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Voting wiser

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Citation for published version (APA):
van de Pol, J. (2016). Voting wiser: The effect of Voting Advice Applications on political understanding.

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Chapter 5

The Effect of Voting Advice Applications on Political Efficacy and Knowledge: A Quasi-Experiment

Abstract

By offering relevant political information in an attractive and easy-to-digest way, and reaching millions of voters, Voting Advice Applications (VAAs) are expected to contribute to political knowledge and internal political efficacy. While previous studies provide correlational evidence or single-group experiments at best, the current study puts the alleged contribution of VAAs to a critical test. To study the causal effect of VAAs, we rely on a quasi-experiment during Dutch municipality elections and use matching techniques to exclude selection bias. We find evidence for an increase in internal efficacy after using VAAs, especially among lower educated voters. We do not find support for the expected gain in factual political knowledge. Our findings confirm the important role of VAAs in the political media landscape of contemporary elections, but do not suggest that VAAs bridge the digital divide.

5.1   Introduction

The steep increase in use of Voting Advice Applications is one of the most significant developments the Internet has contributed to the media landscape during election times in many European countries. Voting Advice Applications (VAAs) ask their users to answer a set of attitude questions on policy issues. Users' positions are compared to the positions of parties or candidates on the same issues, and an overview is presented of the extent to which each party agrees with the user's policy preferences. This has proven to be a successful recipe: web applications like these attract millions of visitors in election times across and beyond Europe (see Marschall, 2014, for an overview). VAAs provide a cost-efficient and appealing way to inform oneself about the political landscape (Garzia, 2010; Marschall & Schultze, 2012; Walgrave, Van Aelst, & Nuytemans, 2008): they make a selection of key issues in an election campaign, summarize the positions of all parties on these issues, and offer a tailored advice to individual users.

The wide reach of VAAs and the relevant information they present in an easy-to-digest way triggers the question whether these web applications have actual engaging and mobilizing capabilities for their users, and whether they contribute to citizen competence to participate in democracy. VAA developers hope to increase their users' understanding of the political landscape and help them in making an informed vote choice (Anderson & Fossen, 2014; De Graaf, 2010). Extant research does provide convincing evidence that VAAs contribute to turnout among their users (Dinas, Trechsel, & Vassil, 2014; Gemenis & Rosema, 2014) and affect vote choices (Alvarez, Levin, Mair, & Trechsel, 2014; Wall, Krouwel, & Vitiello, 2012). However, surprisingly lit-

tle research offers a critical examination of the contribution of VAAs to two essential factors for citizen engagement with politics: factual political knowledge and internal political efficacy. Knowledge of political parties and issues enables voters to decide which party best represents their values and interests (e.g., Delli Carpini & Keeter, 1996). Without internal efficacy, a feeling of competence to understand and participate in politics, people are likely to become disengaged from the democratic process (Kaid, McKinney, & Tedesco, 2007; Kenski & Stroud, 2006; Morrell, 2005). Both factors have been proven to be important for political participation.

The VAA effect on political knowledge has been the focus of previous studies, which looked almost exclusively at the gain in knowledge and interest reported by users themselves. They univocally conclude VAAs have positive effects (Fivaz & Nadig, 2010); especially among women (Marschall & Schmidt, 2010), young and higher educated users (Kamoen, Holleman, Krouwel, Van de Pol, & De Vreese, 2015). Because these studies relied on estimations of VAA-induced knowledge gain reported by VAA users themselves, and did not compare them to non-users, these findings have suboptimal reliability (Walgrave et al., 2008). They do, however, suggest users experience an increase in political competence, or efficacy, after using VAAs. Schultze (2014) and Westle, Begemann, and Rütter (2014) took an important step and measured factual political knowledge. Schultze (2014) subsequently compared the level of knowledge between VAA users and non-users. In his study, knowledge is conceptualized as the capability to correctly identify positions of parties on key issues, which is the kind of knowledge VAAs would contribute to. In the current study we will use a similar conceptualization of political knowledge, but argue that correlational studies like these still suffer from selection bias, which is likely to invalidate the conclusions. Westle and colleagues (2014) compare the level of knowledge before and after respondents used an experimental VAA in mock elections, with the risk of measuring test effects and suboptimal external validity.

Using a large-scale quasi-experiment during the 2014 Dutch municipality elections, this study sets out to offer a captious test of the causal effect of VAAs on political knowledge and internal political efficacy. We draw upon a large sample of voters from nearly all Dutch municipalities that held elections in March 2014. The study includes both voters who used a VAA and voters who were likely to use one, but lived in a municipality in which no VAA was available. Hence, we have a naturally occurring quasi-experiment where VAA use is dependent on municipalities deciding to acquire a VAA, which is a factor that is exogenous to the outcome of the study, political knowledge and efficacy of individuals. This allows us to approximate the causal effect of VAA use on political knowledge and efficacy.

5.2   Political knowledge and efficacy

Democratic processes are conditional on citizens being active, informing themselves on political matters and participate in the political process. Earlier research has found abundant evidence for the positive impact political knowledge has on political engagement (Delli Carpini & Keeter, 1996; Howe, 2006; Popkin & Dimock, 1999). While less often studied, internal political efficacy is also found to boost participation and engagement (Kaid et al., 2007). However, political knowledge and internal efficacy differ in important respects. Factual knowledge of politics helps people to connect their interests with political issues, and therefore to vote for the parties that represent them best. Internal efficacy, on the other hand, is a feeling that one is competent to understand and participate effectively in politics, and has a motivational aspect to it. In contrast to some earlier VAA studies (e.g., Kamoen et al., 2015; Marschall & Schmidt, 2010), the current study distinguishes the two and studies the effect of using a VAA on these concepts separately.

