line with the instrumental approach, which posits increased levels of political engagement among the lower educated users of the VAA, it would be expected that these users would vote at higher rates (compared to lower educated non-users). On the other hand, a null or small increase in political engagement among the higher educated users of the Vote Compass would not produce a participation rate different from that of educated non-users. As such, the expectation is that the VAA would narrow the gaps in participation between the lower and higher educated. Conversely in the psychological approach, as the higher educated users of the Vote Compass are expected to register an increase in interest and knowledge, it would lead them to be more inclined to vote

(compared to educated non-users). Alternatively, as lower educated users are not expected to increase their levels of interest and knowledge significantly, it would be expected that their participation rate would not differ from participation among lower educated non-users. And the VAA would maintain or increase the participation gaps. So, in the end, to what extent does VAA use affect participatory inequalities between lower and higher educated citizens? (RQ3).

5. Methodology

The Field Experiment Design

While many studies of Voting Aid Applications encounter problems of causal inference due to processes of self-selection (Pianzola 2014), the current study overcomes these issues by using a randomized field experiment in combination with a pre-post survey design.

In the context of the 2014 Quebec provincial electoral campaign, I offered direct and randomized access to a VAA to residents of a low-income neighborhood of Montreal, which allowed me to more effectively recruit a representative sample of citizens from both higher and lower socio-economic background[27]. Two weeks before the provincial election, I recruited 389 participants in various locations of the neighborhood: on the street, in sports centers, in community and service centers, and elsewhere[28]. All passersby who were 18 years or older, Canadian citizens, and residents of the neighborhood[29] were offered 15$ to take part in a research project. The use of deception, i.e. presenting the research project as a study on online

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[27] While in many social science studies lower socio-economic status individuals are under-represented, this study is based on a representative sample of the Canadian population in terms of education. In the study, 30% of participants have a high school degree or less, while 70% have some post-secondary education. In the Canadian population, 35.9% of the adult population has a high school diploma or less, while 64.1% have some post-secondary qualification (National Household Survey, Statistics Canada 2011). The neighborhood's composition offered several advantages for the recruitment of Canadian citizens with lower levels of formal education as: 92% of the residents are Canadian citizens and 52% of the local population has a high school degree or less (National Household Survey, Statistics Canada 2011).

[28] The full list of recruitment sites is presented in the Appendix.

[29] In line with the collaboration with the Electoral Management Body of Quebec, to gain access to the official voting records for the participants of this study, all individuals had to be residents of the same electoral district.

media use and citizens' general interests and knowledge about current events, made it possible to divert participants' attention away from politics and the election[30]. Additionally, this experimental setup replicated the sort of public information campaigns conducted by several non-governmental organizations and media companies, and so participants were not surprised or discontented when asked to take part in the information session in public spaces, for example, on the street, in waiting rooms, or in restaurants. The different public venues and locations of the experiment were chosen as representative of people's use of digital devices (e.g. while waiting during a child' sports activity at a sports center, while eating lunch in a restaurant, in the queue before a show starts). Once they accepted, participants were given an electronic tablet to answer survey questions, visit an information website and give us feedback on this website.

Finally, they were informed that they would be given the chance to visit one of multiple websites covering a variety of topics and current events, and that websites would be allocated at random. So, at the end of the first survey, participants were automatically and randomly[31] assigned to visit one of two websites[32]. The experimental condition consisted of an individual web information session of about 15 to 20 minutes, after which participants completed a second survey. The two surveys and the experimental condition were administered on the electronic tablet that participants used individually[33]. The treatment was the VAA called the *Vote Compass*. Voting aid applications are non-partisan web tools that aim at informing citizens and facilitating their vote decision. Their "common operating principle (is that): they compare the positions of parties (or candidates) on a selection of policy issues with the position of the voter; at the end they calculate and display a rank-order list, at the top of which stands the party closest to the

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[30] Deception made it possible to avoid participants' selective opt out due to the political nature of the research project. All participants were debriefed after the last survey, following the election.

[31] Randomization was embedded in the online survey program (i.e. there was no human involvement).

[32] See the Appendix for images of both websites: the Vote Compass and the Movie Quiz.

[33] However, there was a ratio of one research assistant per participant, to ensure that technical problems or computer proficiency would not prevent individuals from using the tablet or the Vote Compass. But research assistants stood at a distance of the participant, so that the participant would not feel observed.

voter within the n-dimensional issue space" (Garzia and Marschall 2012, p.205). The control condition assigned participants to visit a website on recent movies.

Every individual participating in the study was invited to respond to several surveys: two on the same day they were recruited (i.e. one survey before the information treatment and one right after the treatment), and one final survey over the phone, in the week following the election. From the initial 389 participants who completed the two first surveys and the information session, 300 further completed the final survey, giving a retention rate of 77%[34].

Measures

The four dependent variables[35] were measured at three points in time: *initial levels,* measured before the experimental information activity (the pretest); *intentions,* measured right after the information activity (the post-test 1); and *reported levels,* measured two to three weeks after the information activity, during the week that followed the election (the post-test 2). This pre-post design enables me to consider short-term as well as medium-term effects of the Vote Compass on a variety of political variables.

The first dependent variable, political knowledge, is measured with five questions in the different waves of surveys (about political parties and political figures)[36]. Each knowledge

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[34] The retention rates for the second post survey are relatively similar across experimental conditions: 78,3% in the control group and 76,1% in the treatment group. The individuals who dropped out of the study after the experiment differed in some ways from the individuals who remained in the study (and took part in the last survey). On average, the individuals who dropped out after the second survey were younger, less likely to be registered to vote, less likely to read news about politics, had less interest in politics, paid less attention to the electoral campaign, and voted at a lower rate in the 2012 election compared to those who participated in all steps of the study (these differences were significant at the $p<0.05$ level). To evaluate the effect of this attrition on the results, I ran regressions with and without the individuals who dropped out: results vary a little, but do not change significantly.

[35] See the Appendix for question wording and the coding of measures.

[36] The same knowledge questions could not be used through all three waves of surveys, as the short lapse of time between the pretest and post 1 surveys made it very likely that participants would remember answers. However, all questions address similar type of political knowledge, referring to political figures and parties of the province. The questions in the post-test 1 and post-test 2 covered information contained in the VAA. However, knowledge about the last question, "who is the new Prime Minister?" (in the post-election survey), is in part dependent on participants having been attentive to news or having sought this information after the election.

question is coded 0 (incorrect answer or don't know) or 1 (correct answer). The effect on political interest is investigated using two different dependent variables. The first variable, attention to the campaign, may refer to a more *passive* interest in the electoral campaign, which may develop through incidental exposure to information, for example (Tewksbury, et al. 2001, Sotirovic and McLeod 2004). Attention to the campaign is measured with the frequency of attention given to the electoral campaign (coded from 0 for 'never' to 4 for 'daily'). The second variable, information search behavior, refers to a more *active* interest in the campaign, where one intentionally seeks information about the elections. In the pretest, information-seeking captures whether participants' usually inform themselves about politics relative to other topics of current news (coded 0 for 'no' and 1 for 'yes'). In the post-test surveys 1 and 2, the variable captures whether participants intended to search or did search for information about candidates, parties, or the election (coded 0 for 'never', or 1 for 'once or twice' up to 'several times').

The last dependent variable is electoral participation. Participants were first asked whether they had voted in the last provincial election in 2012 (pretest), and then if they intended to vote in the 2014 election (post 1). Finally, the last measure is validated turnout in 2014, provided by the electoral management body of Quebec[37]. The variable is coded 1 if the official records show that participants turned out to vote and 0 otherwise. Using validated turnout avoids problems related to vote misreporting and provides an accurate account of the effect of the VAA on electoral participation (Belli, et al. 1999).

The current study investigates whether the effect of the Vote Compass will differ for individuals with varying degrees of formal education. Thus, individuals' highest level of education is used to divide the sample between the lower educated group of citizens who have a

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[37] On the 316 participants for whom I had a valid name and complete home address, the electoral management body of Quebec was missing voting records for 24 persons. So, for official voter turnout, the sample size is N=292.

high school degree or less (education is coded 1) and the higher educated who have some post-secondary education (education is coded 0)[38].

Analyses

For each of the four dependent variables, I consider whether the group of individuals using the Vote Compass makes significant *gains* in the short run (i.e. between initial levels in the pretest and first post-test levels) and then in the medium term (i.e. between initial levels in the pretest and second post-test levels), compared to the control group. So, controlling for pretest levels in each regression model, I examine whether using the Vote Compass induces change in one's level of knowledge, interest, information search and participation[39]. Further, I evaluate whether the Vote Compass has differential effects for the lower and higher educated citizens who use it. Hence, an interaction term between the information treatment and individual education level is included in all regression models. Finally, in order to control for pretest imbalances between the treatment and control groups and to improve the precision with which the average treatment effects are estimated, regressions are adjusted through the inclusion of three covariates: reading abilities, internal efficacy, and the registration status on voters' list[40].

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[38] The education breakdown of the sample is as follows: 30% of the sample has a high school degree or less, while 70% has post-secondary education. Two other specifications of the education breakdown were tested. Only the educational difference between high school and post-secondary education levels produced significant differential effects of the Vote Compass on political outcomes.

[39] Controlling for individuals' baseline levels in the dependent variable (in the pretest) further helps to limit the impact of overreporting in surveys, because if one has a tendency to overreport their political interest and behaviour, they will likely do so in the different surveys. In this sense it is important to look at individuals' relative change in political engagement and behavior, with the proposed strategy of change models. The use of deception (i.e. making this information activity about 'various current events' and having survey questions on many different current events) further limits social desirability, and thus the tendency of overreporting (Belli, et al. 1999). Furthermore, research assistants always stood at a distance during the experiment, so that participants would not feel observed while they were answering questions and visiting the websites.

[40] Descriptive statistics for all variables are presented in Table 3.3 the Appendix and show some imbalances between the control and treatment groups. Furthermore, a logistic regression model predicting assignment to the experimental conditions revealed that three variables were statistically significant in explaining allocation to the treatment and will thus be included in all regression analyses in order to control for the imbalances.

6. Results

Political Knowledge

The first dependent variable to be considered is political knowledge. The instrumental approach posits that less educated citizens will see their knowledge levels increase after using the Vote Compass, while the higher educated will experience no increase or a small one. Alternatively, the psychological approach predicts that the higher educated who use the Vote Compass will make knowledge gains and less educated users won't.

The first three columns of Table 3.1 present logistic regressions that model political learning in the short term (i.e. knowing the number of parties) and in the medium-term (i.e. knowing who is the leader of the party CAQ and who is the new Prime Minister). In all adjusted regressions, the coefficients of the interaction term (between education and VC use) are negative and not statistically significant. So, while less educated citizens who use the Vote Compass tend to display lower knowledge gains than their more educated counter-parts who use the Vote Compass, the difference in the VAA effect among the less and the higher educated is not statistically significant. The analysis of the average marginal effects of the Vote Compass, in Figure 3.1, further shows that the effects are not statistically different from each other.

While the Vote Compass had no effect on knowing who is the leader of the party CAQ, Figure 3.1 shows that, in the two other knowledge questions, the marginal effect of Vote Compass use was positive. The Vote Compass increased knowledge levels by 17% points in the short term (p<0.1) and by 8% points in the medium term (p<0.1) among the higher educated, and by 6% points and then 7% points among the less educated (but these two effects fall short of statistical significance). Even if the analysis does not confirm the existence of statistically different effects

Table 3.1 - Results of Logistic Regression Models for Knowledge, Information-Search and Electoral Participation -and- Results of OLS Regression Models for Attention to the Campaign: Short-Term effects (white columns) and Medium-Term effects (grey columns).

	KNOWLEDGE			ATTENTION		INFORMATION		ELECTORAL PARTICIPATION	
	Number of parties	Party leader	Prime Minister	Intended	Reported	Intended	Reported	Vote intentions	Validated vote
Initial level	0.90***	1.64***	2.54***	0.78***	0.49***	1.21***	0.43	1.58***	2.15***
	(0.25)	(0.30)	(0.48)	(0.03)	(0.05)	(0.34)	(0.34)	(0.32)	(0.41)
Vote Compass treatment	0.79***	0.14	1.15*	-0.09	-0.03	-0.13	-0.54	-0.19	0.53
	(0.26)	(0.39)	(0.60)	(0.09)	(0.12)	(0.37)	(0.38)	(0.38)	(0.48)
High School Education	-0.18	-0.47	-0.41	-0.32***	-0.39**	-0.55	-0.57	-0.81*	-0.51
	(0.40)	(0.48)	(0.57)	(0.12)	(0.17)	(0.44)	(0.47)	(0.50)	(0.55)
VC treatment	**-0.60**	**-0.29**	**-0.36**	**0.36****	**0.39***	**0.24**	**0.47**	**1.09***	**-0.39**
* HS education	**(0.54)**	**(0.67)**	**(0.85)**	**(0.16)**	**(0.24)**	**(0.58)**	**(0.62)**	**(0.60)**	**(0.77)**
Reading	0.27*	0.36*	0.49*	0.05	0.11	0.49***	0.45***	0.12	-0.08
	(0.16)	(0.20)	(0.28)	(0.05)	(0.07)	(0.18)	(0.18)	(0.19)	(0.25)
Registered to vote	0.01	0.64	1.12**	0.05	0.33**	0.71**	-0.61	1.16***	3.71***
	(0.30)	(0.42)	(0.49)	(0.10)	(0.15)	(0.32)	(0.42)	(0.34)	(0.52)
Internal efficacy	-0.04	0.41**	-0.02	0.00	0.13**	0.42***	0.59***	0.46***	0.30
	(0.14)	(0.19)	(0.25)	(0.05)	(0.07)	(0.18)	(0.19)	(0.17)	(0.21)
Constant	-2.80***	-4.25***	-4.20***	0.49**	0.68**	-2.26***	-1.23	-2.07**	-4.38***
	(0.71)	(0.96)	(1.24)	(0.21)	(0.30)	(0.79)	(0.82)	(0.83)	(1.18)
R2				0.73	0.49				
Log likelihood	-225.07	-127.78	-75.98			-158.11	-144.58	-152.08	-98.09
LR χ2 (df=7)	41.39	89.35	86.05			81.81	41.17	91.50***	164.97***
McKelvey & Zavoina's R2	0.15	0.38	0.51			0.32	0.21	0.32	0.62
N	360	284	284	360	283	364	288	364	277

Note: Cells contain beta coefficients with standard errors in parentheses.

* p < .10 - ** p < .05 - *** p < .01

among the lower and higher educated users, the fact that the higher educated users are the only ones to make significant gains in political knowledge (both in the short and medium term), and make gains that are almost three times as large as the ones of the lower educated in the short term, tends to support the expectation of the psychological approach. The use of a VAA would tend to increase the knowledge gap between the lower and higher educated in the short term, and maintain the gap in the medium term.

Attention to the Electoral Campaign

The second Vote Compass effect to be assessed is on political interest. It is first measured with the frequency with which people pay attention to the electoral campaign. The two approaches state that the Vote Compass would either boost the interest of the lower educated to a greater extent (the instrumental expectation), or further strengthen the interest of the higher educated (the psychological expectation).

