Educational attainment and political trust

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Abstract

Education is crucial for many political attitudes and behaviors, but its relationship with political trust is not clear. We show with a meta-analysis that educational attainment is positively associated with political trust, but we argue that these associations are confounded by the common family background of those who are more trusting and who select into further education. We then triangulate this with three designs. Using data from four twin studies, we show that the relationship between educational attainment and political trust disappears when accounting for family background. We then demonstrate that the relationship is attenuated when matching respondents on early life conditions, but not when adjusting for polygenic indices of educational attainment, providing clearer evidence for environmental confounding. In sum, those predisposed to political trust are also predisposed to remain in education, and therefore education is a proxy for family background and not a cause of political trust.

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Education has long been considered vital for democracy. The more educated are more likely to participate in political life (Willeck and Mendelberg 2022). They also show higher levels of political knowledge (Barabas et al. 2014) and interest (Le and Nguyen 2021). In addition, education is a strong predictor of both social capital (Apfeld et al. 2022) and interpersonal trust (Huang et al. 2009). Educational attainment may therefore promote effective democratic citizenship and underpin the functioning of democracy.

One way in which education may advance democracy is by encouraging political trust. Those with higher diffuse trust in politicians and political institutions are more likely to engage with politics, and to comply with the law (Devine 2024). However, our understanding of whether and how education affects political trust is comparatively thin, despite much evidence that education promotes other pro-democratic attitudes (Mayne and Hakhverdian 2017). This paper seeks to understand how education is related to political trust.

Education, and especially higher education, may have both a direct role and an indirect role in shaping political trust in advanced democracies. Directly, educational experience may make one more supportive of democratic principles and more trusting of democratic institutions, analogous to its well known role in promoting social liberalism (Stubager 2008; Surridge 2016). In support of this, the more educated are not only more liberal than the less educated, but they are also more supportive of democratic norms (Anderson and Tverdova 2003; Anderson et al. 2005; Kolczynska 2020). Indirectly, in advanced democracies, in which corruption is less common and institutions are somewhat responsive, the more educated are expected to have the cognitive resources to appreciate that liberal democratic norms are generally followed (Hakhverdian and Mayne 2012; Mayne and Hakhverdian 2017). Together this suggests that the more educated will be more politically trusting. They care more about adherence to democratic norms, and while they may be aware of their country's democratic deficits, they are more capable of identifying that, in general, these norms are followed in advanced democracies.

For these reasons, educational attainment may be considered a cause of political trust in advanced democracies. Yet, while existing work often finds a positive relationship, it normally uses cross-sectional data (Anderson and LoTempio 2002; Hakhverdian and Mayne 2012; Hetherington 1998; Meer and Hakhverdian 2017), or panel data limited to a few

countries and short time horizons (Claes and Hooghe 2017; Hooghe et al. 2015; Devine and Valgarðsson 2024). In addition, political trust has components that are socialized in early life (Jennings et al. 2009; Devine and Valgarðsson 2024; Jennings and Niemi 2015), and which are dispositional (Cawvey et al. 2018; Mondak et al. 2017; Dawes et al. 2014). Educational attainment also has components that are socialized in early life (Klasik 2012), and those which are influenced by heritable dispositions (Engzell and Tropf 2019; Krapohl et al. 2014). We argue that this means that associations between educational attainment and political trust are unlikely to be causal, and that education instead proxies for pre-adult political socialization and inherited dispositions which also predict political trust.

Using twin data, we show that the relationship between educational attainment and political trust is confounded by family background. This raises the important question of whether the confounding is primarily due to shared early life conditions such as childhood socioeconomic status, or shared heritable dispositions such as cognitive ability. Using cohort data and polygenic indices for educational attainment, our evidence is clearer for the confounding role of early life conditions, although it is nonetheless still likely that both nature and nurture play a role. In short, our findings suggest that educational attainment is unlikely to be a cause of political trust in advanced democracies.

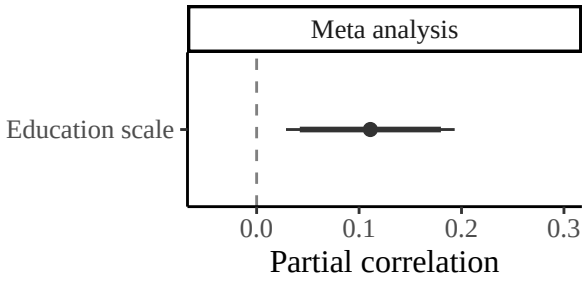
In what follows, we first outline an 'education as cause' view before arguing that educational attainment is instead a proxy for pre-adult political socialization and heritable predispositions which also predict political trust. We then discuss why the data we use allow us to disentangle this relationship, before demonstrating that the association between education and political trust is substantially reduced when accounting for family background. We conclude by suggesting that policymakers looking to alleviate low and declining trust in advanced democracies may wish to look not at increasing levels of education, but at the content of that education instead.

Education and political trust

Many previous studies find a positive relationship between educational attainment and political trust in advanced democracies (Theiss-Morse and Barton 2017). In particular, graduates tend to be more politically trusting than non-graduates (Hakhverdian and Mayne 2012; Meer and Hakhverdian 2017). This association is often quite strong and we illustrate

it in Figure 1, in which we present the results of a meta-analysis combining 189 coefficients from 36 published studies. The vast majority of the coefficients are positive (85 per cent) and most are both positive and statistically significant at the 5 per cent level (72 per cent). The partial correlation is 0.11, and it is significant at the 5 per cent level[1]. The overall effect size is moderate and comparable to other meta-analytic effects in political science: it is for example substantially larger than the effect of ethnic diversity on interpersonal trust of -0.024 (Dinesen et al. 2020), and similar to the rally effect of terror attacks on government support of 0.09 (Godefroidt 2023). Educational attainment is therefore positively associated with political trust in advanced democracies.

Figure 1: Meta-analytic effect of education on political trust in advanced democracies



Note. Partial correlation and 95 per cent confidence interval, drawn from a hierarchical model with random effects for each study and data source. N = 189 coefficients from 36 studies, with 18 data sources. All coefficients have been standardized into partial correlation coefficients, see Aloe (2014) for details. See Online Appendix B for full details including a list of included studies.

One interpretation of this association is that educational attainment exerts a positive, causal effect on political trust in advanced democracies (Mayne and Hakhverdian 2017). However, 80 per cent of the coefficients come from cross-sectional, observational analyses, and none use longitudinal or family data (for example, from a twin study)[2]. Therefore, although there is a positive association between education and political trust, existing evidence does not help us determine how this should be interpreted.

