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# 1 Introduction

Education is regarded as one of the strongest social markers deciding the position of individuals in society. (Bovens and Wille, 2017) Educational experiences are assumed to have a major influence on who we are and how we behave. It is therefore now wonder that education has been linked to a number of socially desirable behaviours. Among these are a whole range of acts of political participatory, ranking from illegal spray-paintings of political slogans to voting in elections. (Persson, 2012) This literature review focuses on the later to examine the state of knowledge when it comes to the linkage between education and voter turnout.

The connection between these two variables has attracted a lot of attention since Brody (1978) made the puzzling observation that although the median American voter becomes more and more educated the overall turnout declines. This puzzling observation has sparked a diverse body of literature trying to establish a link between education and turnout likelihood of individuals that could account for this phenomenon.

The latest attempt to structure this diversity has been undertaken by Persson (2015). Although, a very insightful review I argue that a different perspective on the literature makes more sense. Persson centres its review around the question: Is education a causal factor on its own or does it just pick up other confounding factors. In contrast to Persson I rather focus on the different causal pathways that have been distinguished. A number of authors have proposed diverging mechanisms concerned leaning towards either the view that education has an independent causal effect or towards the view that education is a mere proxy. By contrasting these different pathways I hope to shed more light on the theoretical story behind the correlation rather than on the often theory poor causality question. Besides the difference in approach this review also tries to take new results back to the original question by Brody. Can different schools account for this puzzle.

Therefore, the article at hand is structured as follows: The first section is dedicated to the causal pathways assumed in the literature and provides information on the studies contributing to their development or building on these lines of thought. The subsequent section tries to shed light on the causality question by providing an overview over the methods used to establish it within the field. The third section will then use the causal stories of the first section and examines how they have been used to account for Bordy's paradox. The penultimate section tries to provide the reader with possible ideas for upcoming research projects and identifies untested assumptions made by the academic community. The last section concludes.

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## **2 Causal Pathways from Education to the Ballot Box**

Education is one of the most cited variables when it comes to predicted voter turnout. Smets and van Ham (2013) find that about 74% of studies connect an individual's level of education with the person's likelihood to vote. This makes education, together with age, the most commonly used variable in the field. Nevertheless the question whether education has a causal influence on its own or rather just picks up the correlation of other variables with turnout, is still hotly debated. This question has to a certain degree overshadowed the wide variety of explanations that have been given to account at least for the correlation. In the following sections these potential pathways are presented and short overview about related literature is given.

### **2.1 Civic-mindedness and aware citizens**

A first school of thought argues that education encourages a sense of civic duty as the curricula stress the importance of voting and increase the understanding of the importance of one's vote. This line of thought is based on the famous book "Voice and Equality" by Verba, Scholzman and Brady (1995).

This content based argument has been picked up by a number of scholars, trying to establish that higher education degrees containing more social science elements lead to increased rates of political participation. Besides general considerations about the influence of social science courses especially political science sparked the interest of researchers. This theoretical line of reasoning has been put to a test by Persson (2012) in a two-wave panel study on Swedish adolescents. His study finds that one year of education causes non-significant effect. The differences observed in intended political participation between those who attended a year of vocational high school and those who experienced a year in general high school were still the same as during the first measurement. Although the later curricula stressed civic education way more both groups did not show any significant change. This indicates that students have had already sorted themselves into programmes that reflected their political interest respectively the lack thereof.

Besides general considerations about the influence of social science courses especially the effect of political science on students sparked the interest of researchers. Esaiasson and Persson (2014) reach a conclusion which is in contrast to the previously discussed piece of work. They find that the importance attributed to voting increases during the course of studies for polit-

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ical science students compared to those from other disciplines. The researches reached this conclusion by conducting a two-wave panel with Swedish students over a time span of nearly one semester. During this semester students were exposed to political science teaching in a bachelor program. Possible self-selection effects were controlled for by the use of a difference-in-difference design using law and communication students as a reference group. The results obtained by this study need to be taken with a grain of salt though. Students of political science can be assumed to be those who feel the biggest social desirability bias towards civic issues. Their curriculum stresses the importance of civic engagement and as Solis (2013) has shown that more education leads to more over-reporting concerning voting, it is likely that part of the effect found here, could be due to over-reporting because desirability issues.