In the fourth and fifth column of Table 3.1, we see from the interaction term that the VC has a statistically distinct effect among education groups (in the short-term ß=0.36 with p<0.05, and in the medium-term ß=0.39 with p<0.1). In other words, less educated citizens who use the Vote Compass tend to register a more positive effect in their level of political interest than the higher educated users. And so in this case, there is evidence that the effect of the Vote Compass differs for the less and more educated users.

In the short term, the marginal effect of Vote Compass use on intentions to pay attention to the campaign is positive for the lower educated and negative for the higher educated. But as it can be seen on Figure 3.2, only the effect among the lower educated is statistically significant. In the medium term, the marginal effect of Vote Compass use on reported attention to the campaign is again negative and not statistically significant for the higher educated, while it is positive,

substantial and statistically significant for the lower educated (p<0.1). So, using the Vote Compass does not have any effect among the higher educated (compared to the educated control group), but leads the less educated to pay increased attention to the campaign by 7% points and 10% points, in the short and medium term (compared to the lower educated control group). These findings lend support to the instrumental approach, as the Vote Compass stimulated attentiveness only among the lower educated. The Vote Compass in fact diminished gaps in political interest between lower and higher educated citizens, as the lower educated citizens who use the Vote Compass report similar levels of interest as the higher educated citizens who did not use the Vote Compass[41].

Information-Seeking Behavior

Now, turning to the second measure of political interest, information-seeking behavior, I measure whether VAA use had an effect on participants' intentions to actively look for information on the elections in the second half of the electoral campaign (short-term effect), and then, on their actual information search behavior during the last weeks of the electoral campaign (medium-term effect).

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[41] In the short term, the predicted values of campaign attention for the lower educated users of the VC is 2.58, compared to 2.63 for the higher educated individuals in the control group. So when the less educated use the VC, the difference in interest between the two groups goes from 0.32 to 0.05. In the medium term, we observe a similar pattern, where the predicted values of campaign attention for the lower educated users of the VC is 2.93, compared to 2.96 for the higher educated individuals in the control group. So when the less educated use the VC, the difference in interest between the two groups goes down from 0.29 to 0.03.

Figure 3.1 - Average Marginal Effects of the Vote Compass on Knowledge by Education Levels (90% Confidence Intervals)
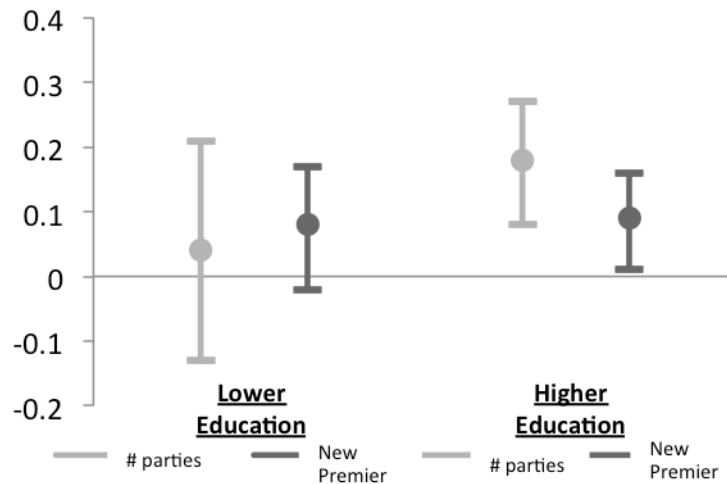
Figure 3.2 - Average Marginal Effects of the Vote Compass on Campaign Attention by Education Levels (90% Confidence Intervals)
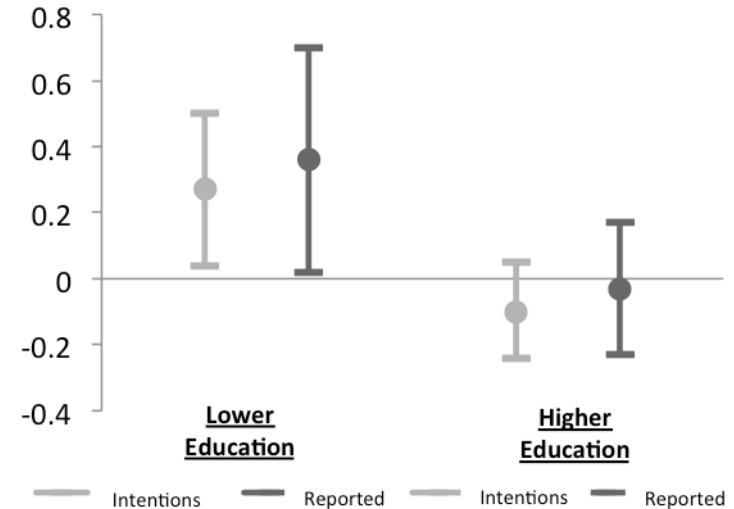
Figure 3.3 - Average Marginal Effects of the Vote Compass on Information-Seeking by Education Levels (90% Confidence Intervals)
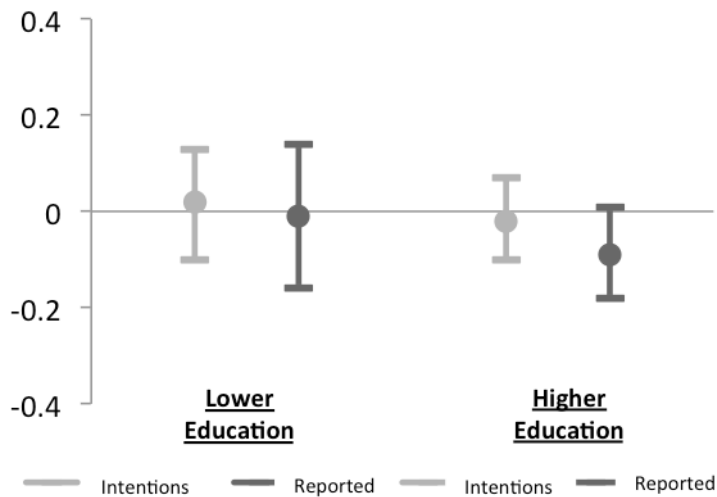
Figure 3.4 - Average Marginal Effects of the Vote Compass on Electoral Participation by Education Levels (90% Confidence Intervals)
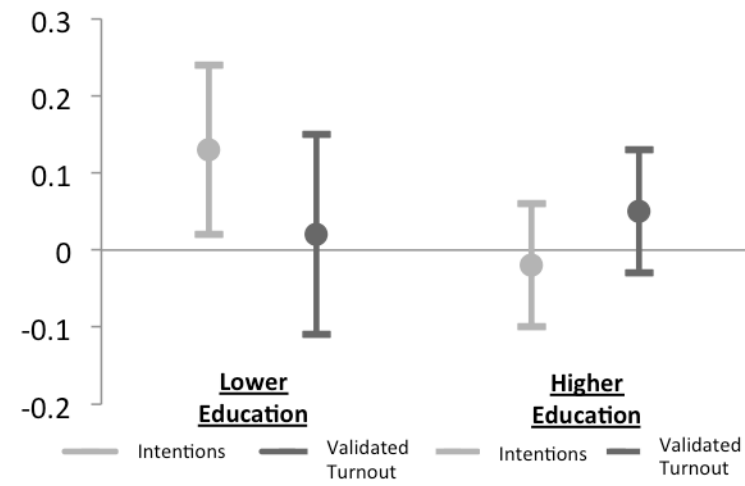
We first note, in the sixth and seventh column of Table 3.1, that the interactions between education and Vote Compass use are positive, but lack statistical significance. So, the effect of the Vote Compass on information-search is not different among the two education groups. Looking at Figure 3.3, we see that the average marginal effect of Vote Compass use on intentions to search for information is null or close to zero for both education groups, in the short and in the medium term. This implies that the Vote Compass had no effect on information-seeking behavior regardless of individuals' levels of education.

Electoral Participation

Finally, I consider whether using the Vote Compass may increase the motivation to vote in the upcoming election (short-term effect) and actual electoral participation in the election (medium-term effect). In the eighth column of Table 3.1, the coefficient of the interaction term between education and Vote Compass use is large, positive, and statistically significant ($ß=1.09$, $p<0.1$). So, this differential effect implies that less educated users benefit more from the VC, in terms of motivation to vote, than the higher educated users. This is further supported by the analysis of the marginal effects of the Vote Compass among the two education groups, in Figure 3.4. Using the Vote Compass had the substantial and significant effect of increasing voting intentions of the less educated citizens by 13% points, while it had no effect among the higher educated. And so again, the Vote Compass reduces the gap in motivation to vote between the lower and higher educated citizens[42].

In the last column of Table 3.1 displaying the medium term model, the interaction term between education and Vote Compass use becomes negative and loses statistical significance. So the effect of the Vote Compass on electoral participation is not different among the two education

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[42] The predicted value of vote intentions for the lower educated users of the VC is 0.80, compared to 0.79 for the higher educated individuals in the control group. So when the less educated use the VC, the difference in motivation to vote between the two groups is nil.

groups. This is further confirmed by Figure 3.4, where the average marginal effects of Vote Compass use on electoral participation are relatively similar among the two education groups, increasing participation by 2% points among the less educated group and 5% points for the higher educated. While the effects of the Vote Compass on actual electoral participation are not statistically significant, the sizable increase in the motivation to vote among lower educated gives partial support to the expectations of the instrumental approach.

7. Discussion and Conclusion

Voting Aid Applications (VAAs) are becoming increasingly popular tools of information around the world. While many believe that these 'apps' have the potential to inform and educate citizens on electoral decision-making, and ultimately to motivate them to cast a ballot, we generally lack precise evidence about their democratic benefits and who actually benefits from using them. The present experimental study contributes to the field of political behavior and communication by offering a causal evaluation of this information 'app'. The findings confirm that online campaigns matter and represent effective ways of engaging citizens in the political process. But more importantly, given the research questions, this study speaks to the debate about the Internet's effect on political inequalities, and to the literature that examines whether online information reinforces participation patterns or fosters new participation. The findings show that use of a VAA offers more benefits to the advantaged in terms of political knowledge, but also brings more benefits to the disadvantaged in terms of political interest and motivation to vote. So, like other studies before, this study shows that the impact of online campaigns on political inequalities is far from being straightforward (Bimber, et al. 2015). They can simultaneously increase and decrease political inequalities.

First, the effect of the VAA on political interest and motivation to participate proved to be distinct for the lower and higher educated users, and the direction of this differential effect

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confirmed the instrumental approach (as seen in the second and fourth line of Table 3.2). While the less educated citizens who used the VAA made significant and substantial gains in terms of attentiveness and motivation to vote, compared to the other lower educated individuals who did not use this app, the VAA had no impact on the interest and motivation of the higher educated users. In this sense, the Vote Compass was able to close the gaps in political interest and motivation to vote between the lower and higher educated users. These results support the mobilization thesis about the Internet's effects, as this simple and interactive web application managed to get *new* people interested and engaged in electoral politics, not just the ones who are usually attentive and participative. Alternatively, the impact of the VAA on political knowledge tends to support the expectations of the psychological approach. While higher educated users made significant gains in political knowledge, compared to the educated non-users, the lower educated users' gains in knowledge were generally smaller and not statistically significant (as seen in the first line of Table 3.2). The fact that only the more knowledgeable and cognitively skilled individuals were able to learn from the VAA lends support to the knowledge gap hypothesis and to the reinforcement thesis: online campaign information tends to further increase gaps in knowledge and facilitate the engagement of those who are already interested and active in politics.

Despite the fact that both the higher and the lower educated users experienced some increase in political engagement, neither group displayed significant changes in terms of active interest in the campaign and actual participation (as seen in the third and fifth line of Table 3.2). The absence of a Vote Compass effect on information-seeking behavior and on electoral participation may be explained by the fact that one information activity is usually not enough on its own to change political habits and decrease the costs of voting (Niven 2001, Hooghe, et al. 2010). But even if the VAA's impact on electoral participation fell short of statistical significance,

it can be noted that the size of this VAA effect (+2 and +5%pts increases in participation) compares advantageously with the effect of Get-Out-The-Vote mobilization campaigns, such as volunteer phone calls (+1.9%pts) or canvassing (+2.5%pts) (Green, et al. 2013). A replication of this study with a larger sample size would be able to ascertain whether this interactive web application can inform the public and also mobilize citizens as much or even more than personal encouragements to vote.

Table 3.2 - Summary of the Findings: the Effects of the Vote Compass for Groups of Citizens with More and Less Formal Education

	Lower education group	Higher education group	Differential VC effect between the 2 groups	Who benefits most from the VC
Knowledge	+	**++**	no	higher educated
Attention to the campaign	**+**	0	**yes**	lower educated
Information-seeking behavior	0	0	no	
Electoral participation intentions	**+**	0	**yes**	lower educated
Electoral participation	+	++	no	

Note: The positive (+) or negative (-) effects in bold are statistically significant (p<0.1).

This experimental study innovated in its investigation of the causal and differential effects of online information campaigns in a number of ways. First, by offering a direct and randomized access to the VAA, it circumvented problems of self-selected use of this information app, and thus allowed for a strong causal evaluation of the effects of VAA use. Secondly, access to the VAA was offered to individuals with diverse backgrounds, in various settings that are representative of how people use mobile apps (for example: while eating a meal, and while sitting in a waiting room). Thus the results are believed to offer an externally valid assessment of how citizens use VAAs and benefit from them. But even if this study overcame a number of issues that affected prior VAA studies, it nonetheless presents some limitations. First, the sample size is modest, which may explain why some of the effects fall short of statistical significance. Hence, a

replication of this study with a larger population sample would be able to clarify some of these initial findings. Secondly, it may be possible that those who give credit to the Vote Compass or find it interesting may be more receptive to its information, and thus register more effects on political engagement (Lupia and Philpot 2005). Future studies should thus also consider the effects of perceptions about these apps.

While the present study was intended as a first step in understanding how VAAs' effects operate, future research should investigate the causal mechanisms underlying the effects of VAAs. The findings provided baseline knowledge about the types and levels of VAA effects we might expect; however, we need to further understand the causal paths between interest, knowledge, information-seeking, and participation. Also, VAAs could potentially affect citizens' participation by strengthening feelings of political competence or by stimulating political discussions in social networks (Shah, et al. 2005). Additionally, we need to identify which parts of the VAAs are driving these effects. In other words, which information is most useful or interesting for users: the detailed information about parties' issue positions, the personalized voting advice offered on the results page, or something else altogether? Additionally, VAA studies need to pay more attention to users' characteristics and how various social groups (such as youth, women, or immigrants) may use political information in distinct ways and learn differently from these apps. Finally, while the impact of VAAs tends to be limited in the medium term and in terms of behavioral outcomes, we may wonder if the effects of VAAs could in fact be indirect and materialize in the long run. It may be possible that the VAA's effects on attentiveness and knowledge would predispose individuals to be more open or receptive to political information in later years, and thus facilitate political learning and participation in subsequent electoral campaigns (Tewksbury, et al. 2001). Panel studies examining the political attitudes and

behaviors of VAA users across years or elections would be able to inform us on these potential long-lasting benefits.

