

## Original Article

## Childhood harshness predicts long-lasting leader preferences

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## ABSTRACT

Understanding the origins of political authoritarianism is of key importance for modern democracies. Recent works in evolutionary psychology suggest that human cognitive preferences may be the output of a biological response to early stressful environments. In this paper, we hypothesized that people's leader preferences are partly driven by early signals of harshness. We experimentally elicited children's (Study 1) and adults' (Study 2) political preferences using faces controlled for dominance and trustworthiness and showed that early childhood harshness has an enduring effect on adult political attitudes. Importantly, this effect was further confirmed using self-reported extreme authoritarianism (Study 2) and by the analysis of the large database of the European Value Survey (Study 3). We discuss the potential political implications of this early calibration of leader preferences.

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For decades, empirical works have demonstrated that political preferences vary systematically with environmental harshness. Perceived threat to safety and dangerous worldviews indeed correlates with right-wing authoritarianism (Onraet, Dhont, & Hiel, 2014; Sibley, Wilson, & Duckitt, 2007), and threatening or war scenarios are associated with a preference for taller, more masculine, more dominant and less trustworthy leaders (Laustsen & Petersen, 2015; Little, Roberts, Jones, & DeBruine, 2012; Re, DeBruine, Jones, & Perrett, 2013). Importantly, this authoritarianism shift also appears in response to non-political threats. For instance, pathogen- and disease-avoidance, a major issue in human evolution, correlate with the degree of authoritarianism at the country level (Murray, Schaller, & Suedfeld, 2013; Thornhill, Fincher, & Aran, 2009) and at the individual level (see Terrizzi, Shook, & McDaniel, 2013 for a meta-analysis). Taken together, these studies suggest that the preference for strong leaders is a deeply rooted evolutionary response to external stressors.

However, cues from individuals' current environment are not the only signals affecting behavior. Signals perceived during childhood are indeed crucial to calibrate current and future behaviors (Bateson et al., 2004; Del Giudice, Ellis, & Shirtcliff, 2011; Nettle, Frankenhuys, & Rickard, 2013). Environmental childhood provides cues about the kind of environment individuals will likely face as adults or the kind of somatic resources they can rely on for their development (Nettle et al.,

2013). In line with this idea, empirical research shows that phenotypes are adjusted to early conditions through multiple developmental mechanisms (Frankenhuys, Panchanathan, & Nettle, 2016). For instance, non-human animals who experience a period of high stress in the juvenile period go on to be more present-oriented, and to prioritize immediate survival and reproduction over long-term benefits (Bateson et al., 2004). Similarly, people born with low birth-weight or who experience psychosocial stress and family disruption in childhood mature earlier and have their first child sooner than control populations (Adair, 2001; Nettle, Coall, & Dickins, 2011; Sloboda, Hart, Doherty, Pennell, & Hickey, 2007). Harshness in early stages of development also induces important changes in social cognition. For example, independently of their socioeconomic status later in life, adults who grew up in stressful environments are more sensitive to social threats and negative emotions, which may be adaptive in more competitive and violent environments (Javanbakht et al., 2015; Kim et al., 2013). The goal of the present paper is to study whether leader preferences are also influenced by cues of childhood harshness, independently of individuals' current circumstances. To test this hypothesis, we relied on a robust measure of harshness in childhood: resource deprivation. Childhood resource deprivation indeed reflects both lower levels of resources and increased instability and exposure to adverse events (Evans, 2004). In other words, resource deprivation constitutes an interesting proxy for the level of external stress experienced during childhood. Therefore, we assess the association between deprivation during childhood and children's leader preferences (Study 1). We then evaluate the persistence of this effect in adulthood (Studies 2 & 3).

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To measure leader preferences consistently in children and adults, we relied on participants' perception of faces. Extensive research in psychology has indeed shown that facial cues are used for leader choice both in adults and children, and that their use reliably predicts election outcomes (Antonakis & Dalgas, 2009; Olivola & Todorov, 2010; Todorov, Mandisodza, Goren, & Hall, 2005). In addition, cross-national studies and experimental manipulations have shown that the importance granted to specific facial cues such as trustworthiness or dominance is sensitive to environmental factors (Laustsen & Petersen, 2015; Little et al., 2012). Similarly, real-life political differences between Democrats and Republicans have been linked with stable differences in facial preferences when choosing a leader (Laustsen & Petersen, 2015; Olivola, Sussman, Tsetsos, Kang, & Todorov, 2012). These results suggest that people's reliance on specific facial cues to choose a leader is a reliable proxy for their actual political preferences.