The notion that citizens' knowledge of politics is beneficial for the democratic process is uncontested. In order for citizens to feel engaged with society and to actively participate in democracy, many scholars argue, it is vital to be informed about democratic institutions and the political set-up (Delli Carpini & Keeter, 1996; Galston, 2001; Strömbäck, 2005). As Delli Carpini & Keeter (1996, p. 155) point out: "Less informed segments are […] less able to discern their political interest, less likely to participate in politics, and, most important, less likely to connect their political interests effectively to their political participation". Furthermore, knowledge is strongly related to political attitudes that are ideologically consistent and to support for democratic values such as tolerance and trust in the political system and public life (Delli Carpini & Keeter, 1996).

There is considerable academic debate on the level of factual knowledge that is required for citizens in order to make rational decisions and participate in democracy (such as which party to vote for) (Galston, 2001; Strömbäck, 2005). While some see the notably low level of knowledge among the electorate as problematic for democracy (Somin, 2006), others argue that – even without basic knowledge of the system – citizens will "get by" using information shortcuts, heuristics and cues (Lupia, 1994; Popkin & Dimock, 1999). The information on which citizens base their voting decisions (such as inflation, gas price, crime, and health care) is obtained accidentally – in everyday life, without actively informing themselves about politics. But even these low-information rationality theorists acknowledge the relevance of some basic knowledge in order to understand and interpret political information. Additionally, several studies showed that citizens make different political decisions were they fully informed (Boudreau & Mackenzie, 2014; Oscarsson, 2007), which suggests that there is merit to

having more knowledge of politics.

We expect VAAs to contribute to specific types of knowledge. For instance, we assume VAA users will gain little knowledge about political institutions. By indicating their opinions towards the policy issues, users will however learn what are the most salient issues in the political campaign, and the result screen will show users which party they agree most with, and what the party's positions are on each issue. Depending on the type of VAA, users will also learn about the political spectrum: whether they are left- or rightwing and conservative or progressive, and where all parties are (Marschall & Garzia, 2014). In addition, there might be learning effects if using a VAA motivates users to look for more information on politics, or discuss politics with others (Marschall & Garzia, 2014; Schultze, 2014). In any case, we expect that the most important type of information that people learn from using VAAs is the positions of parties on important issues, which is how we conceptualized political knowledge in this study.

H1   VAA usage increases political knowledge on issue positions of parties.

Internal political efficacy, or self-efficacy, is another prerequisite for citizens to be engaged with civic society and democracy. Internal political efficacy refers to a feeling that one is competent to understand politics and participate effectively in politics. It is distinguished from external political efficacy, which is a confidence in the responsiveness of the political system, i.e. that their participation means something for the political outcome (Niemi, Craig, & Mattei, 1991). Internal efficacy is an important determinant for engagement with politics: without this political self-confidence, citizens are not motivated to engage in politics or to vote (Kaid et al., 2007; Kenski & Stroud, 2006; Morrell, 2005). This is confirmed in previous research: internal efficacy is found to be a predictor of political participation (Jung, Kim, & de Zúñiga, 2011), and it relates negatively to cynicism (Pinkleton, Weintraub Austin, & Fortman, 1998). Increased levels of political efficacy will hence contribute to a thriving democracy.

We expect VAA use to contribute to political efficacy because they are a remarkably cost-efficient way to inform oneself about the key political issues and the positions of all parties regarding these issues. Because VAAs give a personalized recommendation, they are likely to give users the feeling they are making a better-informed voting decision, since they took all relevant issues into consideration and compared all parties and candidates. This expectation is also in line with previous studies that found that VAA users reported an increase in political understanding (e.g., Kamoen et al., 2015).

H2   VAA usage increases internal political efficacy of citizens.

We do not expect VAAs to affect everyone to the same extent. The capacity of VAAs to contribute to political knowledge and efficacy will depend on whom VAAs can reach via media channels and peer-to-peer publicity (Hirzalla, Van Zoonen, & De Ridder, 2010). In the literature on new political media (like VAAs) and their consequences for political engagement, efficacy and knowledge, two lines of thought are represented. On one side are scholars who believe that the availability of political information on the internet reinforces the same gap or divide that characterizes the use of so-called 'legacy media', and hence they call this the digital divide (Norris, 2001). Those who are more likely to use legacy media (newspapers, television, radio) for political information are the same people who are more likely to use new media to learn about politics; usually higher educated people (Wei & Hindman, 2011). New media do not succeed either in bridging the divide between those who are politically engaged and those who are not (Norris, 2001; Scheufele & Nisbet, 2002), and will therefore not increase knowledge or efficacy among citizens who are less knowledgeable. The internet may even widen the divide if it allows people to be more selective in the content they choose to consume. This line of thought is referred to as the "normalizing thesis" (Hirzalla et al., 2010; Kenski & Stroud, 2006).