The results of this study have several implications. First, this study contributes to political communication and mobilization research by confirming the importance of considering both the utility of the information offered and the characteristics of the individuals who use this information when assessing the effects of campaigns (Eveland Jr and Scheufele 2000). In this sense, the findings support the two theoretical perspectives which posit that user characteristics, especially education, are key to explaining the effects of information campaigns. A general evaluation of campaigns may in fact hide distinct information dynamics, taking place among groups of citizens with different characteristics and abilities. Secondly, this study contributes to the literature focusing on the impact of Internet and web resources on democratic participation and political inequalities. In a context of rapidly increasing rates of Internet penetration and more equalized access to the Internet, the question is not so much about how *access* to web resources affects democracy, but how *use* of these resources will affect the way democracy works. This experimental study controlled for differential access to information on the web, and assessed the actual impact of using a VAA on individuals' engagement and participation. The results support the mobilization thesis, confirming that these web information resources do not benefit more to those who have traditionally had more access to them. In this sense, as the use of VAAs becomes normalized and processes of self selection into VAA use become less problematic, the results show that VAAs will be particularly useful to engage marginalized and less politically sophisticated citizens, and they can ultimately work to foster political engagement and moderate political inequalities. Thirdly, the results show that these political 'apps' have the potential to inform voters during electoral campaigns. As several studies have shown that informed citizens may vote differently, compared to similar uninformed citizens, we could anticipate that

widespread and increasing use of VAAs could lead to different electoral results (Zaller 1992, Bartels 1996).

Finally, this study has the potential to inform strategies of information and voter education campaigns during elections. As the Internet provides relatively easy and inexpensive ways to reach a great number of people, political actors increasingly utilize web information campaigns. The positive news is that online information apps are useful and effective ways to engage the public. However, the current study raises some concerns, as online apps such as the VAAs have *both* the ability to mitigate and to increase political inequalities. If VAAs are accessible through 'political websites' that are mostly visited by informed and politically sophisticated citizens, we can likely expect the advantaged to become even more knowledgeable about politics. So, in many countries, VAAs may actually be working to maintain or increase political inequalities. However, if VAAs are offered on more 'popular websites', or used as civic education tools with specific groups who are less politically engaged, the results of this study show that VAAs would likely help the disengaged to tune back in to politics, and thus diminish political inequalities.

As this study sheds new light on the differential benefits of online information campaigns and their impact on political inequalities, it becomes clear that access to online information remains an issue of concern in contemporary democracies. Understanding who benefits from online information, and in what ways, is a first step to designing more efficient campaigns. But if the goal of information campaigns is to get citizens to tune back into politics and to "lift the bottom" (Delli Carpini and Keeter 1996), then access to VAAs and online information more generally should be targeted at the groups of citizens in need of such information, and especially the less advantaged citizens.

Chapter 4: The Impact of Voting Aid Applications on Electoral Preferences: A Field Experiment in the 2014 Quebec Election

Abstract:

Whereas the last chapter addressed the general assumption that voter education and information campaigns benefit citizens, in terms of strengthening levels of engagement, this chapter considers campaigns' potential to influence the quality of citizens' engagement. Indeed, campaign information can potentially influence citizens' political opinions and considerations, and ultimately (mis)guide voting decisions. In the fourth chapter, I thus continue the investigation of Voting Aid Applications (VAAs) and assess whether they affect users' vote choice. VAAs are a unique type of campaign information, as they provide non-partisan and interactive information during elections, and match users' policy demand with the political supply of parties. Thus, VAAs decrease the costs of voting. But do VAAs actually influence citizens' electoral decisions? Do they help the undecided to form a political preference, and lead the decided to change their vote choice? In this study, I use a randomized field experiment to evaluate the effect of the Vote Compass on users' electoral preferences during the 2014 Quebec election. Given Quebec's multidimensional political space and multiparty system, VAAs have the potential to assist citizens in making a complex electoral decision. The results show that users of the VAA are more likely to form an electoral preference, but this is only the case among thirty-year olds, higher educated, and more politically interested users. At the same time, using a VAA does not affect preferences on Election Day and only impacts party preferences of voters in the short term: the politically uninterested and the older users are more likely to change their party preferences, whereas the thirty-year olds and the politically interested users are less likely to change their initial party preference. Furthermore, the type of recommendation received from the tool does not affect users' vote choice. So contrary to what some have feared, VAAs do not lead to vote switching.

1. Introduction

Campaigns affect citizens' electoral decision making in different ways: by mobilizing, educating, engaging and persuading them (Gelman and King 1993, Iyengar and Simon 2000, Kam 2006, Huber and Arceneaux 2007). In recent years, a new type of information has appeared in of the campaigns' communication environment: Voting Aid Applications (VAAs). These online applications are quite different from campaign materials that we have seen before. Unlike TV ads or party leaflets, they are independent and non-partisan, and offer personalized information on how citizens' preferences relate to political parties' programs. They are designed for information and education purposes, not persuasion. While they lead citizens to reflect on their own preferences as well as learn about party programs, they also provide 'advice' about respondents' proximity to different political parties and how they are located in the political space (Marschall and Garzia 2014, Enyedi 2015). In a context where the salience of traditional cleavages and partisan identification have declined (Dalton and Wattenberg 2002), VAAs may be particularly relevant for voters who are less attached to particular parties. Because of the increasing popularity of these websites, and their wide use in elections at multiple levels around the world (Marschall 2014), the question of their influence on the electorate is of substantive importance. Do VAAs affect citizens' voting decisions?

These new campaign tools have stirred some controversy, and the perspectives on the tool's potential democratic usefulness are quite mixed. Some argue that VAAs cannot give 'true' and objective advice, and may thus have a detrimental effect on the electorate by telling citizens whom to vote for. Others are skeptical of the value of VAAs as political literacy tools and argue that they are an inconsequential form of 'infotainment'. On the other hand, many consider VAAs as a meaningful way to inform and educate voters during campaigns, which could have positive effects on electoral behavior. While these opposing views are expressed in the media and blogs

(Ruusuvirta 2010, Blaze Carlson 2011, Kelcey 2013), political scientists have only recently started to investigate VAAs' effects on voters' electoral decision-making. Initial scholarly work has displayed mixed findings and contrary conclusions (Walgrave, et al. 2008, Ruusuvirta and Rosema 2009, Andreadis and Wall 2014). Therefore, we still do not know clearly whether, or to what extent, VAAs affect vote choice.

Furthermore, most studies have failed to consider the conditions under which the effect of VAAs might be observed. As citizens have different abilities to process information and consider different factors in their voting decisions (Sniderman, et al. 1991, Zaller 1992), it is unlikely that the political information provided by VAAs will have the same resonance across different groups of citizens. Taking voter heterogeneity into account may help us identify certain groups of the population who may be more affected or helped in their voting decision (Marschall and Garzia 2014). Finally, it is not clear what the driving mechanism(s) of VAAs' political effects would be. One possibility is that VAA users learn about different party options and thus become better equipped to make informed decisions. In fact, research has shown that VAAs stimulate psychological engagement with the electoral campaign (Garzia and Marschall 2012, Mahéo 2014). Another possibility is that the personalized advice, the most distinctive feature of VAAs, would influence users' electoral choices. This advice is argued to be the most persuasive element of VAAs' information, but it is not yet clear how or how much it impacts users (Wall, et al. 2014, Enyedi 2015).

The objective of this study is to investigate the effect of VAAs on users' electoral preferences. In addition to examining whether using VAAs generally increase citizens' propensity to form a preference or to change their electoral preference, I consider whether this effect varies for users with different background characteristics. The general assumption is that these voter education tools should first and foremost help those who have lower levels of political

information and those who are less likely to vote, namely young and less educated citizens (Verba, et al. 1995, Delli Carpini and Keeter 1996). Lastly, I examine whether receiving advice that confirms or disconfirms initial preferences affects vote choice.

Using a randomized field experiment, together with a panel survey, allows me to overcome the methodological limits of previous survey-based studies, and to assess the causal effect of VAA use on the propensity to change one's electoral preference, whether by switching party preference or forming a preference for a party. Quebec is a particularly interesting context in which to study the effects of VAAs, as the multi-dimensional nature of politics and the increasingly fractionalized party system make the voting decision task relatively complex for citizens. The information provided by VAAs should be particularly important in multiparty systems (Hooghe and Teepe 2007).

2. Voting Aid Applications: What They Are, How They Work

VAAs are non-partisan web tools that aim to inform citizens and facilitate their voting decision-making. They first appeared in their online form in the early 2000s in Europe. Since then, they have been used in dozens of developed and developing countries, for local, regional, national and supranational elections (Marschall and Garzia 2014). They are now used by millions of citizens around the globe (Marschall 2014). One consequence of this booming interest is the multiplication and diversification of VAAs, but their "common operating principle [remains that]: they compare the positions of parties (or candidates) on a selection of policy issues with the position of the voter; at the end they calculate and display a rank-order list, at the top of which stands the party closest to the voter within the n-dimensional issue space" (Garzia and Marschall 2012).

Research on VAAs has developed several lines of investigation[43], but it mainly addresses the substantive question of VAAs' effect on electoral behavior. Some have investigated whether VAAs can increase turnout and political engagement, showing that indeed VAAs can stimulate the political engagement of citizens (Mykkanen and Moring 2006, Marschall and Schultze 2012, Mahéo 2014, Enyedi 2015). Others have examined whether VAAs can influence users' vote choice, which is my focus here.

The strand of VAA research related to vote choice is based on both subjective and objective measures of VAAs' influence. Most of the initial studies relied on users' self-reports to measure the effect of VAAs on vote choice (Walgrave, et al. 2008, Marschall and Schmidt 2010). After using a VAA, users were typically asked whether they felt the VAA had affected their vote, raising possible concerns about the reliability of self-reports. These studies produced varying results. The range of users who felt the VAA had influenced their decision varies from 6% of the sample (Garzia and Marschall 2012) to a high of 67 percent (Ladner, et al. 2010b). However, other research finds that 90% of users deny that the VAA had any effect on their vote (Walgrave, et al. 2008). Lately, studies have started using panel data and national election surveys, to compare voters' electoral preferences (before using the VAA) to their electoral choice after the election (Wall et al., 2014; Walgrave et al., 2008). While this type of study offers a more reliable and objective measure of the influence of VAAs on vote choice, the results remain mixed. Some find that VAA users are significantly more likely to change their vote choice (Ruusuvirta and Rosema 2009, Ladner, et al. 2010a), while others find that users are slightly more likely to change their vote choice right after using the VAA, but not on the day of the election days or weeks later (Walgrave, et al. 2008). However, these conclusions are limited by issues of causality, as

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[43] For example, some study the profile of VAA users (Hooghe and Teepe, 2007, Marschall, 2014) and others examine how the selection of issue statements affects the nature of VAAs' advice (Walgrave et al., 2009, Lefevere and Walgrave 2014).

individuals first self-select into using the VAA and then further self-select into answering the post-survey (Pianzola 2014). In sum, these initial results call for further investigation of VAA's direct and conditional effects on the electorate, using methodologies and measures that allow for an assessment of their causal effects.

There are a number of ways in which VAAs could affect users' vote decisions, but they all revolve around their informative potential (Walgrave, et al. 2008). First, users are asked to answer a battery of questions on policy issues, which leads them to think about various public issues and express their policy preferences. Therefore, the first effect of VAAs might be on opinion formation, which is a way of saying that they sharpen 'political demand'. Secondly, users of VAAs learn about the full range of the 'political supply', including political parties that they might not have initially known about or considered. Finally, unlike other sources of campaign information, VAAs are interactive web applications that present personalized information. VAAs match users' policy preferences to political parties' issue stances and offer them summary measures of the comparison between their demand and the political supply. This summary information takes multiple forms (as seen on the image below). For example, there is a graph showing the user where he/she stands in the political space relative to all political parties. Another form of comparative information is displayed in bar graphs, giving the level of agreement with each political party. Although VAAs do not seek to guide people's vote, this comparative information is what is termed the VAAs' 'advice' (Walgrave, et al. 2009, Wall, et al. 2014, Enyedi 2015). It provides an objective measure of which party options are the most proximate to users[44].

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[44] Different factors may explain why people vote for parties, beyond issues and issue positions (such as partisanship, evaluation of leaders or of the government), and so a VAA cannot be expected to predict perfectly users' vote choice. And in fact, this tool is *not* presented as a 'vote predictor' by its developers. It offers one type of feedback to users, based on their position on issues. While users may fail to respond to some of the issue questions, Van der Linden and Dufresne used simulations to test the quality of the Vote Compass' feedback, and showed that the Vote Compass is robust to the inclusion and exclusion of questions (i.e. individuals receive the same results), and that the contextual
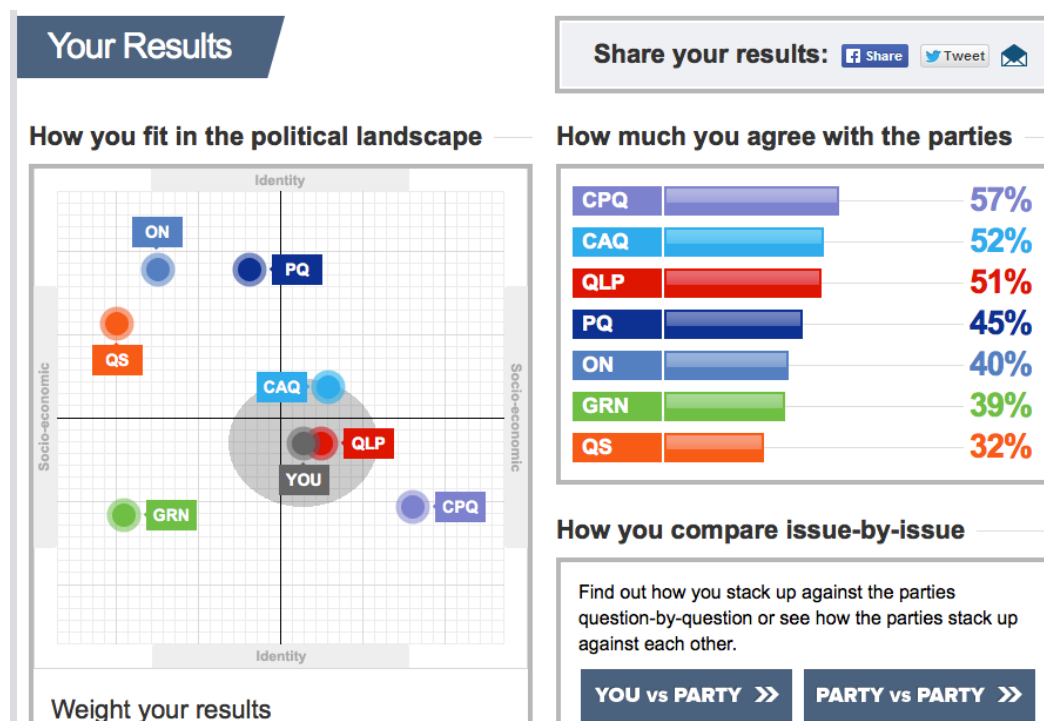
These three types of information will generally affect the costs of electoral decision-making. First, information about the political demand and supply will decrease information costs for citizens (Downs 1957). Secondly, the comparative information will further decrease the cognitive cost of electoral-decision making. Given the multi-dimensionality of the political space and the number of issues debated in a campaign, it can prove cumbersome for voters to compare all factors and party positions, even more so in a multi-party system (Blais and Dobrzynska 1998). In this sense, the comparative part of the VAA facilitates the juxtaposition of different pieces of information and generally decreases the cost of voting. In sum, the easy, accessible and aggregate information provided by the VAA is believed to help users make more *informed* decisions.