Educational attainment as a cause of political trust.

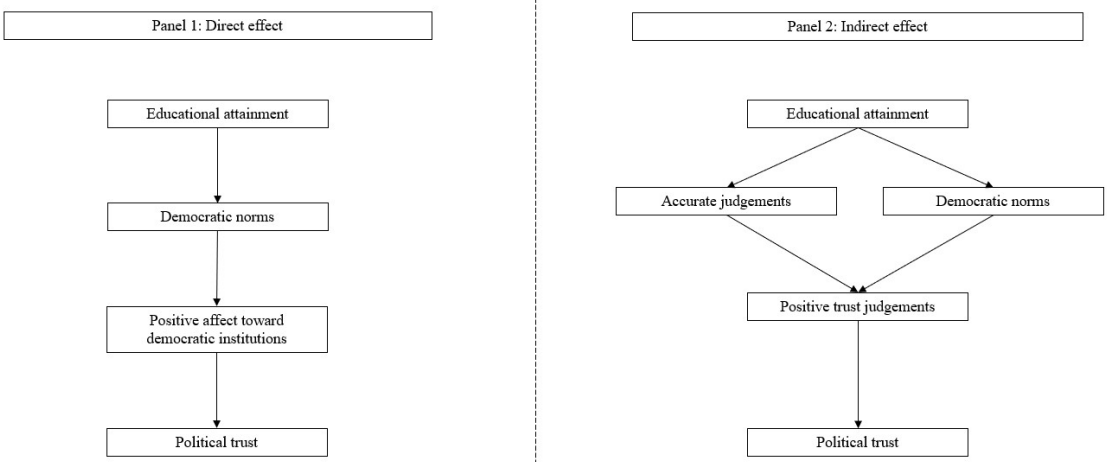
Why might the positive association between educational attainment and political trust be causal in origin? There are both direct and indirect ways in which educational attainment might cause political trust, and we demonstrate these in Figure 2. The direct role

[1]It is important to note that partial correlation magnitudes cannot be interpreted in the same way as zero order correlations. Doucouliagos (2011) suggests that a partial correlation over 0.07 should be interpreted as moderate, and a partial correlation over 0.33 should be interpreted as large.

[2]In addition, there is some evidence of publication bias exaggerating the results (Egger's p-value $<$ 0.001, Egger's limit = 0.02).

of educational attainment for political trust comes from its 'norm-inducing' role, which we demonstrate in Panel 1. Education in democracies, especially higher education, is argued to imbue those who attend with democratic values (Kotzian 2011; Hibbing and Theiss-Morse 2002). These democratic values are likely to directly prompt a more trusting view of democratic institutions, which to some extent embody these norms.

Figure 2: The commonly accepted 'education as cause' view of the relationship between education and political trust in advanced democracies.



In support of this, the more educated are more supportive of democratic processes (Evans and Rose 2007; Jamal 2006). They also tend to express more respect for human rights, and to condemn corruption more strongly (Anderson et al. 2005; Anderson and Tverdova 2003). Direct experiences with democratic processes during education (for example, through school councils) are also associated with political trust (Claes and Hooghe 2017; Kiess 2022). Similarly, perceived procedural fairness within educational institutions may be generalized into adolescents' political trust (Abdelzadeh et al. 2015). Nonetheless, these direct influences are not the only ways in which education may affect political trust. In addition to their direct role in shaping attitudes, educational experiences also affect how people interpret the world around them.

We demonstrate the indirect role of education for political trust in Panel 2. This relies on an evaluative model of political trust, in which people are assumed to grant or withhold trust based on their appraisal of the performance of political actors and institutions (Mayne and Hakhverdian 2017; Meer and Hakhverdian 2017; Elsas 2015). It is then ar-

gued that factors which affect political trust, including educational attainment, must do so by affecting the 'skills' which people use to evaluate politics, or by affecting the 'norms' against which they judge what they see (Mayne and Hakhverdian 2017). The crux of this is the claim that only the more educated possess both the background knowledge and respect for democratic norms to understand that the political institutions in advanced democracies are, in general, worthy of their trust (Mayne and Hakhverdian 2017). It is suggested that the more educated are more likely to understand the constraints within which their political system operates, and to judge government performance against more realistic expectations, leading to greater political trust (Theiss-Morse and Barton 2017). Rather than the unqualified positive attitude toward democratic institutions that the direct mechanism implies, this indirect mechanism relies on the more educated taking a considered judgement that the institutions in their country are worthy of their trust.

In support of this idea, there is reasonable evidence that people benchmark against liberal democratic norms when making political trust judgements. For example, perceived procedural fairness is strongly related to political trust in longstanding democracies (Grimes 2017). There is also reasonable evidence that the more educated make more considered political trust judgements against their normative benchmarks. The more educated are more politically attentive (Willeck and Mendelberg 2022), and knowledgeable (Persson 2015), and, in particular, they are more capable of correctly assessing their country's human rights record (Anderson et al. 2005). As we would expect, therefore, the positive association between education and political trust is partly mediated by respect for democratic norms (Kolczynska 2020; Ugur-Cinar et al. 2020). Similarly, in democracies with high rates of corruption, the more educated are more capable of realizing that democratic norms have been broken, and they are consequently less politically trusting in these countries (Hakhverdian and Mayne 2012).

However, while the existing evidence suggests there is a positive relationship between educational attainment and political trust, it is insufficient to judge whether this association is causal in origin. For one thing, it is generally cross-sectional (Mayne and Hakhverdian 2017; Hakhverdian and Mayne 2012) or based on short panel studies, typically with data drawn from a single country and from only a few years (Hooghe et al. 2015; Claes and Hooghe 2017). One exception is Devine and Valgarðsson (2024), who find using panel data

from three countries that although educational attainment explains differences in political trust between people, it does not explain differences in political trust within people over time. Nonetheless, given the limited over-time variation in educational attainment within people in their panel data, it is unclear whether this null result is explained by education having no causal effect on political trust, or there being too little variation within people for a within-person effect to be identified in the data they use.

An 'education as proxy' view of political trust.

