Who lies?

A meta-analysis of the effect of sex, age, and education on honesty

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Comments (and more data) are very welcome!
Abstract

What characteristics distinguish liars from truth-tellers? Recent research has explored “when” and “why” people lie. Yet little is known about “who” lies. Previous studies have led to mixed results about the effect of gender on deception, and they have largely neglected the role of other characteristics, such as age and level of education. To shed light on these questions, here I report a meta-analysis of 6,508 distinct observations, collected in 50 Deception Game treatments, by 6 research groups. I find that: (i) males are more likely than females to tell black lies; (ii) males are more likely than females to tell altruistic white lies; (iii) males are (marginally) more likely than females to tell Pareto white lies; (iv) age has no effect on the decision to tell black lies; (v) age has no effect on the decision to tell altruistic white lies; (vi) age has no effect on the decision to tell Pareto white lies; (vii) educated subjects are more likely than non-educated subjects to tell black lies; (viii) the level of education has no effect on the decision to tell altruistic white lies; (ix) educated subjects are more likely than non-educated subjects to tell Pareto white lies.

Keywords: lying aversion, honesty, gender, age, education, deception game.
Introduction

People often act dishonestly, and they do more so when their actions have small economic consequences on other people or the society as a whole. Yet, when millions of people make such “small” dishonest actions, the overall consequences may become disastrous. Particularly emblematic is the case of employee theft, which, according to the U.S. Chamber of Commerce, costs American companies between $20 billion and $50 billion a year\(^1\), as about 75% of all employees steal at least once, and half of them steal repeatedly.

But, on the other hand, not everyone chooses to act dishonestly. Cases in which people act honestly, even when no one is watching, abound, as it has been pointed out by recent research in experimental economics and psychology. For example, when people are asked to report the outcome from a (privately rolled) dice, knowing that their payoff will be equal to the outcome reported (so that they have an incentive to lie), not everyone lies (Fischbacher & Föllmi-Heusi, 2013; Kajackaite and Gneezy, 2015; Weisel and Shalvi, 2015). Similarly, experimental studies have shown that some people act honestly even when being dishonest would be beneficial to all parties involved (Erat & Gneezy, 2012; Cappelen, Sørensen & Tungodded, 2013; Biziou-van-Pol, Haenen, Novaro, Occhipinti-Liberman & Capraro, 2015).

Why do, in the same context, some people act honestly while others do not?

Previous studies have explored what makes people act dishonestly by focusing on social and moral preferences (Biziou-van-Pol, 2015; Levine & Schweitzer, 2014; Levine & Schweitzer, 2015; Shalvi & de Dreu, 2014), incentives (Dreber & Johannesson, 2008; Erat & Gneezy, 2012; Fischbacher & Föllmi-Heusi, 2013; Gneezy, 2005; Kajackaite & Gneezy, 2015; Mazar, Amir & Ariely, 2008; Sutter, 2009), the role of group-serving lies versus individual-serving lies (Cohen,

\(^1\)https://businesspracticalknowledge.wordpress.com/legal-security/employee-theft.
Gunia, Kim-Jun & Murnighan, 2009; Conrads, Irlenbusch, Rilke & Walkowitz, 2013; Gino, Ayal & Ariely, 2013; Wiltermuth, 2011), and the role of manipulating cognitive resources (Gino, Schweitzer, Mead & Ariely, 2011; Shalvi, Eldar & Bereby-Meyer, 2012; Gunia et al., 2012; van’t Veer, Stel & van Beest, 2014; Capraro, 2017).

Yet, little is known about the effect of basic socio-demographic characteristics, such as gender, age, and level of education. Previous studies have led to mixed results with regard to the effect of gender (Abeler, Nosenzo & Raymond, 2016; Biziou-van-Pol et al., 2015; Cappelen et al., 2013; Childs, 2012; Dreber & Johannesson, 2008; Friesen & Gangadharan, 2012; Erat & Gneezy, 2012). Particularly emblematic is the case of altruistic white lies (lies that benefit another person at the expenses of the liar): an earlier work by Erat and Gneezy (2012) found that women are more likely than men to tell altruistic white lies, whereas a more recent work by Biziou-van-Pol et al. (2015) found the opposite: men are more likely than women to tell altruistic white lies. A similar inconclusiveness is present also in the case of black lies (lies that benefit the liar at the expenses of another person): an earlier work by Dreber & Johannesson (2008) showed that men are more likely than women to tell black lies, whereas a subsequent work by Childs (2012) found no gender differences in the decision to tell a black lie. A recent meta-analysis of more than 32,000 observations reports that males are more likely than females to lie (Abeler, Nosenzo & Raymond, 2016). In the same work, the authors also report no effect of age on lying. However, they did not control for the type of lie (black vs white). Controlling for the type of lying is important, especially in light of the previous discussion showing that some effects may
be type-specific. Finally, to the best of my knowledge, no studies have investigated the role of the level of education on honesty.²