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structure of dimensions is stable (i.e. the distance between parties on each dimension is stable) (working paper: "The curse of dimensionality in Voter Engagement Applications Reliability and validity in algorithm design", 2016).

3. Information and Decision-Making Processes

VAAs' information can potentially have three distinct types of effects on vote choice: change, reinforcement, or the development of an electoral preference for a party. In his theory of opinion formation, Zaller (1992) argues that individuals' responses to political information depend on people's reception and acceptance of the message. But Zaller highlights that reception and acceptance of political information depend on individuals' predispositions and level of political attentiveness. So politically attentive individuals are more likely to comprehend information, but also to resist persuasive information that is inconsistent with their political predispositions. The theory of motivated reasoning further states that individuals display a 'disconfirmation bias' when processing information and shows that politically sophisticated individuals are particularly likely to discard counter-attitudinal information (Taber and Lodge 2006, Taber, et al. 2009).

Both of these theories point to the importance of citizens' prior beliefs, their abilities, and the type of persuasive information, in determining information processing and its effects on attitudes. Thus, to study VAAs and their effects on vote choice, it is necessary to consider individuals' background characteristics and abilities, whether citizens have initial electoral preferences or not, and the type of information provided by a VAA.

Preference Formation

First, we need to consider the case of individuals who do not have a party preference before using the Voting Aid Application. If individuals do not have an electoral preference to begin with, receiving new information could potentially lead them to form an opinion. Following Zaller (1992), it is hypothesized that citizens who do not have fixed preferences will be the most receptive to new information and the most susceptible to persuasion. Thus, it is expected that

VAA users who do not have electoral preferences will be more likely to form a preference than their counterparts who are non-users [Hypothesis 1].

Vote Change

For individuals who have an initial electoral preference, the question is whether using a VAA can lead them to *change* that preference[45]. If individuals have set preferences, the consideration of new information may disconfirm their initial choice and possibly persuade them to change their mind, or alternatively it may confirm and reinforce their initial preference. While these individuals may gain new information and learn about parties' political supply and which parties match with their own preferences, this will not necessarily persuade them to change their preference. Studies in political psychology have shown that it is difficult to make people change their behaviour and that individuals with fixed preferences are likely to resist counter-attitudinal information and mostly accept confirmatory information, which tends to reinforce their behaviour (Zaller 1992, Cacioppo, et al. 1996, Taber and Lodge 2006). Thus, it is hypothesized that VAA users who have clear electoral preferences will be no more likely to change their preference than their counterparts who do not use the tool [Hypothesis 2].

As the 'advice' produced by VAAs is believed to be the most persuasive element, it is worth paying closer attention to this type of information and investigating whether receiving confirmatory or contradictory advice affects vote choice. Along the lines of the resistance axiom (Zaller 1992) and evidence of a 'disconfirmation bias' in information-processing (Cacioppo, et al. 1996, Taber, et al. 2009), it is expected that users will accept congruent information (i.e. advice confirming their initial choice) and disregard incongruent information (i.e. advice contrary to their initial choice). So VAA advice that conflicts with users' initial perspective will tend to be

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[45] The present study does not measure *strength* of preferences and so I do not examine reinforcement of preferences as a potential outcome of VAA use.

discarded and will be inconsequential for party preferences. Lenz (2009) has shown that, in fact, when individuals are confronted with new or contradictory information about party positions (i.e. contradictory to what the individual initially believed), they tend to adjust their attitudes to match their preferred party position, not the other way around. Hence, users who receive contradictory advice are no more likely to change their vote choice than users who receive confirmatory advice [Hypothesis 3].

Differential Processes

Research in political behaviour, communication, and psychology leads us to believe that individuals will not all *process* and *use* VAA information in the same way. Individual characteristics, like age, education and political sophistication, influence how people process information (Zaller 1992, Cacioppo, et al. 1996, Eveland Jr and Scheufele 2000, Bimber 2003, Valentino, et al. 2004, Lupia and Philpot 2005) and the kind of factors they take into account in their electoral decision (Sniderman, et al. 1991, Johnston, et al. 1996, Fournier 2002). Hence, citizens' heterogeneity needs to be integrated in the study of VAAs, in order to understand whether this tool affects all equally, or if it is more effective for certain groups of citizens over others.

As the VAA is a voter education tool that provides simple and structured information to help citizens make informed decisions, we would expect VAAs and their information to have the most impact on those who usually lack knowledge about parties and their programs, namely youth, less educated and less interested individuals (Fivaz and Nadig 2010). Alternatively, more politically experienced and interested citizens - who already have high levels of information - would not benefit in significant ways from the simple information provided by VAAs. In fact, several studies have shown that when information is formatted in simple and creative ways, youth and lower educated individuals may make more gains than others in terms of political

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interest and knowledge (Neuman, et al. 1992, Kwak 1999, Eveland Jr and Scheufele 2000, Ward, et al. 2003). In this sense, Information Communication Technologies may help to engage the less politically interested in electoral politics.

However, psychological models of information processing and evidence from other communication studies would actually suggest the opposite about VAAs' effect: these information tools will allow the information rich to get richer. These studies show that more politically experienced, sophisticated and educated individuals will be more efficient in processing and using information (Cacioppo, et al. 1996, Valentino, et al. 2004) and research has in fact found that higher educated users gain more political knowledge from VAAs than less educated users (Mahéo 2014). Hence older[46], more educated and more sophisticated users may be better equipped, politically and cognitively, to process VAA information. Therefore, in the case of individuals who do not have an initial preference, it is expected that older, more educated and more interested users of the VAA will be more likely to form an electoral preference than younger, less educated and less interested users [Hypothesis 1a].

But while more politically sophisticated and experienced individuals are more skilled in terms of using information, they are also more likely to discard counter-attitudinal information and thus less susceptible to persuasion (Zaller 1992, Taber, et al. 2009). Additionally, more experienced and educated voters tend to include a more complex set of considerations in their voting decision (Sniderman, et al. 1991). So gaining information about different parties and policy issues would be less consequential for individuals who already have a well-developed and structured electoral calculus. In consequence, older, more educated and more interested users of the VAA will be less likely to experience persuasion effects, and will thus be less likely to change

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[46] Older citizens are usually more knowledgeable about politics, more interested, vote at higher rates and are more experienced in different aspects of public life that may prove relevant to politics (e.g. dealing with public administrations, tax returns) (Delli Carpini and Keeter, 1996).

their initial electoral preference, compared to younger, less educated and less interested users [Hypothesis 2a].

Table 4.1 - Hypotheses

Hypothesis	Reported Initial Preference (pretest)	Treatment	Moderators	Hypothesized effect on preferences: (post test 1 and 2)
H1	No preference	VAA use		**Change** in preference
H1a	No preference	VAA use	Age Education Interest	**More Change** in preference for: Older, educated and interested individuals (compared to younger, less interested and lower educated individuals)
H2	Preference	VAA use		**No Change** in preference
H2a	Preference	VAA use	Age Education Interest	**Less Change** in preference for: Older, educated and interested individuals (compared to younger, less interested and lower educated individuals)
H3	Preference	VAA use	Contradictory advice	**No Change** in preference

4. Methodology and Data

Experimental Design

While most studies of VAAs rely on survey data and run into issues of self-selection (Pianzola 2014), the present study overcomes these issues by combining a randomized experiment with a panel survey. During the 2014 Quebec provincial election campaign, residents of a Montreal neighborhood[47] were offered direct and randomized access to a VAA. In the two weeks before the election, 389 participants were recruited in various locations of the neighbourhood (i.e. on the street, in sports centers, community centers, at cultural events and

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[47] This study was carried out with the collaboration of the Quebec electoral management body. One condition of this collaboration was that all participants had to be residents of the same electoral district.

more). All passers-by who were 18 years or older, Canadian citizens, and residents of the neighborhood were offered 15$ to take part in a research project on citizens' general interests and knowledge about current events. Once they accepted to take part, participants were given an electronic tablet[48] to answer survey questions, visit an information website and give us feedback on this website. This 'on the street' setup replicated the sort of information campaigns conducted by several non-governmental organizations and media companies, and so participants proved to be comfortable with the setup.

Participants were informed that they would be visiting one of multiple websites covering a variety of topics and current events, and that these websites would be allocated at random. So at the end of the first survey, participants were automatically and randomly[49] assigned to visit one of two websites[50]. The experimental condition consisted of one individual web information session of about 10 to 20 minutes, after which participants completed a second survey. The treatment was a voting aid application called the *Vote Compass* (VC). The control condition was an online quiz on Quebec movies, which contained no political information.

In total, participants in the study were asked to respond to three surveys. On the day of the experiment, individuals responded to a survey before the information treatment (pretest) and another one right after the treatment (post-test 1). Then, in the week following the election, participants were re-contacted by phone for one last survey (post-test 2), which took place about three weeks after the information treatment. 300 individuals completed all three surveys, resulting in a retention rate of 77%[51].

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[48] There was a ratio of one research assistant per participant, to ensure that computer proficiency would not prevent individuals from using the tablet or the Vote Compass.

[49] Randomization was embedded in the online survey program (i.e. there was no human involvement).

[50] See the Appendix for images of both websites.

[51] The retention rates are similar in the control and treatment groups. On average, the individuals who dropped out of the study after post-test 1 were younger, less likely to be registered to vote, less interested in politics, voted at a lower rate in the 2012 election, and paid less attention to the electoral campaign - compared to those who participated in the three surveys (differences significant at the $p<0.1$ level).

Measures

In the current study, I consider two distinct effects of the Vote Compass on citizens' electoral preferences. First, I examine whether citizens who have an initial preference for a party *change* their party preference after using the VC. Secondly, I consider whether citizens who have no initial preference *form* an electoral preference when they use the Vote Compass.

For these two types of changes, I use respondent's vote choice in the previous election as their initial preference[52], which is measured in the pretest survey. Party preferences in the current 2014 election are measured twice: right after the information session and in the week following the election (with the first and second post survey). This allows for an evaluation of changes in preferences in both the short and medium term. In consequence, the outcome variable *preference change* is coded 1 if the individual changed his/her party preference between 2012 and 2014, and coded 0 if her preference remained the same. Secondly, the variable *preference formation* is coded 1 if the participants who had not voted in 2012 (and had not reported a vote choice) stated a party preference in 2014, and coded 0 if they did not state any party preference for the 2014 election.

I also investigate whether the effect of the VC varies for individuals with different background characteristics. First, I consider the effect of the VAA for individuals with varying levels of formal education. Individuals' educational attainment is used to divide the sample into four groups: those with a high school degree or less (coded 0), with some vocational or trade education or a degree (coded 1), with a cegep or college education or a degree (coded 2), and

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[52] In the pre-test survey, participants were asked if they had voted in the last 2012 provincial election, and for those who had voted, whom they had voted for. Ideally, we would use participants' party preference for the current election as the baseline measure of 'initial party preference'. However, a pilot study revealed that in the short lapse of time between the pre-test survey and the first post-survey, participants recalled being asked the same question about their vote intentions for the 2014 election and made an effort to recall their previous answer and give the same answer to the vote choice question in the pre-test and post-test 1, thus making it impossible to measure any change based on exposure to the treatment. Given that there are only 18 months between the 2012 and the 2014 elections, reported party choice for 2012 is a good proxy for 2014 vote intentions.

those with university education or a degree (coded 3). Secondly, I examine whether the effect of the VAA varies across age groups. The variable for age is coded in four categories (ages 18 to 30 coded 0, ages 31 to 40 coded 1, ages 41 to 50 coded 2, and ages 51 years-old and more coded 3). Finally, the conditioning effect of political sophistication is considered, using a continuous variable for political interest (coded from 0 for no interest, to 3 for a lot of interest) (Luskin 1990, Xenos and Moy 2007).

To study the effect of confirmatory versus contradictory advice, I use the Vote Compass log files, which record respondents' answers to the issue questions and how they compared to parties' positions on the same issues. Wall (2014) and Walgrave and colleagues (2008) showed that recall measures of the 'advice' are usually unreliable, as users are likely to misreport the personalized advice they obtained through the VAA. So by using the VAA log file, I am able to recreate precisely the 'advice' offered by the VAA and obtain an objective measure. This advice represents the percentage of general agreement between the user and each political party. The Vote Compass team was able to provide the log file for 111 of the 209 participants who were assigned to visit the VC website. Based on the first party that was 'recommended' to users (i.e. the party with which the user agreed most on issues), I can determine whether users received confirmatory advice (i.e. the first recommended party is the same as the user's initial party preference, coded 0) or contradictory advice (i.e. the first recommended party is *not* the same as the user's initial party preference, coded 1). I also consider the second party that is recommended to users (i.e. the party with the second highest level of agreement), and determine whether users received confirmatory advice based on either the 1st or 2nd recommended party (i.e. the first or second recommended party is the same as the user's initial party preference, coded 0) or contradictory advice (i.e. the first or second recommended party is the *not* the same as the user's initial party preference, coded 1).

Analyses

To estimate the effect of the Vote Compass on preference formation and party preference change, I consider whether users behave differently than non-users. So for each outcome, I run a logistic regression and calculate the average treatment effect of the VC on the propensity to form or change an electoral preference[53]. Furthermore, I evaluate whether the VC has differential effects for younger or older citizens, more or less interested citizens, and more or less educated citizens. Hence, an interaction term between the experimental condition and the individual background characteristic (i.e. age, interest and education) is included in additional logistic regression models. In order to control for initial imbalances between the treatment and control groups[54], and to improve the precision with which the average treatment effects are estimated, three covariates are included in the regression models: internal efficacy, registration status and reading abilities (Gerber and Green 2012). Finally, two-sample t-tests are used to measure the effect of the VAA advice *among* VAA users*,* and to see whether the rate of preference change differs among VAA users who receive confirmatory advice versus those who receive contradictory advice.

5. Results

Preference Formation

First, I consider the case of people who do not have set initial preferences for a political party[55] (n=110). So the question here is: does the Vote Compass lead them to form a preference

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[53] Average Treatment Effects are obtained with the *margins* command and are displayed in Table 4.5 in the Appendix.

[54] A logistic regression model predicting assignment to the experimental conditions revealed that three variables were statistically significant in explaining allocation to the treatment: internal efficacy, registration status on voters' lists, and reading abilities. See Table 3.3 in the Appendix for descriptive statistics of the population sample.