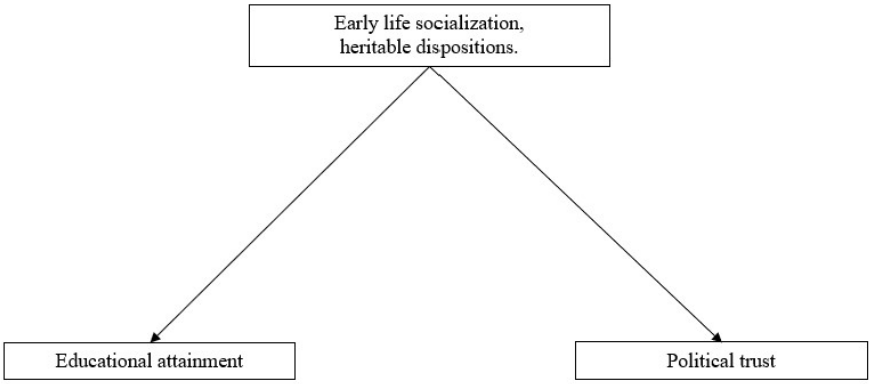
A causal interpretation of the relationship between educational attainment and political trust would rely on political trust being sufficiently malleable to be moulded by educational attainment. However, this may not be the case. Recent studies emphasize that political trust is stable in long run panel data and does not respond to major life events (such as unemployment) or to major political events (such as changes in government) (Devine and Valgarðsson 2024; Hooghe et al. 2015; Schoon and Cheng 2011). This is at odds with the dominant 'running tally' approach to political trust and it is therefore suggested that political trust may have a component that is socialized in early life, and a substantial heritable component (Dawes et al. 2014; Kettlewell and Tymula 2021)[3].

These less malleable components to political trust have significant implications for our understanding of how educational attainment might affect political trust. As Mayne and Hakhverdian (2017) note, 'the conventional view of 'education as cause' with regard to political trust might overstate the added value of education if both political trust and its normative and cognitive predictors are developed outside of traditional venues of education'. We therefore argue that the relationship between educational attainment and political trust is likely to be confounded by these previously downplayed determinants of political trust and we illustrate this in Figure 3. Education and political trust have common causes related to the shared family background of those who are more trusting of political institutions and more likely to enter higher education. Therefore, any causal relationship between educational attainment and political trust is much weaker than the observed positive correlation may suggest.

Education as a proxy for early life socialization.

[3]For example, political trust is strongly related to several personality traits that are themselves both stable and heritable (Cawvey et al. 2018; Mondak et al. 2017).

Figure 3: An 'education as proxy' model for the relationship between education and political trust.



What might these confounders look like? The first set of confounders are those related to early life conditions, meaning the socialization within one's family and local community which people experience while growing up. One important example is early life household socioeconomic status, which is associated with both educational attainment and political trust in later life. For one thing, family socioeconomic status affects whether people are likely to remain in education for longer or to enter higher education (Klasik 2012). Those from more comfortable backgrounds are more likely to attend fee-paying schools and to receive the financial support from their family to enable them to enter higher education (Chevalier and Lanot 2002). Household socioeconomic status is also strongly associated with school motivation and classroom attainment (Schoon and Cheng 2011).

Furthermore, political trust is associated with both household socioeconomic status and with (perceived future) personal socioeconomic status, likely because those in higher income brackets feel more comfortable with the political system (and with their lives in general). In addition, given that politicians are disproportionately drawn from higher income brackets (Carnes and Lupu 2023; O'Grady 2019), and perceived cultural distance with politicians is negatively related to political trust (Noordzij et al. 2021), those from similar socioeconomic backgrounds to politicians are likely to be more trusting of those politicians and of the institutions which they occupy. Those in higher income brackets accordingly express higher political trust (Mayne and Hakhverdian 2017), as do those who report greater financial satisfaction (Catterberg and Moreno 2006) and, most relevant for our argument, those who grew up in more financially comfortable households (Schoon et al. 2010; Schoon and Cheng 2011; Hooghe et al. 2015).[4] Early life experiences are therefore

[4]Earlier studies suggested that family socialization had only a limited effect on political trust (Beck and

likely to affect both educational attainment and political trust.

In addition, the direct and indirect roles of educational attainment for trust are likely to be strongly associated with people's early life conditions. First, considering the direct role, it is unclear how democratic norms are imparted during education. What then are plausible suggestions? One possibility is direct experience with democratic procedures, through school councils and other such processes (Claes and Hooghe 2017; Kiess 2022). Yet, it is perhaps more plausible that those who are already more knowledgeable about democratic norms are more likely to participate in these processes, and the family is a strong candidate for where these norms are acquired. Accordingly, when accounting for family background in a co-twin control design, the relationship between educational attainment and political knowledge is substantially reduced (Weinschenk and Dawes 2019; Weinschenk et al. 2021), especially within those households which discuss politics more frequently (Robinson 2020), suggesting that knowledge about politics is acquired through the family rather than the educational system.

The indirect role of education relies on the more educated possessing the normative benchmarks and contextual knowledge to recognize that their political institutions generally perform quite well, compared to global and historical norms. This view not only faces the aforementioned issues with the norm-inducing role of educational attainment, but also the fact that the accuracy-inducing role of educational attainment is likely to be endogenous to early life conditions. The only plausible mechanism is that those who stay in education longer are more likely to possess the historical, institutional and geopolitical knowledge to contextualise the democratic performance of their country.

But where does this knowledge come from? Of course, it is possible that it comes from history and geography lessons in school and college, but this appears unlikely. Particularly in the United States, historically, students were presented with a highly stylized and even glorified image of government which, if left unchecked, would instead be likely to create unrealistic expectations and reduce political trust (Hibbing and Theiss-Morse 1996). It is perhaps more plausible that this knowledge is acquired through the family. Those who

Jennings 1991; Jennings et al. 2009; Mishler and Rose 2001), relying on correlational designs comparing political trust among parents and their children. Yet these studies focused narrowly on direct parent-child socialization, rather than considering family background and heritable predispositions more broadly.

remain in education longer, and especially those who enter higher education, tend to have highly educated parents and social circles (Klasik 2012), in which knowledge and discussion of global affairs is the norm (McIntosh et al. 2007; Fraile 2013), as are international travel and access to the resources required to acquire this knowledge. Those who enter higher education are therefore likely to have been more capable of making accurate political trust judgements long before they started university.

It appears therefore that family background is strongly associated with both education and political trust, but in failing to account for this, existing work mistakenly interprets the positive relationship between educational attainment and political trust causally. Although education may still have some role in shaping political trust, the primary agent of socializing trust is the family, and this affects both people's educational pathways and their political trust simultaneously. Similarly, accounting for family background undermines the associations between education and political participation (Persson 2015), interpersonal trust (Oskarsson et al. 2017), the belief that voting is a civic duty (Weinschenk et al. 2021), and political knowledge (Weinschenk et al. 2021; Weinschenk and Dawes 2019).