On the other side are scholars who argue that online media do have the potential to engage citizens who were not engaged before; this is known as the "mobilizing thesis" (ibid). The internet gives people access to a lot of information, offers new ways for involving oneself in politics – like being in direct contact with politicians through social media – and provides applications such as VAAs that summarize and present essential political information in an easy and appealing way (Garzia, 2010; Kenski & Stroud, 2006; Kruikemeier, Van Noort, Vliegenthart, & De Vreese, 2013). A meta-analysis of research on the effects of internet use on political engagement does not provide strong support for a positive effect that would narrow the digital divide, but does not point at a clear negative effect either (Boulianne, 2015) Recently, however, scholars have been arguing that instead of looking at the internet in general it is necessary to make a distinction between several kinds of online media, such as online versions of legacy media (websites of newspapers and television shows), online native outlets, party websites, social media and Voting Advice Applications (Dimitrova, Shehata, Stromback, & Nord, 2011; Hirzalla et al., 2010; Kruikemeier et al., 2013).

As the discussion above implies, an important prerequisite for VAAs to be able to mobilize citizens and increase their political efficacy and knowledge, is that people who are not highly educated also use them. Additionally, for VAAs to narrow the divide between those who are informed already and those who have 'tuned out' of politics, they should especially be helpful for the latter group. Studies on the users of VAAs, however, suggest that VAAs predominantly reach politically interested, higher educated men (see Marschall, 2014, for an overview) – precisely the group that already

is relatively knowledgeable. However, Chapters 2 and 3 of this dissertation show that apart from a majority of highly politically engaged users, a substantial minority of VAA users – who is generally lower educated – is much less interested in politics and less politically efficacious, and indicates to use the VAA to gain more insight into the positions of parties, or to determine which party to vote for.

When assessing the mobilizing capacity of VAAs, we will differentiate between higher and lower educated people to see whether VAAs succeed in contributing to knowledge and efficacy more for lower educated people, who are more likely to be at the uninformed and less engaged end of the digital divide (Norris, 2001; Wei & Hindman, 2011). VAAs have a wide reach and are being used by substantial shares of the general electorate – including the lower educated, relatively less informed segments. We expect the latter group to benefit most from VAA use in terms of political knowledge and efficacy, because they will be exposed to new information more than higher educated users.

> H3   The increase in (a) knowledge and (b) political efficacy caused by VAA use
> will be stronger among lower educated people.

5.2.1   Estimating causal VAA effects

In the research literature on Voting Advice Applications, an ongoing debate concerns the question how causal effects of using VAAs on any outcome variable should be measured. As mentioned before, studies that rely on estimations of VAA effects that are reported by VAA users themselves (Fivaz & Nadig, 2010; Kamoen et al., 2015) are criticized for being unreliable (Walgrave et al., 2008). Other studies of VAA effects compare actual political knowledge (Schultze, 2014), reported in post-election studies, between voters who used a VAA before the elections and voters who did not. This approach has as weakness that VAA use is not an exogenous variable in analyses of its effects: a positive statistical relationship between VAA use and knowledge could also be driven by more knowledgeable people being more likely to use a VAA. A correlation between VAA use and knowledge or efficacy can therefore not be interpreted as a causal effect.

To accurately study whether VAA use causes higher knowledge, a randomized (field) experiment would be the ideal design. However, as Gemenis and Rosema (2014) point out, it would be neither feasible nor ethical to deny access to VAAs for some and force others to use a VAA during election time. An alternative approach would be to look at spontaneous VAA use, and use statistical matching techniques to minimize the differences between those who used a VAA and those who did not. Theoretically, if these groups are identical on all factors except for VAA use, any dif-

ference in outcome variables can only be caused by the use of a VAA. This approach was used by Gemenis and Rosema (2014), who used a Dutch national election study sample and pre-processed their data using matching techniques to eliminate mean differences in age, education, sex, political knowledge, interest and party identification between those who did and did not use a VAA. After pre-processing, they still found an effect of VAA use on turnout.

In correlational studies like the one by Gemenis and Rosema, however, matching techniques cannot completely make up for the fact that VAA use is not exogenous. A range of unobserved covariates that are not taken into account, but relate to both VAA use and the outcome, might severely bias conclusions about the causal effect (Arceneaux, Gerber, & Green, 2006; Ho, Imai, King, & Stuart, 2007; Levendusky, 2011; Pianzola, 2014). For instance, while the matched groups of VAA users and non-users have identical levels of political interest, the group of VAA users might include more individuals with politically engaged friends. These friends might encourage them both to use a VAA, and to go out and vote. If this unobserved covariate (engaged friends) would have been taken into account, the conclusion could be that there is no causal effect of VAAs on turnout.

Compared to correlational studies, the current quasi-experimental study takes an important step towards studying causal effects of VAAs in a natural (i.e., externally valid) setting. Efficacy and knowledge are compared between VAA-users living in municipalities that commissioned a VAA, and similar people in municipalities without a VAA. In this way the possibility of unobserved confounding effects is greatly reduced, since the decision of municipality councils and VAA developers to make a VAA available is hardly related to characteristics of individual citizens. By balancing background characteristics that are known to predict VAA use, and additionally controlling for structural municipality characteristics, we further diminish any difference between the treatment group (who used a VAA) and control group (who did not use a VAA).

