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***Replication Paper of***

***“Paranoid styles and innumeracy: implications of a conspiracy mindset on Europeans’ misperceptions about immigrants”***

**Abstract**This replication paper revisits Martini et al. (2022), who demonstrate that individuals with a higher propensity for conspiracy thinking are more likely to overestimate the share of immigrants and asylum seekers in their country. Innumeracy, defined as the inability to deal with numbers and provide accurate estimates on political issues, is known to be widespread among the public. Yet, despite the growing prevalence of conspiracy mindsets in Western democracies, this psychological disposition has not been extensively explored as a potential correlate of innumeracy. Martini et al. address this gap by showing that individuals with stronger conspiratorial worldviews tend to substantially overestimate the actual size of the immigrant population in their own country. This association persists even when controlling for country-level heterogeneity and a wide range of cognitive, affective, and socio-demographic factors. Using data from an online sample across ten European countries, and a refined comparative design, their study contributes to our understanding of how conspiracy thinking distorts factual beliefs and potentially undermines democratic accountability.

After faithfully replicating the original findings using the same dataset and methodological framework, I introduce a novel extension: testing the interaction between conspiracy thinking and trust in official statistics. This addition investigates whether institutional distrust exacerbates the cognitive effects of conspiratorial beliefs on demographic misperceptions. The results reveal a marginally significant interaction effect, suggesting that conspiracy thinking is particularly impactful among individuals who lack trust in statistical authorities. This analysis not only reinforces the central claim of the original article but also provides a deeper understanding of the conditional nature of innumeracy in political thinking.

**Introduction**Many people struggle to understand numbers and statistics, and they often give inaccurate estimates about important political facts. This issue, known as innumeracy, affects how citizens judge things like the size of minority groups or how public money is spent. When people vote or form opinions based on these incorrect beliefs, it can weaken democratic accountability (Delli Carpini & Keeter, 1996; Kuklinski et al., 1998; Flynn et al., 2017).

Researchers have offered different explanations for why people get facts wrong. One idea is that people interpret information based on what they already believe, called motivated reasoning. For example, someone who is already worried about immigration might overestimate how many immigrants live in their country, simply because it matches their feelings or political views (Bartels, 2002; Herda, 2010, 2013). Other studies highlight cognitive shortcuts. Instead of seeking accurate data, people rely on personal experience, background knowledge, or what they see in the media to guess facts. This can lead to consistent errors in judgment (Nadeau et al., 1993; Duch et al., 2000).

These shortcuts are examples of cognitive biases, mental habits that help the brain process information more quickly, but not always accurately. Biases are natural and affect everyone. They come from how our brain handles memory, attention, and complexity. While they are useful in daily life, they can distort how we see the world, especially when making political decisions.

In recent years, researchers have paid more attention to how conspiracy thinking may increase these misperceptions. A conspiracy mindset is a general tendency to believe that major events are secretly controlled by powerful groups. People with this mindset often trust their gut feelings over official facts. They rely on simple, global explanations and may reject expert knowledge or detailed information. Once they adopt a conspiratorial way of thinking, it becomes hard to change their minds, even when new facts are available (Douglas et al., 2019; Swami et al., 2014).

Martini et al. (2022) examine this idea by studying how conspiracy thinking relates to overestimates of immigration in Europe. Using survey data from ten countries collected in 2017, they show that people who score higher on a conspiracy scale tend to believe there are more immigrants than there actually are. This link remains strong even after considering differences in age, education, ideology, and media use. The issue is especially clear when people estimate immigration from outside the European Union, a topic that has often been at the centre of conspiracy theories, especially after the 2015 refugee crisis (Drochon, 2018).

These findings suggest that conspiracy thinking may influence how people process political information, both through cognitive bias and distrust in institutions. People who reject official sources, like government statistics, are more likely to rely on personal beliefs or social media. This makes their estimates less accurate and harder to correct.

This replication paper builds on Martini et al.’s work. First, I reproduce their original findings using the same data and methods. Then, I test a new idea: that the effect of conspiracy thinking is stronger among people who do not trust official statistics. In other words, conspiracy thinking may lead to more serious misperceptions when combined with a lack of trust in institutions. This extension offers a deeper understanding of how political misperceptions form and how both mindset and trust matter.

1. **Theoretical background**

Innumeracy refers to the inability to accurately interpret or estimate numerical information about politics and society. It includes common errors in judging the size of minority groups, foreign aid spending, or public finances. These misperceptions are widespread across Western democracies and can distort political attitudes and voting behaviour (Flynn et al., 2017; Duffy, 2018).

