Applied Cognitive Psychology, Appl. Cognit. Psychol. **31**: 50–58 (2017)
Published online 28 November 2016 in Wiley Online Library (wileyonlinelibrary.com) **DOI**: 10.1002/acp.3301

Why Education Predicts Decreased Belief in Conspiracy Theories

JAN-WILLEM VAN PROOIJEN*

Department of Experimental and Applied Psychology, VU Amsterdam/The NSCR, Amsterdam, The Netherlands

Summary: People with high education are less likely than people with low education to believe in conspiracy theories. It is yet unclear why these effects occur, however, as education predicts a range of cognitive, emotional, and social outcomes. The present research sought to identify mediators of the relationship between education and conspiracy beliefs. Results of Study 1 revealed three independent mediators of this relationship, namely, belief in simple solutions for complex problems, feelings of powerlessness, and subjective social class. A nationally representative sample (Study 2) replicated these findings except for subjective social class. Moreover, variations in analytic thinking statistically accounted for the path through belief in simple solutions. I conclude that the relationship between education and conspiracy beliefs cannot be reduced to a single mechanism but is the result of the complex interplay of multiple psychological factors that are associated with education. © 2016 The Authors. Applied Cognitive Psychology published by John Wiley & Sons Ltd.

In our globalized world, people frequently encounter distressing collective events such as economic crises, wars, natural disasters, epidemics, and the unexpected deaths of celebrities. Large groups of regular citizens make sense of such events through a belief in conspiracy theories (Oliver & Wood, 2014). Conspiracy beliefs are commonly defined as assumptions that a group of actors meet in secret agreement in order to pursue goals that are widely seen as malevolent (Zonis & Joseph, 1994). Such conspiracy theories often implicate powerful groups like governmental institutions (e.g., allegations that 9/11 was an inside job), major branches of industry (e.g., pharmaceutical companies), or ethnic groups that carry negative stereotypes (e.g., Muslims Jews). Although many different conspiracy theories exist, belief in one conspiracy theory predicts belief in conceptually unrelated conspiracy theories (Abalakina-Paap, Stephan, Craig, & Gregory, 1999, Goertzel, 1994, Swami et al., 2011, Van Prooijen & Acker, 2015) or even contradictory conspiracy theories (Wood, Douglas, & Sutton, 2012). This suggests that people vary in the extent to which they are generally prone to explain societal events through assumptions of conspiracy formation. Correspondingly, research within this emerging domain has identified a range of demographic, individual-difference, and situational factors that predict people's susceptibility to conspiracy theories (for overviews, see Bilewicz, Cichocka, & Soral, 2015; Van Prooijen & Van Lange, 2014)

One demographic predictor of belief in conspiracy theories is education level. Various studies revealed that high education levels predict a decreased likelihood that people believe in conspiracy theories (Douglas et al., 2016; Van Prooijen, Krouwel, & Pollet, 2015). What is unclear, however, is *why* this relationship emerges. Education is associated with a range of cognitive, emotional, and social outcomes, and hence, there may be multiple underlying processes that explain this relationship. Establishing these underlying processes provides novel insights that may form the basis for future interventions designed to systematically decrease conspiracy beliefs among the population. This is important given the many detrimental implications of believing in conspiracy theories, for public health (Oliver & Wood, 2014), political participation (Goertzel, 1994; Jolley & Douglas, 2014), and radicalization (Van Prooijen et al., 2015).

In the present research, I examine four theoretically plausible mediators of the relationship between education level and belief in conspiracy theories. While education is likely to have a myriad of effects, I focus specifically on the implications of education for the general psychological domains of cognitive complexity, experiences of control, self-esteem, and social standing. These domains not only have been theorized and found to be core outcomes of education but also they have been identified as important predictors of belief in conspiracy theories. In the following, I will illuminate how these general psychological domains are theoretically and empirically related to education, and why they are likely to predict belief in conspiracy theories.

MEDIATORS OF THE EDUCATION–CONSPIRACY LINK

Cognitive complexity

Education is associated with cognitive complexity, defined here as people's ability to detect nuances and subtle differences across judgment domains, along with a tendency to consciously reflect on these nuances. People with high cognitive complexity are better equipped to attain high education levels; moreover, education nurtures and develops such complexity (e.g., Deary, Strand, Smith, & Fernandes, 2007; Rindermann & Neubauer, 2004). It therefore stands to reason that education negatively predicts a tendency to embrace relatively simplistic explanations for complex events. Consistently, research found that education level is associated with disbelief in paranormal phenomena, a finding that was mediated by analytic thinking—that is, deliberative and conscious information processing (Aarnio & Lindeman, 2005; see also Gervais & Norenzayan, 2012). These arguments are relevant for belief in conspiracy theories, which is correlated with belief in paranormal phenomena (e.g., Darwin, Neave, & Holmes, 2011), and which also has been described as a simplification of reality. For instance, Hofstadter (1966) noted that a core function of

*Correspondence to: Jan-Willem van Prooijen, VU Amsterdam, Department of Experimental and Applied Psychology, Van der Boechorststraat 1, 1081BT Amsterdam, The Netherlands.
E-mail: j.w.van.prooijen@vu.nl

conspiracy theories is to provide straightforward explanations for complex and distressing events that are hard to comprehend otherwise.

Research on intuitive versus analytic thinking styles and conspiracy beliefs yielded results that are consistent with the idea that increased cognitive complexity predicts decreased belief in conspiracy theories. Swami and colleagues (2014) found that analytic thinking decreases belief in conspiracy theories; furthermore, intuitive thinking—that is, an information processing style that is based on heuristics instead of careful reflection—increases belief in conspiracy theories. The seemingly articulate nature of some conspiracy theories notwithstanding, these findings are consistent with the assertion that conspiracy beliefs are grounded in a general tendency to embrace relatively simplistic ideas. A study by Van Prooijen and colleagues (2015) on the relationship between conspiracy beliefs and political radicalization provides converging evidence for the role of cognitive complexity. These scholars found that conspiracy beliefs are strongly associated with a belief in simple solutions for complex societal problems. Moreover, education predicted a decreased belief in such simple solutions. It can therefore be hypothesized that the negative relationship between education and belief in conspiracy theories is mediated by cognitive complexity, which is operationalized in the present study as a decreased tendency to believe in simple solutions for complex problems (Hypothesis 1).