In support of this, Hooghe et al. (2015) finds that differences in political trust between those who entered higher education and those who did not were already present at age 16, suggesting that the differences are related to pre-adult socialisation and dispositional factors. Similarly, Torney-Purta (2004) finds that aggregate levels of political trust among adolescents tend to mirror those in the adult population. Again, this undermines the temporal claim inherent to the 'education as cause' view. If adolescents' political trust is already largely in place by the time they enter higher education, how then can further education affect their political trust?

Educational attainment as a proxy for heritable predispositions.

The second set of confounders between educational attainment and political trust are those related to heritable predispositions. Cognitive ability is a clear candidate that has already been shown to partially explain the effect of educational attainment on political trust (Hooghe et al. 2012; Schoon et al. 2010; Schoon and Cheng 2011; Serek and Macek 2014). Cognitive ability is partly heritable and tends to be sticky across the lifespan (Plomin et al. 1994). Those with higher cognitive ability tend to stay in education for longer, and to be

more successful in the education system (Krapohl et al. 2014; Engzell and Tropf 2019; Deary et al. 2007; Belley and Lochner 2007; Bartels et al. 2002). In addition, they tend to accrue more socioeconomic resources throughout their life, and this makes them more comfortable with their position in society and as such, more trusting of the political institutions that govern it (Schoon and Cheng 2011). Those with higher cognitive ability are also more likely to obtain the contextual knowledge and critical thinking ability necessary to make informed political trust judgements (Luskin 1990)[5]. They may then select both into higher political trust and into higher levels of education.

Similarly, personality traits are known to be heritable (Dawes et al. 2014) and are another potential confounder between educational attainment and political trust. Those who are more emotionally stable and agreeable, and less extraverted, tend to be more trusting of political institutions (Mondak et al. 2017) and tend to attain higher levels of education (Smith-Woolley et al. 2019). Those with higher cognitive ability and commensurate personality traits are therefore more likely both to remain in education and to be more politically trusting.

A further concern is that people also might select into higher education due in part to their generalized trust of institutions, which in turn is likely to have components which are socialized in early life and those which are heritable. These educational decisions are often influenced by people's parents, who share to some extent the heritable predispositions of their children, for example their personality traits (Vukasović and Bratko 2015). In this view, people select into further education based on their pre-existing trust in institutions, which is in turn influenced by their early life socialization and heritable dispositions. As such, there is no causal relationship between educational attainment and political trust.

Hypotheses

Existing evidence does not allow us to determine whether therelationship between educational attainment and political trust is causal in origin. In this paper, we build on recent work on the origins of political trust and control for previously unmeasured confounders

[5]While Hooghe et al. (2012) suggest that educational attainment increases political trust by improving cognitive ability, this does not account for selection into further education based on prior cognitive ability and therefore is likely to over-estimate the effect of education on later political trust (Schoon and Cheng 2011; Schoon et al. 2010; Deary et al. 2008).

related to family background. Using three different designs, we demonstrate that educational attainment is unlikely to cause political trust in advanced democracies.

Our hypotheses follow straightforwardly from our discussion of possible confounders. Our baseline, following the meta-analysis, is that the more educated will be more trusting than the less educated.

H1. Educational attainment is positively associated with political trust.

The more educated, and those who are more politically trusting, are likely to share early life conditions related to family socioeconomic status, and this could undermine the relationship between educational attainment and political trust.

H2. When accounting for early life conditions, the relationship between educational attainment and political trust is weaker.

In addition, the more educated and the more politically trusting may share heritable dispositions, for example those related to personality, further undermining the relationship between educational attainment and political trust.

H3. When accounting for heritable predispositions, the relationship between educational attainment and political trust is weaker.

Finally, we suggest that when accounting for both types of possible confounder, there is unlikely to be a remaining relationship between educational attainment and political trust, meaning that the descriptive claim (H1) that the more educated are more politically trusting than the less educated cannot be interpreted causally.

H4. When accounting for family background (early life conditions and heritable dispositions), educational attainment is no longer associated with political trust.

Data and measures

Data

We use three types of data to triangulate the relationship between educational attainment and political trust. We first use data from four twin studies, which we summarize in Table 1. These are the Minnesota Twins Political Survey (MTPS), the Swedish Twin Registry's Screening Across the Lifespan Twin Young dataset (SALTY), the Australian Twins Economic Preferences Survey (ATEPS) and the National Longitudinal Study of Adolescent Health (Add. Health). All participants are monozygotic (MZ) or dizygotic (DZ) twins with another member of the dataset[6]. MZ twins share 100 per cent of their genes, while DZ twins share 50 per cent of their segregating alleles. All twins are furthermore raised in a similar early life environment. Using twin data permits us to improve upon existing work by measuring the relationship between educational attainment and political trust while controlling for the heritable predispositions and early life conditions shared by the twins, which cannot be accounted for with standard observational data. In addition, using data collected over four different educational contexts and three different time periods allays concern that our results may be specific to a particular country or time period.

Table 1: Summary of twin data

Name	Country	Survey fieldwork	N	MZ pairs	DZ pairs	Age range
Minnesota Twins Political Survey (MTPS)	USA	2008-2009	1349	356	240	53-62
Screening Across the Lifespan Twin (Young) (SALTY)	Sweden	2009-2010	9793	1015	1729	51-66
Australian Twins Economic Preferences Survey (ATEPS)	Australia	2020-2021	1249	401	159	18-66
National Longitudinal Study of Adolescent Health (Add. Health)	USA	2001-2002	4368	234	349	18-26

Second, we use cohort data from the United Kingdom. These data are drawn from the 1970 British Cohort Study (UK70) and we summarize them in Table 2. These data track respondents from birth and contain batteries of questions relating to early life conditions (such as family socioeconomic status) and cognitive ability, which are not typically recorded in standard observational data. This again permits us to see whether the relationship between educational attainment and political trust is attenuated when accounting for these early life conditions, and cognitive ability, and therefore provides a partial test of confounding due to shared early life conditions and heritable predispositions (given that

[6]Except in the Add. Health data, in which some participants are also non-twin siblings. Compared to unrelated people, respondents within each family still grew up in a largely similar environment and share a substantial proportion of their segregating alleles.

cognitive ability is partially heritable, see for example Deary et al. 2007).