Two main mechanisms help explain these biases. First, motivated reasoning leads individuals to form beliefs that match their pre-existing views or emotions rather than factual accuracy (Kunda, 1990; Lodge & Taber, 2013). For instance, people who feel threatened by immigration often overestimate the number of immigrants in their country (Herda, 2010). Second, cognitive heuristics like the availability heuristic push individuals to rely on personal experience or media exposure when making judgments, resulting in errors when that information is unrepresentative (Tversky & Kahneman, 1973).

A third key factor is conspiracy thinking, a general tendency to view major events as secretly orchestrated by powerful, hidden actors. This mindset favors intuition over analysis, rejects official data, and relies on emotionally charged explanations (Douglas et al., 2019; Swami et al., 2014). In the context of immigration, such thinking may lead people to adopt unsupported beliefs and inflate demographic estimates, especially when conspiracy narratives like the “Great Replacement” theory are present in public discourse.

Hypothesis: Higher levels of conspiracy thinking are associated with greater overestimation of immigrant and asylum seeker populations.

1. **Data and Design**

The analysis is based on data from the second wave of the EUENGAGE Panel Survey, conducted between July 6 and October 6, 2017. The survey includes nationally representative online samples from ten EU member states: Czechia, France, Germany, Greece, Italy, the Netherlands, Poland, Portugal, Spain, and the United Kingdom. Respondents (N = 11,639 before listwise deletion) were aged 18 or older and recruited via an opt-in online panel administered by Research Now. A non-probability quota sampling strategy was used to approximate the adult internet-using population in each country, balancing for age group, gender, and region (based on Eurostat NUTS2 classifications).

To improve data quality, respondents who completed the survey in less than 50% of the country-level median response time were excluded, following best practices in online panel research (Baker et al., 2010). Although the educational distribution slightly deviates from national statistics, other demographic characteristics closely match population benchmarks. Analyses are conducted on unweighted data, with robustness checks using post-stratification weights reported in the Appendix.

The two main dependent variables are:

* error.immigrants.trim: trimmed estimation error for the perceived share of immigrants.
* error.asylum.seekers.trim: trimmed estimation error for the perceived share of asylum seekers.

The key independent variable is consp\_01, an index measuring conspiracy mindset, derived from four survey items. Control variables include left-right ideology (lr), education, age, gender, income, media use, trust in official statistics (trust.stat), and concern about immigration.

Given the skewed distribution of the outcome variables, the authors apply Yeo-Johnson transformations to normalize them prior to regression analysis. All models are estimated via Ordinary Least Squares (OLS) with robust standard errors clustered by country.

1. **Dependent variable**

To capture citizens’ misperceptions about immigration, the dependent variable is defined as the difference between each respondent’s estimate and the actual percentage of immigrants or asylum seekers in their country. This approach, following Herda (2010), offers a direct and quantifiable measure of innumeracy.

Respondents were randomly assigned to estimate either:

* the percentage of non-EU immigrants, or
* the percentage of asylum seekers in their country’s population.

This split-ballot design allows the study to test whether perceptions vary depending on how “immigrants” are categorized, and to reduce possible framing effects.

Each respondent’s estimate was compared to official statistics from Eurostat and UNHCR (2016), producing two key variables:

* innumeracyimm: the estimation error for non-EU immigrants
* innumeracyas: the estimation error for asylum seekers

To ensure data quality, extreme overestimates were excluded using Tukey’s outlier rule. This removed values above ~63% for immigrants (93 cases) and ~37% for asylum seekers (375 cases), which were considered likely due to mistakes or deliberate exaggeration.

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As shown in Figure 1 of the original study, most respondents overestimate both immigrant and asylum seeker populations. generally, error varies by country and group, with immigrant estimates generally more exaggerated, likely due to broader media exposure and public discourse compared to refugees. The outcome variables are left in raw percentage point form to preserve interpretability and avoid imposing arbitrary accuracy thresholds, in line with recommendations from Herda (2010) and Duffy (2018).

1. **Explanatory variables**

The main independent variable in this study is conspiracy thinking, measured using four survey items adapted from McClosky and Chong (1985). Respondents were asked how much they agreed with statements suggesting that powerful actors secretly control politics and media. A factor score was computed using confirmatory factor analysis, ensuring that all items measured the same concept across countries. The final score, which reflects each respondent’s level of conspiracy mindset, was rescaled from 0 to 1 for easier interpretation.