[55] This group is based on the sample of participants who did not vote in the last election, in 2012. It is likely that those 2012 non-voters did not know whom to vote for, or did not have strong (enough) preferences to motivate them to cast a ballot. While other factors could explain non-voting in the 2012 election (e.g. unavailability), it is assumed that not having

for a specific political party? The results of two logistic regressions, displayed in the first two columns of Table 4.2, show that the VC has a positive effect on preference formation in the short and medium term, but this effect is not statistically significant. So Hypothesis 1 is not confirmed: those who have no initial preference are not significantly more likely to form an electoral preference after taking the Vote Compass.

I then consider the variation in the VC effect across age, educational attainment and levels of political interest. Columns 3 to 6 in Table 2 reveal that the interaction terms are never statistically significant. But even if the interaction terms are not statistically significant, we need to examine the marginal effects in order to assess whether VAA use and conditional factors interact in influencing the probability of forming a preference (Berry et al., 2010). Figures 4.1 to 4.3 display the average marginal effects of the Vote Compass in the short term, and provide evidence of differential effects. Firstly, VC use only has a positive and statistically significant effect on the preference formation of one of the middle-aged groups (but only in the short term). In fact, non-voters who are 31 to 40 years old are 42 percentage points more likely to develop a preference for a party after using the VC, compared to non-users of the same age (Figure 4.1). Secondly, VC use has a positive and statistically significant effect on the preference formation only for the university educated and highly interested users (again only in the short term). The university educated and the highly interested users are respectively 27 percentage points and 40 percentage points more likely to develop a preference for a party after using the VC, compared to non-users with the same level of education or interest (Figures 4.2 and 4.3). In the medium term, none of the marginal effects of the Vote Compass were statistically significant.

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expressed a preference for a party in the 2012 election makes 2014 voters less likely to have clear or fixed preferences in the current election, and I assume that non-voting in 2012 is a proxy for 'no fixed preference' in 2014.

Table 4.2 - Results of 8 Logistic Regression Models for Preference Formation: Standard Models and Interaction Models, in the Short-Term (ST, in white columns) and Medium-Term (MT, in grey columns).

	STANDARD MODEL (NO INTERACTION)		INTEREST		EDUCATION		AGE	
	ST	MT	ST	MT	ST	MT	ST	MT
Vote Compass Use	0.34	0.36	-1.21	-0.26	0.21	0.08	-0.31	-0.58
	(0.43)	(0.76)	(1.14)	(1.95)	(0.59)	(0.99)	(0.62)	(1.24)
MODERATOR	-	-	-0.05	0.68	-0.77**	-0.60	0.25	-0.53
			(0.35)	(0.75)	(0.32)	(0.55)	(0.28)	(0.56)
VC treatment	-	-	0.70	0.33	0.36	0.47	0.24	0.78
* MODERATOR			(0.46)	(0.99)	(0.36)	(0.63)	(0.45)	(0.85)
Reading	0.08	0.26	0.01	0.12	0.32	0.43	0.02	0.20
	(0.27)	(0.46)	(0.29)	(0.50)	(0.30)	(0.50)	(0.29)	(0.48)
Registered to vote	0.81*	1.18	0.88*	0.82	0.88*	1.22	0.70	1.24
	(0.44)	(0.78)	(0.46)	(0.85)	(0.46)	(0.79)	(0.46)	(0.83)
Internal efficacy	0.21	0.23	0.11	-0.05	0.52*	0.40	0.28	0.24
	(0.24)	(0.41)	(0.26)	(0.44)	(0.28)	(0.48)	(0.25)	(0.40)
Constant	-1.27	-0.24	-0.71	-0.41	-2.10**	-0.62	-1.51	0.67
	(0.95)	(1.45)	(1.05)	(1.75)	(1.05)	(1.58)	(1.06)	(1.70)
Pseudo R2	0.04	0.07	0.07	0.13	0.10	0.09	0.07	0.09
Log likelihood	-64.88	-24.11	-67.75	-25.99	-67.75	-25.99	-51.72	-25.68
LR χ2 (df=4 or 6)	5.77	3.77	9.66	6.69	14.08	4.92	9.15	4.60
McKelvey & Zavoina's R2	0.071	0.13	0.12	0.24	0.18	0.17	0.12	0.17
N	98	64	98	64	98	64	95	62

Note: Cells contain beta coefficients with standard errors in parentheses.
* p < .10 - ** p < .05 - *** p < .01

Figure 4.1 - Average Marginal Effects of the Vote Compass on **Preference Formation** By Age Group, in the Short-Term (90% Confidence Intervals)

Figure 4.2 - Average Marginal Effects of the Vote Compass on **Preference Formation** By Education Level, in the Short-Term (90% C.I.)

Figure 4.3 - Average Marginal Effects of the Vote Compass on **Preference Formation** By Level of Interest, in the Short-Term (90% C.I.)

Figure 4.4 – Average Marginal Effects of the Vote Compass on **Preference Change** By Age Group, in the Short-Term (90% C.I.)
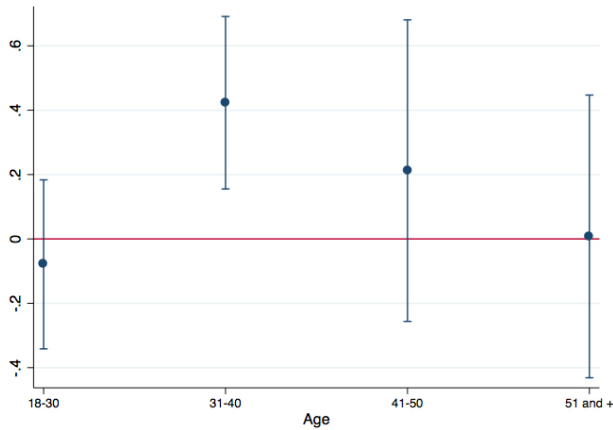
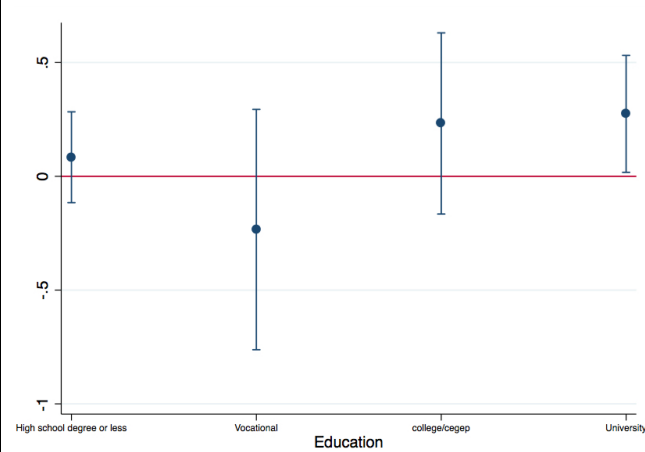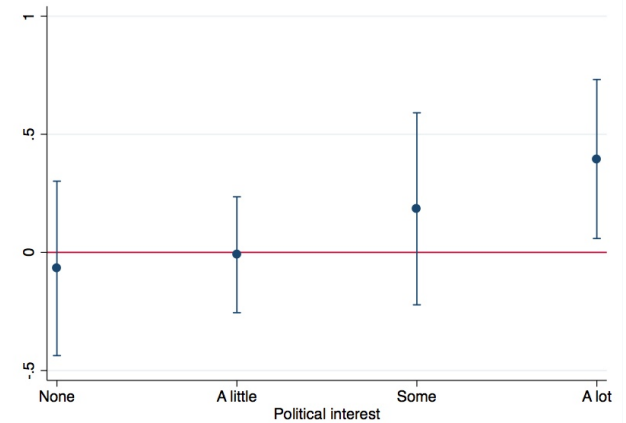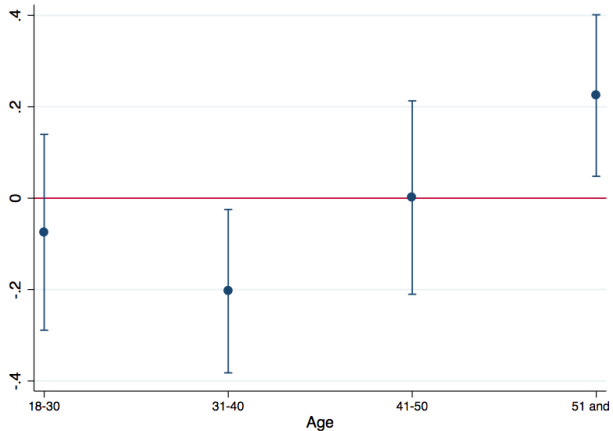Figure 4.5 – Average Marginal Effects of the Vote Compass on **Preference Change** By Education Level, in the Short-Term (90% C.I.)
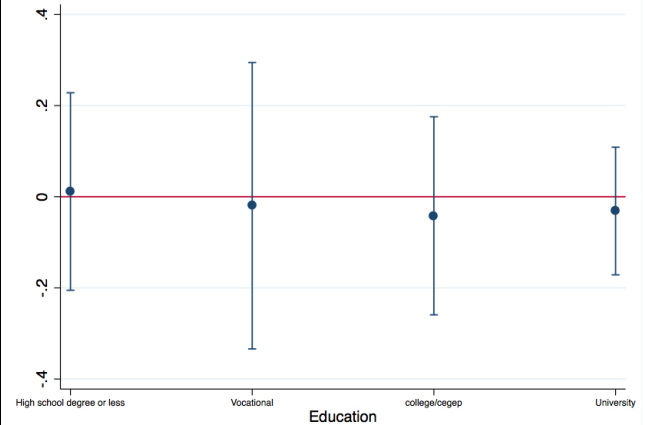
Figure 4.6 – Average Marginal Effects of the Vote Compass on **Preference Change** By Level of Interest, in the Short-Term (90% C.I.)

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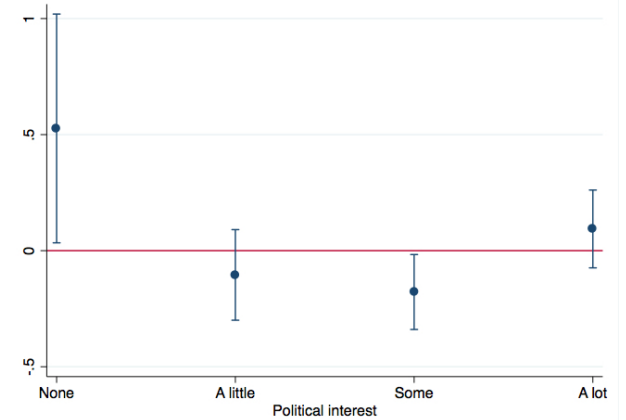
In sum, Hypothesis 1a is partially confirmed. As predicted, users of the VC who are 31 to 40 years-old, university educated and highly politically interested are substantially and significantly more likely to form an electoral preference, compared to the youngest users, the lower educated, and those less politically interested. However, this effect is limited to the short-term.

Party Preference Change

I now consider the effect of VC use on party preference change, among citizens who voted in 2012 and stated their vote choice[56] (n=269). Here the question is whether using the VC leads people to change their initial electoral preference.

The results of two logistic regressions (columns 1 and 2 in Table 4.3) show that, in general, the VC has a small negative effect on party preference change, in both the short term and medium term, but these effects are not statistically significant. So, the VC generally does not affect preference change and Hypothesis 2 is confirmed.

From all the interaction models (columns 3 to 6 in Table 3), there is evidence of only one differential effect of VC use, along the dimension of age, in the short term. The coefficient of the interactive term in column 5 of Table 3 is positive and statistically significant, which indicates that VC use has a larger effect on preference change for older users compared to younger users. This is confirmed in Figure 4.4, where we see that the 31-40 years old users are 20 percent points less likely to change their preference, and the users aged 51 years old and more are 22 percentage points more likely to change their party preference (compared to non-users of the same age groups). The effect among the 31-40 years old remains the same in the medium term,

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[56] It has to be acknowledged that 2012 voters could have changed their electoral preference in the 18 months that separated the 2012 and 2014 election, due to factors like retrospective evaluations of the government. The important point is that people who have performed an electoral calculus and decided their electoral preferences in 2012 should be more likely to have clear or fixed electoral preferences again in the current election.

Table 4.3. - Results of 8 Logistic Regression Models for **Preference Change**: Standard Models and Interaction Models, in the Short-Term (ST, in white columns) and Medium-Term (MT, in grey columns).

	STANDARD MODEL (NO INTERACTION)		INTEREST		EDUCATION		AGE	
	ST	MT	ST	MT	ST	MT	ST	MT
Vote Compass Use	-0.11	-0.24	-0.36	-0.78	0.01	-0.18	-0.84*	-0.76
	(0.27)	(0.30)	(0.95)	(1.05)	(0.52)	(0.57)	(0.45)	(0.52)
MODERATOR	-	-	-0.25	-0.23	0.05	-0.14	-0.50***	-0.33*
			(0.25)	(0.28)	(0.16)	(0.18)	(0.18)	(0.20)
VC treatment * MODERATOR	-	-	**0.07**	**0.19**	**-0.06**	**-0.04**	**0.52****	**0.34**
			(0.31)	(0.34)	(0.22)	(0.25)	(0.25)	(0.27)
Reading	-0.30*	-0.15	-0.29	-0.13	-0.31*	-0.09	-0.33*	-0.16
	(0.17)	(0.19)	(0.18)	(0.19)	(0.18)	(0.20)	(0.18)	(0.19)
Registered to vote	-0.01	-0.34	-0.02	-0.33	-0.01	-0.26	-0.11	-0.33
	(0.40)	(0.49)	(0.40)	(0.50)	(0.41)	(0.50)	(0.43)	(0.51)
Internal efficacy	-0.22	-0.27	-0.09	-0.21	-0.24	-0.20	-0.19	-0.25
	(0.15)	(0.17)	(0.18)	(0.21)	(0.16)	(0.18)	(0.16)	(0.18)
Constant	1.16	1.08	1.51	1.48	1.11	0.90	1.95**	1.53
	(0.76)	(0.89)	(0.95)	(1.08)	(0.82)	(0.96)	(0.82)	(0.94)
Pseudo R2	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.03
Log likelihood	-167.91	-133.73	-170.22	-135.65	-171.22	-136.08	-170.30	-135.65
LR $\chi 2$ (df=4 or 6)	6.63	4.70	8.17	5.36	6.74	6.10	15.08	7.56
McKelvey & Zavoina's R2	0.03	0.03	0.04	0.03	0.03	0.04	0.08	0.05
N	260	211	259	210	260	211	258	210

Note: Cells contain beta coefficients with standard errors in parentheses.

* p < .10 - ** p < .05 - *** p < .01

and represents the only statistically significant effect of the Vote Compass on preference change in the medium term.

Figure 4.5 shows that there is no difference in the effect of the VC along the dimension of education: all marginal effects are close to zero and not statistically significant in the short term. On the other hand, Figure 4.6 points to differences in the effect of VC use across levels of political interest in the short term. In fact, users who have no interest in politics are 54 percentage points more likely to change their party preference (compared to uninterested non-users), while politically interested users are 17 percentage points less likely to change their initial preference (compared to similarly interested non-users)(these effects are statistically significant at the 90% level).