Table 2: Summary of cohort data

Name	Country	Birth year	N	Sweeps with trust	Sweeps with early life conditions
1970 British Cohort Study (UK70)	UK	1970	3159[7]	Age 42	Ages 0, 5, 10, 16

Third, we then use polygenic indices (PGI) for educational attainment in the Add. Health and SALTY datasets. A PGI is an index that partially summarizes a person's genetic predisposition to a certain trait (e.g., Becker et al. 2021; Mills and Tropf 2020). The consensus among behavioural geneticists is that complex traits such as educational attainment are highly polygenic, which means that they are influenced by many genetic variants, with each contributing a small effect (Chabris et al. 2015). A PGI aggregates these small effects based on effect sizes obtained from a corresponding Genome Wide Association Study (GWAS). This allows us to test for genetic confounding by partially controlling for one's education-linked dispositions and testing the extent to which this attenuates the effect of realized educational attainment on political trust[8].

Measures of political trust

We measure political trust using questions asking respondents to rate their trust in different institutions and actors. We summarize these question batteries in Table 3. The exact questions are in Appendix C, but it should be noted that they all refer to generalized political trust in institutions or 'politicians' in general (system support), and not trust in specific named political actors or incumbents (Easton 1975). In each case, we scaled the items such that our results can be interpreted in terms of standard deviation changes in political trust[9]. Following the meta-analysis by Devine (2024), we do not expect the different question wordings to meaningfully affect our results. Nonetheless, by scaling several different trust items we keep any resulting measurement error to a minimum.

[7] Final sample with complete information on all relevant early life conditions and political trust.

[8] Since genes are fixed at conception, conditioning on PGIs limits collider bias and reverse causality, whereas a survey measure of disposition, such as personality, may be affected by both education and political trust.

[9] We did so by standardizing each item onto a 0-1 scale (with 1 being the most trusting response), then summing the resulting items and dividing through by the number of items to create an aggregated 0-1 political trust scale. We then standardize the scale by subtracting its mean and dividing by its standard deviation.

Table 3: Measures of political trust

Dataset	Political trust
MTPS	Four-item battery for trust in politicians and government. $\alpha = 0.69$.
SALTY	Single item that asks about trust in politicians (four-point scale).
ATEPS	Four-item battery for trust in politicians. $\alpha = 0.78$.
NLSAH	Three-item battery for trust in local, state and federal government. $\alpha = 0.96$.
UK70	Two-item battery for trust in politicians, recorded at age 42 ($\alpha = 0.65$).

Measures of educational attainment

We measure educational attainment by asking respondents to rate the highest level of education they have completed. The exact question wordings are recorded in Table 3. In each case, we use several different operationalizations. In the Swedish data, we take our measure of educational attainment directly from state registry data and so do not need to rely on respondents' self-reports. We separate out those with low (did not complete high school), medium (completed high school but did not attend university) and high (attended university) education. As a robustness test, we also use a continuous measure of years of education where available.

Table 4: Measures of educational attainment

Dataset	Political trust
MTPS	What is the highest level of education you have completed? (five-point scale)
SALTY	The highest degree recorded by the state registry. (13-point scale after conversion)
ATEPS	What is the highest level of education you have achieved? (five-point scale)
NLSAH	What is the highest level of regular school you have completed? (17-point scale)
UK70	What is the highest level of education you have completed? (15 options)

Method

Co-twin models

We first use discordant twin (also known as co-twin) models to predict political trust using educational attainment. These involve first splitting the data into two sub-samples, MZ twins and DZ twins. In each sample, we run two regressions. The first is a 'naïve' model in which we predict political trust using educational attainment, with only birth year fixed effects, sex, and interactions between the birth year fixed effects and sex as control variables (McGue et al. 2010). This gives a baseline relationship between educational

attainment and political trust, to which we compare the results of the second model. This model predicts political trust using educational attainment, but instead of birth year fixed effects and sex, it includes controls for twin pair fixed effects. The fixed effects absorb all variation from the shared early life environments and heritable predispositions common to the twin pairs. The substantive meaning of the model is thus that it allows us to see whether differences in education within twin pairs[10] lead to differences in their political trust. In all models, we cluster the standard errors at the twin-pair level, as is standard for co-twin designs (Oskarsson et al. 2017; Frisell et al. 2012).

If the relationship between educational attainment and political trust is confounded, then the effect size will diminish substantially in the twin pair fixed effects models and it will likely lose statistical significance. Because MZ twins are virtually identical in their genes, the models with the MZ twins sub-sample are a more complete test of genetic confounding and we therefore use these as the baseline model (following Weinschenk et al. 2021). These models are our most comprehensive test for confounding, accounting for all heritable predispositions and early life conditions shared by the twin pairs. It is also important to note that non-shared confounding factors could still bias the relationship, and so any remaining correlations in the fixed effects models are not necessarily causal. Nonetheless, if the effect sizes are much smaller in the fixed effects models than in the naïve models, then it is likely that the naïve association is confounded by family background.

Testing the sources of confounding

We then investigate the sources of confounding using the cohort data. We match the treated respondents on several early life conditions relevant to subsequent educational decisions. We then regress educational attainment on political trust in both the matched and unmatched samples and compare the results. If the relationship between educational attainment and political trust is confounded by those early life conditions on which we match respondents, then we expect the coefficient on educational attainment to be attenuated after matching. In a subsequent model, we then also match based on cognitive ability. Given that this has both socialized and heritable components (Deary et al. 2007),

[10]There are various sources of twin discordance, including non-shared life experience (e.g., random events), in utero environmental factors (e.g., uneven blood supply), epigenetic modifications (e.g., cytosine methylation affecting gene expression), genetic mosaicism (e.g., de novo mutations), and other developmental stochasticity (e.g., random molecular movements) (e.g., Tikhodeyev and Shcherbakova 2019; Czyz et al. 2012).

this provides a partial test for genetic confounding, while the first model tests only for confounding due to shared early life conditions.

Matching is appropriate when the treatment and control groups are unbalanced on factors relevant to the dependent variable, but there is limited overlap between the groups. This prevents valid inferences being drawn on the population in a standard regression framework, for example if the data lacks those with high cognitive ability or comfortable socioeconomic backgrounds who did not attend university (Gelman and Hill 2006). Following Persson (2015) we use as many relevant variables as possible from those available in the cohort data to improve the precision of our matching[11] (Gelman and Hill 2006; Ho et al. 2007), and we list these variables in Table 5. We also compare the results of several different matching methods in Appendix E.