## **2.2 Able citizens**

Ability is the second causal mechanism that connects education with voter turnout. This line of thought goes back to a study conducted by Rosenstone, Rosenstone and Hansen (1993). [WIE GENAU]. They find that what matters in determining the influence of education on voter turnout are the skills developed while studying. Individuals with great verbal skills find it easier to participate in the political process, to argue, to deal with information, and make their minds up about political decisions. Therefore, the cost respectively effort is lowered for those individuals which are educated, to take part and the hurdles to get active are lowered.

This line of thought is taken up by Hillygus (2005) in his famous article "THE MISSING LINK: Exploring the Relationship Between Higher Education and Political Engagement". While examining data from the Baccalarate and Beyond study of ca. 8000 college graduates in the US, he finds that indeed those who graduated from social sciences programs have a higher likelihood to vote and be politically active while on the other extreme students graduating from a science or business degree actually decrease their turnout likelihood. Interestingly these effects still hold even when controls for the quality of the institution and intellectual skills are included. He interprets these findings as indicator that the skills acquired in social science degrees are beneficial for political participation.

This finds have been re-examined very recently by Bhatti (2017) in the context of Danish regional and municipal elections. Arguing that the study by Hillygus still focuses too much on length of education rather than type of education, a register based panel data set is used to

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determine the influence of degree type on voting likelihood. In contrast to Hillygus, turnout data in this case does not rely on self-reported but rather on official voting records and the study explicitly controls for self-selection of students into different programs by using a difference in difference design. Opposed to the findings of Hillygus no significant differences between programs are found with the general exemption of studies that have a very high civic content (e.g. political science). These findings are in sharp contrast to the skill theory developed above and point more towards the role of social networks, as also no difference in observed effect exists between those, that finished the program already and those who had only started studying.

### **2.3 External political efficacy**

Another approach situated between skill and civic-mindedness exists, linking education with turnout via changes in the individuals perception of its own political efficacy and political interest. (Wolfinger and Rosenstone, 1980) HIER ELABORIEREN

This findings have been challenged recently though. A more recent experimental study finds that external political efficacy is not increased by more education. The non-finding is produced in a study by Friedman et al. (2011) who evaluate an education experiment in Kenya. Based on academic excellence the highest scoring 15% of boys and girls in sixth grade were awarded grants to cover for their education. While producing normatively positive outcomes such as better test scores, no evidence could be found that political efficacy could be increased. This calls into question the results of the study by Wolfinger and Rosenstone (1980) making this causal path questionable.

### **2.4 Social Networks**

Besides the possible connections discussed already another more commonly known school of thought argues that education matters not because of the skills or knowledge acquired, but rather because of the social status gained. This relative education model has been developed by Nie, Junn and Stehlik-Barry (1996). The authors argue that relatively more education leads to higher social status which in turn is correlated with all types of political participation. What matters is relative rather than absolute education. [ELaborieren]

This peace of work has been criticised by Tenn (2005) who argues that the original model does not allow for tests between absolute and relative effects of education that both might be at work

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simultaneously. What is even more, is that the former study did not allow, according to Tenn, to test for age, respectively cohort effects as relative education was measure in relation to the whole population. Tenn therefore constructs a measure of relative education that only compares within the same cohorts to account for the dynamic effects of education. Their findings indicate that indeed relative rather than absolute education is the more important factor which is interpreted as rendering the correlation between years of education and turnout spurious, as the authors assume that relative education is related to social status and background characteristics.

This school than has been further developed by Campbell (2009) who essentially finds support but argues that it only applies to electoral activity and not all types of political participation. He also shows that the model only holds if the geographical, and age distribution of educational attainment are considered. This indicates that the relative effects are relative to the closer surroundings instead of a broader nationwide effect.

A relatively new study by Persson (2013) goes, in contrast to the studies previously mentioned, beyond the United States and finds support across 37 countries using combined survey data from the European Social Survey and the Comparative Study of Electoral Systems data base.

## **2.5 Cognitive Ability, Genes and other Unobservables**

While the previous approaches all assumed that the often observed correlation between education and turnout is causal. This section discusses the role of a number of other factors that have been linked to the connection, claiming that the assumed causality is spurious and other factors cause both education and turnout.