As predicted, VC use decreased the propensity to change electoral preferences for the middle age group and interested users, while it increased the probability of preference change among politically uninterested users. But contrary to the expectations, the VC increased the propensity to change electoral preferences for the older group of users. Thus, Hypothesis 2a is only partly confirmed.

The Advice

After investigating the effect of Vote Compass *use*, I turn to the effect of the 'advice', that is, the information provided by the VC on the results page[57]. First, Figure 4.7 presents how frequently users receive confirmatory or non-confirmatory advice. I focus on the party that displays the highest level of agreement in the bar graph (i.e. Advice 1), but also consider the possibility that users' initial preference is confirmed by one of the two parties displaying the highest levels of agreement (i.e. Advice 1 or 2). We see that the majority of 'first party advice'

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[57] See the image of the Vote Compass: "How much you agree with the parties".

offered by the VC does *not* confirm users' initial party preference. For almost 60% of users, the VC does not display users' initially preferred party as the first ranked party (in terms of percentage of agreement, in the bar graph). But if I include the second party and focus on 'Advice 1 or 2', two thirds of users actually get a confirmation of their initial party preference.

Figure 4.7: Proportion of Vote Compass users who receive a confirmatory or a non-confirmatory advice – based on 'Advice 1' and 'Advice 1 or 2'
(n=74)
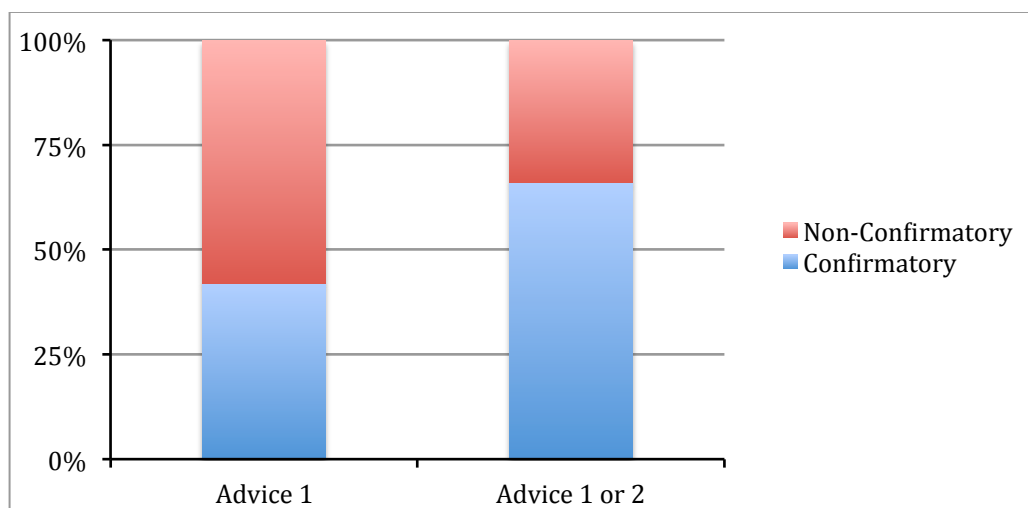
Given that contradictory advice is frequent, we may wonder if VAA users are more likely to switch party choice when they are confronted with this information. I conducted two-sample t-tests to compare the rate of preference change in the groups with confirmatory and non-confirmatory advice. The results show that those who use the VC and obtain non-confirmatory advice are not significantly more likely to change their party preference, compared to users who obtain a confirmation of their preference[58]. The evidence shows that different types of

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[58] In the short term (n=74), there was no significant difference in the rate of preference change for 'confirmation on Advice 1' (M=0.26, SD=0.8) and '*no* confirmation on Advice 1' (M=0.42, SD=0.8) (t(72)=-1.43, p = 0.158). There was also no significant difference in the rate of preference change for 'confirmation on Advice 1 or 2' (M=0.35, SD=0.7) and '*no* confirmation on Advice 1 or 2' (M=0.36, SD=0.10); t(72)=-0.11, p = 0.912. Results are similar in the medium term (n=59).

incongruent information ('Advice 1' or 'Advice 1 or 2') do not push users to change their party preference, in either the short term or the medium term. Thus, Hypothesis 3 is confirmed.

Table 4.4 - Results

Hypothesis	Reported Initial Preference	Treatment	Moderators	Effect found on preferences:
H1	No preference	VAA use		**No change** in preference → Hypothesis not confirmed
H1a	No preference	VAA use	Age Education Interest	**More change** in preference for thirty-year olds, highly interested and university educated users → Hypothesis partly confirmed
H2	Preference	VAA use		**No change** in preference → Hypothesis confirmed
H2a	Preference	VAA use	Age Education Interest	**Less change** in preference for thirty-year olds and politically interested users **More change** for the older age group and politically uninterested users → Hypothesis partly confirmed
H3	Preference	VAA use	Contradictory advice	**No change** in preference → Hypothesis confirmed

6. Discussion and Conclusion

Voting Aid Applications are relatively new, but they are an increasingly important player in the information environment of electoral campaigns. They represent an easy way to obtain non-partisan and personalized information in the context of elections. In this sense, VAAs contribute to the diversification and accessibility of information that is fundamental to the democratic process (Delli Carpini and Keeter 1996). But as their popularity increases throughout the world, observers have expressed concerns about the nature of the information provided and the impact it could have on the electoral process. Thus, in this exploratory study, I investigated

the effect of a VAA on users' electoral decision making with two questions in mind. First, is the information provided by VAAs persuasive and prone to lead citizens to change their party preferences? Second, given the educational objective of VAAs, do they help undecided citizens to learn about politics and ultimately form an electoral preference? And do they especially help those most in need of political information, the younger and the less educated?

This research contributes in a number of ways to the sub-field of political behavior focused on VAAs' political effects. The experimental design, coupled with the panel survey and the use of deception, makes it possible to overcome the methodological limits of previous studies and to have more confidence that the observed effects of VAAs are in fact causal. Also, conducting the experiment in various locations with a representative sample of the population allows to strengthen the generalizability of the findings. In fact, participants from diverse backgrounds used the VAA in a variety of contexts that are representative of mobile devices' uses and web applications' uses (e.g. sitting in a waiting room, or while eating a meal). In addition to assessing the main effect of a VAA, I further considered the possibility of heterogeneous effects. As this information tool is designed for educational purposes, it is important to know whether it fulfills its objective to be useful (or more useful) for groups of citizens who tend to be less knowledgeable of, or experienced with the electoral process.

The results of this study first show that, indeed, the Vote Compass can have a learning effect and stimulate preference formation. But as expected from political psychology, older, higher educated and more politically interested citizens are the ones who are more likely to form a party preference when using the Vote Compass. While this is good news, as we obtain further evidence of VAAs' educational utility, it leads us to conclude that VAAs may be missing the target. The youngest, less educated and less politically interested citizens, who are usually less politically engaged and knowledgeable (Delli Carpini and Keeter, 1996), are the ones most in

need of civic education material, but are not benefiting from VAA use. Thus, it seems that a minimal level of political sophistication is necessary to be able to effectively use VAAs, and benefit from the VAA's educational experience.

However, the learning effects were only observed in the short-term, right after the exposure to the Vote Compass, and did not last up to Election Day. This tends to confirm prior findings which recognized that VAAs mostly affect voting *intentions* (Walgrave et al., 2008). However, we also need to acknowledge that one web education activity is usually not enough to lead to behavioral changes (Hooghe et al., 2010). So one possibility for voter education campaigns and organizations would be to consider combining VAA use with a follow-up discussion or with another information activity, in order to help less politically sophisticated users to process the newly acquired political information and make the most of it. Additionally, we have to consider the possibility that the effect of a VAA may be enhanced with multiple or frequent use (Enyedi, 2015), and as the use of these applications becomes normalized in society, we may witness more concrete effects.

While the results of this study do not show that the VAA *generally* lead citizens to change their initial preferences, there are clear indications that the VAA did impact users' preferences in certain cases. Confirming our expectations, the results showed that politically uninterested users of the Vote Compass were more likely to change their party preference, whereas the thirty-year olds and interested users were less likely to change their preferences. Ultimately, the impact of the Vote Compass on party preference change was mostly limited to the short term. The only significant effect of the Vote Compass on Election Day was observed among the thirty-year olds who were still less susceptible to change their party preference. One surprising result is that the oldest users, aged 51 years or more, were more likely to change their party preference on the day of the information activity. There is a possibility that this group may have been impressed by the

novelty of the web application and the interactive information displayed by the VAA (especially in the context of Quebec where VAAs are relatively new), which could have increased their willingness to consider other party options.

Finally, receiving a non-confirmatory advice did not significantly push users to change their party preferences (compared to other users who received confirmatory advice). This result tends to corroborate prior findings in social psychology (Cacioppo et al., 1996, Zaller, 1992) and of VAA studies (Wall et al., 2014), that citizens tend to disregard incongruent information. In future studies on the effect of VAAs' recommendations, scholars should examine the impact of different types of VAA advice on electoral preferences (i.e. bar graphs or diagrams) and consider conducting laboratory experiments to investigate how people react to confirmatory or contradictory advice. For example, when users are offered results in the form of a bi-dimensional graph and a bar graph, do users pay attention to both, or only one? And why? Also, how do people react to surprising recommendations? Knowing better how people use and perceive VAAs will further our understanding of information processing, and possibly help VAA designers enhance the education potential of these web applications.

This exploratory study offers an innovative way to study the political effects of VAAs, but it nonetheless has some limitations. First, the measure of initial electoral preferences, based on reported voting behavior in the 2012 election, is only a proxy for initial party preferences in the 2014 election. Secondly, the relatively small size of the sample limits the estimation of the effects of the VAA (notably in the medium-term) and may explain why several effects fall short of statistical significance. Additionally, the generalizability of the findings is in part limited by the context of the experimental study. All participants were recruited in the same electoral district, which has a history of electing candidates of the same party overtime, the Parti Québécois. Additionally, in the Quebec context, with a first-past-the-post electoral system and a long time

domination of two major parties, alternative party options may have been perceived as less viable by citizens, both at the provincial and the district levels. In this sense, the utility and the impact of the VAA may be smaller in Quebec, compared to contexts with an electoral system based on proportional representation. Replications of this experimental study, with a bigger sample and in different electoral contexts, would thus be needed to confirm these findings.

In line with previous VAA studies, the findings tend to show that VAAs have little durable effects on vote choice (Enyedi, 2015, Walgrave et al., 2008). The effect of the VAA was much more pronounced immediately after its use, than on Election Day. Even if some of the results of this study are limited due to the small size of the sample, there is clear evidence that some citizens learn to develop preferences and engage in open-minded thinking about party options immediately after using the VAA (Kam, 2006), while there is no indication that the VAA lead to more vote switching on the day of the election.

VAAs provide a great example of how the Internet has the potential to contribute to the quality of democracies. This voter education application provides information on parties' programs in a unique, structured, and interactive way, thus making political information more *accessible* and practical for citizens. However, inequalities in citizens' abilities to *use* and process this information prove to be a source of unequal democratic benefits. This highlights the fact that more efforts need to be made to further tailor political websites and applications to different citizens' needs, especially those most in need of political information.

Chapter 5: Conclusion

1. Introduction

Political inequality and political mobility are complex subjects of study especially as we need to consider both the amount of political authority and its quality, with the differences in views and interests (Brady, et al. 2015). Nonetheless, as subjects they deserve far more attention because of how unequal political voice and authority impact political decision-making and public policy outputs. The fact that socio-economic (dis)advantage translates into unequal political influence violates the democratic ideal of political equality (Walzer 1983, Lijphart 1997, Dahl 2006, Bartels 2008); yet this dissertation has shown the complexity of the dynamic processes of inequalities and the difficulty of addressing political inequalities.

Inequalities in political participation originate in the family and are passed from one generation to the next (Verba, et al. 2005, Calarco 2014, Brady, et al. 2015). In addition, political participation and attitudes learned at an early age tend to remain relatively stable over the life cycle (Jennings, et al. 2009, Prior 2010, Neundorf, et al. 2013). In such a context of persistence and stability of political traits across generations and throughout life, one rightfully questions if there is room for change? Is political mobility possible? And can those who are initially at a political disadvantage eventually catch up with the more participative members of society?

The objective of this dissertation has been to investigate whether various types of education could be a means of political mobility? Considering the uneven levels of social, economic, and political resources (both inherited from the family and that pervade daily life), can education impact inequalities in participation between social groups? The ambition of this dissertation has been to consider a variety of sources of political inequalities and to control for these in the evaluation of the participation-enhancing

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benefits of education. Through propensity score analysis and experimentation, this dissertation aimed to isolate the effect of formal education and voter education on political engagement, electoral participation, and political decision-making. In addition, this dissertation compared the impact of education for citizens who stand at different 'starting lines' in politics. In consequence, I considered different mechanisms through which education may affect participation and I estimated the impact of education for different social groups.

2. What We Have Learned

The main objective of this dissertation was to address the democratic challenge of political inequalities and assess pertinent means by which to level the political playing field. In this vein, the dissertation focused on two avenues of adult learning and asked whether these forms of education could break the cycle of reproduction of inequalities. The main results of that line of questioning are summarized in Table 1.

The first insight from this dissertation is that citizens' political engagement and behaviours are not completely set in childhood, and that citizens' continue to learn about politics, outside of the family, in adulthood. The three chapters showed that adult citizens respond to different stimuli and can experience significant changes in psychological engagement, electoral participation, and preference formation.

This dissertation examined two types of education, which provide different opportunities for citizens to learn about politics during adulthood and to further build their abilities to be active in politics. Formal education and voter education are both important for democracy: university education is an important explanatory factor in political participation, and voter education campaigns are an integral part of elections. The first

question addressed by this work is whether these types of education have participation-enhancing benefits.

Table 5.1 - Summary of Findings: The Effects of Formal Education and Voter Education on the Political Engagement and Behaviour of Socio-Economically Disadvantaged and Advantaged Citizens, and on the Inequalities between Them (Statistically Significant Results are Highlighted in Blue and Purple).

		Disadvantaged	Advantaged	Change in Inequalities
UNIVERSITY EDUCATION	Electoral Participation	++	+	–
VAA EDUCATION	Knowledge	+	++	+
	Passive Interest (Attention)	+	0	–
	Active Interest (Info-seeking)	0	0	0
	Intentions to vote	++	0	–
	Electoral Participation	+	++	+
	Preference formation	0	++	+
	Preference change	0	0	0

Chapter two addressed the impact of formal education on electoral participation. The Inverse Probability of Treatment Weight regression analyses controlled for the influence of the family background and provided evidence of a positive causal effect of university education on electoral participation, both at the federal and provincial levels. So,

evidence from the Canadian context confirms prior findings from the United States, that university education does indeed have participation-enhancing benefits (Dee 2004, Milligan, et al. 2004, Sondheimer and Green 2010, Henderson and Chatfield 2011, Mayer 2011).