In the present project, we exploited the differential impact of dominance and trustworthiness in social judgments (Oosterhof & Todorov, 2008) to investigate the relationship between childhood deprivation and the preference for authoritarian leaders. More precisely, we used faces controlled for both dominance and trustworthiness to measure how early adverse experience may shape the use of these two facial cues for choosing a leader. Finally, we confirmed the association between leader preferences and childhood deprivation by analyzing the effect of self-reported extreme authoritarianism in a nationally representative sample of French adults (Study 2) and in a large-scale survey on 46 European countries (Study 3, European Values Study Longitudinal Data File 1981–2008 (EVS 1981–2008), 2015).

## 1. Study 1

The aim of this first study was to investigate the immediate effect of childhood poverty on children's preference for strong leaders. To do so, we adapted an existing experimental design that successfully elicits political preferences in children (Antonakis & Dalgas, 2009).

### 1.1. Materials and methods

#### 1.1.1. Participants

41 children from the city of Slatina, Romania, aged 6 to 8 years ( $M = 6.85 \pm 0.13$  years; results are given in the standard form: mean  $\pm$  95% confidence intervals) were recruited in two schools situated in a deprived neighborhood and in a working-class neighborhood, about 1 km away from the city center. A minimum target of 20 participants per group was pre-planned based on the number of 6 to 8 year-olds in the lower-SES school; the exact number was determined by scheduling constraints and by the number of parental consent forms we received. The study was approved by the schools' management team and by the School Inspectorate. Parents signed a written informed consent form and children provided verbal assent at the start of the procedure. All study procedures complied with the Declaration of Helsinki. Children received a small gift to thank them for their participation.

Two *Childhood Deprivation Groups* (*Deprived* and *Not Deprived*) were formed based on children's neighborhood. Because neighborhood status may interact with children's status, we excluded children whose parental income did not match their neighborhood's status. With this goal in mind, we asked parents whether their income was above or below the legal minimum wage in Romania (i.e. 850 lei per month, which corresponds approximately to 216\$). One participant was excluded in the *Deprived Group* and one was excluded in the *Not Deprived Group* resulting in 20 participants in the *Deprived Group* and 19 in the *Not Deprived Group*. The two groups were further characterized by lack of material possessions and lower access to cultural activities, they had younger and less educated parents, more siblings and more crowded houses and more unstable families (all  $ps < 0.035$ ; Table S1). Children in the *Deprived and Not Deprived Childhood Groups* were matched on

age ( $t(37) = 0.19, p > 0.250$ ) and gender ratio ( $\chi^2(1, N = 39) = 0.62, p > 0.250$ ; Table S1).

#### 1.1.2. Procedure and analysis

Following Antonakis and Dalgas (2009), we asked children to choose the individual they would prefer as the captain of their team to go on a mountain trip. They had to repeat this choice five times, on five different pairs of faces. Each pair included two versions of a single avatar identity: a more dominant one and a more trustworthy one (Fig. 1A). The identities were selected by a native Romanian to match the most common types of faces in Romania. Morphs were created with the XxMorphs freeware and using the Facegen 3.1 open database (Oosterhof & Todorov, 2008). The more dominant faces corresponded to a 50% morph between a 3-point dominant and a 1-point trustworthy face. Theoretically, the obtained average faces were 1.5-point dominant and 0.5-point Trustworthy. Symmetrically, the more trustworthy faces corresponded to a morph between a 1-point dominant and a 3-point trustworthy face, resulting in 0.5-point dominant and 1.5-point trustworthy faces.

Validation of the stimuli by 60 Amazon MTurkers (MTurk, <http://www.mturk.com>) confirmed that the more dominant faces were judged as more dominant and less trustworthy than the more trustworthy faces (mean of participants' correct identification rate: most dominant face:  $86\% \pm 6\%$ ; most trustworthy face:  $79\% \pm 6\%$ ; mean percentage of correct identification for each face: most dominant face:  $86\% \pm 4\%$ ; most trustworthy face:  $79\% \pm 13\%$ ). The pairs were presented in a random order and the position of the more dominant face (on the right or on the left of the more trustworthy face) was counterbalanced between pairs. The task lasted approximately 5 min.

The effect of *Childhood Deprivation* on the probability of choosing the more dominant face was investigated using a logistic regression taking *Childhood Deprivation* as a predictor. All the results obtained with this model were confirmed using *Parental income status* instead of *Childhood Deprivation* as the predictor (See Supplementary information).