Experience of control

Throughout an educational trajectory, people learn how to independently solve problems, and they acquire the social skills that are necessary to influence their social environment. It has been noted that, as a consequence, education makes people feel more strongly in control of their life and their social world, thus decreasing feelings of powerlessness (Mirowsky & Ross, 2003). Empirical research confirms that education is associated with the extent to which people feel in control of their social environment, which is a common explanation for the effects of education on for instance positive health behavior (e.g., Mirowsky & Ross, 1998) and well-being (Ross & Van Willigen, 1997). The effects of education on feelings of control and powerlessness are likely to hold implications for people's susceptibility to conspiracy theories.

People are particularly receptive to conspiracy theories when they lack control, and hence feel powerless. Lacking a sense of control leads to mental sense-making in the form of illusory pattern perception, that is, connecting dots that is not necessarily connected in reality (Whitson & Galinsky, 2008). These sense-making activities are central in belief in conspiracy theories, which are designed to increase understanding of a distressing situation. Various studies established a causal effect of lacking control, as well as the closely related concept of subjective uncertainty, on belief in conspiracy theories (Van Prooijen, 2016; Van Prooijen & Acker, 2015). Likewise, people are most likely to believe in conspiracy theories in response to distressing societal events that they cannot control (Van Prooijen & Van Dijk, 2014). Also correlational findings confirm that feelings of powerlessness predict belief in conspiracy theories (Abalakina-Paap et al., 1999). I therefore expected that education predicts decreased feelings of powerlessness or increased feelings of control, which mediates the relationship of education with conspiracy beliefs (Hypothesis 2).

Self-esteem

Education frequently has been linked to self-esteem. The relationship between self-esteem and education—although often smaller than anticipated—appears robust across empirical studies, and the evidence suggests that this relationship is primarily due to educational performance influencing self-esteem rather than vice versa (for an overview, see Baumeister, Campbell, Krueger, & Vohs, 2003). Consistently, students largely base their self-esteem on their academic successes and failures (Crocker, Sommers, & Luhtanen, 2002). These findings suggest that education predicts self-esteem. What are the implications of such self-esteem differences for belief in conspiracy theories?

There is evidence suggesting that belief in conspiracy theories is associated with low self-esteem. For instance, Abalakina-Paap and colleagues (1999) reasoned that conspiracy theories allow people with low self-esteem to blame others for their predicaments. Their results support a negative association between self-esteem and conspiracy belief, albeit weakly so. Various other studies also find a modest empirical relationship between low self-esteem and increased conspiracy belief (Cichocka, Marchlewska, & Golec de Zavala, 2016; Crocker, Luhtanen, Broadnax, & Blaine, 1999; Swami et al., 2011). I therefore hypothesized that education would predict increased self-esteem, which in turn would mediate the relationship between education and belief in conspiracy theories (Hypothesis 3).

Social standing

Education influences people's social standing relative to others, both in objective as well as subjective terms. Education is intimately related with people's objective social standing in terms of socio-economic status (SES): People with high education are more likely to occupy the relatively privileged positions in society in terms of desirable jobs and high income (e.g., Griliches & Mason, 1972). These objective indicators also impact people's subjective reality; however, people with high education tend to believe that they are held in high regard and perceive themselves as doing well in life economically compared with others (Mirowsky & Ross, 2003). Here, I argue that subjectively perceiving oneself as high or low on the societal hierarchy (i.e., subjective social class) is likely to influence the extent to which people believe in conspiracy theories.

Specifically, whereas subjectively perceiving oneself as having low social class may increase communitarianism within one's direct social environment (Piff, Stancato, Martinez, Kraus, & Keltner 2012), it also reflects feelings of being marginalized, and having low social standing, within society as a whole. These feelings of societal marginalization are relevant for people's susceptibility to conspiracy theories. Research indicates that communitarian but marginalized groups within society tend to make sense of

the realistic problems that their group faces through assumptions of conspiracy formation (Crocker et al., 1999). In a similar vein, subjective low social class may lead people to blame the psychological or realistic problems that they face (e.g., alienation from the societal elite, unemployment, and relative deprivation) to the existence of malevolent conspiracies. As such, I predict that the relationship between education and belief in conspiracy theories is mediated by subjective social class, even when controlling for objective indicators of social class (i.e., income level; Hypothesis 4).

STUDY 1

In Study 1, I tested the four hypotheses in a large-scale sample within the Netherlands. The questionnaire contained an extensive measure of belief in conspiracy theories, as well as indicators of belief in simple solutions (Van Prooijen et al., 2015), feelings of powerlessness (Abalakina-Paap et al., 1999), self-esteem (Robins, Hendin, & Trzesniewski, 2001), and subjective social class (Adler, Epel, Castellazzo, & Ickovics, 2000). Participants' gender, age, and objective SES (i.e., income level) were included as control variables. The aim of this study was to establish the independent mediational role of these four variables to account for the relationship between education level and belief in conspiracy theories.

Method

Procedure and participants

The study had the form of an online questionnaire on belief in conspiracy theories that was coordinated by a Dutch popular science journal (targeted at the general audience), in collaboration with the author. The study was promoted by the journal among its readership in the Netherlands, and participation was possible for a period of 3 weeks. The questionnaire took 5 to 10 min to complete, questions were posed in a fixed order, and participation was voluntary. There were a total of 4062 participants (2328 men, 1659 women, 75 not reported; $M_{age} = 32.25$ years, $SD = 12.86$).

Measures

Participants' education level was measured with seven categories representing the Dutch educational system, ranging from 1 (*basic/lower education*), 2 (*lower secondary education*), 3 (*higher secondary education*), 4 (*pre-university education*), 5 (*community college*), 6 (*higher vocational education or bachelor degree*) to 7 (*university master's degree*).[1]

To measure belief in conspiracy theories, participants were presented with 20 statements reflecting common conspiracy theories, and they indicated their agreement to each statement on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*). Example items were 'There has been a free energy source for a long time, but the oil industry tries to keep this a secret'; 'People never really landed on the moon, everything was recorded in TV studios'; and 'The British Royal family was behind the murder on Princess Diana'. Participants' responses to these items were aggregated into a reliable index of belief in conspiracy theories (α = .91).