The non-findings mentioned in the previous section can be explained if newest research in the field is considered. A recent study comparing the perception of the political efficacy over 28 countries conducted by Borgonovi and Pokropek (2017, p. 125)) finds that one's one political efficacy is "[...] is strongly related to parents' SES [socio economic status] and that, on average, around 60% of the parental SES gradient is mediated by cognitive abilities (which account for around 30% of the parental SES gradient) and own SES (which account for the remaining 30%)". This indicates that the cognitive abilities of the children, which were the top 15% of their class, mediated the effect of education, which is in turn the strongest predictor itself for SES. In summary their results indicate that education as the strongest indicator of SES is insofar important as it changes the individual's economic situation. The lion's share of this effect is nevertheless not

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open for manipulation as it concerns the inherited SES (also influencing the child's education) from the parents and the child's cognitive ability. The results are estimated using a highly sophisticated modelling technique employing unconfounded multilevel structural equation modelling with three mediation variables which are numeric and verbal ability, as well as parental socioeconomic status. Nevertheless, it is noteworthy that the study in question only captures cross sectional data at one point in time. Due to the extensive tests necessary for the cognitive ability variable (approximately one hour per person) no second wave of this data exists.

Cognitive ability and other (unobserved) background characteristics are amongst the hardest things to control for in social science research. A huge number of variables qualify as of being of potential importance. Especially when it comes to socialisation procedures the number of unobservables is quit high. In order to account for this a study conducted by Denny and Doyle (2008) uses data generated by an extensive government research project which enables them to control in a panel setting for political interest, cognitive ability and character traits. They utilise the British National Child Development survey which was administered to those people born in the time period from the third of March to the night of March in 1959 and has been repeated in six waves. They conclude that the effect of education is over-estimated if cognitive ability and character traits are taken into account. Also political interest, as well as voter participation, is driven by character traits which are covarying with both making models including one to explain the other potentially biased.

As convincing as this evidence sounds the findings of Burden (2009) indicate that education is a dynamic variable rather than a static one. He finds that it matters whether one received her education in the 1950s or the 80s. While examining survey data from 1959 to 2004 in the United States, education shows to have a non-constant effect on turnout likelihood over time. This indicates that the extensive data collected on the 1953 cohort in Great Britain might tell little about today's effect of education, as pedagogic methods, curricula, and university systems have changed.

This demonstrates a fundamental problem in controlling for background covariates that panel data can help to account for these characteristics but provides little current day evidence as time effects are used to distinguish causal effects what conflicts with the dynamic nature of the variable.

In order to avoid biased results caused by covarying unobservables and to reach currently ap-

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plicable knowledge researchers went to lengths in order to achieve quasi experimental standards. While older literature employed matching methods like propensity matching (Kam and Palmer, 2008), newest research achieves better control by using already matched individuals within the population. Two recent studies consider the impact of education on a sample of mono-zygotic twins (Dinesen et al., 2016) respectively siblings (Gidengil et al., 2017). This research designs have the obvious advantage of reducing the influence of unobserved external factors as it can be reasonably assumed that besides a huge share of shared genetics, the circumstances of the children's upbringing and socialisation haven been highly similar.

The study by Dinesen et al. (2016) is based twin surveys in Denmark, the United States, and Sweden. The countries are selected on the basis of data availability. The design although having a very high level of internal validity due to the utilised co-twin control design suffers from external validity concerns as the samples in Denmark and Sweden are different form the national population in some key characteristics such as age. The study finds that, after controlling for observable and also unobservable factors in the upbringing of the respondents, education has small and positive effect but only does so in Denmark and the United States. It is important to notice that the data is also coherent when the different national sub samples are considered as not only the recorded characteristics vary but also the mode of administration, therefore the estimated inter-country differences in the importance of education could be due to measurement error.

The even more recent study by Gidengil et al. (2017) uses a similar design but sacrifices some of the internal validity in order to gain better measures and a more representative sample. The study is based on a cross-sectional data set compiled by the Finish government providing the advantage that the authors have no need to rely on self-reported data but have anonymised official records to their disposal. This is a major advantage especially given the finding of Solis (2013) that higher education is correlated with higher over-reporting of electoral activity. The results found are highly similar to those by Dinesen et al. and confirm that the effect of education is rather small put positive if alternative factors like family background are taken into consideration. The congruence between the results of these two studies strengthens the argument that education does matter and has an independent effect on voter turnout, but at the same time relativises the importance of education for voter turnout as background characteristics have a way stronger influence on voting behaviour.