Chapter three and four assessed the impact of a voter education campaign tool, called the Voting Aid Application, on political engagement, electoral participation, and electoral decision-making. The experimental design offered the possibility to control for users' background characteristics and to circumvent the problem of self-selected use of political information. While the analyses did not provide conclusive evidence of participation-enhancing benefits of VAA use, it was nonetheless clear that this voter education app had other democratic benefits. Indeed, the use of a VAA proved to be able to increase levels of political knowledge, interest, and motivation to vote. Alternatively, the VAA had little effect on the electoral decision-making of users at the polling station, with only temporary effects on the preference formation of undecided citizens and on changes of preferences of decided citizens. The findings of this experimental study tend to confirm the evidence of cross-sectional studies of VAAs, in that VAAs can engage citizens in the electoral process without orienting their votes or triggering vote switching (Walgrave, et al. 2008, Marschall and Schultze 2012, Enyedi 2015). This confirms that voter education and information campaigns matter in the context of elections as they represent effective ways to inform citizens and engage them in politics (Delli Carpini and Keeter 1996, Iyengar and Simon 2000, Kam 2006).

But beyond the examination of the democratic benefits of these two types of education, the argument developed in this dissertation is that we need to know who benefits from formal education and voter education. Indeed, the answer to this second

question can inform us, not only about the possibilities of strengthening participation, but also about the potential for formal education and voter education to equalize participation.

Thus, chapter two also compared the participation-enhancing benefits of university education among socio-economically advantaged and disadvantaged groups of citizens. While university education tended to have a larger impact on the electoral participation of citizens from less privileged families than for more privileged ones, there was no conclusive evidence that the effect of education was significantly different between the two groups. In other words, in Canada, university education does not offset participation inequalities between socio-economically advantaged and disadvantaged individuals.

Chapters three and four also assessed how the effects of the voter education varied across groups of citizens. First, the evidence showed that the VAA only stimulated political knowledge among the more educated users, and thus widened the knowledge gap between the more and less educated citizens. Alternatively, this simple and interactive web application had a significantly greater impact on the political interest and motivation to vote of the less educated users, and it ultimately narrowed political engagement gaps between the haves and the have nots. Finally, the VAA only helped older, more educated and more politically interested users to form a preference for a party on the day of the information activity. In sum, the findings show that VAAs offer distinct benefits to different social groups. This confirms that a general evaluation of campaigns may in fact hide distinct information dynamics across groups of citizens and obscure the potential democratic benefits and limits of voter education campaigns for citizens with different cognitive and political abilities (Neuman, et al. 1992, Kwak 1999, Eveland Jr and Scheufele 2000, Eveland 2001). Indeed, depending on the political outcome considered, the VAA alternatively increased or decreased political inequalities between the political haves and the have nots.

In sum, formal education and voter education may stimulate political engagement and participation, but they do not equalize participation per se.

3. Contributions to the Discipline

This dissertation contributes to different fields of study by addressing the interplay between education, information, and political participation, and by using two distinct operationalizations of education. The first argument is that citizens may learn about politics in different contexts and develop their capacities to be active at different times in life. The second argument of this dissertation is that possibilities to learn in adulthood may help to compensate for disadvantages inherited from parents, in childhood. In Chapter two, the empirical study speaks to the literature of political behaviour with its investigation of the effect of university education on electoral participation. In chapters three and four, this dissertation speaks to the fields of social psychology and political communication, by examining the impact of a voter information tool on users' political engagement, participation and vote choice.

The first contribution of this dissertation is methodological. For both empirical studies, I used methodological techniques to control for individuals' background characteristics and isolate the direct and independent effect of education on participation. Both the propensity score analysis and the experimental design enabled me to circumvent the issue of endogeneity of educational and informational choices, which has been a central limit for cross-sectional studies. The Inverse Probability of Treatment Weight analysis allowed me to control for family influences and pre-adult characteristics experiences in childhood and adolescence, which are explanatory factors for both educational attainment and political participation. I was thus able to offer an estimate of the effect of education on

participation that was purged of parental influences (i.e. the parental transmission of socio-economic status and political characteristics to their children). The randomized experiment also made it possible to assess the net effect of the VAA, by removing the possibility for individuals to choose to use or access this information. Randomization makes it possible to control for background characteristics that impact both consumption of political information and political participation, and assess the direct effect of the VAA. This methodological contribution paves the way for more substantive contributions, by supplementing prior evidence from the fields of political behaviour and communication on the effect of formal education and information campaigns.

Even if political science research has accumulated a substantive amount of evidence on the association between educational attainment and political participation, the bulk of this evidence comes from cross-sectional studies and remains mixed. In the first chapter, I used an IPTW analysis to investigate this causal link in the Canadian context and provided evidence of a positive causal effect of education on electoral participation. This finding supports the conventional view that education is a cause for participation, and not just a proxy for parental status or pre-adult characteristics (Verba, et al. 1995, Henderson and Chatfield 2011, Mayer 2011). The fact that the results in the Canadian case match the results from most American studies (in contrast to the findings in several European countries), further indicates that formal education may be a particularly important resource for citizens in contexts where electoral participation is more costly and unequal (Milligan, et al. 2004, Gallego 2014). Additionally, chapter one went a step further than previous causal studies on the effect of formal education, by controlling for family background and comparing the impact of university education across socio-economic backgrounds. Contrary to the evidence found for civic education in high school (Campbell

2008, Neundorf, et al. 2015), the effect of university education did not differ substantively between lower and higher SES groups. Resources and abilities acquired in the university context failed to compensate for early family disadvantage. In chapters three and four, the experimental design allowed to evaluate the net political effects of the VAA, but more specifically to assess this effect among lower and higher educated citizens who are said to consume and process political information in different ways. While the effect of the VAA on electoral participation was not confirmed, this study extended the scope of VAA studies by providing evidence of positive effects on non-behavioral outcomes: political knowledge, interest and motivation. This confirms prior findings that information campaigns have various democratic benefits in times of elections, notably by informing, educating and engaging citizens (Bartels and Vavreck 2000, Kam 2006). Additionally, the evidence of differential effects of the VAA for the more and less educated users confirmed evidence from communication studies that media use do not accrue the same benefits to all citizens, and that political inequalities may be diminished or increased (Ettema and Kline 1977, Eveland Jr and Scheufele 2000).

This dissertation speaks to the theory of social psychology by focusing on individuals' predispositions, and how these matter for information processing and political decision-making (Zaller 1992, Cacioppo, et al. 1996, Lupia and Philpot 2005). The findings on the differential effects of VAAs support the argument that individual abilities, most notably educational and cognitive abilities, are important in explaining how people use political information. However, the findings show that both the more and the less sophisticated users can benefit in some way from the VAA's information. So this supports insights from communication studies, that no single group of citizens automatically or invariably benefits from political information. The type of information and communication

medium considered is also key in understanding who benefits from campaign information, and how (Eveland Jr and Scheufele 2000, Valentino, et al. 2004, Xenos and Moy 2007).

4. Informing Public Policy

This dissertation draws attention to the problem of participation inequalities and aims to contribute to the reflection on potential ways to solve or at least reduce these inequalities. There are multiple ways to diminish political inequalities, both direct and indirect, promoted by governments or other actors of civil society (Page and Simmons 2000, Dahl 2006, Soss and Jacobs 2009). This dissertation focused on the general concept of education as a potential way to solve inequalities. While many scholars have focused on education in childhood and adolescence (i.e. civic education and parental socialization), I focus on avenues of political learning in adulthood. The three empirical chapters looked more specifically at university education and voter education provided by not-for-profit organizations.

The first study provided evidence of participation-enhancing benefits of formal education. While university education did not diminish significantly the participatory gap between advantaged and disadvantaged individuals, it still proved to have a significant causal effect in stimulating electoral participation. In consequence, public policies facilitating access to university education would tend to foster citizen participation in Canada (Page and Simmons 2000, Dahl 2006, Soss and Jacobs 2009). If policymakers promote access to higher education, it will increase electoral participation, or at least prevent it from further declining among the younger generations (Blais, et al. 2004, Milligan, et al. 2004). But we cannot realistically expect all citizens to pursue university education, and we obtained evidence that university education is no silver bullet for the

problem of participatory inequalities. As such, other forms of education and policy avenues should be considered to address the complex issue of political inequalities.

The second and third studies considered another education intervention: voter education provided by the VAA during electoral campaigns. The fact that the VAA was able to stimulate political interest, knowledge, motivation, and preference formation, but did *not* influence party preferences, leads us to believe that public agencies and organizations whose mission is to build citizens' political capacities and promote electoral participation could use such a tool. It was especially clear that the disadvantaged, those most in need of voter education and political information, could particularly benefit from the app. VAAs are a good example of how Information and Communication Technologies can be used to develop simple and interactive tools of information that reach a large number of citizens at a relatively low cost (compared to face-to-face voter education programs, for example). In a context where resources and governmental funding are limited, it is almost inevitable that organizations that conduct information campaigns need to use ICTs and cost-efficient tools like the VAA.

The findings showed that VAAs have several overall democratic benefits; however, they also showed that these online apps could potentially increase political inequalities between socio-economically advantaged and disadvantaged citizens. The question of access and promotion of this tool is thus an important issue. It would thus be judicious to focus the promotion of this education tool where there is the most in need of information: socio-economically disadvantaged and marginalized communities. As such, VAAs could be promoted by organizations that offer services to underprivileged citizens and become a resource in their strategies of voter information during elections. However, the VAA proved to have somewhat limited effects in time and in scope. As one voter education activity may

not be enough to have lasting and participatory effects, a strategy combining several information or education activities might prove more successful. NGOs and associations who use VAAs as voter education activities could potentially complement this activity with a follow-up discussion, promote additional uses of the VAA, or provide additional types of voter information.

In conclusion, by gaining understanding of what kind of effects these various education programs have on political engagement and participation, and who benefits most from these programs, political decision-makers and designers of education campaigns will be better equipped to make decisions about which education programs to promote and to whom they should be targeted. This information should also help prevent voter education programs from having the unintended consequence of increasing inequalities.

5. Where Do We Go Next? Beyond the Studies' Limitations and Towards New Avenues of Research

This dissertation makes a number of contributions with regards to the study of the impact of formal education and voter information campaigns on citizens' political engagement and behaviour. However, it could not overcome a number of limitations.

First, only one national context was covered: Canada. Nonetheless, this dissertation offers the first causal evaluation of the effect of university education on participation outside of the European and the American contexts, and the first causal evaluation of the impact of a VAA outside of Europe. So, this dissertation extended the geographical scope of prior studies on education and VAAs, but it should be noted that the findings may not be generalizable to other national contexts. In fact, national institutions matter in determining the costs of electoral participation and may thus condition the effect of university

education and voter education on participation and participatory inequalities. Education programs are likely to be more meaningful in contexts where participation is costly and where social institutions and organizations have a more limited ability to provide resources to disadvantaged citizens and to mobilize those less likely to participate (Gallego 2010, 2014). The variation in institutional context likely explains some of the observed variation in the estimated effects of formal education on political participation (with a notable divide between European studies that generally find no effect and studies on the United States that mostly find an effect) and of the estimated effects of VAAs. While two studies have offered comparative evidence on the effect of formal education on participation (Milligan, et al. 2004, Dinesen, et al. 2016), there has been no comparative study on VAAs. Consequently, more cross-national studies should be conducted in order to establish a clearer pattern in the effect of these education programs.

The second limitation of this dissertation is that it focuses on one form of political participation. While voting is recognized as central to representative democracies, we cannot generalize the present findings to other forms of participation (Verba, et al. 1995). Forms of participation vary in terms of the resources and skills that individuals require to be active, and so education would be more likely to make a substantial difference in the case of more resource intensive political actions (Verba, et al. 2005), like protest participation and political consumerism (Gallego 2007). As other forms of participation matter for political voice and equality, and as we still lack systematic evidence on the causal effect of education across types of participation (Kam and Palmer 2008, Mayer 2011), future studies should estimate and compare the causal effect of education on various forms of political action beyond the context of elections.

A third limit of the three studies comes from the short-term evaluation of the effects of education. The first study evaluated the impact of university education on the electoral participation of youth aged 20 to 25 years old. While a significant and positive effect is found in this early phase of adulthood, we wonder if this effect is durable. Put another way: Does the education treatment permanently shape the pattern of political participation of individuals? Whereas the NLSCY stopped short of collecting information from individual respondents beyond their twenties, prior research on the stability of political interest and engagement from the twenties onwards leads us to believe that the effect of education would be durable (Prior 2010, Neundorf, et al. 2015). The assessment of the VAA's impact was also limited in time and covered only short-term effects (on the day of the voter education activity) and medium-term effects (two to three weeks after the activity). The question here is whether this voter education could have other, more lasting democratic effects. The uniqueness of the VAAs comes from their presentation of non-partisan and comparative information about the different policy or party options in a given election; so this type of campaign could impact the willingness of citizens to consider different political options or to consider various types of information when making an electoral decision (Kam 2006). But this effect on 'open-minded thinking' may take time to develop or may need more intense stimuli. As the effect of VAAs tend to be enhanced with multiple or frequent uses (Enyedi 2015), and as the use of these civic apps becomes normalized in society, we may witness more concrete effects on citizens' considerations and electoral-decision making in the long run.

Beyond the avenues for improvement of studies on formal education and voter education campaigns, several lines of investigation seem particularly promising for future

research. One is about gaining a deeper understanding of how the effect of education works. The three chapters offered a contribution in documenting the effect of university education and voter education on electoral participation. The logical next step would be to explain these causal and differential effects. The third chapter provided initial insights into the mechanisms of VAA effects by looking at the effects of the Vote Compass on knowledge, campaign attention, information search, and motivation. But more causal pathways should be considered. As mentioned earlier, VAAs may stimulate open-minded thinking, but they may also impact internal efficacy and political discussion which would ultimately affect political participation. In the case of formal education, it is still to be explored whether education impacts participation through the development of cognitive abilities (Denny and Doyle 2008), resources and political engagement (Verba, et al. 1995), and/or politically relevant social networks (Nie, et al. 1996). Whereas the experimental manipulation of formal education is not feasible, twin studies and natural experiments coupled with panel studies could provide important evidence by extending the study of education to other dependent variables (i.e. interest, efficacy). Alternatively, this dissertation has shown that the experimental manipulation of voter education is possible. As such, future studies should aim to randomize allocation to VAA use (or other voter education tool) and administer several waves of surveys, in order to investigate various democratic benefits of VAAs, some of which may also be mediating the impact of voter education on voting (such as efficacy and political discussions).