5.3   Data and Methods

On March 19, 2014 council elections were held in almost all municipalities the Netherlands. For 105 of the 392 municipalities that held elections on this day[1], one or more Voting Advice Applications were available to all residents of the municipality. These applications were online for four weeks during the election campaign. After election day, a survey was sent to respondents who were registered at the panel of the Dutch VAA *Kieskompas* (see for a description of the methodology: Krouwel, Vitiello, & Wall,

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[1] 19 of the Dutch 392 municipalities did not have elections that day

2014). Over the course of the last decade, these respondents had voluntarily enrolled at the *Kieskompas* panel by leaving their email address at a visit to *Kieskompas* during earlier elections. The survey was sent out by March 24, 2014; a reminder was sent at April 2 and the survey closed at April 6.

The survey has a nearly perfect coverage of Dutch municipalities: respondents from 382 out of 392 municipalities completed the survey. Eleven respondents lived in municipalities that did not run elections on March 19, 2014. In two municipalities that did have elections no one responded; from all other municipalities at least one person filled out the survey. The response rate was 32.7%; the survey was sent to 39,213 people and completed by 12,855 people. We discarded respondents younger than 18 (not eligible to vote). 3917 respondents did not indicate in which municipality they live and/or whether they used a VAA. A VAA (*Stemwijzer* or *Kieskompas*[2]) was available in 70 municipalities; people in other municipalities could therefore not use a VAA to receive a voting advice for the elections they participated in. To have a sound and strict comparison, we only included in our analyses those respondents who lived in municipalities for which *Stemwijzer* and/or *Kieskompas* was available and also indicated they used at least one of these (the treatment condition, $N = 3,522$), and those living in non-VAA municipalities who indicated they did not use a VAA (the control condition, $N = 2,223$)[3].

Our final sample size is $N = 5,745$. As these respondents are VAA users who signed up for the *Kieskompas* panel voluntarily, they are likely not representative of the general Dutch population in general. However, our aim is to make inferences about VAA effects on likely VAA users. That is people who are likely to use a VAA when one is available and therefore will actually be subject to the 'manipulation' we study. Our sample offers a very good reflection of that group of citizens. Additionally, this quasi-experiment incorporates a realistic and natural treatment (the VAA) that takes place in a natural context (whenever and wherever people prefer to use a VAA).

The post-election survey included questions about respondents' sex, age, educa-

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[2] *Stemwijzer* and *Kieskompas* are the two Dutch VAAs that are well known and widely used. In the municipality elections a third VAA, *De Stem Van …*, was available in some municipalities, but used by too few people (172) to include in our analysis.

[3] If we would include in the control condition those living in VAA-municipalities who did not use a VAA ($N = 947$), we are comparing VAA users with less similar people, increasing the likelihood of selection bias. Those living in non-VAA municipalities but indicated they did use a VAA ($N = 2,242$) might have used the VAA of a neighboring municipality, or the municipality where they work. Because they could not learn about issues, party positions and their match with parties in the municipality for which they voted, and because we cannot be sure what type of treatment they actually received, we do not take the effect of their VAA experience into account. We matched those who complied with the treatment (using the VAA when available) to those who complied in the control condition (not using a VAA when no VAA is available for their region), so that eventually we are simulating a field experiment in which all participants are complying with the treatment assignment.

tion, occupation and degree of urbanization of their living environment. Internal political efficacy was measured by three items from the widely used scale developed by Niemi et al. (1991): "I think that I am better informed about politics than most people", "I feel that I have a pretty good understanding of the important political issues facing our municipality" and "I consider myself well-qualified to participate in politics", all measured with a Likert scale. Together these items have a Cronbach's α of .73. We combined them one a scale ($M = 3.5$, $SD = .8$, range 1 – 5).

Studies on political knowledge, and its causes and consequences, often conceptualize political knowledge as 'civics-textbook' kind of information like number of seats in parliament, recognizing politicians, or the current political situation (Delli Carpini & Keeter, 1996; Fraile, 2013; Levendusky, 2011). The information that VAAs provide, in contrast, is about policy proposals of political parties and candidates, ideological positions of parties and candidates relative to each other, and the position of the VAA user in this political spectrum (Garzia, 2010). As it is unlikely that this leads to more knowledge about political institutions, appearance of politicians or current affairs, we follow Schultze (2014) and Westle et al. (2014) and conceptualize political knowledge as the ability to correctly recognize party positions on a set of exemplary political issues.

We asked respondents to identify the positions of six political parties on five political statements. As the VAAs included in this study were developed for a large number of municipalities and therefore included different issues in each municipality, it was impossible to directly assess what users learned from VAAs about policy positions in their own municipality. We were not able to develop a measure of knowledge gain that was tailored for each municipality-specific VAA separately. Moreover, we want to study whether using a VAA contributes to users' political knowledge above and beyond recalling party positions on single issues. Therefore, we asked respondents to identify the positions of six national parties that are also represented in most municipalities, and we selected a number of issues that relate to both national and local issues, and to ideological divisions as much as possible.

The knowledge items were taken from the VAAs Kieskompas and Stemwijzer that were developed for the 2012 general elections. We selected the following statements: "The government budget for development aid can be reduced"; "The government should intervene more with the economy"; "Marriage officiants are allowed to refuse services to gay couples"; "Taxes on meat should be increased"; and "Unemployment benefits can be reduced", and asked respondents to indicate which parties agreed with which statements. The correct answers were also taken from the VAAs, which use standardized methodologies to calibrate party positions on these statements (Krouwel & Van Elfrinkhof, 2013).