To assess feelings of powerlessness, I asked the following question: 'How powerless do you usually feel when you watch how events unfold in the news?' (1 = *Not at all powerless*; 7 = *Very powerless*). Furthermore, I measured participants' self-esteem with the following question: 'How positive or negative do you generally feel about yourself?' (1 = *Very negative*, 7 = *Very positive*). Previous research reveals that one-item measures can yield an indication of self-esteem that has equal convergent and predictive validity as longer self-esteem questionnaires (Robins et al., 2001).

To measure subjective social class, participants responded to the McArthur scale of subjective social class (Adler et al., 2000). Participants were presented with a ladder ranging from 1 (bottom) to 10 (top), and were asked to imagine that the ladder represents the place that people have in society. At the top of the ladder are citizens with the highest SES, and at the bottom are citizens with the lowest socio-economic standing. Participants were then asked to indicate where they believe they are placed in society in terms of their socio-economic standing. We also asked participants to indicate their monthly income with five categories: 1 (*0 to 1000 Euros*), 2 (*1001 to 2000 Euros*), 3 (*2001 to 3000 Euros*), 4 (*3001 to 4000 Euros*), and 5 (*more than 4000 Euros*). Income is a proxy for objective social class and was therefore included as control variable in the analyses. Subjective and objective social class were moderately but significantly correlated ($r = .26$, $p < .001$).

Finally, I measured participants' belief in simple solutions with three items (1 = *strongly disagree*, 7 = *strongly agree*): 'With the right policies, most problems in society are easy to solve'; 'For most societal problems it is clear how they have originated'; and 'Most societal problems are too complex to know for sure what the right policy is' (recoded). These three items were averaged into a reliable indicator of belief in simple solutions (α = .69).

Results and discussion

The Means, standard deviations, and entercorrelations of the measured variables are displayed in Table 1. The data were analyzed with a hierarchical regression analysis in which gender, age, and income were entered in Step 1 as control variables; education level was entered in Step 2; and the four predicted mediators were entered in Step 3. Furthermore, I tested the indirect effects of education level on belief in conspiracy theories through a bootstrapping analysis.

Regression analysis

The results are displayed in Table 2. Degrees of freedom deviate from the total sample because of attrition and missing values. The control variables (Step 1) did not significantly predict belief in conspiracy theories ($R^2 < .01$), $F < 1$. Step 2, in which education level was added to the regression model, was significant ($\Delta R^2 = .03$), $F(1, 2974) = 78.14$, $p < .001$. Consistent with previous findings, higher education was associated with decreased belief in conspiracy

[1] The literal Dutch terms are (1) Basis/lager onderwijs, (2) LBO/VBO/VMBO/MAVO, (3) HAVO, (4) VWO, (5) MBO, (6) HBO of WO-Bachelor, (7) WO doctoraal of Master.

Table 1. Means, standard deviations, and intercorrelations of the study variables (Study 1)

	M	*SD*	1	2	3	4	5	6	7
1. Income	2.17	1.10	–						
2. Education level	5.23	1.45	.13***	–					
3. Powerlessness	3.98	1.59	−.05**	−.05***	–				
4. Self-esteem	5.31	1.27	.18***	.07***	−.12***	–			
5. Subjective SES	5.87	1.84	.26***	.26***	−.11***	.27***	–		
6. Belief in simple solutions	4.50	1.27	.05**	−.15***	.08***	.08**[*]	−.09***	–	
7. Belief in conspiracy theories	3.16	1.18	.01	−.15***	.26***	−.02	−.15***	.37***	–

**$p < .01$ ***$p < .001$.

Table 2. Hierarchical regression analysis: Belief in conspiracy theories as a function of education level (Step 2) and the four potential mediators (Step 3). Study 1

Step 1	*B*(*SE*)	$CI_{95\%}$ of *B*	β	*t*(2975)
Gender	0.03(.04)	−0.05; 0.11	.01	0.69
Age	0.001(.002)	−0.003; 0.004	.01	0.40
Income	0.003(.02)	−0.04; 0.04	.003	0.17
Step 2				
Gender	0.04(.04)	−0.04; 0.12	.02	0.92
Age	-0.001(.002)	−0.004; 0.003	−.01	−0.39
Income	0.03(.02)	−0.01; 0.07	.03	1.55
Education level	-0.13(.01)	−0.15; −0.10	−.16	−8.84***
Step 3				
Gender	0.04(.04)	−0.04; 0.11	.02	0.99
Age	-0.005(.002)	−0.009; −0.002	−.06	−3.45**
Income	0.06(.02)	0.02; 0.10	.06	3.19**
Education level	−0.06(.01)	−0.09; −0.04	−.08	−4.81***
Powerlessness	0.16(.01)	0.14; 0.18	.23	13.56***
Self-esteem	0.01(.02)	−0.02; 0.04	.01	0.66
Subjective social class	−0.06(.01)	−0.08; −0.04	−.09	−5.17***
Belief in simple solutions	0.30(.02)	0.27; 0.33	.34	20.06***

**$p < .01$ ***$p < .001$.

theories, as indicated by the negative regression weight. Next, the four potential mediators were added to the regression model (Step 3). This step was highly significant ($\Delta R^2 = .18$), $F(1, 2970) = 173.48$, $p < .001$. As can be seen in Table 2, three out of four mediators were significant: Feelings of powerlessness predicted increased belief in conspiracy theories; subjective social class predicted decreased belief in conspiracy theories; and belief in simple solutions predicted increased belief in conspiracy theories. Self-esteem was not a significant predictor of belief in conspiracy theories. After inclusion of the mediators, the standardized regression weight of education level was much lower than in Step 2, albeit still significant.