### 1.2. Results

In line with our hypotheses, children experiencing deprivation were more likely to choose the more dominant and less trustworthy face as the captain for their team (logistic regression:  $b = 0.68 \pm 0.57, z = 2.33, p = 0.020$ ). This difference was explained by a preference for strong leaders in the, most deprived group only ( $M = 0.62 \pm 11, t(19) = 2.30, p = 0.033$ ; Least deprived group:  $M = 0.45 \pm 10, t(18) = -0.99, p = 0.337$ ).

### 1.3. Conclusions

This first study demonstrates that children's leader preferences are sensitive to their environment and that deprivation biases these preferences towards strong leaders. Thus, in a second study, we investigate the long-lasting effect of early exposure to stressors on a nationally representative sample of adults with diverse socio-economic backgrounds.

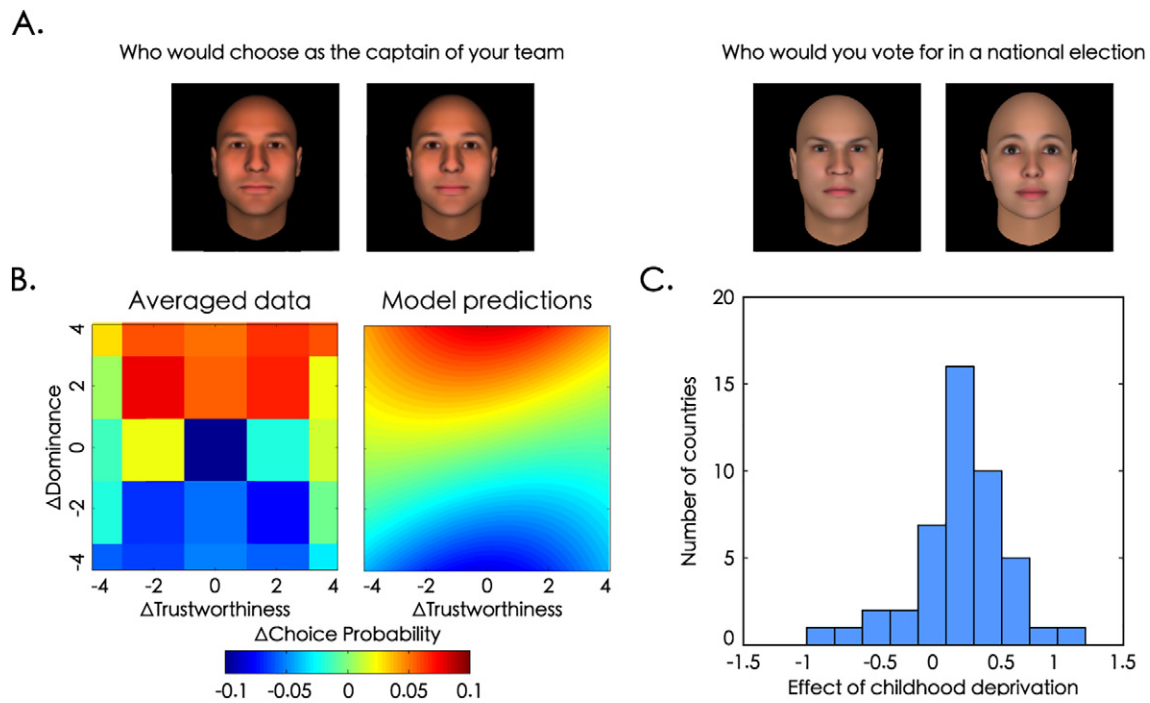
## 2. Study 2

Adult participants had to choose whom they would vote for in a national election between avatar faces parametrically varying on trustworthiness and dominance. Participants also reported their preference for authoritarian leaders to investigate the relationship between childhood deprivation and explicit authoritarian attitudes.

### 2.1. Materials and methods

#### 2.1.1. Participants

The number of subjects was fixed *a priori* with IPSOS polling institute to constitute a sample that was representative of the French population