The eventual knowledge score is an index with 30 possible values: for each party

and statement combination for which respondents correctly indicated whether the party agreed or not, respondents received one point. If respondents did not check any party/statement combination (i.e., if they did not indicate any party to agree with any statement) their answers were recorded as missing (resulting in 53 additional missing values). The index was rescaled to make it comparable with internal efficacy (M = 3.5, SD = .5, range 1 – 5).

5.3.1 Covariate balance

In a randomized field experiment, which would be the golden standard for studying causal effects, there are no dependencies between using a VAA and any background characteristic or other potential confounder (Gerber & Green, 2012). The semi-random allocation of VAAs over Dutch municipalities creates a quasi-experimental setting, in which there should be no systematic relations between someone's VAA use and their (observed or unobserved) background characteristics. In other words, because the reason that someone uses a VAA is an exogenous factor – municipalities deciding to commission VAA developers to make one available – there are no reasons to expect that those who use a VAA are a systematically different selection of people than those who do not use a VAA. However, VAA availability is not completely randomly assigned so we still expect differences between VAA users and non-users. For that reason, we pre-process our data by statistically balancing VAA users and non-users on their individual background characteristics (covariates), using entropy balancing. The purpose of this pre-processing is to make sure the distributions of covariates is identical between the treatment and control group, which further reduces dependencies between VAA use and background characteristics. In addition, in our analyses we control for municipality characteristics to take into account the fact that some municipalities will more likely commission a VAA than others.

Entropy balancing reweights the observations in the control group to reach a distribution of covariates that is identical to the distribution of covariates in the treatment group, as specified by the researcher (Hainmueller, 2012). For balancing the subsamples of users and non-users, we specified the covariates age, education, sex, occupation (employee / entrepreneur / retired / student / unoccupied) and degree of urbanization of their living environment[4]. In addition, we included interactions between all covariates to make sure the means of one covariate (e.g., age) is the same across each level of another covariate (e.g., education). We included nine interactions; because the occupation variable had many small categories, we did not include interactions between

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[4] In order not to 'control away' possible mediated effects of VAA use on efficacy and knowledge, we did not control for characteristics that could be affected by the treatment, such as political media consumption.

occupation and other covariates (the weighting still ensures equal distribution of cases over the categories of occupation in both subsamples).

The entropy balancing is specified with, for the numerical variables, the same mean, variance and skewness across treatment groups. For the binary variables (including dummies of categorical variables) exactly adjusting the mean also exactly adjusts the variances. Our large sample size allowed us to put relatively strict constraints on the entropy balancing: we included a total of 11 covariates and almost all interactions between them, and for the numeric covariates we constrained the variances and skewness to be the same across groups as well, in addition to the means.

Figure 5.1 shows difference-in-means tests for all covariates and the interactions, for the unmatched sample, the sample that is processed with entropy balancing and the exactly matched sample (see footnote 5). While the means of most covariates and interactions differ considerably and significantly, after covariate balancing all means are identical, and all p-values are insignificant. Hence, after pre-processing the data, differences in knowledge and efficacy should be the result of the treatment.

In addition to covariates relating to individual respondents, municipalities also differ on structural characteristics like the population size and income. Theoretically these characteristics could both relate to the likelihood that a VAA is available (Kleinnijenhuis, Van de Pol, Van Hoof, & Krouwel, 2015), and to average levels of knowledge and efficacy, in which case these factor would result in a spurious relationship. Since our sample is a self-selection of people who used a VAA before and are plausibly very similar on relevant aspects, we do not expect them to differ across municipalities. However, to make sure our results are robust we controlled our analyses for the following characteristics: number of inhabitants, share of inhabitants under 20 years old, average household income, and share of non-Western immigrants living in the municipality. These municipality data were obtained through the Dutch Central Office for Statistics (CBS).