Here I wish to contribute to this discussion by analyzing the role of gender, age, and level of education, on honesty in a large sample of more than 6,500 observations, coming from 50 different experimental treatments, conducted by 6 different research groups.

**Method**

*Measure of honesty*

Generally speaking, researchers have developed two methods for measuring honesty, differing on whether dishonest behavior can or cannot be observed by the experimenter. Specifically, on the one hand, there is the case in which the experimenter does not know whether a given participant acted honestly or not. For example, in Fischbacher and Föllmi-Heusi (2013), participants roll a dice, in private, and then report the resulting outcome. Participants are paid an amount equal to the number they report, unless the number is six, in which case they do not get any payment. Since the dice is rolled privately, researchers cannot detect whether a given participant has lied or not. The only thing the researcher can do is to compare the distribution of reported outcomes with the random distribution, in order to deduce whether a significant

²Previous research has mainly focus on the effect of demographic characteristics on social preferences (Bolton & Katok, 1995; Eckel & Grossman, 1998; Andreoni & Vesterlund, 2001; Fong, 2001; List, 2004; Dufwenberg & Muren, 2006; Houser and Schunk, 2006; Niederle and Vesterlund, 2007; Croson and Gneezy, 2009; Capraro, Jordan & Rand, 2014; Capraro & Marcelletti, 2014; Carlsson, Johansson-Stenman & Nam, 2014; Dreber et al., 2014; Capraro, 2015; Lin & Yu, 2015; Rieger & Mata, 2015; Brañas-Garza, Capraro & Rascón-Ramirez, 2016; Kettner & Waichman, 2016; Rand et al., 2016).
proportion of subjects lied. Similar designs were used by Mazar, Amir & Ariely (2008), Greene & Paxton (2009), Fosgaard, Hansen & Piovesan (2013), Ploner & Regner, (2013), Shalvi & Leiser (2013), Pascual-Ezama, Prelec & Dunfield (2013), van’t Veer, Stel & van Beest (2014) and Charness, Blanco, Ezquerra & Rodriguez-Lara (2017).

On the other hand, there are the so-called *deception games*, in which experimenters have complete knowledge about how the decisions are made, and thus they know whether a given participant lied or not. In the original formulation of the Deception Game (Gneezy, 2005), the experimenter gives a piece of information (for example, the outcome of a dice) to Player 1, but not to Player 2. Then Player 1 is asked to report this information to Player 2. The role of Player 2 is to guess the true state of the world (for example, the true outcome of the dice). If Player 2 guesses the true state of the world, then Player 1 and Player 2 get paid according to Option A; if Player 2 does not guess the true state of the world, then Player 1 and Player 2 get paid according to Option B. Only Player 1 knows the exact allocations of money corresponding to Option A and Option B. One variant of the deception game was introduced by Biziou-van-Pol et al. (2015), in order to avoid the problem of *sophisticated deception* (i.e., Player 1 telling the truth because he expects that Player 2 will not believe him, Sutter 2009). In this variant, Player 2 has no active choice: whether participants are paid according to Option A or Option B depends only on whether Player 1 decides to lie or to tell the truth.

A meta-analysis of the role of gender and age on honesty using the die-rolling paradigm has been recently proposed by Abeler, Nosenzo and Raymond (2016). Thus, in this work I will focus on studies measuring honesty using deception games. I opt for analyzing both types of deception games (Player 2 active, and Player 2 passive), because the experiments I have collected the data of use a strategy space of size six, and it has been noted that, with such
relatively large strategy space, sophisticated deception is likely to play a minor role in participants’ decisions (Erat & Gneezy, 2012).