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This findings also explain the famous non-finding of Berinsky and Lenz (2011). In their study the authors use the Vietnam draft lottery as a random procedure to increase education among the male cohort which would have been drafted if not enrolled in college. This thread lead to a spike in male collage education to avoid fighting in Vietnam. The forced nature of educational attainment produced no significant increase in voter turnout amongst those that received more education. These findings can be explained by the sibling studies finding that education only has a small effect if controlled for background characteristics that also influence educational attainment. If young males were forced into collage and would not have gone otherwise this correlation between background characteristics and education would diminish while at the same time the correlation between background characteristics and voting would be sustained, leading to an artificially lowering in the estimated influence of education on voting.

The findings are in line with the results of a study by Sandell and Plutzer (2005). Using a sample of children from families that experience a divorce during the examination period Sandel and Plutzer are able to estimate the influence of divorces on voting likelihood. They find a strong and significant influence vieing that of education. These findings also strongly emphasise the importance of upbringing and socialisation.

### **3 Methodology in the course of the research program**

What makes the question about the connection between voter turnout and education as attractive as it appears to be is the strength to have a variable that is inherently non-political but is nevertheless as strong predictor for a political outcome. This also comes at a cost. The further down we go the funnel of causality the more problems we encounter. Starting with measurement issues very soon also a whole number of unobservable or hardly observable characteristics appear and become of importance. Education as a central live choice can be assumed to depend on a whole number of characteristics inherent in the individual (such as character traits or cognitive ability) but also variables connected to the social surrounding especially during the socialisation phase (such as SES of the parents). Most of these factors can also be assumed to effect political participation, attitudes towards the political system, external efficacy and a whole number of characteristics. This complexity has shifted the focus of the literature towards methodological issues and way from theory. The theories are often just presented based on previously

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found evidence, respectively the lack thereof as most findings are contradictory. The main developments in the field are therefore methodological. Although only a few articles go as far as Sondeheimer and Green (2010) or Berinsky and Lenz (2011) and completely focus on the method rather than on the theory, the field has experienced a rapid change towards more sophisticated research designs as the debate has moved towards ways to maximise internal validity and avoid endogeneity problems.

A number of studies try to achieve strong causal claims by using an instrumental variable approach. They instrument using free secondary education schemes (Ma, 2017), variation in Child labour laws (Chevalier and Doyle, 2012), or the Vietnam draft lottery which raised education levels among young men (Berinsky and Lenz, 2011). Depending on the timing of the study (e.g. Hillygus, 2005), or the stance taken towards instrumental variables ((Tenn, 2007; Denny and Doyle, 2008)) also longitudinal designs have been used, mostly to estimate the marginal effect of *single years* of education. Especially the latter two papers stress the length aspect of education assuming a “the more the better” connection.

Randomized experiments are scarce in the field as ethical issues arise by withholding education completely from individuals to achieve a proper control group. A notable exception is the use of a number of education experiments by Sondeheimer and Green (2010). They use randomly assigned class sizes from three different experiments and track down the former participants. By matching these participants to the official voting records they come closest to a classic field experiment.

Besides experiments in the classic use of the term, a number of quasi experimental research designs have been employed more recently to generate control groups with lesser education and in contrast to the Sondeheimer study with a more coherent treatment. Among the deployed methodologies is propensity matching (Kam and Palmer, 2008) which tries to generate a control group created based on observable characteristics. Each individual gets assigned a match which is most similar to the treatment group. In a similar vein Bhatti (2017) uses a difference-in-difference design to isolate the effect of education. Solis (2013) and Dang (2017) use a regression discontinuity design, utilising the merit based assignment of educational grants in Chile as cut-off respectively compulsory schooling laws in Vietnam. All of these designs control effectively for observable factors but leave the problem of omitted variable bias uncovered as factors might exist that influence the observable indicators (especially the performance used by

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Solis (2013)) and turnout as well.

Two new studies effectively control for these factors by building their control group on family members, namely siblings (Gidengil et al., 2017) and twins (Dinesen et al., 2016). This approach allows to assume highly similar upbringing environments for control and treatment group and is in the case of Gidengil et al. (2017) even complemented with official government records. In summary a broad trend aims rather at internal than external validity as accounting for potential unobservable factors is a task of uttermost complexity.

After this discussion of different methodological takes on the problem, the question whether different methodologies lead to different results concerning the causal effect of education is obvious. While studies using instrumental variables frequently (but not always see Ma (2017)) find that the relationship between education and voter turnout is spurious Berinsky and Lenz (2011); Chevalier and Doyle (2012) the newer methods of causal inference find contradictory results. While Bhatti (2017), Kam and Palmer (2008), and Solis (2013) find little to no evidence that would causally link education to voter turnout Dang (2017), Dinesen et al. (2016), and Gidengil et al. (2017) find evidence for a significant effect of education although mediated by unobserved characteristics.