In sum, we will compare individuals who used a VAA with very similar individuals, to whom a VAA was not available. Hence, the treatment effect we arrive at is the treatment effect on the treated (Ho et al., 2007). In other words, we estimate the effect of VAA use on efficacy and knowledge for those who are likely to use a VAA, rather than for the population at large (including those who would probably never voluntarily use a VAA) (see Gerber & Green, 2012, p. 134, for a discussion).
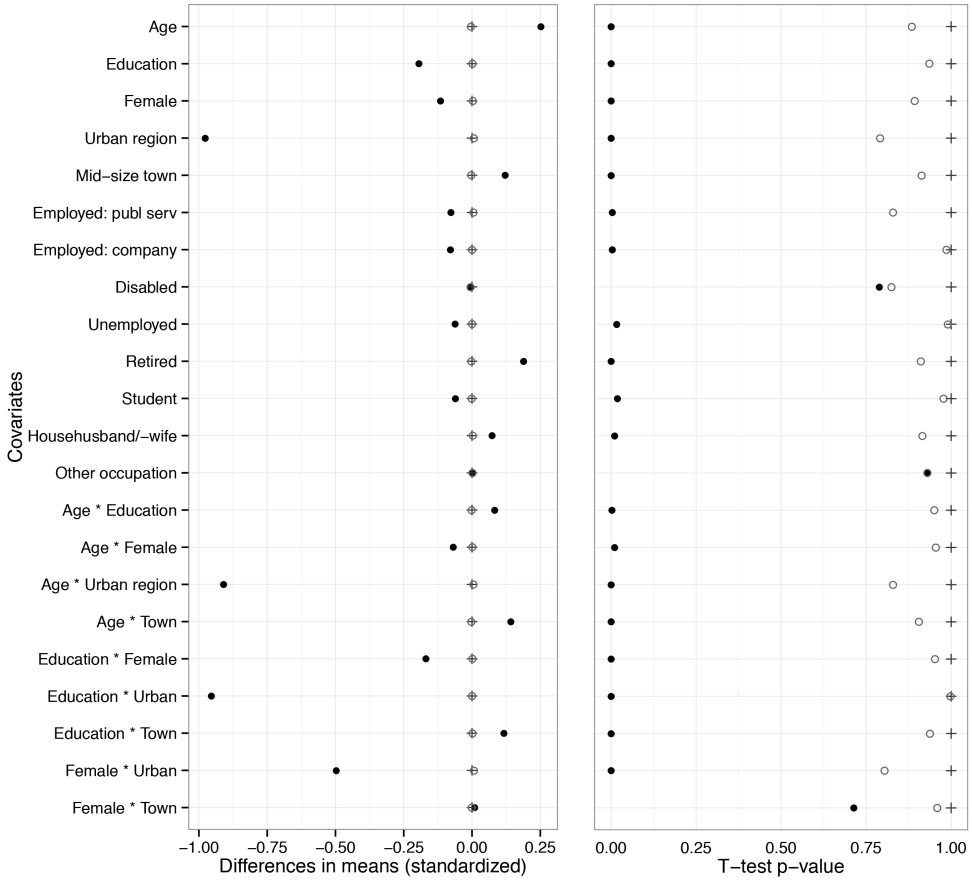
Figure 5.1: T-tests of differences in means for all covariates, in three samples. The black dots represent, respectively, the differences in means and the t-test p-values for the unmatched and unweighted sample. The dark grey pluses represent the exact matched sample and the light grey circles represent the sample processed with entropy balancing.

5.4 Results

5.4.1 Political knowledge

We test our hypotheses by running OLS regressions on the sample that was not pre-processed and secondly on the sample that was reweighted according to the entropy balancing procedure. For each approach, first the mean difference in efficacy is tested between VAA users (in municipalities with a VAA available) and non-users (in non-VAA municipalities), and in a second model the interaction with education is added. In all models, coefficients are controlled for structural municipality characteristics. Hypothesis 1 predicts that VAA use leads to higher levels of knowledge of party positions. As Table 5.1 shows, we could not find any evidence for a positive effect of using VAAs on political knowledge[5]. The first two models show the results of our quasi-experiment without preprocessing the data. In these models, the coefficient for the VAA effect is negative and statistically insignificant. In the sample that is pre-processed with entropy balancing there is even a significant negative coefficient, indicating VAA users are generally less knowledgeable about politics than voters who did not use a VAA. Hence, these results do not confirm Hypothesis 1. Also Hypothesis 3a is not supported: we could not find evidence for a stronger VAA effect on knowledge among lower educated people (see also Figure 5.2).

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[5] As a robustness check, we also pre-processed our data with exact matching. One-to-one exact matching matches observations in the treatment condition (VAA use) with observations in the control condition that have identical values on all specified covariates and their combinations (i.e., 37 years old, female, vocational training, living in a midsize town, self-employed), thus eliminating all associations between VAA use and observed background characteristics (Ho et al., 2007). While this approach ensures the best similarity between treatment and control groups (see Figure 5.1), the drawback is that observations for which no exact match can be found are discarded, which in our analyses means only 2,156 observations could be retained. In the sample that was pre-processed with exact matching, we found the same results: no positive effect of VAA use on knowledge; also no moderation effects by education. The significant negative effect in the entropy balanced data could not be replicated using exact matching.

Table 5.1: Effect of VAA use on political knowledge

	Not pre-processed		Entropy balancing	
	b (s.e.)	*b* (s.e.)	*b* (s.e.)	*b* (s.e.)
Intercept	3.54***	2.98***	3.58***	2.90***
	(0.01)	(0.04)	(0.01)	(0.04)
VAA use	-0.02	-0.10	-0.06***	-0.01
	(0.02)	(0.06)	(0.02)	(0.06)
Education		0.12***		0.14***
		(0.01)		(0.01)
VAA × education		0.02		-0.01
		(0.01)		(0.01)
§				
N	5,692	5,609	5,571	5,571
R^2	0.01	0.10	0.01	0.10

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$
§Coefficients are controlled for the structural municipality characteristics *number of inhabitants, ratio of inhabitants under 20, average disposable income per household and percentage of non-Western immigrants*. These characteristics have been omitted from the table for reasons of conciseness.

5.4.2 Internal efficacy

For the outcome variable internal political efficacy, we followed the same procedure. Hypothesis 2 predicts that VAA use leads to a higher internal political efficacy. Table 5.2 shows the regression analyses of the effect of VAA use on internal political efficacy.

When comparing users to non-users in the data that was not pre-processed, there is a modest effect of VAA use on political efficacy: on a five-point scale, efficacy is 0.07 points higher for people who use VAAs. Because there are still some differences between the users and non-users with respect to (observed) relevant background characteristics, this estimation of the effect can be biased. After adding education as a moderator, the relation between education and efficacy appears to have about the same magnitude as the relation between VAA use and efficacy. Without pre-processing the data, no moderation with education is visible.