**Fig. 1.** Influence of childhood deprivation on leader preferences. **A.** Facial preferences experiment design. Children had to choose, for 5 pairs of faces, the individual they would prefer as the captain of their team. The faces of each pair corresponded to the same identity varying in the level of dominance (1.5 or 2.5 points) and trustworthiness (2.5 or 1.5 points; left). Adults had to choose the individual they would vote for in a national election for 36 pairs of faces varying parametrically on dominance and trustworthiness (right). **B.** Differences between choice probabilities for the different face combinations in *Deprived* and *Not Deprived Childhood* participants in Study 2. Difference in choice probability is represented from red for a higher probability for the *Not Deprived* ( $N = 649$ ) than for the *Deprived Childhood Group* ( $N = 163$ ) to blue for a lower probability of choice for the *Deprived Childhood Group*. The pixelized figure corresponds to the averaged data for each combination of  $\Delta$ Dominance and  $\Delta$ Trustworthiness and the smoothed figure to the models' predictions. Participants who experienced poverty during their childhood had a higher probability of choosing more dominant and less trustworthy leaders than those who did not experience poverty. **C.** Impact of Childhood Deprivation on extreme authoritarianism for 46 European countries. Two-level analyses revealed that having experienced deprivation during childhood increased the probability of reporting extreme authoritarianism. Importantly, this effect was also significant after controlling for parents' cultural capital as well as current status and confidence in politics.

for age, gender, geographical region, urban vs. rural and occupation (quota method). 1006 French participants (544 women) aged 16 to 83 years old ( $47.42 \pm 1.01$  years) participated in this online study. Each participant received a description of the study and provided their informed consent before starting the experiment. Following IPSOS' policy, participants were not paid to take part in the study. The experiment lasted around 15 min.

### 2.1.2. Procedure

The procedure for this experiment was a standard discrete choice task (McFadden, 1980, see Fig. 1A). This methodology was validated in two pre-test experiments, see Supplementary information Study S1 & S2 for details.

The experiment was programmed in Javascript. Eight avatar faces, generated via FaceGen 3.1 software and controlled for their level of trustworthiness and dominance were used for this experiment. These faces have already been successfully demonstrated to elicit dominance and trustworthiness judgments both at the explicit and implicit level (Stewart et al., 2012). These faces spanned every possible combination of dominance and trustworthiness in a range of  $-2$  to  $+2$  points with an increment of 2 points (Oosterhof & Todorov, 2008) and were regularly spaced on both dominance and trustworthiness. In each presented pair, the faces were 2 to 4 points different from each other on at least one dimension (dominance or trustworthiness). This resulted in 36 pairs of faces.

Each trial began with a central fixation cross presented for 300 ms. The two faces were then presented simultaneously. Participants had to select who they would vote for in a national election, and had up to 2 s to answer by pressing "e" for the face on the left and "p" for the face on the right. If they failed to answer within 2 s, the next trial was automatically presented. A blank page was presented for around

100 ms after each trial. The 36 possible pairs of faces were presented in a random order. The presentation position of the faces (the more trustworthy face on the left or on the right) of each pair was randomized.

At the beginning of the experiment, participants filled a questionnaire designed to measure their subjective level of resources in childhood and adulthood on 100-point scales (Griskevicius, Tybur, Delton, & Robertson, 2011). This questionnaire has been used in multiple studies demonstrating a link between childhood poverty and adult behaviors, independently of participants' current level of resources (e.g., Griskevicius et al., 2013). Following the literature, we used participants' current level of resources as a control variable to investigate the independent effect of childhood poverty. In addition, participants also completed two other validated questionnaires: one on negative household affect (Bernstein et al., 1994) and one on parental care (Mikach & Bailey, 1999). At the end of the experiment, participants had to indicate their agreement with the sentence "I think having a strong leader who does not have to bother with parliament and elections is a good thing" on a 4-point scale. This self-reported measure of participants' preference for a strong leader was used to assess the link between our experimental measure and explicit political attitudes. Extreme authoritarianism was defined as strong agreement with this sentence.

Eighty-six participants were excluded for not meeting basic quality checks such as indicating their gender consistently at two different times of the procedure. Reaction times inferior to 200 ms were discarded (mean reaction time of the included participants before filtering:  $1.16 \pm 0.02$  s). Thirty-six participants were excluded for pressing the same key on  $>90\%$  of the trials, thirty-five participants were excluded for having given responses with a reaction time superior to 200 ms in less than half the trials and one participant was excluded for not having given any response with a reaction time superior to 200 ms. Twenty-

four participants were excluded for not having given any response. The analyses were performed on 818 participants.

### 2.1.3. Childhood deprivation measure

In economics, poverty is defined as an income below 50% of the median income of the population (e.g., Alesina, Glaeser, & Sacerdote, 2001). We applied this definition to participants' subjective levels of resources. The subjective poverty line was computed on a sample constituted of the 1006 participants from Study 2 and 685 additional participants drawn from the same population ( $N = 1691$  in total). Poverty thresholds were set at a score of 65.5 for *Childhood Deprivation (Deprived or Not Deprived Childhood Groups)* and 76.5 for *Current Resources (Low or Middle Current Resources Groups)*. 163 participants were included in the *Deprived Childhood Group* and 649 in the *Not Deprived Childhood Group*. In the older subsample (662 participants), 138 participants were included in the *Deprived Childhood Group* and 524 in the *Not Deprived Childhood Group*.