This type of experimental design can also be used for the investigation of the moderating effects of other socio-demographic characteristics, such as immigration status, visible minority status and age. Indeed, another important avenue of research lies in understanding how information campaigns and voter education works for different groups

of citizens, and whether they can be particularly meaningful for those who are less likely to be active in politics. So beyond the consideration of socio-economic disadvantage, education, and age, future studies should examine how VAAs (and other campaign tools) might affect the political development and participation of immigrants and foreign-born citizens. As the share of immigrants increases in most industrialized democracies, it becomes increasingly important that one understands how immigrants adapt to national politics and if there are specific means to facilitate adult political 're-socialization' (Wass, et al. 2015). It would be interesting to assess whether the VAA cost-efficient app would be able to develop immigrants' understanding of national politics and bolster their capacities to engage in politics. Formal education may also be differentially important for various groups of citizens (Campbell 2008, Pacheco and Plutzer 2008, Brand and Davis 2011). Future studies should thus consider how various socio-demographic characteristics moderate the effect of formal education on political development, notably the characteristics that define both socio-economic and political disadvantage. The question is whether formal education could bring important transitions in life and change patterns of participation among groups who are marginalized in society and politics, such as new immigrants and ethnic minorities.

Thirdly, to understand unequal participation and find ways to diminish political inequalities, we need to investigate other factors that affect the participation of the advantaged and the disadvantaged *differentially*. Factors that will only affect one of these groups, or that affect disproportionately one group, have a strong potential to impact unequal participation. While political science research has focused on factors related to political institutions and how these may differentially affect socio-demographic groups (Blais 2006, Gallego 2010, 2014), more information is needed on the impact of social

programs and policies and how they may affect citizens' participation and the inequalities in participation. Indeed, social policies and programs are important in citizens' daily lives, and more so for socio-economically disadvantaged citizens. The policy-feedback literature shows that the use of social programs can impact political participation (Soss 1999, Campbell 2003, Sharp 2009) and provide another meaningful avenue for citizens to 'learn about politics' (Soss 1999). While there is evidence that the effect of programs may vary across socio-demographic groups (Mettler 2002, Campbell 2003), we still need more and comparative evidence to know whether social programs may mitigate political inequalities, and if so, how.

Political mobilization is also an important factor of participation that will differentially impact the advantaged and the disadvantaged. Indeed, citizens of different socio-economic status groups have different types of networks and social resources, which may help them in becoming active in politics. Given the lower levels of individual and political resources of disadvantaged citizens, mobilization may be particularly important for them to take part in politics. As research has found that left-wing parties and unions are not effective anymore in mobilizing the poor or the underprivileged in society (Gray and Caul 2000, Gallego 2010), we need to turn our attention to other actors in society. Indeed, other groups may have the ability to highlight the value of the act of voting and facilitate the political participation of more disadvantaged citizens. With the welfare state retrenchment and the adoption of new public management since the 1980s, local service providers and organizations have become essential in some communities, and they may be an increasingly important link between underprivileged citizens and the state.

Finally, if we believe that it is important that all needs, interests and policy preferences should be considered in the decision-making process, then we may consider

ways to make participation mandatory. Beyond the discussion of mandatory voting, we may look at other ways politics may promote direct and equal political voice, and citizens' juries are one example of that (Lenaghan 1999). This form of political participation is interesting, notably as it builds on the ideas of civic duty and democratic deliberation. This form of participation has the potential to substantially cut the costs of participation and diminish the importance of one's personal motivation to be active in politics. Additionally, it may provide information and resources for participation, and strengthen the value of participation. While the institutional design of these juries may vary and present different limits or advantages for democratic participation, it provides an interesting avenue for both citizens' political voice and governments' ability to be politically responsive (Smith and Wales 2000). It is thus worth considering how these juries may be designed and implemented to truly facilitate equal voice of citizens.

6. Concluding Remarks

The central argument of this dissertation is that we need to address political inequalities and find means to decrease these inequalities. If the disadvantaged citizens in society systematically participate less in politics than the more privileged ones, political decision-makers may not hear about their needs and interests, and will thus be less likely to respond with adequate policies. Inequalities in participation thus bias political representation and violate the ideal of equal consideration of citizens.

While participation inequalities are complex to address and full political equality may never be attained, we may nonetheless attempt to move closer to egalitarian goals (Dahl 1996, Dahl 2006). The question is then *how* do we move closer to political equality? This dissertation focused on one factor: education. It showed that both formal education

and voter education could be meaningful ways to strengthen the political engagement and participation of citizens, but that they do not automatically equalize participation. So, education may further the democratic ideal of engaged citizenship, but not as clearly the ideal of political equality.

As political participation inequalities have multiple sources (be they institutional or individual, economic or social), there is likely no single or straightforward solution. The challenge ahead of us is thus to evaluate more and diversified means to address these inequalities. The investigation of factors that differentially benefit the advantaged and the disadvantaged will help us further understand unequal participation and find ways to progressively and incrementally move towards political equality.

Appendix

1. **Appendix of Chapter 2**

List of covariates included in the Propensity Score Regression, All measured before youth turn 16 years-old (Cycles 1 to 5)

Covariates measured through surveys with parents:

Socio-demographics:
Child's Gender (female: coded 0-1)
Household income – in childhood (in dollars)
Household income – in adolescence (in 9 categories; coded 1-9)
Mother's educational attainment (in 6 categories; coded 1-6)
Father's educational attainment (in 6 categories; coded 1-6)

Family characteristics
Single parent family status (coded 0-1)
Number of siblings in the family (coded 0-7)
Family dysfunction score (coded 0-35)

Parental educational norms
Parents' expectations about child's educational attainment (coded 1-5)
Parents talk about school with child (frequency coded 1-7)
Parents talk about friends with child (frequency coded 1-7)

Child's Civic Participation
Child participated in clubs or community groups – in childhood (provided by parents) (coded 0-1)

Child's Personality Characteristics:
Child has a prosocial behaviour (coded 0-20)

2. Covariates measured through surveys with young respondents, during adolescence:

Social network
Friends' encourage youth to succeed (coded 1-4)

Civic Participation
Number of groups the respondent is involved with – in adolescence (coded 0-5)

Cognitive abilities
Math test score – in adolescence (test performed by Statistics Canada) (Min: 219 – Max: 873)

2. Appendix of Chapter 3

Survey Questions and Measures

PRETEST survey (before the experimental condition):

<u>Information seeking behavior</u> : is coded 0 if the individual does not report seeking information about 'politics', and 1 if he/she reports seeking information about 'politics'
Question: Select the topics on which you prefer to seek information? (in the newspapers, on the web, in magazines or other) Choose all that apply.
Categories: sports, local news, arts and shows, TV shows, politics, health and family, horoscope, celebrity news, economy, employment, other.
Answer to categories: yes - no

<u>Attention to the campaign</u> : is coded 0 for never, up to 4 for every day
Question: How frequently do you currently pay attention to the electoral campaign?
Answer categories: Never, Less than once a week, once a week, several times a week, every day.

<u>Political knowledge</u> - two questions:
Question: Who is the current Prime Minister of Quebec?
Answer categories: Françoise David, Denis Coderre, Pauline Marois, François Legault, I don't know
Correct answer is coded 1, and incorrect answers or I don't know are coded 0.

Question: Who is the current Minister of Finance in Quebec?
Answer categories (pictures and names): Thomas Mulcair, Nicolas Marceau, Jean Charest, Philippe Couillard, I don't know
Correct answer is coded 1, and incorrect answers or I don't know are coded 0.

<u>Voting behavior</u> - past voting behavior: is coded 0 for no and I don't know, and 1 for yes.
Question: Did you vote in the last provincial election in 2012?
Answer categories: Yes, no, I don't know, I was not eligible

FIRST POST survey (right after the experimental condition):

<u>Attention to the campaign</u> - Intention to pay attention to the campaign:
is coded 0 for never, up to 4 for every day
Question: How frequently do you think you will pay attention to the electoral campaign in the next weeks?
Answer categories: Never, Less than once a week, once a week, several times a week, every day.

<u>Information seeking behavior</u> - Intention to search for information: is coded 0 for never and I don't know; and coded 1 for once or twice, or several times.
Question: In the upcoming weeks, do you think you will read or search for information on the elections, political parties or candidates?
Answer categories: Yes several times; yes once or twice; no never; I don't know

Political knowledge :
Question: Do you know how many political parties are taking part in the electoral campaign?
Answer categories: 2, 4, 7, 10, I don't know
Correct answer is coded 1, and incorrect answers or I don't know are coded 0.

Voting behavior - Intention to vote: coded 0 for certainly and probably not, or I don't know, and coded 1 for probably and certainly yes.
Question: Do you think you will vote in the next provincial election, in April?
Answer categories: certainly not, probably not, probably yes, certainly yes, I don't know.

SECOND POST survey (about three weeks after the experimental condition):

Attention to the campaign : is coded 0 for never, up to 4 for every day
Question: How frequently did you pay attention to the electoral campaign in the past weeks?
Answer categories: Never, Less than once a week, once a week, several times a week, every day.

Information seeking behavior: is coded 0 for never and I don't know; and coded 1 for once or twice, or several times.
Question: In the past weeks, did you read or search for information on the elections, political parties or candidates?
Answer categories: Yes several times; yes once or twice; no never; I don't know.

Political knowledge - two questions:
Question: Can you tell me who is the new Prime Minister of Quebec?
No answer categories (i.e. fill in)
Correct answer is coded 1, and incorrect answers or I don't know are coded 0.

Question: Can you tell me who is the leader of the political party: the Coalition Avenir Quebec?
No answer categories (i.e. fill in)
Correct answer is coded 1, and incorrect answers or I don't know are coded 0.

Table 3.3 - Descriptive statistics of pretest measures across experimental groups (means, standard deviation)

	Pop mean	Experimental condition		Significance level of the difference	N
		VoteCompass	*Control*		
Socio-demographic					
Female	0.51	0.53	0.50	Not sig.	388
(0-1)	(0.50)	(0.50)	(0.50)		
Age groups	4.42	4.41	4.43	Not sig.	381
(1-11)	(2.60)	(2.67)	(2.53)		
Education degrees	6.31	6.20	6.44	Not sig.	389
(1-9)	(2.42)	(2.44)	(2.41)		
Work full-time	0.41	0.41	0.42	Not sig.	389
(0-1)	(0.49)	(0.49)	(0.50)		
Student	0.12	0.12	0.12	Not sig.	389
(0-1)	(0.32)	(0.33)	(0.32)		
Abilities					
Reading	3.17	3.09	3.26	0.023	387
(1-4)	(0.83)	(0.89)	(0.75)		
Internet use	3.51	3.46	3.57	Not sig	385
(1-4)	(0.92)	(0.98)	(0.85)		
Political engagement					
Registered to vote	0.79	0.73	0.86	0.000	383
(0-1)	(0.41)	(0.45)	(0.34)		
Internal efficacy	2.82	2.84	2.80	Not sig.	378
(1-4)	(0.93)	(0.91)	(0.95)		
Usually read about politics	0.52	0.47	0.58	0.016	389
(0-1)	(0.50)	(0.50)	(0.50)		
Political interest	2.83	2.79	2.87	Not sig.	385
(1-4)	(0.95)	(0.97)	(0.93)		
Attention to the campaign	2.46	2.36	2.57	Not sig.	382
(0-4)	(1.38)	(1.45)	(1.29)		
Political knowledge	1.58	1.55	1.61	Not sig.	382
(0-2)	(0.56)	(0.58)	(0.54)		
Political behavior					
Voting behavior in 2012	0.72	0.69	0.74	Not sig.	387
(0-1)	(0.45)	(0.46)	(0.44)		

Table 3.4 - Overview of the Dependent Variables

Dependent Variables - post test 1	N	Mean	S.D.	Min	Max
Knowledge - Number of Political Parties	380	0.42	0.49	0	1
Attention to the campaign - Intention	382	2.53	1.30	0	4
Information seeking behavior - Intention	380	0.76	0.43	0	1
Voting behavior - intention	381	0.76	0.43	0	1

Dependent Variables - post test 2	N	Mean	S.D.	Min	Max
Knowledge - New Prime Minister	301	0.84	0.37	0	1
Knowledge - Leader of Party CAQ	301	0.68	0.47	0	1
Attention to the campaign - Reported	301	2.88	1.22	0	4
Information seeking behavior - Reported	301	0.73	0.45	0	1
Voting - official turnout	292	0.63	0.48	0	1

Sites of recruitment in the low-income neighborhood:

- on the street, at the intersection of the two main streets of the neighborhood
- a YMCA (a sports center with subsidized rates for low income citizens)
- a social and recreational center (which organized after-school activities for children)
- a community center (which provides various services to local residents)
- a restaurant (offering complete meals for $3)
- a community center where local residents had access to different services, such as: an internet cafe, affordable optician services and affordable food baskets
- a family center (which offered a variety of services, activities, courses, and a community room to hang out)
- a wrestling event (in a church basement)

Images of the treatment and control conditions

The treatment: the Vote Compass

Welcome page:

Issue questions:

Results' page:

The control condition: the movie quiz

Quiz : Le meilleur du cinéma québécois en 2013

Par Valérie Bourdeau le 26 décembre 2013   🐦 Suivre @CinemasCineplex   + PARTAGER

💬 0 Commentaire(s)

En 2013, Denis Villeneuve a réalisé son premier long-métrage en anglais, intitulé:

○ Prisoners

○ Minefield

○ Enemy

○ Maelstrom

PROCHAINE QUESTION

3. Appendix of Chapter 4

Table 4.5 - Average Treatment Effects of the Vote Compass on Preference Formation and Preference Change, in the General Sample and in Sub-Groups Defined by Age, Educational Attainment and Levels of Political Interest (statistical significance in parentheses).

	Preference formation		Preference change	
	Short Term	Medium Term	Short Term	Medium Term
General sample	+8%pts (p=0.432)	+4%pts (p=0.629)	-2% pts (p=0.685)	-5%pts (p=0.423)
Age				
18-30	-8%pts (p=0.621)	+8%pts (p=0.664)	-7%pts (p=0.567)	-10%pts (p=0.531)
31-40	**+42%pts** (p=0.009)	-12%pts (p=0.409)	**-20%pts** (p=0.061)	**-21%pts** (p=0.063)
41-50	+21%pts (p=0.456)	-	+0%pts (p=0.613)	+9%pts (p=0.524)
51 and more	+0%pts (p=0.977)	-	**+22%pts** (p=0.037)	+4%pts (p=0.711)
Education				
High School degree or less	+8%pts (p=0.490)	+2%pts (p=0.806)	+1%pts (p=0.931)	-5%pts (p=0.731)
Vocational	-23%pts (p=0.466)	-6%pts (p=0.856)	-1%pts (p=0.917)	-6%pts (p=0.812)
College or cegep	+23%pts (p=0.337)	-	-4%pts (p=0.751)	-2%pts (p=0.895)
University	**+27%pts** (p=0.079)	+22%pts (p=0.423)	-3%pts (p=0.713)	-7%pts (p=0.423)
Interest				
No interest	-7%pts (p=0.763)	-6%pts (p=0.759)	**+54%pts** (p=0.079)	+33%pts (p=0.287)
Little interest	-1%pts (p=0.946)	+13%pts (p=0.454)	-10%pts (p=0.378)	-14%pts (p=0.285)
Some interest	+18%pts (p=0.456)	-	**-17%pts** (p=0.070)	-17%pts (p=0.116)
A lot of interest	**+40%pts** (p=0.053)	-	+9%pts (p=0.359)	+9%pts (p=0.432)

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