In summary it can be said that the literature although employing more and more sophisticated research designs is still inconclusive about the causality of the nature of the relationship between education and voter turnout. A number of potential reasons for this are given in the penultimate section.

## **4 Brody's puzzle: possible solutions**

As outline in the introduction, Brody (1978) noticed in the 1970s already a problem in the assumed connections between education and voter turnout. Why has voter turnout been steadily declining although the median American voter experienced more and more education? Given the evidence presented above a number of possible explanations for this situation have been proposed. Rendering the so called "paradox of participation" way less paradoxical than a first view might suggest. In the following paragraphs explanations that are given by the diverging approaches are evaluated in how far they can shed light on this issue.

The first proposed model linking civic-mindedness and turnout is not helpful when it comes

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to explaining this outcome. Brody indeed argued following this line of thought when he brought up the paradox in the first place. What sheds more light on the problem is the skill perspective. Armingeon and Schädel (2015) argue that although larger parts of society acquire the skills necessary to participate the de-alignment of the society as a whole increases decision making difficulty. Their study using electoral survey data across eight European countries shows that participation becomes more unequal. The less educated participate less than previously. A greater need of the uneducated to rely on clues and heuristics is met by less and less available cues that are considered to be trustworthy. The de-alignment from traditional milieus leaves the voters in a political blank space without indications what to vote and why to vote. If these findings are linked with the ones by Hillygus (2005) that strong divergence in verbal ability exist even amongst college graduates they also indicate that the number of citizens which is willing and able to make up their mind about complex political questions might be even lower than Armingeon and Schädel (2015) assumed.

The relative education model suggests that even if the whole American electorate would become more educated that only relative education matters. Therefore increased education for everybody would not lead to increased participation but rather cause a shift in education levels that participate more towards higher formal degrees. Campbell (2009) These findings would explain why the overall level of turnout did not increase but can provide no explanation why turnout decreased over the years.

The last account considering education mostly as a proxy of early life experiences, upbringing, and socialisation has not yet been able to contribute to the solution of Brody's paradox. One could speculate that in the age of de-alignment and decreasing levels of party identification, also the emphasis on politics within the socialisation process would decrease. Less workers sports clubs, less church related youth groups and there like might leave an increasing number of people without firm commitments developed during socialisation. Nevertheless this remains speculation and would need to be put to empirical testing.

## **5 Future Research**

Although the literature about the connection between education and voter turnout has been steadily improving during the last years a number of issues, unanswered potentially interesting ques-

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tions, and methodological problems remain unsolved. This section outlines a number of possible pathways for future research.

One of the major assumptions in comparative research is unit equivalence. Apples can and should not be compared to oranges and vice versa. This point is not sufficiently proven in the case of education research when it comes to consistency over time and space. As Burden (2009) has shown in the US context the effect of education is dynamic over time, as the education system changes in accessibility, pedagogical methods, and curricula. This is usually not taken into account when panel data is used in the field. The results found by Burden are in concordance with those by a more recent study by Kahne, Crow and Lee (2013). They find that depending on the type of civic education pupils receive in school different forms of political participation are encouraged. This can be assumed to have been subject of change over the last decades and is most often not accounted within the literature.

The same problem applies to comparison across spatial units. Although there are common trends in Western curricula, nobody would dispute that pedagogical styles differ significantly from country to country, what should lead to different effects on political participation. This critique finds support by an often reported gap between European and American data on the strength of the relationship between the two variables. This point could even be taken more seriously as it could be argued that different institutions produce different levels of skill, types of networks, or might encourage the students more or less to become socially active. To give an example: The workload experienced by some students in some institutions might discourage, or even render participatory practices prohibitively costly, therefore producing less civic individuals. In summary unit equivalence is not sufficiently established in this literature.

A good example for this critique is a study by Chevalier and Doyle (2012) finding that the United States are in a sample of 38 countries the state with the strongest covariance between turnout and education. When they drop the United States out of the sample, the estimated coefficient for education even loses statistical significance. Digging into the problem why the US might be an outlier, they neglect classic variables connected to the political systems and rather focus on crime. In the United States live about 5 million people who have lost their voting rights due to disenfranchisement laws. Prisoners and in some states even former prisoners are not allowed to vote.