Mediation analysis

Given that self-esteem was not significantly correlated with belief in conspiracy theories (Table 1) and was not a significant predictor in the regression model (Table 2), I concluded that Hypothesis 3 is not supported by the data and therefore dropped this variable from the mediation analysis. Through a bootstrapping analysis (5000 samples) utilizing the MEDIATE macro (Hayes & Preacher, 2014), I tested a model with education level as independent variable, conspiracy beliefs as dependent variable, and powerlessness, subjective social class, and belief in simple solutions as parallel mediators. Gender, age, and income were again included as control variables.

The model is depicted in Figure 1. As indicated by the fact that 0 is not in the 95% confidence interval, the indirect effect through powerlessness was significant ($B = -.008$, $SE = .003$), $CI_{95\%}[-.014; -.001]$, as was the indirect effect through subjective social class ($B = -.016$, $SE = .004$), $CI_{95\%}[-.024; -.009]$, and the indirect effect through belief in simple solutions ($B = -.039$, $SE = .005$), $CI_{95\%}[-.049; -.029]$. These findings reveal that perceived powerlessness, subjective social class, and belief in simple solutions independently contribute to the negative relationship between education level and belief in conspiracy theories. These results support Hypotheses 1, 2, and 4.

STUDY 2

While the Study 1 results are promising, they are also limited in at least three ways. First, the sample was drawn from the readership of a popular science journal, and although this journal is widely read among Dutch citizens, one may wonder how representative this sample is for the general population. Indeed, the average education level was on the high side for this sample (Table 1). Second, belief in simple solutions was measured through self-report. It remains an assumption whether participants' responses to such a self-report measure can be accounted for by the mental skills that characterize cognitive complexity (i.e., analytic thinking). Third, in Study 1, all the measures were assessed at the same

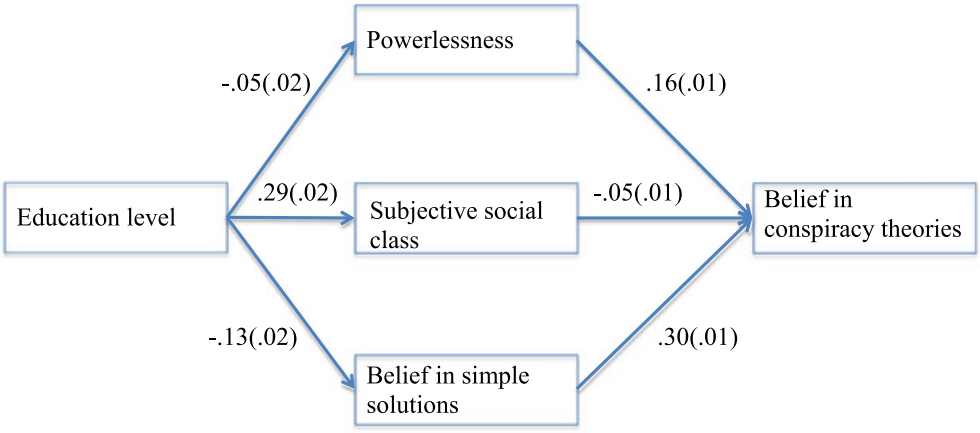

Figure 1. Mediation model Study 1. Indirect effects through powerlessness, subjective social class, and belief in simple solutions were significant ($ps < .05$). Values outside of brackets are *B*s, values inside brackets are *SE*s.

time point, raising concern about common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

To address these concerns, I re-analyzed a previously conducted (and hitherto unpublished) study on a sample stratified to be nationally representative of the Dutch adult population. Although this study was conducted before designing the current research question, it contained indicators of most of the measures necessary to test the current hypotheses.[2] Moreover, the mediators were assessed at a different point in time than the dependent variable (separated by 2 weeks), avoiding the problem of common method variance. In the analysis of the data, I first tested whether the mediation model would replicate in this nationally representative sample. After that, I tested whether or not the path through belief in simple solutions would be attributable to variations in analytic thinking.

Method

Procedure and participants

The study was conducted online by a research agency on a sample stratified to be representative of the Dutch population. The measures reported here were parts of a larger battery of questionnaires, and multiple researchers contributed to this project for different and independent research purposes. The measures were assessed in two different waves (Time 1 and Time 2), which were separated by two weeks. The total sample contained 1251 participants; of these, 970 participated in both waves, thus forming the basis of the present analyses (511 men, 459 women; $M_{age} = 50.86$ years; $SD = 15.85$).

Measures

The questionnaire contained a measure of education level, which the research agency categorized into three categories ranging from 'low'(1), 'average' (2) to 'high' (3). Specifically, basic/lower education and lower secondary education were classified as 'low'; higher secondary education, preuniversity education, and community college were classified as 'average'; higher vocational education or university's degree were classified as 'high'.

The hypothesized mediators were all assessed at Time 1. As indicator of participants' feelings of control, the questionnaire contained the following items (1 = *strongly disagree*, 7 = *strongly agree*): 'When the government makes decisions, it is possible for citizens to express their thoughts and feelings about that', 'Citizens can influence government decisions', and 'It is possible to object against government decisions'. These items were averaged into a reliable feelings of control scale ($\alpha = .74$).[3] To measure subjective social class, the questionnaire contained the same scale as in Study 1.

To measure analytic thinking I used the Cognitive Reflection Test (Frederick, 2005; see also Gervais and Norenzayan, 2012). This measure is designed to assess participants' analytic thinking skills through three mathematical questions, where the correct answer deviates from the intuitive answer that one is likely to arrive at if one does not use analytic thinking (e.g., 'A bat and a ball cost 1.10 Euros. The bat costs one Euro more than the ball. How much does the ball cost?' Intuitive answer: 10 cents; correct answer: 5 cents). Participants' analytic thinking score was calculated by adding the number of correct responses.

To measure belief in simple solutions, participants responded to the following three questions (1 = *strongly disagree*, 7 = *strongly agree*): 'With the right policies, most societal problems are easy to solve', 'If I were in charge, the biggest problems of our society would be solved quickly', and 'Most societal problems have a clear cause and a simple solution'. These three items were averaged into a reliable measure of belief in simple solutions ($\alpha = .84$).