### 2.1.4. Subjective Maltreatment and Parental Care

Two categories, similar to those for Childhood and Current Deprivation were created for Subjective Maltreatment and Parental Care. The *Negative Household Affect* threshold was set to a score of 115 resulting in 95 participants included in the *Negative Household Affect Group* and 723 included in the *Not Negative Household Affect Group*. For Parental Care, the threshold was set to a score of 125 and 81 participants were included in the *Low Parental Care Group* and 737 in the *Middle Parent Care Group*.

### 2.1.5. Pre-analyses

We first checked that participants from the two Childhood Deprivation Groups did not differ on basic task performance measures. As no objective measure of accuracy was available for this preference task, we used mean reaction times and number of valid trials as measures of task performance. We found that the two groups did not differ on these basic performance measures (Reaction times - *Not Deprived Childhood Group*:  $M = 1164.65 \pm 18.93$ ; *Deprived Childhood Group*:  $M = 1159.69 \pm 37.95$ ;  $t(816) = 0.23$ ,  $p > 0.250$ ; number of valid trials - *Not Deprived Childhood Group*:  $M = 33.25 \pm 0.25$ ; *Deprived Childhood Group*:  $M = 33.75 \pm 0.47$ ;  $t(816) = -0.12$ ,  $p > 0.250$ ). Therefore, it appears that the two groups differed neither on their attention to or in their comprehension of the task.

### 2.1.6. Analyses

As recommended by McFadden in his seminal paper on choice experiments (McFadden, 1980), choices were analysed using mixed logit logistic regression for each subject, taking trial number and face position as random factors and faces' levels of trustworthiness and dominance as regressors. We measured the effect of *Childhood Deprivation* on the probability of choosing a strong leader (a more dominant and less trustworthy leader) by computing this probability for each individual based on her individual coefficients. Importantly, this computed probability corresponds to the probability of choosing the strong leader in any pair of faces, i.e., independently of the avatar's level of dominance and trustworthiness. In other words, this measure reflects participants' general preference for a strong leader. The effect of *Childhood Deprivation* and the controlling factors was assessed using logistic regressions on the probability of choosing a strong leader. Finally, we used similar logistic regressions on extreme authoritarianism to assess the effect of *Childhood Deprivation* on self-reported authoritarianism.

## 2.2. Results

Strong leaders (defined, as in Study 1, as a more dominant and less trustworthy leader) had a lower chance of being chosen than more trustworthy and less dominant leaders in general (probability of choosing a strong leader:  $M = 0.36 \pm 0.01$ ,  $t(817) = -35.39$ ,  $p < 0.001$ ). As

expected, participants who had experienced childhood poverty were more likely to choose a strong leader ( $b_{ChildDep} = 0.10 \pm 0.08$ ,  $z = 2.49$ ,  $p = 0.013$ ; Fig. 1A-B).

Finally, genetic studies have shown that family environment has less influence on political attitudes after the individual has left the family house (see Hatemi & McDermott, 2012 for a review on this topic). To confirm the existence of a long-term effect of childhood poverty, we ran our analyses after excluding participants who were younger than 30 years old at the time of testing. The impact of childhood poverty on leader preferences was also present in these older participants ( $b_{ChildDep} = 0.11 \pm 0.09$ ,  $z = 2.52$ ,  $p = 0.012$ ), which confirms the long-term impact of childhood adversity. Importantly, this effect was preserved after controlling for participants' current level of resources both in the complete sample ( $b_{ChildDep} = 0.09 \pm 0.08$ ,  $z = 2.25$ ,  $p = 0.025$ ) and in the older subsample ( $b_{ChildDep} = 0.11 \pm 0.09$ ,  $z = 2.34$ ,  $p = 0.019$ ).

To assess the role of potential confounds, we tested the effect of childhood deprivation after controlling for participants' current poverty and level of education as well as variables assessing participants' childhood affective environment (parental care or negative household affect). The effect of childhood deprivation was robust to the inclusion of these variables, both in the complete sample ( $b_{ChildDep} = 0.09 \pm 0.08$ ,  $z = 2.17$ ,  $p = 0.030$ ) and in the older subsample ( $b_{ChildDep} = 0.09 \pm 0.09$ ,  $z = 2.08$ ,  $p = 0.038$ ).