Table 5: Measures of early life conditions in the cohort data

Dataset	Matching variables
UK70	Household income (age 10)
	Household social class (age 0, age 5)
	Parents' education level (age 0, age 10)
	Parental health (age 5)
	Cultural activities (age 10)
	Family activities (age 10)
	Number of children in household (age 10)
	Cognitive ability (age 5)

We then directly test for genetic confounding by using polygenic indices (PGI) for educational attainment from Add. Health (Braudt and Harris 2020) and SALTY (Magnusson et al. 2013)[12]. For the Add Health sample, we regress educational attainment on political trust while controlling for birth year fixed effects, sex, interactions between the birth year fixed effects and sex. Because the SALTY dataset has a large DZ twins sample, here we use only the DZ twins and include twin-pair fixed effects. Since genetic differences between siblings are random, using a within-family model eliminates any residual environmental confounding[13]. We then add controls for each PGI and see whether the effect of education

[11] We excluded some variables due to substantial missingness.

[12] For Add. Health, the educational attainment PGI is constructed based on Lee et al. (2018). For the SALTY dataset, the educational attainment PGI is derived from the polygenic index repository (Becker et al. 2021).

[13] We provide more information on PGIs in Appendix A. As with all measures, PGIs are imperfect and in particular, they may contain residual influences from environmental mechanisms such as population stratification and assortative mating. Since sibling differences in genes are random, DZ twin differences in PGIs are free of shared environmental confounding (Selzam et al. 2019). In the SALTY data, the DZ

on political trust is attenuated. The greater the extent to which underlying genetic factors which predict educational attainment also predict political trust, the greater this attenuation. In all models, we again cluster standard errors at the twin-pair level.

In summary, the co-twin method is a control by design approach which controls for all relevant shared early life conditions and heritable dispositions. This allows us to test whether educational attainment causes political trust. Our subsequent cohort and polygenic index models then allow us to more directly test which confounding factors underpin the fixed effects in the co-twin models.

Analysis

Co-twin models

Does educational attainment cause political trust? In Table 6 we report the standardized point estimates and their standard errors for the co-twin control designs predicting political trust with our three-point education scale[14]. We separate those with a 'low' level of education (did not complete high school) from those with a medium level (completed high school) and a high level (attended college). In all four cases, attending college exerts a positive, statistically significant effect on political trust in the naïve models (without twin pair fixed effects). And the effect size is reasonable. Attending college is associated with a 0.3 to 0.7 standard deviation increase in political trust. This is consistent with prior work which generally finds a positive and reasonably large effect of educational attainment on political trust (Mayne and Hakhverdian 2017; Hakhverdian and Mayne 2012).

But in each case, this effect falls substantially in the fixed effects models. In all four cases, the effect is no longer statistically distinguishable from zero at the five per cent level, and it is very close to zero in the Minnesotan, Australian, and Swedish cases. It appears then that when controlling for the family factors shared by the twin pairs, there is no longer a meaningful relationship between holding a college degree and political trust. This is regardless of the educational context, or the time period in which the data was collected.

sample size is sufficient for a within-family analysis. In the Add. Health data, the DZ sample is insufficient for a within-family approach, but we include the first ten principal components of the genetic relatedness matrix to control for potential environmental confounders related to population stratification.

[14]We report the results for the MZ twins here, because MZ twins allow for the most direct control for confounding by shared environments and heritable predispositions. See Online Appendix D for summary statistics and full results (including DZ twins).

It is therefore unlikely that any relationship between higher education and political trust is causal in nature.

While there is a positive effect in the naive 'medium' education models, it is usually not statistically distinguishable from zero, and therefore it appears that higher education is driving the positive naive relationship between educational attainment and political trust. Nonetheless, this positive effect generally decreases in magnitude in the fixed effects models (reversing in sign in the Minnesotan case), and is very close to zero in all three cases. In the Swedish case we see a positive and statistically significant effect of 'medium' education on political trust, but again this becomes very close to zero and loses statistically significance in the family fixed effect model. It appears therefore that not only is there no causal effect of college education on political trust, but there is no causal effect of educational attainment on political trust at all.

Table 6: Co-twin models predicting political trust with education level.

Dataset	SALTY		MTPS		ATEPS		Add. Health	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High education	0.651*	0.038	0.316*	−0.072	0.277*	0.099	0.460*	0.183
	(0.057)	(0.093)	(0.129)	(0.306)	(0.113)	(0.249)	(0.231)	(0.560)
Medium education	0.238*	−0.022	0.143	−0.066	−0.076	−0.156	0.303	0.047
	(0.058)	(0.119)	(0.129)	(0.246)	(0.119)	(0.230)	(0.231)	(0.430)
Twin pair fixed effects	N	Y	N	Y	N	Y	N	Y
Num. obs.	2030	2030	698	698	802	802	424	424

Note. *p $<$ 0.05. The models include data on MZ twins only, from ATEPS, MTPS, Add. Health and SALTY. The dependent variables are political trust indices. 'Low' education means those who did not complete high school. Those with 'medium' education completed high school but did not attend university, and those with 'high' education attended university. All models control for sex, birth year fixed effects, and interactions between sex and the birth year fixed effects. Standard errors are clustered at the twin pair level. See Online Appendix D for full models.

These results are robust in a number of ways and we report robustness tests in Online Appendix D. First, the results are broadly similar when re-conceptualising educational attainment onto a single continuous scale[15]. Second, we demonstrate that there is still reasonable variation in educational attainment within the MZ twin pairs, and therefore the null result is not an artifact of there being insufficient variation in educational attainment

[15]This maximises the variation in educational attainment with which to explain variation in political trust. We report these results for SALTY and Add. Health, the two datasets in which a continuous 'years of education' variable is available.

within the twin pairs. In addition, alternate model specifications using bivariate variance decompositions give similar results[16]. Regardless of dataset or measurement, the proportion of the correlation between educational attainment and political trust attributable to the non-shared environment (i.e., the component contributing to the quasi-causal relationship between educational attainment and political trust) is near zero and statistically insignificant. We also report sensitivity power analyses for each sample in the Appendix.