Belief in conspiracy theories was measured at Time 2. Participants indicated how plausible they considered seven

[2] The only exceptions were that this study did not contain a measure of self-esteem or a measure of income level. Given the nonsignificance of these variables in Study 1, in combination with the methodological and conceptual advantages of a nationally representative sample where the mediators were assessed at a different point in time than the dependent variable, I considered this study as appropriate for the present purposes despite these omissions.

[3] These three items were derived from a modified version of the 7-item procedural justice scale (Colquitt, 2001). Procedural justice is empirically and theoretically grounded in feelings of (process and decision) control (e.g., Thibaut & Walker, 1975; Lind & Tyler, 1988; Van Prooijen, Van den Bos, & Wilke, 2004). Given the purposes of the present project, in the current study, I analyzed the three items that most explicitly refer to the control that people experience in their relations with powerful authorities. An analysis of the full procedural justice scale yielded similar results.

statements (1 = *very implausible*, 7 = *very plausible*), such as 'Politicians are frequently being bribed by major companies or interest groups', 'Radiation of mobile phones is bad for our health. Both telecom companies and the government know this but keep the evidence a secret', and 'The financial crisis was caused deliberately by bankers, for personal profit'. This yielded a reliable scale of belief in conspiracy theories ($\alpha = .82$).

Results and discussion

The Means, standard deviations, and intercorrelations of the measured variables are displayed in Table 3. I first sought to replicate the findings of Study 1 using the same analytical strategy. Then, I tested whether analytic thinking mediates the path through belief in simple solutions.

Regression analysis

The regression results are depicted in Table 4. Step 1 was significant ($R^2 = .03$), $F(2, 967) = 12.23$, $p < .001$, which was attributable to a significant age effect (i.e., older age predicted increased conspiracy belief). Step 2, in which education level was added, was significant ($\Delta R^2 = .05$), $F(1, 966) = 57.09$, $p < .001$. Replicating earlier findings and Study 1, high education level predicted decreased belief in conspiracy theories. Finally, Step 3 in which the mediators were added was significant ($\Delta R^2 = .15$), $F(3, 963) = 63.78$, $p < .001$. As can be seen in Table 4, feelings of control and belief in simple solutions again predicted belief in conspiracy theories. In Study 2, subjective social class was not a significant predictor in the regression model. Although the correlations of this variable with conspiracy beliefs and education level were significant, and consistent with Study 1 (see Table 3), it did not uniquely predict conspiracy beliefs above and beyond feelings of control and belief in simple solutions.

Mediation analysis

I then analyzed the same mediational model as in Study 1 through the SPSS Mediate macro (Hayes & Preacher, 2014), with gender and age as control variables. The model is depicted in Figure 2. The indirect effect through feelings of control was significant ($B = -.03$; $SE = .006$), $CI_{95\%}$ [−.04; −.02], as was the indirect effect through belief in simple solutions ($B = -.04$; $SE = .007$), $CI_{95\%}$[−.05; −.02]. The indirect effect through subjective social class was not significant ($B = -.009$; $SE = .006$), $CI_{95\%}$[−.02; .001]. These findings again support Hypotheses 1 and 2 but not Hypothesis 4.

Analytic thinking

I then tested whether the path through belief in simple solutions is attributable to analytic thinking. The line of reasoning laid out in the introduction would suggest that education predicts decreased belief in simple solutions because of an increased capacity for analytic thinking. Put differently, this reasoning suggests a serial mediation model: education ➔ analytic thinking ➔ belief in simple solutions ➔ belief in conspiracy theories. To test this model, I utilized the 'process' macro by Hayes (2013) (Model 6). The results supported this serial mediation model: Total model ($B = -.05$; $SE = .008$), $CI_{95\%}$[−.07; −.04]; serial indirect effect ($B = -.009$; $SE = .002$), $CI_{95\%}$[−.014; −.005]. The

Table 3. Means, standard deviations, and intercorrelations of the study variables (Study 2)

M	*SD*	1	2	3	4	5	6
1. Education level	2.01	0.76	–				
2. Feelings of control	3.99	1.29	.20***	–			
3. Subjective SES	6.21	1.49	.30***	.18***	–		
4. Analytic thinking	0.96	1.01	.30***	.17***	.12***	–	
5. Belief in simple solutions	4.00	1.24	−.22***	−.18***	−.06*	−.22***	–
6. Belief in conspiracy theories	4.02	1.13	−.26***	−.34***	−.13***	−.21***	.34***

*$p < .05$ ***$p < .001$.

Table 4. Hierarchical regression analysis: Belief in conspiracy theories as a function of education level (Step 2) and three potential mediators (Step 3). Study 2

Step 1	*B*(*SE*)	$CI_{95\%}$ of *B*	β	*t*(967)
Gender	0.11(.07)	−0.04; 0.25	.05	1.48
Age	0.01(.002)	0.006; 0.015	.15	4.79***
Step 2	*B*(*SE*)	$CI_{95\%}$ of *B*	β	*t*(966)
Gender	0.07(.07)	−0.07; 0.21	.03	0.97
Age	0.008(.002)	0.004; 0.012	.11	3.53***
Education level	−0.35(.05)	−0.44; −0.26	−.24	−7.56***
Step 3	*B*(*SE*)	$CI_{95\%}$ of *B*	β	*t*(963)
Gender	0.08(.07)	−0.05; 0.21	.04	1.25
Age	0.009(.002)	0.005; 0.013	.12	4.17***
Education level	−0.16(.05)	−0.25; −0.07	−.11	−3.46**
Feelings of control	−0.22(.03)	−0.27; 0.17	−.25	−8.65***
Subjective social class	−0.03(.02)	−0.07; 0.02	−.04	−1.29
Belief in simple solutions	0.25(.03)	0.20; 0.30	.27	9.33***