We then further tested the link between childhood deprivation, our experimental measure of preference for strong leaders, and participants' self-reported extreme authoritarianism. As expected, participants with a higher probability of choosing a strong leader during the task were more likely to endorse extreme authoritarianism ( $b_{Prob} = 2.06 \pm 1.59$ ,  $z = 2.55$ ,  $p = 0.011$ ). As for facial preferences, childhood poverty predicted extreme authoritarianism both before (complete sample:  $b_{ChildDep} = 0.56 \pm 0.42$ ,  $z = 2.62$ ,  $p = 0.009$ ; older subsample:  $b_{ChildDep} = 0.50 \pm 0.46$ ,  $z = 2.14$ ,  $p = 0.033$ ) and after including the control variables (complete sample:  $b_{ChildDep} = 0.59 \pm 0.43$ ,  $z = 2.65$ ,  $p = 0.008$ ; older subsample:  $b_{ChildDep} = 0.47 \pm 0.46$ ,  $z = 1.97$ ,  $p = 0.048$ ).

## 2.3. Conclusions

This study revealed a long-term impact of childhood deprivation on adult leader preferences using both facial preferences and self-reported extreme authoritarianism. Importantly, the effect of childhood deprivation was still present after controlling for potential confounding factors such as parental care and level of education. To assess the robustness of the link between extreme authoritarianism and childhood deprivation, we analysed responses from an independent large-scale sociological survey.

## 3. Study 3

The impact of childhood deprivation on the preference for strong leaders was analysed using a large scale sociological survey conducted on 66,281 respondents living in 46 European countries (the European value survey, Wave 4, [European Values Study Longitudinal Data File 1981–2008 \(EVS 1981–2008\)](#), 2015).

### 3.1. Material and methods

#### 3.1.1. Dataset and measures

We analysed Wave 4 (collected between 2008 and 2010) of the European Value Survey ([European Values Study Longitudinal Data File 1981–2008 \(EVS 1981–2008\)](#), 2015). The analyses were performed on 66,281 respondents (mean number of respondents per country:  $1440.89 \pm 94.21$ ) from 46 European countries. Extreme authoritarianism was measured exactly as in Study 2. Childhood Deprivation was measured using the question: "Parent(s) had problems to make ends meet" in the European Value Survey. A childhood poverty threshold was computed using the same method as in Study 2. Because responses



to the childhood deprivation question may have different values for different countries, the poverty threshold was computed for each country separately. This method was also applied to three other subjective childhood measures (parental political involvement, parental interest for the news and parental interest for books) and to three subjective adulthood measures (current level of religiosity, life satisfaction and confidence in political institutions).

### 3.1.2. Analyses

The effect of Childhood Deprivation on extreme authoritarianism was computed using two-level analyses: logistic regressions were run for each country separately and coefficient significance was assessed using *t*-tests at the group level. Countries for which R identified fitting errors were excluded ( $N = 2$  in the all sample analysis with the control variables and  $N = 3$  in the older sample analysis with the control variable).

### 3.2. Results

Our analyses confirmed the effect of childhood deprivation on extreme authoritarianism (all respondents:  $M = 0.21 \pm 0.10$ ,  $t(45) = 4.07$ ,  $p < 0.001$ ; Fig. 1C; respondents older than 30 years old:  $M = 0.18 \pm 0.12$ ,  $t(45) = 2.78$ ,  $p = 0.008$ ). As in Study 2, we further tested the effect of childhood deprivation after controlling for participants' level of education, income level as well as childhood measures assessing parents' cultural capital (interest in books, news and politics as well as their level of education). In addition, we also included additional variables measuring participants' current level of stress and resources (recent episode of unemployment and subjective life satisfaction) as well as variables measuring participants' attitudes that could potentially mediate the link between childhood deprivation and extreme authoritarianism (religiosity, Altemeyer & Hunsberger, 1992, and confidence in political institutions, Knigge, 1998). These analyses confirmed a specific effect of childhood deprivation on adults' political attitudes (all respondents:  $M = 0.11 \pm 0.10$ ,  $t(43) = 2.11$ ,  $p = 0.040$ ; older respondents:  $M = 0.13 \pm 0.11$ ,  $t(42) = 2.25$ ,  $p = 0.029$ ).