In addition to conspiracy thinking, several control variables are included in the models:

* Media exposure: Measured by how often people consume news from TV, newspapers, and social media in a typical week.
* Self-confidence: Respondents were asked how confident they felt about the accuracy of their estimate on immigration. Those who said they were confident were coded separately.
* Trust in official statistics: A binary variable indicating whether respondents trust or distrust official data. Since conspiracy thinkers often distrust institutions, this is a potentially important factor linked to innumeracy.
* Concern about immigration: A measure of whether people see immigration as a threat.
* Left-right ideology: Self-placement on the political spectrum, since views on immigration often differ by ideology.
* Sociodemographic controls: Including gender, age, education, income, and area of residence. Education is especially relevant, as higher education tends to be linked to better political knowledge and lower levels of innumeracy.

All continuous variables (except age) were rescaled to range from 0 to 1 to standardize interpretation across models.

1. **Main Findings**

The original study finds strong evidence that higher levels of conspiracy thinking are associated with greater estimation error. This relationship holds across several model specifications and remains robust to a wide range of controls. Visualizations of predicted values show a clear upward trend in misperception with increasing conspiracy scores.

To test the hypothesis, the authors used a linear regression model where the dependent variable is the estimation error (innumeracy) of each respondent. Country fixed effects were included to account for differences between countries, and the Yeo-Johnson transformation was applied to normalize the skewed error variables. Robust standard errors were clustered by country. Three models were estimated:

* Estimation error for non-EU immigrants
* Estimation error for asylum seekers
* A combined estimation error for both groups

In all models, the results strongly support the main hypothesis: Higher levels of conspiracy thinking are linked to greater overestimation of both immigrant and asylum seeker populations. Additional Findings:

* TV news exposure was associated with lower innumeracy, especially in the immigrant and combined models. This challenges earlier studies but suggests that some news media may help people form more accurate beliefs.
* Self-confidence in one’s own estimate was related to greater bias, especially when estimating immigrants, confirming that being sure of one’s answer does not always mean being correct.
* Trust in official statistics reduced estimation errors. People who trust statistical institutions tend to give more accurate answers.
* Concern about immigration and right-wing ideology were both associated with higher overestimation. These results confirm that political attitudes influence misperceptions.
* Among socio-demographic controls:
* Higher education was consistently linked to lower innumeracy
* Income showed a small negative effect, suggesting that people with lower income may be more prone to overestimate immigration
* Area of residence had no significant effect
* A final control for the type of question asked (immigrants vs. asylum seekers) showed that respondents asked about non-EU immigrants were more inaccurate, possibly due to stronger stereotypes or media exposure.

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Because the dependent variables were transformed to reduce skewness, the regression coefficients are not easy to interpret directly. Instead, the authors visualize the effects using Figure 2, which shows how conspiracy thinking influences estimation error.

* For non-EU immigrants:  
  People with the lowest level of conspiracy thinking overestimate the immigrant population by about 4 percentage points,  
  while those with the highest-level overestimate it by about 10.3 points.
* For asylum seekers:  
  The effect is smaller. Estimates range from an overestimate of 2.2% (low conspiracy thinking) to 4.7% (high conspiracy thinking).

These patterns confirm that people with stronger conspiratorial beliefs are more likely to misjudge immigration levels. Several additional tests confirm the reliability of the findings:

* The Generalized Information Matrix test shows no signs of model misspecification.
* The same analysis was run using the full dataset (with outliers included) and with post-stratification weights to match national populations. Results remained consistent.

Overall, the authors conclude that the effect of conspiracy thinking on immigration misperception is strong, statistically significant, and stable across model specifications.

**6. Replication Process**

**6.1 Replication Strategy**

To replicate the original findings by Martini et al. (2022), I used the dataset MGOBBI\_RISP.csv and the authors’ R scripts. The full replication included:

* Descriptive statistics and summary tables
* Bar plots of average estimation errors by country (Figure 1)
* Yeo-Johnson transformations to normalize the skewed dependent variables
* Linear regression models predicting estimation errors for both immigrants and asylum seekers
* Visualizations of predicted values for conspiracy thinking

**6.2 Replication Results**

The replication was fully successful. Descriptive statistics and all figures matched the original paper exactly. The key regression models confirmed the original finding: conspiracy thinking (consp\_01) is positively and significantly associated with overestimation of both non-EU immigrants and asylum seekers. These results validate the robustness, transparency, and reproducibility of the original study.