**$p < .01$ ***$p < .001$.

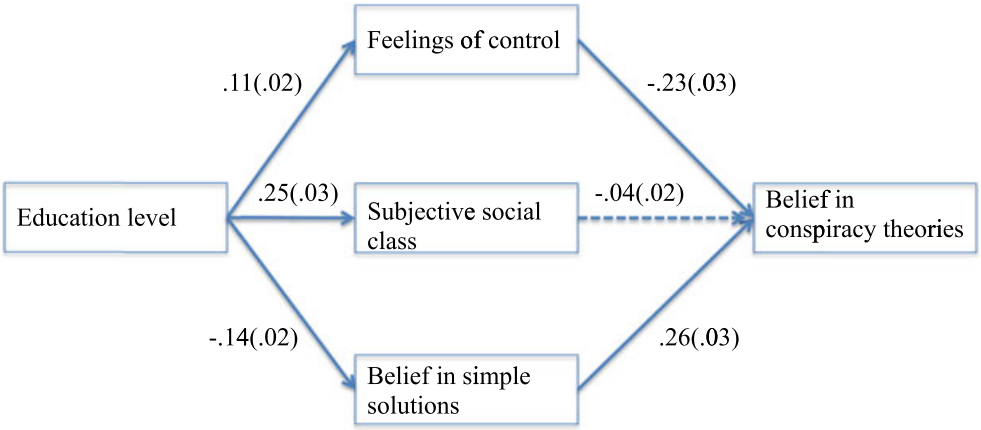

Figure 2. Mediation model Study 2. Indirect effects through feelings of control and belief in simple solutions were significant (*p*s < .05), dashed line is nonsignificant (*p* = .11). Values outside of brackets are *B*s, values inside brackets are *SE*s.

full model is displayed in Figure 3. It can be concluded that analytic thinking skills statistically account for the path through belief in simple solutions.

GENERAL DISCUSSION

Previous research indicated a negative relationship between education level and belief in conspiracy theories, such that people with high education levels are less likely to believe in conspiracy theories than people with low education levels (Douglas et al., 2016; Van Prooijen et al, 2015). The present study was designed to investigate the underlying processes explaining *why* this relationship emerges. Study 1 provides evidence for three independent mediators. People with high education level are less likely to believe in simple solutions for complex problems; they feel less powerless (and hence more in control) within their social environment, and they subjectively perceive themselves as higher in social class. These three factors jointly contribute to the relationship between education and belief in conspiracy theories. Study 2 replicated these findings for belief in simple solutions and feelings of control but not for social class. Moreover, Study 2 revealed that the mediating role of belief in simple solutions is due to the relationship between education and analytic thinking skills. Taken together, these studies suggest that the relationship between education and belief in conspiracy theories cannot be reduced to a single psychological mechanism but is the product of the complex interplay of multiple psychological processes. Particularly cognitive complexity and feelings of control are independent processes through which education predicts belief in conspiracy theories.

The results for subjective social class were mixed: Study 1 did but Study 2 did not support the mediating role of this variable. Although also in Study 2 subjective social class was significantly correlated with both education and conspiracy beliefs in the predicted ways (Table 3), after controlling for the other mediators the indirect effect through this variable turned out to be nonsignificant. It is noteworthy, however, the size of the relevant regression weights in the mediation model was quite comparable between Studies 1 and 2 (see Figure 1 vs. Figure 2). I therefore suspect that subjective social class does contribute to the relationship between education and conspiracy beliefs but that the effect is small. Study 1 had a much larger sample size than Study 2, making that study more powerful to detect this effect.

The Study 1 findings did not support the mediating role of self-esteem. Although we found a small but significant correlation between education and self-esteem (cf. Baumeister et al., 2003), self-esteem was uncorrelated with belief in conspiracy theories (Table 1). Indeed, we note that the relationship between self-esteem and belief in conspiracy theories does not replicate in all studies (Swami, 2012). Here, I speculate about two possible reasons why the relationship between self-esteem and belief in conspiracy theories is not empirically robust. First, research indicates that narcissism predicts belief in conspiracy theories through increased paranoia (Cichocka et al., 2016). Whereas narcissism is not the same as self-esteem—and it is likely that narcissism and self-esteem are associated with conspiracy beliefs through different processes—many narcissists tend to have high explicit self-esteem. Cichocka and colleagues reason that narcissism suppresses the relationship between self-esteem and conspiracy beliefs. Second, there are more dimensions to self-esteem than whether it is high or low. One study found

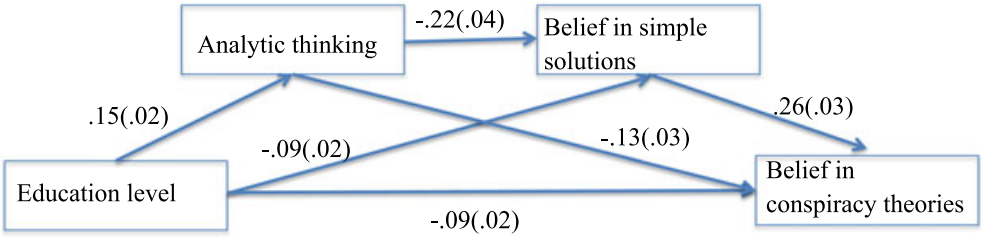

Figure 3. Serial mediation model Study 2. All regression lines in the model are significant (*p*s < .001).

that self-esteem instability—that is, the extent to which self-esteem fluctuates over time—is a better predictor of conspiracy beliefs than self-esteem level (Van Prooijen, 2016). These considerations suggest that more research is needed to fully explain when and why self-esteem is related with belief in conspiracy theories.

Previous studies within this research domain predominantly focused on the psychological origins of belief in conspiracy theories (Abalakina-Paap et al., 1999; Goertzel, 1994; Swami et al., 2011; Van Prooijen & Acker, 2015; Wood et al., 2012). The present study utilizes some of the insights that emerged from these research efforts to establish what can be performed to actually *reduce* conspiracy theorizing among the population. Integrating insights from educational psychology with theorizing on belief in conspiracy theories, the framework presented here posits that education is associated with some of the main predictors of belief in conspiracy theories. Through these mechanisms, education might be a successful intervention to reduce the potential for conspiracy beliefs among citizens. More research is needed to fully establish the success of education as intervention, particularly as the present study does not provide evidence of cause and effect. Nevertheless, the findings presented here may provide impetus to a line of research that is focused on establishing interventions designed to reduce belief in conspiracy theories.