## 4. Discussion

With the present experiments, we aimed to understand the effect of childhood environment on political preferences. In line with our hypothesis, we found that experiencing poverty during childhood was associated with an increased preference for dominant leaders. These results are consistent with the literature on the effect of external threats on political preferences (Laustsen & Petersen, 2015; Perrin, 2005; Sales, 1973; Van de Vyver, Houston, Abrams, & Vasiljevic, 2016). For example, analyses of historical records have revealed increased authoritarianism during periods of social and economic threat (such as the Great Depression, the late 1960s and the late 1970s in the US, Sales, 1973). Similarly, the acute threats of 09/11/2001 in the US (Perrin, 2005) and of the 2005 London bombings (Van de Vyver et al., 2016) are associated with increased conservatism and authoritarianism.

However, the present studies suggest that the effect of external threats is much more pervasive than previously thought. Our results indeed reveal an immediate effect of early adverse experiences on children's preferences (Study 1) as well as a postponed effect on adults' political preferences (Studies 2–3). This postponed effect was evidenced both in the experimental task and in self-reports and suggests the existence of a direct relationship between childhood environmental harshness and political attitudes. However, it is important to note that no causal link between childhood deprivation and political attitudes can be drawn based on these correlational studies. Indeed, we cannot exclude the existence of unobserved variables that might impact both adult political attitudes and childhood environmental harshness independently. In an effort to control for potential confounding factors, we included various control variables in our models. These additional

analyses show that the effect of childhood environmental harshness on political attitudes was independent of participants' current environment (current status and recent life events), cultural factors (education level and parenting style), and confidence in political institutions. This robustness check suggests a limited impact of omitted observable variables in our context.

In addition, it is worth noting that genetic factors may also be partly responsible for our results. Indeed, authoritarianism, lower socio-economic status, as well as educational attainment and cognitive skills are all partly genetically determined (Hatemi & McDermott, 2012; Marioni et al., 2014; Plomin & Deary, 2015; Rietveld et al., 2013). Genetic factors also mediate the association between lower socio-economic status and many social and cognitive traits (Hill et al., 2016; Krapohl & Plomin, 2016; Trzaskowski et al., 2014). Therefore, it is possible that the evidenced association between childhood deprivation and authoritarianism is due to genetic mechanisms, such as the co-transmission of genetic factors associated with a lower socio-economic status and those linked with higher degrees of authoritarianism. The present findings would thus be strengthened by future research involving external shocks in experimental settings or natural experiments.

In addition, we have to acknowledge the small sample size of the study on children (Study 1,  $N = 39$ ) and that further experiments are needed to replicate the early sensitivity of leader preferences to environmental factors. The present results should also be confirmed by using different measures of childhood deprivation in adults. Indeed, even if actual and retrospective socio-economic status appear to have similar effects on adult outcomes (Cohen, Janicki-Deverts, Chen, & Matthews, 2010; Mittal, Griskevicius, Simpson, Sung, & Young, 2015), contrasting perceived and objective deprivation would allow us to test whether individuals' subjective perception of environmental harshness has a more potent effect on behavior than objective environmental harshness.

Despite these caveats, the present findings are the first to point to possible mechanisms that may lead to an early emergence of authoritarianism and orient individuals' behavior throughout their lifespan. This idea is consistent with longitudinal studies showing that right-wing authoritarianism is stable over months (Onraet et al., 2014; Sibley et al., 2007) and years (Mirisola et al., 2014) and with brain imaging research showing substantial differences between adults who experienced stressful environments as children in brain areas involved in face evaluations (Javanbakht et al., 2015; Kim et al., 2013; Mende-Siedlecki, Said, & Todorov, 2012). Therefore, the effect of childhood poverty evidenced in our study may rely on deep changes in brain functioning. In the present studies, however, the immediate and long-term effects of childhood deprivation on political preferences were evidenced using a cross-sectional design. Longitudinal studies are thus needed to confirm the association between childhood deprivation and leader preferences, and to track its evolution across the lifespan.

In addition, our studies may also shed light on the ecological bases of authoritarianism and on the possible adaptive value of such political attitudes. Indeed, we provide further evidence that leader choice is highly responsive to environmental threats and that the plasticity of leader preferences is also present in children. Our results thus extend existing data showing that more masculine and more dominant leaders are preferred in times of threat (Laustsen & Petersen, 2015; Little, Burriss, Jones, & Roberts, 2007; Re et al., 2013) and that right-wing political attitudes increase with perceived threat (Onraet et al., 2014; Sibley et al., 2007). Interestingly, Van Vugt, Hogan, and Kaiser (2008) have suggested that these contextual effects could be construed as the adaptive responses of an evolved leader choice mechanism. In this perspective, choosing a strong leader would be an adaptive response to an increased need for group coordination in harsh environments (Laustsen & Petersen, 2015). Our results showing an early plasticity of leader preferences in response to external threats are compatible with this idea but alternative explanations cannot be ruled out at this stage.