One particular concern is that the fall in the effect of educational attainment on political trust between the naive and fixed effects estimates might be driven by attenuation bias due to measurement error, which can be exacerbated in fixed effects models (e.g., Griliches 1979). As with any measurement, our measures of education and political trust are not perfect and this will account for some of the drop in the effect of education on trust. But we believe it is unlikely that measurement error accounts for much of the attenuation for two reasons. First, in the Swedish case we expect the least measurement error. The Swedish education data is validated, being taken from state registers rather than self-reported, and the sample size is the largest of the four datasets. Despite this, we see the greatest attenuation in the Swedish case, which appears to be inconsistent with measurement error driving the results. Second, we re-ran the models with an additional correction for measurement error drawn from several previous studies (Ashenfelter and Krueger 1994; Isacsson 1999; Oskarsson et al. 2017), and the results are similar. It appears therefore that the positive relationship between educational attainment and political trust is confounded by the family factors held constant within the twin pairs, and there is therefore unlikely to be a causal relationship between them.

The Add. Health twins sample is the smallest of the four we use. However, using the Add. Health data, we are able to conduct an additional test using an extended sample of siblings (which includes both twins and non-twin siblings). Non-twin siblings still tend to share their early life environments to a significant extent and they share 50 per cent of their segregating alleles, meaning that these models are still a reasonable test for both genetic and environmental confounding. In addition, they benefit from a ten-fold larger sample, which also alleviates concern about measurement error. We present the results of these models in Table 7. Once again, we observe positive and statistically significant effects on

[16]We run bivariate decomposition models for the Swedish and Minnesotan data, in which the sample size is sufficient for these estimates to be reliable.

political trust in the naive models, but these effects are small and statistically insignificant when accounting for family background in the fixed effects models. See Online Appendix D for full results.

Table 7: Co-sibling models predicting political trust with different measures of education.

Dataset	Add. Health	
	(1)	(2)
High education	0.297*	0.139
	(0.058)	(0.117)
Medium education	0.151*	0.076
	(0.058)	(0.101)
Family fixed effects	N	Y
Num. obs.	4160	4160

Note. *p $<$ 0.05. The models include data on siblings from Add. Health. The dependent variables are political trust indices. All models control for sex, birth year fixed effects, and interactions between sex and the birth year fixed effects. Standard errors are clustered at the family level. See Online Appendix D for full models.

In summary, we have robust and consistent evidence that educational attainment is unlikely to cause political trust. However, we are not yet able to directly examine the role of shared early life environments and shared heritable dispositions, which are both entirely captured by the family fixed effects. In what follows, we draw on two alternative data sources to address this question.

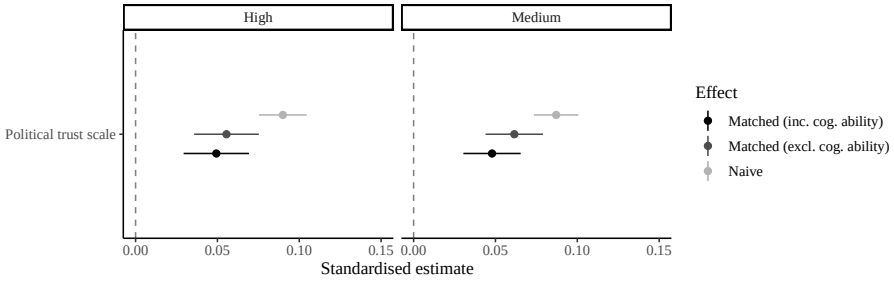
Testing the sources of confounding

One possibility is that the relationship between levels of education and political trust is confounded by early life conditions, for example family socioeconomic status or parental education levels. We test this using the cohort data to match respondents based on their early life conditions, expecting the association between education levels and political trust to be lower in the matched model than in a naive model if these confound the relationship.

In Figure 4, we show the effect of being in the high (college degree) or medium (at least two A levels) group on political trust before and after matching for early life conditions and cognitive ability. The light colour estimates are those of a naive model predicting political trust with degree status, while the darker colour estimate is that matched on their early

life conditions, and the darkest coloured estimate is that matched on early life conditions and cognitive ability[17].

Figure 4: The effect of education level on political trust, before and after matching for early life conditions and cognitive ability.



Note. The models include data from UK70. The dependent variables are political trust indices, and the independent variables are indicators of college attendance (high) and high school completion (medium). The matched estimates are the same models after matching for early life conditions (dark grey estimates) and after further matching for cognitive ability (black estimates). See Online Appendix E for full details.

In the unmatched data, education level is associated with higher political trust. This effect is statistically significant, and it is quite large. Those with a degree are around 9 per cent more politically trusting at age 42, as are those with at least two A levels[18]. However, this initial effect falls to around 5.5 per cent (for the high education model) or 6 per cent (for the medium education model) after matching for early life conditions. As such, some (but not all) of the confounding between education and political trust revealed in the twin data is likely attributable to shared early life conditions.

By contrast, we do not find much direct evidence for confounding due to heritable predispositions. When additionally matching respondents based on their cognitive ability, the effect of education level on political trust is further reduced, but only slightly. The estimated effect of holding a degree on political trust falls from around 5.5 per cent to around 5 per cent when additionally matching for cognitive ability, and the effect of completing high school falls by around 1 per cent. As such, although this still likely accounts for some of the confounding revealed in the twin models, our direct evidence for confounding due to heritable dispositions is comparatively weaker.

One important caveat is that each of the 'early life conditions' on which we match

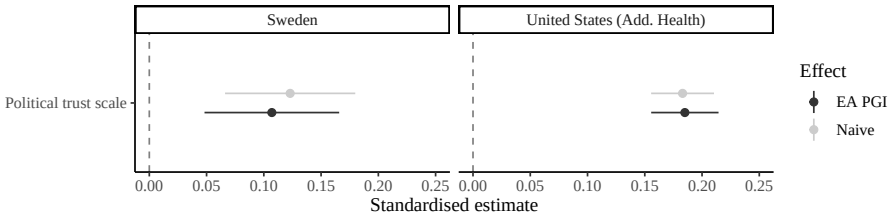
[17] See Online Appendix E for full details including demonstrations of balance in and alternative matching procedures.

[18] The effect is driven by degree status rather than any particular degree subject.

respondents also has a modest heritable component, because parents to some extent share heritable predispositions with their children and these affect the environment in which they raise their children. Therefore, while we have clearer evidence for confounding due to shared early life conditions, it is also likely that heritable predispositions also contribute to the attenuation in the cohort models[19].

We turn to directly examining heritable dispositions using the Add. Health and SALTY datasets, in which we have PGIs which capture heritable predispositions related to educational attainment. Figure 5 plots the relationship between educational attainment and political trust against the relationship after controlling for the education PGI.