**6.3 Extension**

Interaction Between Conspiracy Thinking and Trust in Official Statistics

**6.4 Theoretical Motivation**

While the original paper includes trust in official statistics (trust.stat) as a control, it does not examine whether this trust moderates the effect of conspiracy thinking. Theoretically, individuals who are both conspiratorial and distrustful of official sources may be especially likely to ignore factual corrections and rely on biased or emotional reasoning. This combination of distrust and suspicion could amplify their tendency to misjudge immigration figures.

**Hypothesis:** The positive effect of conspiracy thinking on estimation error is stronger among those who lack trust in official statistics.

**6.5 Methodological Approach**

To test this hypothesis, I modified the main regression model to include an interaction term between consp\_01 and trust.stat. The dependent variable is the Yeo-Johnson-transformed error in estimating the non-EU immigrant population. The model is specified as follows:

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I then computed predicted values across the full range of consp\_01, separately for those who trust vs. distrust official statistics. These predictions were transformed back to the original scale using the inverse Yeo-Johnson function, and the results were visualized using ggplot2.

**6.6 Results**

The interaction term consp\_01:trust.stat was positive (β = 1.27) and marginally significant (p = 0.0947). The plot reveals a clear difference:

* Among respondents who distrust official statistics, the effect of conspiracy thinking is stronger—predicted estimation error increases more steeply with higher levels of consp\_01.
* Among those who trust official data, the relationship is still positive but much flatter.

These results are consistent with the hypothesis: distrust amplifies the impact of conspiracy thinking on demographic misperceptions.

**6.7 Discussion**

This extension reveals that the influence of conspiracy thinking is not uniform across the population. Its effect on innumeracy depends on whether individuals trust institutional sources of information. When trust is low, people are more likely to reject official figures and rely on alternative narratives or gut feelings. In contrast, when trust is high, conspiracy beliefs still matter—but their impact is muted. This finding contributes to a richer understanding of how misperceptions are formed. It emphasizes the need to consider interactions between psychological traits and institutional attitudes when studying political misinformation.

**6.8 Contribution**

This replication paper makes two key contributions:

* It confirms the original findings that conspiracy thinking is linked to overestimation of immigrant populations.
* It introduces a theoretically grounded extension by showing that the effect of conspiracy thinking is stronger among those who distrust official statistics.

This suggests that efforts to reduce misinformation may be more effective if they combine fact-checking with efforts to rebuild public trust in institutions like national statistics agencies.

**6.8 Limitations and Future Research**

Although the interaction effect is theoretically meaningful, its statistical significance is only marginal. Future studies could test this hypothesis with experimental data or longitudinal panel surveys to better establish causality. Additionally, future work could explore other potential moderators, such as digital media literacy, political cynicism, or institutional trust more broadly, to understand the complex pathways through which conspiracy thinking distorts public perceptions.

**7. Conclusion**

Understanding political ignorance is key to studying how public opinion forms. When citizens misperceive basic facts, such as the size of the immigrant population, it can distort political decision-making and weaken democratic accountability (Delli Carpini & Keeter, 1996; Flynn et al., 2017).

This study explores one underexamined factor behind these misperceptions: conspiracy thinking. Although conspiracy beliefs are not new, they have gained traction in modern politics as a way of understanding complex events. People with a conspiracy mindset tend to rely on intuition rather than evidence, resist new information, and explain events through hidden plots by powerful groups. These cognitive tendencies may lead them to reject official data and overestimate immigration figures.

Using survey data from 10 EU countries (2017), the study confirms that many citizens overestimate the percentage of immigrants in their country. Importantly, those who score higher on the conspiracy thinking scale are more likely to show this bias, even after accounting for country differences and individual characteristics like education, media habits, or ideology.

While the data are cross-sectional and do not allow us to confirm causality, the relationship is consistent and robust. Future research could use longitudinal or experimental designs to explore whether conspiracy thinking causes misperceptions, or vice versa, and to examine similar patterns in other policy areas beyond immigration.

In short, this study adds a new perspective to the literature on innumeracy. It shows that misperceptions may stem not just from lack of knowledge, but from deeper psychological and attitudinal traits. It also contributes to conspiracy theory research by shifting focus from causes to consequences, using a validated scale across multiple countries. This makes it one of the first studies to provide comparative evidence on how conspiracy thinking distorts factual understanding of key political issues.

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