Indeed, leader preferences could be just as well guided by other cognitive mechanisms. Specifically, it has been demonstrated that leader choice is mainly determined by broad competence judgments that are independent from the more specific assessment of leadership qualities (see Olivola & Todorov, 2010 for a review). In our context, this might suggest that dominant leaders are more appealing in harsh environments simply because they are perceived as more competent in these specific environments. This indeed makes sense from an ecological point of view: stressful environments are more competitive and less cooperative (Evans, 2004), which favors dominant individuals, who are likely to outperform others and to acquire larger amounts of resources. This alternative view would predict that leader preferences are guided by competence evaluations that bear no relevance to people's need for group coordination. Further research testing the optimality of leader preferences under different environmental constraints is thus needed to tease apart these two interpretations.

Finally, these studies may offer a new way of explaining long-term changes in political attitudes. The early calibration of social preferences indeed suggests that political life is not only influenced by current circumstances (recessions, wars, acts of terrorism, etc.) but also by early life conditions. This may have a protective effect against aggravating circumstances when voters experienced favorable situations as children, but it can also hinder the beneficial effects of current improvements in people's environment. For instance, in the early 1970's, after 30 years of rising prosperity, more and more people started to embrace 'post-materialist values' such as emphasized autonomy and self-expression (Inglehart, 2015). Yet, cohorts born and raised before World War II, who had experienced the recession of the 30's and wartime restrictions, continued to adhere to 'materialist values', emphasizing economic security and authoritarianism (Inglehart, 2015). Conversely, since the 1970's, Western countries have experienced >30 years of economic stagnation and rising inequalities (Twenge & Kasser, 2013). The effect of stress on people's political attitudes may have been mitigated for a while by the presence of large cohorts of individuals brought up during times of rising prosperity (1945–1975) and whose political attitudes were still influenced by a favorable childhood. But as the younger generations (generations X and Y) are coming of age, and starting to vote, authoritarian candidates may become increasingly popular.

## 5. Future directions

The present studies are a first step towards establishing an association between early exposure to adversity and authoritarianism. Two lines of research should be developed to further investigate the ontology and development of social attitudes from an ecological perspective. On the one hand, the same evolutionary reasoning could be applied to test whether other environmental factors known to affect adult political preferences also influence leader preferences when they are experienced during childhood. For instance, it would be particularly interesting to test whether exposure to pathogens or diseases during childhood also increase preference for autocracy, as it does in adults (Thornhill, Fincher, Murray, & Schaller, 2010; Thornhill et al., 2009). Based on this perspective, another open question is to understand how people's current and childhood environment interact to produce different political attitudes. Indeed, recent research in evolutionary psychology has suggested that childhood experiences may activate different behavioral responses to current environmental threats (Del Giudice et al., 2011; Griskevicius et al., 2011; Griskevicius et al., 2013). Based on these results, one could hypothesize that external threats will shape political attitudes differently depending on people's prior childhood environment.

On the other hand, our study focused on the ontology of one particular political attitude but it is worth noting that different political and social attitudes often covary. For instance, preference for authoritarian leaders is associated with a preference for conformity and with higher degrees of prejudice against minorities (Altemeyer, 1996; Cohrs,

Moschner, Maes, & Kielmann, 2005; Duckitt, 2006; Laythe, Finkel, & Kirkpatrick, 2001). However, little is known about whether these traits constitute a behavioral syndrome, i.e. the output of a coordinated strategy (Baumard & Chevallier, 2015; Griskevicius et al., 2013; Pepper & Nettle, 2017; Réale et al., 2010), or if it is rather an aggregation of independent phenotypes that respond to similar environmental signals. This behavioral syndrome approach has already been successfully applied to describe the co-variation of somatic and reproductive behaviors and to shed light on the pressures that may have shaped its evolution (Brumbach, Figueredo, & Ellis, 2009; Ellis, Figueredo, Brumbach, & Schlomer, 2009; Mell, Safra, Algan, Baumard, & Chevallier, 2017; Simpson, Griskevicius, Kuo, Sung, & Andrew, 2012). Addressing the question of the co-variation of this set of political attitudes in an ecological perspective would thus provide insight on the evolutionary roots of political behavior.

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## Appendix A. Supplementary information

Supplementary information to this article can be found online at <http://dx.doi.org/10.1016/j.evolhumbehav.2017.05.001>.

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