Figure 5: The effect of years of education on political trust, before and after controlling for educational attainment polygenic indices



Note. The models include data from SALTY and Add. Health. The dependent variables are trust indices, and the independent variables are years of education. The models based on DZ twin data from SALTY include twin fixed effects. The models based on Add. Health include the first ten principal components of the genetic relatedness matrix. All models cluster standard errors at the family level. See Online Appendix F for full details.

In each case, we see a positive effect of educational attainment in the naive model, but this is not meaningfully attenuated when controlling for the PGIs. In the Swedish data, in addition to the genetic confounding accounted for by the twin-pair fixed effects, controlling for the PGI reduces the association by a further 16%; while in the American data, the effect is unchanged. Thus, we do not find clear evidence of confounding by heritable dispositional factors as proxied by the educational attainment PGIs.[20]

Overall, we have clear evidence that the relationship between educational attainment

[19]Likewise, cognitive ability has a component that is socialized in early life, but it has a large heritable component (Deary et al. 2007; Plomin and Deary 2015).

[20]As we further explain in Appendix A, this is likely in part because currently available PGIs do not account for all genetic variants linked to the target trait (educational attainment). It is still likely that heritable factors are responsible for some of the confounding between educational attainment and political trust which we observed in the co-twin models. Our bivariate variance decomposition results for the twin data also suggest that the confounding has a moderate genetic component. However, due to the strong assumptions these models entail, we do not report those results here. See the Appendix for full results.

and political trust is confounded by early life conditions which predispose some people to stay in education for longer and to be more trusting of political institutions. We also found some support for the idea that heritable dispositions are a confounder, especially in the co-twin models, in which we were able to control for both shared heritable predispositions and early life conditions simultaneously.

Conclusion

Political trust is an important indicator of democratic health. Those who are more trusting of politicians and political institutions are more likely to engage in institutionalized forms of political participation and more likely to comply with the law (Devine 2024). Consequently, many studies have tried to understand the causes of political trust, in the hope that this knowledge may help trust be preserved and increased.

Education is important for many attitudes and behaviours that promote democracy, but whether it is similarly important for political trust has rarely been systematically considered. We confirmed with a meta-analysis that, in advanced democracies, there is a strong positive association between educational attainment and political trust. One plausible interpretation of this association is that education has a similar, causal role for political trust as it does for other democracy-promoting attitudes. In this view, education is vital for democratic citizenship not only because it promotes political interest, social capital and interpersonal trust, but also because it encourages diffuse political trust.

However, we argued that the relationship between education and political trust is unlikely to be causal due to the shared family background of those who remain in education for longer, and who are more trusting of political institutions, and we demonstrated this using three designs. When accounting for these previously unmeasured confounders using a co-twin control design, the relationship between educational attainment and political trust disappeared. In each of the four twin datasets we used, the relationship was no longer statistically distinguishable from zero in the fixed effects models. Educational attainment, therefore, is unlikely to cause political trust in advanced democracies. We cannot directly estimate the exact proportion of the confounding that is genetic or environmental, and it is highly likely that both nature and nurture have a role to play, although our evidence was particularly strong for confounding due to shared early life conditions.

There are, as always, some caveats to our findings. First, although our evidence suggests that increasing levels of education would be unlikely to increase political trust, this does not mean that all educational interventions would be ineffective in increasing political trust. Rather than trying to extend the time young people spend in formal education, interventions aimed at changing the content of that education might be more useful[21]. In addition, interventions that change the structure of the education system may affect political trust, for example, the introduction or removal of educational tracking. Future research on political trust, therefore, should focus on testing the effects of specific educational policy interventions, and in particular those which changed the content of the syllabus or the structure of the education system, rather than looking at educational attainment alone.

Second, we are unable to isolate the exact early life conditions that are responsible for the confounding between educational attainment and political trust. While the discordant twin models suggest that the relationship between educational attainment and political trust is confounded, and our cohort models suggest that early life conditions have a substantial role to play in this, we are unable to isolate the precise conditions responsible (which are entirely captured by family fixed effects). In all likelihood, the confounding is attributed to many aspects of one's family background and no one early life condition is particularly responsible. Nonetheless, future research with comprehensive measures of political trust and pre-adulthood environments could investigate precisely how political trust develops in adolescence, before it enters its period of relative stability (Devine and Valgarðsson 2024). Our data lack the pre-education measures of political trust which would permit this type of analysis.

These caveats aside, our findings have substantial implications for our understanding of both education and political trust in advanced democracies. While existing work has generally assumed a positive, causal relationship between educational attainment and political trust, our findings suggest that this is unlikely to be the case. Our research therefore contributes to the 'education as proxy' literature, which suggests that educational attainment is unlikely to cause political attitudes and behaviour due to the common family backgrounds which predict both (Kam and Palmer 2008; Persson 2015). While recent causally

[21] Although it should be noted that the evidence that civics education affects political trust is limited (Claes et al. 2012; Finkel and Ernst 2005).

identified work suggests that education most likely does increase social capital (Apfeld et al. 2022), other work casts doubt on the previously assumed causal roles of education for political participation and interpersonal trust (Oskarsson et al. 2017; Dinesen et al. 2016). It appears that there may be limits to role of education in promoting democratic citizenship.

We also have reason to doubt the dominant model of political trust, which considers it to be an evaluative attitude, and as such suggests that educational attainment should be associated with higher trust in political institutions. Our findings add to the growing body of work suggesting that political trust has roots in early life experiences (Devine and Valgarðsson 2024), and that accounting for the early life origins of political trust affects our understanding of its causes and consequences (Kelly et al. 2025).

Finally, as discussed, there are substantial policy implications. Interventions aimed at increasing young people's time in formal education are unlikely to affect their outlook toward the political system. However, further research should consider whether those interventions which change the structure or content of the education system could affect political trust. As such, those looking to arrest low and declining political trust, which is especially prominent in younger generations, may wish to look beyond improving educational attainment, because the democracy-promoting qualities of educational attainment have some limitations.

Data availability statement

The Australian, Swedish, and Adolescent Health data are not publicly available. Due to the sensitivity of twin study data, we are under contractual obligations not to distribute these data to others. Researchers interested in replicating our results can obtain these data by entering into contractual agreements with the Sydney University of Technology, the Swedish Ethical Review Authority, and the Carolina Population Center respectively. The Minnesotan data is publicly available and can be obtained by interested researchers.

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