It should be noted that not all previous studies found a relationship between education and belief in conspiracy theories. For instance, in samples of African-Americans (Parsons, Simmons, Shinhoster, & Kilburn, 1999) and in samples collected in Muslim countries (Gentzkow & Shapiro, 2004), the relationship between education and conspiracy beliefs does not emerge. I suspect that the key to explain this discrepancy is feelings of group-based oppression and marginalization (Crocker et al., 1999). Many African-Americans feel marginalized as a group in US society; likewise, many citizens of Muslim countries feel marginalized as a group by the Western world in general and the US in particular. Education may predict the extent to which one feels in control individually, but education is unlikely to alleviate perceived victimization of the group that one identifies with. Identification with a group that is under threat is a core predictor of belief in conspiracy theories (Van Prooijen & Van Dijk, 2014) and may well supersede any effect of education. Whilst the present research sought to establish the mediators of the relationship between education and conspiracy theories, a fruitful avenue for future research would be to also establish the moderators of this relationship.

The current studies have a number of noteworthy strengths and limitations. The strengths are that both samples are high powered, and the sample of Study 2 was stratified to be nationally representative while measuring the mediators separate from the dependent variable. This suggests that the findings observed here are robust and likely to replicate in follow-up studies. Furthermore, the present study is the first to examine the mediating processes underlying the link between education and belief in conspiracy theories and found evidence for at least two theoretically plausible mediators. One limitation of the present research, however, is that the empirical relationships observed here are correlational, leaving questions about cause and effect. The current findings for instance do not exclude the possibility that children who feel powerless, and who lack cognitive complexity, are less likely to attain high education levels. More research is therefore needed to provide more solid and causal evidence for the key assertions in this contribution.

Education is widely seen as a tool to provide children with cognitive skills, to train their problem-solving capabilities, to stimulate a sense of mastery, and to increase their opportunities on the job market. A practical implication of the present study is that through some of these mechanisms, education also may have an unintended side effect by contributing to a less paranoid society. I speculate here that these effects on conspiracy beliefs can be achieved without explicitly focusing on the validity or invalidity of specific conspiracy theories throughout an educational curriculum. Instead, by teaching children analytic thinking skills along with the insight that societal problems often have no simple solutions, by stimulating a sense of control, and by promoting a sense that one is a valued member of society, education is likely to install the mental tools that are needed to approach far-fetched conspiracy theories with a healthy dose of skepticism.

In sum, the current research sought to answer the question why education predicts decreased belief in conspiracy theories. Results of two studies suggest that at least two mediators strongly contribute to this relationship, namely, cognitive complexity and feeling of control. Furthermore, subjective social class also may contribute to this relationship, although the evidence for this mechanism is weaker. The present studies hence underscore the multifaceted implications of education levels for the extent to which people think critically about societal issues in general and conspiracy theories in particular. I conclude that the relationship between education and belief in conspiracy theories is accounted for by multiple independent psychological processes.

ACKNOWLEDGEMENTS

I thank Mark Traa and his colleagues at Quest for their help in conducting Study 1 and acknowledge the research agency 'Flycatcher' for conducting Study 2.

REFERENCES

Aarnio, K., & Lindeman, M. (2005). Paranormal beliefs, education, and thinking styles. *Personality and Individual Differences*, *39*, 1227–1236. DOI:10.1016/j.paid.2005.04.009.

Abalakina-Paap, M., Stephan, W., Craig, T., & Gregory, W. L. (1999). Beliefs in conspiracies. *Political Psychology*, *20*, 637–647. DOI:10.1111/0162-895X.00160.

Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy white women. *Health Psychology*, *19*, 586–592. DOI:10.1037/0278-6133.19.6.586.

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest*, *4*, 1–44. DOI:10.1111/1529-1006.01431.

Bilewicz, M., Cichocka, A., & Soral, W. (2015). *The Psychology of Conspiracy*. Oxon: Routledge.

Cichocka, A., Marchlewska, M., & Golec de Zavala, A. (2016). Does self-love or self-hate predict conspiracy beliefs? Narcissism, self-esteem, and the endorsement of conspiracy theories. *Social Psychological and Personality Science*, *7*, 157–166. DOI:10.1177/1948550615616170.

Colquitt, J. A. (2001). On the dimensionality of organizational justice: A construct validation of a measure. *Journal of Applied Psychology*, *86*, 386–400. DOI:10.1037//0021-9010.86.3.386.

Crocker, J., Luhtanen, R., Broadnax, S., & Blaine, B. E. (1999). Belief in U. S. government conspiracies against blacks among black and white college students: Powerlessness or system blame? *Personality and Social Psychology Bulletin*, *25*, 941–953. DOI:10.1177/01461672992511003.

Crocker, J., Sommers, S. R., & Luhtanen, R. K. (2002). Hopes dashed and dreams fulfilled: Contingencies of self-worth and graduate school admissions. *Personality and Social Psychology Bulletin*, *28*, 1275–1286. DOI:10.1177/01461672022812012.

Darwin, H., Neave, N., & Holmes, J. (2011). Belief in conspiracy theories: The role of paranormal belief, paranoid ideation and schizotypy. *Personality and Individual Differences*, *50*, 1289–1293. DOI:10.1016/j.paid.2011.02.027.

Deary, I. J., Strand, S., Smith, P., & Fernandes, C. (2007). Intelligence and educationalachievement. *Intelligence*, *35*, 13–21. DOI:10.1016/j.intell.2006.02.001.

Douglas, K. M., Sutton, R. M., Callan, M. J., Dawtry, R. J., & Harvey, A. J. (2016). Someone is pulling the strings: Hypersensitive agency detection and belief in conspiracy theories. *Thinking and Reasoning*, *22*, 57–77. DOI:10.1080/12546783.2015.1051586.

Frederick, S. (2005). Cognitive reflection and decision-making. *Journal of Economic Perspectives*, *19*, 25–42. DOI:10.1257/089533005775196732.

Gentzkow, M. A., & Shapiro, J. M. (2004). Media, education and anti-Americanismin the Muslim world. *Journal of Economic Perspectives*, *18*, 117–133. DOI:10.1257/0895330042162313.