In the entropy-balanced data, the findings of the first model prove to be robust. A similar positive effect of VAA use on efficacy is found: modest but statistically significant. This supports Hypothesis 2. In addition, the entropy-balanced sample shows that the VAA effect is negatively moderated by education. This is in line with Hypothesis 3b: the higher one is educated, the smaller becomes the positive effect of VAA use
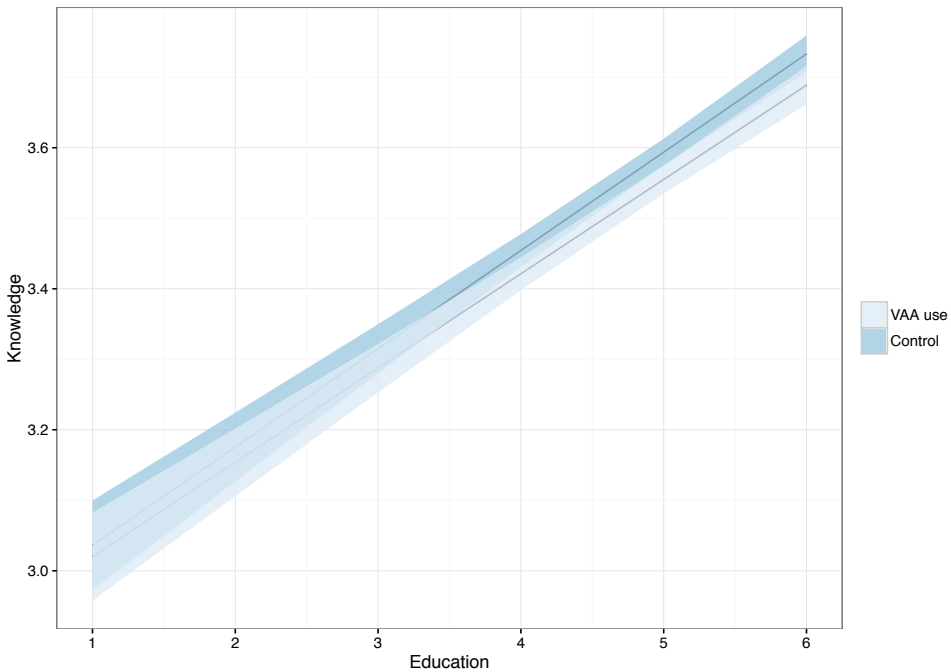
Figure 5.2: Moderated effect of VAA use on political knowledge by education.

on efficacy. In other words, the effect is stronger for lower educated people. Figure 3 illustrates this effect, which is in the hypothesized direction: the increase in efficacy caused by using VAAs is higher for lower educated people[6,7].

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[6] The robustness analysis on the exact matched data also shows a significant VAA effect on internal efficacy. A moderation effect by education could however not been found, which may be explained by the selection of observations: in the entropy-balanced sample almost all observations could be retained while in the exact matched sample more than half of the observations had to be discarded. This results in a more narrow distribution of education in the latter sample, with less lower educated people ($M = 4.9$, $SD = 1.0$, range: 2–5) compared to the entropy-balanced sample ($M = 4.7$, $SD = 1.2$, range: 1–5).

[7] The fact that the interaction is not found in the sample that was not preprocessed points at a suppression effect. In this sample, VAA users are generally higher educated than non-users. The effect of using VAAs is greater for lower educated people, but because the treatment group is on average higher educated than the control group, this interaction effect is masked. In the entropy balanced sample, where the distribution of education is equal across groups, the interaction between treatment and education can be observed.

Table 5.2: Effect of VAA use on political efficacy

	Not pre-processed		Entropy balancing	
	b (s.e.)	*b* (s.e.)	*b* (s.e.)	*b* (s.e.)
Intercept	3.46***	2.73***	3.46***	2.48***
	(0.02)	(0.07)	(0.02)	(0.06)
VAA use	0.07*	0.18*	0.07**	0.42***
	(0.03)	(0.09)	(0.02)	(0.09)
Education		0.16***		0.20***
		(0.01)		(0.01)
VAA × education		-0.02		-0.07***
		(0.02)		(0.02)
§				
N	5,745	5,658	5,619	5,619
R^2	0.01	0.05	0.01	0.06

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

§Coefficients are controlled for the structural municipality characteristics *number of inhabitants, ratio of inhabitants under 20, average disposable income per household and percentage of non-Western immigrants.* These characteristics have been omitted from the table for reasons of conciseness.

5.5 Discussion

This study is the first to examine, in a real-world setting, the causal effect of Voting Advice Application use on political knowledge and on internal political efficacy. A quasi-experiment was carried out, and the data were pre-processed using matching and covariate balancing to avoid selection bias, allowing us to study the causal relation between VAA use and efficacy and knowledge. We found support for the hypothesis that using a Voting Advice Application during election time increases political efficacy; after using a VAA in the municipality elections, people more often felt they were informed about and had a good understanding of politics. This effect is robust across matching approaches, but is small in magnitude. Furthermore, the effect is found to be larger for lower educated people, which is in line with our expectations. Generally, lower educated people are less efficacious than higher educated people, but after using a VAA this difference becomes smaller.