These findings highlight a problem but also might provide an opportunity. The influence of

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education on the chances of imprisonment might provide researchers with a good instrumental variable to account for early socialisation and unobserved background variables. The idea is that societal strata with lower SES and a more complex upbringing should have higher chances of imprisonment as well as lower educational attainment. At the same time a causal influence of imprisonment on voting is everywhere besides the United States unlikely as only the US has that extensive disenfranchisement regulations. This certainly would necessitate further investigation

Another thing I would like to point out is the need to be clearer about causal mechanisms. While many studies invest heavily in highly sophisticated research designs, in order to prove or disprove causality, the theory parts are often way less developed. A whole number of studies glimpses at different parts of the literature proceeding directly to the test without specifying which of the competing theories is put to test. More theoretical clarity would help to identify possible confounders, and potential concomitant occurrences. Taken into account these would help to improve and strengthen claims for causality.

A last aspect of the already existing literature deserves attention, the strong geographical clustering of research. Most of the studies discussed in this review focus rather narrowly on the United States (e.g. Brody (1978); Campbell (2009); Hillygus (2005); Kam and Palmer (2008)) and second most often on Sweden (e.g. Persson (2012); ?). In case countries are discussed beyond the former two a strong focus is given by the literature to western countries like Ireland Ma (2017) or Great Britain Denny and Doyle (2008). This is troublesome as the level of general education in most Western countries is extremely high already, when compared to less developed states. This might artificially reduce the estimated influence of education on voter turnout as only cases at the very high end of the spectrum are considered, leading to estimates that cover up a potentially causal relationship at low or medium levels of general educational attainment. A recent study by Dang (2017) on the influence of education in Vietnam, also pointing out that research so far has only considered consolidated democracies, could suggest more research in this direction. Using a regression discontinuity design and the introduction of compulsory schooling laws as random assignment mechanisms between generations, Deng finds in the analysis of World Value Survey data a strong and significant effect of education on voter turnout. These findings should encourage more attention for the potentially not uniform effect of education across different levels of general education as well as levels of democratic consolidation.

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## 6 Conclusion

This review has tried to re-group and update the education-turnout literature since Pearson's last review in 2015. So what has changed since Pearson's testimony that: "The literature provides a frustrating, divided picture and we are left without a clear answer as to whether education causes political participation. In addition, a number of studies complicate the discussion further by arguing that the effect of education is relative rather than absolute."? (Persson, 2015, p.699)

Most current research points towards a causal linkage between education and voter turnout. (Dang, 2017; Gidengil et al., 2017; Dinesen et al., 2016; Armingeon and Schädel, 2015) Nevertheless, the impact of these effects is shown to have been hugely overestimated. Individual level characteristics, socialisation, and cognitive ability eat up most of the effect historically attributed to education. This renders the contradictory findings of previous research lamented by Persson more understandable. Omitted variable bias has been plaguing the field leading to all kinds of miss-estimation. The two recent studies of Dinesen et al. (2016) and Gidengil et al. (2017) offer the strongest internal validity achieved so far and provide the same results with data gathered independently. This shows very strong support for the causal claim made.

Nevertheless the field is still plagued by issues. Although only probably only small the causal effect of education is not explained yet. The two studies cited above are busy establishing whether there is causation, but fail to identify the exact mechanism by which education actually influences voter turnout. The general focus on the question causality or correlation has led to a lack of competitive theory testing amongst the existing arguments. This issue also plagues the explanation of Brody's paradox. While a number of potential explanations is available for ad-hoc arguments, competitive empirical testing still lacks behind. The observation of (Burden, 2009, p. 542) still holds true that: "What is even further the case is that voting literature has established that many turnout depressing factors that individually these explanations are quite plausible, but together they are unsustainable. Each theory accounts for the failure of turnout to rise too neatly. Each author is able to marshal enough negative force in particular variables to perfectly offset the positive effects of education. These "just so" arguments seem a bit too tidy to fully account for Brody's puzzle". This situation will stay the same if competitive micro-level theory testing about education stays unconducted.

A second noteworthy issue is that the external validity of their findings remains shaky. Twins as well as siblings differ in their characteristics from the overall population. Only children might

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be affected differently by their upbringing. Both studies are also conducted in the Scandinavian context this could be problematic to generalise due to the issue of unit equivalence discussed in the last section.

In summary it can be said that the picture is way clearer now than by the time Pearson wrote his review article. A causal link between education and turnout seems to exist although way weaker than originally assumed. Nevertheless, his concerns about competitive theory testing remain an important issue on which further literature would need to focus.

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