Gervais, W. M., & Norenzayan, A. (2012). Analytic thinking promotes religious disbelief. *Science*, *336*, 493–496. DOI:10.1126/science.1215647.

Goertzel, T. (1994). Belief in conspiracy theories. *Political Psychology*, *15*, 733–744. DOI:10.2307/3791630.

Griliches, Z., & Mason, W. M. (1972). Education, income, and ability. *The Journal of Political Economy*, *80*, S74–S103.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.

Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *British Journal of Mathematical and Statistical Psychology*, *67*, 451–470. DOI:10.1111/bmsp.12028.

Hofstadter, R. (1966). The paranoid style in American politics. In R. Hofstadter (Ed.), *The paranoid style in American politics and other essays* (edn, pp. 3 – 40). New York, NY: Knopf.

Jolley, D., & Douglas, K. (2014). The social consequences of conspiracism: Exposure to conspiracy theories decreases intentions to engage in politics and to reduce one's carbon footprints. *British Journal of Psychology*, *105*, 35–56. DOI:10.1111/bjop.12018.

Lind, E. A., & Tyler, T. R. (1988). *The social psychology of procedural justice*. New York: Plenum.

Mirowsky, J., & Ross, C. E. (1998). Education, personal control, lifestyle, and health. *Research on Aging*, *20*, 415–449. DOI:10.1177/0164027598204003.

Mirowsky, J., & Ross, C. E. (2003). *Education, social status, and health*. NJ: Aldine Transaction.

Oliver, J. E., & Wood, T. (2014). Medical conspiracy theories and health behaviors in the United States. *JAMA Internal Medicine*, *174*, 817–818. DOI:10.1001/jamainternmed.2014.190.

Parsons, S., Simmons, W., Shinhoster, F., & Kilburn, J. (1999). A test of the grapevine: An empirical examination of conspiracy theories among African Americans. *Sociological Spectrum*, *19*, 201–222. DOI:10.1080/027321799280235.

Piff, P. K., Stancato, D. M., Martinez, A. G., Kraus, M. W., & Keltner, D. (2012). Class, chaos, and the construction of community. *Journal of Personality and Social Psychology*, *103*, 949–962. DOI:10.1037/a0029673.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*, 879–903. DOI:10.1037/0021-9010.88.5.879.

Rindermann, H., & Neubauer, A. C. (2004). Processing speed, intelligence, creativity,and school performance: Testing of causal hypotheses using structural equation models. *Intelligence*, *32*, 573–589. DOI:10.1016/j.intell.2004.06.005.

Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: Construct validation of a single-item measure and the rosenberg self-esteem scale. *Personality and Social Psychology Bulletin*, *27*, 151–161. DOI:10.1177/0146167201272002.

Ross, C. E., & Van Willigen, M. (1997). Education and the subjective quality of life. *Journal of Health and Social Behavior*, *38*, 275–297. DOI:10.2307/2955371.

Swami, V. (2012). Social psychological origins of conspiracy theories: The case of the Jewish conspiracy theory in Malaysia. *Frontiers in Psychology*, *3*, 1–9. DOI:10.3389/fpsyg.2012.00280.

Swami, V., Coles, R., Stieger, S., Pietschnig, J., Furnham, A., Rehim, S., & Voracek, M. (2011). Conspiracist ideation in Britain and Austria: Evidence of a monological belief system and associations between individual psychological differences and real-world and fictitious conspiracy theories. *British Journal of Psychology*, *102*, 443–463. DOI:10.1111/j.2044-8295.2010.02004.x.

Swami, V., Voracek, M., Stieger, S., Tran, U. S., & Furnham, A. (2014). Analytic thinking reduces belief in conspiracy theories. *Cognition*, *133*, 572–585. DOI:10.1016/j.cognition.2014.08.006.

Thibaut, J., & Walker, L. (1975). *Procedural justice: A psychological analysis*. Hillsdale, NJ: Erlbaum.

Van Prooijen, J.-W. (2016). Sometimes inclusion breeds suspicion: Self-uncertainty and belongingness predict belief in conspiracy theories. *European Journal of Social Psychology*, *46*, 267–279. DOI:10.1002/ejsp.2157.

Van Prooijen, J.-W., & Acker, M. (2015). The influence of control on belief in conspiracy theories: Conceptual and applied extensions. *Applied Cognitive Psychology*, *29*, 753–761. DOI:10.1002/acp.3161.

Van Prooijen, J.-W., Krouwel, A. P. M., & Pollet, T. (2015). Political extremism predicts belief in conspiracy theories. *Social Psychological and Personality Science*, *6*, 570–578. DOI:10.1177/1948550614567356.

Van Prooijen, J.-W., Van den Bos, K., & Wilke, H. A. M. (2004). The role of standing in the psychology of procedural justice: Towards theoretical integration. In W. Stroebe & M. Hewstone (Eds.) *European Review of Social Psychology* (*15*, 33-58). East Sussex: Psychology press. doi: 10.1080/10463280340000108

Van Prooijen, J.-W., & Van Dijk, E. (2014). When consequence size predicts beliefin conspiracy theories: The moderating role of perspective taking. *Journal of Experimental Social Psychology*, *55*, 63–73. DOI:10.1016/j.jesp.2014.06.006.

Van Prooijen, J.-W., & Van Lange, P. A. M. (Eds) (2014). *Power, politics, and paranoia: Why people are suspicious of their leaders*. Cambridge: Cambridge University Press.

Whitson, J. A., & Galinsky, A. D. (2008). Lacking control increases illusory pattern perception. *Science*, *322*, 115–117. DOI:10.1126/science.1159845.

Wood, M. J., Douglas, K. M., & Sutton, R. M. (2012). Dead and alive: Beliefs in contradictory conspiracy theories. *Social Psychological and Personality Science*, *3*, 767–773. DOI:10.1177/1948550611434786.

Zonis, M., & Joseph, C. M. (1994). Conspiracy thinking in the middle east. *Political Psychology*, *15*, 443–459. DOI:10.2307/3791566.