The results indicate that the contribution of VAAs to political understanding, as propagated by many VAA developers and assumed by governments who finance VAAs (De Graaf, 2010; Kleinnijenhuis et al., 2015), mostly relates to a *feeling* of understanding; political knowledge proofs to be harder to affect than political efficacy. While us-
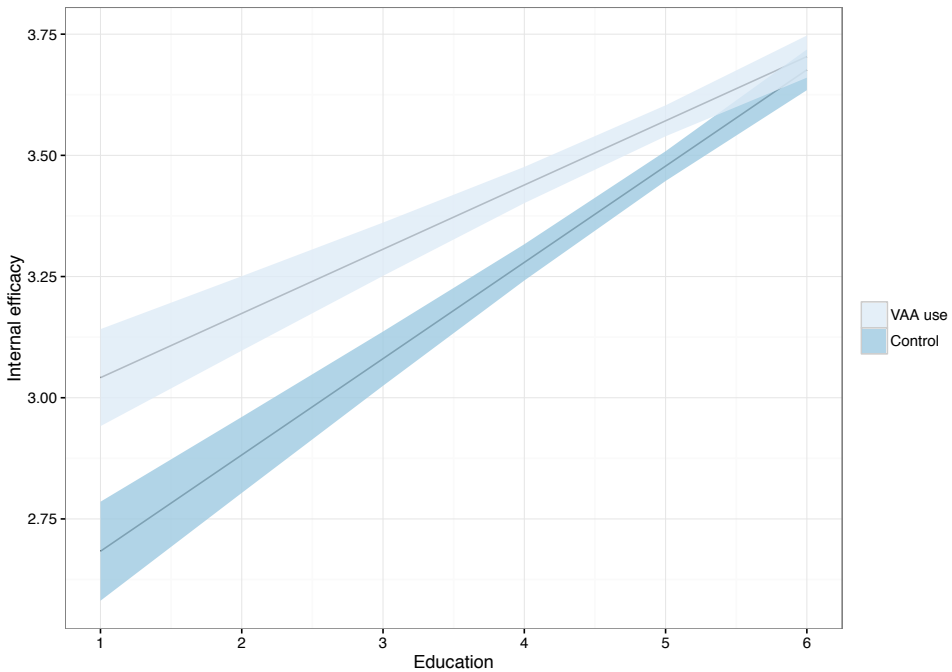
Figure 5.3: Moderated effect of VAA use on political internal efficacy by education.

ing an attractive and interactive internet tool does potentially make people feel more efficacious – more confident about their political choices and preferences – we do not find that it actually informs people. In one model we even found a negative VAA effect: people who used a VAA during the campaign were, on average, less knowledgeable than non-VAA users. While this finding is not robust across our matching methods, it could hint at a dynamic where voters who consulted a VAA *feel* like they are sufficiently informed and those who could not use a VAA put more effort in finding out about party positions. Additionally, we expected the impact on knowledge to be larger for lower educated people, but could not find support for this hypothesis either.

An important remark to make, however, is that we conceptualized political knowledge as the ability to correctly identify the positions of parties on ideological issues at the national level. While these measures were optimal given the design (it was not possible to tailor our measure to each of the 382 municipalities), many political issues that were covered by the local VAAs were of a more practical character: increasing highway capacity, building a wind park, housing issues, and such. It is conceivable that there is an actual effect of VAAs on knowledge of local issues and party positions that we were not able to distinguish. However, studying the VAA effect on a munici-

pality level allowed for this quasi-experimental set-up, leading to a better estimate of the causality of the effect.

All in all, we developed a demanding test of the causal effect of VAAs on political efficacy, and especially of the effect on knowledge. First, we measured the outcome variables only after the elections, which is one to five weeks after people used the VAA. Secondly, in our sample, efficacious and engaged citizens are likely to be overrepresented. Respondents self-selected into VAA usage, then into leaving one's email address to join surveys about politics and VAAs, and finally into responding to the survey we sent them after the municipality elections. This may lead to a ceiling effect: we look for an increase among those who already have high levels of efficacy and knowledge. On the other hand, VAA usage in the Netherlands is very widespread (Marschall, 2014), so people who self-select into VAA use do not necessarily have to be a niche of highly politically efficacious and knowledgeable citizens. And – equally important – we test for the impact of VAAs for the group of people who would actually use VAAs, rather than those who would never use them anyway. In short, we might have failed to capture some of the effects on efficacy and knowledge because of our conservative set-up, but the effects we did find prove to be relevant and very robust.

The fact that VAA availability – and hence VAA usage – is an exogenous variable has important implications for our design. In most cross-sectional studies of media effects, respondents self-select into media usage, which makes usage an endogenous variable and this leads to findings suffering from selection bias. Matching on some observed covariates does not solve this problem, as there are numerous reasons why people choose to use or not to use the medium of interest, and most of these cannot be measured and accounted for. However, since in our study VAA usage is an exogenous variable, we expect no systematic relations with (measured and unmeasured) individual covariates. Matching and covariate balancing, and controlling for municipality characteristics, further reduces the imbalance that still exists between VAA users and non-users. Hence, our study design approximates a randomized experiment.

Our findings partially support the mobilization thesis that online media are capable of bridging the so-called digital divide (Kenski & Stroud, 2006; Norris, 2001; Scheufele & Nisbet, 2002). Lower educated people, who generally have lower levels of political internal efficacy (and more often find themselves at the disengaged side of the digital divide), are the ones who gain most in political efficacy from using VAAs, narrowing the divide. Considering the huge popularity of VAAs, they have a great potential to engage people in politics and by that to increase the quality of democracy (Strömbäck, 2005). However, if VAAs aspire to contribute to factual political knowledge they should attempt to improve their design in such a way that users are challenged to gain more knowledge about key issues and party positions.

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