Finally, deception games may also differ for the economic consequences of lying. I employ the terminology introduced by Erat and Gneezy (2012): *black lies* are those that benefit the liar at the expenses of the other person; *altruistic white lies* are those that benefit another person at a cost for the liar; *Pareto white lies* are those that benefit both the liar and the other person. I have no reason to restrict the study to any of these types of lies, and thus I will analyze them all, but I will do that separately, since it might be the case that some results are specific to a particular type of lie.

**Data collection**

Data collection proceeded in two steps. First, I announced my plan of conducting a meta-analysis of two-player deception games on the ESA Experimental Methods Discussion Google Group. In this way, the authors interested in having their work included in the meta-analysis could send me the raw data of their experiment. Then, I conducted a database search looking for keywords such as “gender differences in deception”, and similar, and I emailed the authors of all relevant papers and requested the raw data of their experiment.

In doing so, I received raw data of 18 different experimental treatments. Some of them are published, others are not (e.g., Emma Levine sent me six unpublished experimental treatments). To which I have added 32 different experimental conditions of my research group (some of them are published, others are not). To minimize file-drawer effects, I include in the meta-analysis also unpublished studies.
Thus, I analyze a total of 50 experimental treatments, for a total of 6,508 distinct observations. *Distinct* means that, in case a subject participated in more than one study (many of these studies were conducted online on Amazon Mechanical Turk, so that one can keep track of subjects using their MTurk ID and their IP address), I keep only the first observation. Similarly, in case the data come from iterated games, I keep only the first observation.

**Data analysis**

This study focusses on the role of socio-demographic characteristics on deception. In particular, I focus on three characteristics: gender, age, and level of education.

*Gender.* To analyze the effect of gender on deception, I use random-effects meta-analysis. Specifically, for each single study, I use linear regression to compute the effect of gender on honesty with and without control on age and level of education. Then I build a .csv file with five columns: study, genderc, genderse, genderc_control, genderse_control, where: genderc (resp. genderse) is the coefficient (resp. the standard error) of the linear regression predicting honesty as a function of gender without control on age and level of education; and, similarly, genderc_control (resp. genderse_control) is the coefficient (resp. the standard error) of the linear regression predicting honesty as a function of gender with control on age and level of education. On this new .csv file, I conducted random-effects meta-analysis with and without control on age and level of education, by launching the *Stata* commands `metan genderc genderse` and `metan genderc_control genderse_control`.

*Age.* The analysis of the effect of age on deception cannot be done by means of random-effects meta-analysis, because of the heterogeneity across studies (some studies are conducted on Amazon Mechanical Turk, and thus average age is typically around 30 years old, yet others are
conducted on the physical lab, with a much younger sample, typically made of university students). Thus, to analyze the effect of age on honesty, I pool together all data and, on this aggregated sample, I conduct linear regression predicting honesty as a function of age, with and without control on sex and level of education.

Level of education. In the studies conducted by my research group, subjects self-reported their level of education (available answers: less than high school diploma, high school diploma, vocational training, attended college, bachelor’s degree, graduate degree, unknown). Since the level of education is a categorical variable, I use the median test to test for the overall effect of the level of education on honesty and pairwise rank-sum test for a more detailed analysis. To strengthen the results, I also use random-effects meta-analysis as follows. For each study, I create a continuous variable, named “education”, which takes value 1 if a subject has less than high school diploma up to 6 if a subject has a graduate degree. Then, for each single study, I use linear regression to compute the effect of level of education on honesty with and without control on age and gender. Then I build a .csv file with five columns: study, educationc, educationse, educationc_control, educationse_control, where: educationc (resp. educationse) is the coefficient (resp. the standard error) of the linear regression predicting honesty as a function of education without control on age and sex; and, similarly, educationc_control (resp. educationse_control) is the coefficient (resp. the standard error) of the linear regression predicting honesty as a function of level of education with control on age and sex. On this new .csv file, I conducted random-effects meta-analysis with and without control on age and level of education, by launching the Stata commands metan educationc educationse and metan educationc_control educationse_control.
Black lies

I start analyzing the role of gender, age, and level of education on the decision to tell black lies, namely, lies that benefit the liar at the expenses of another person.

Method

I analyze $N = 1,941$ distinct observations, coming from 21 different experimental conditions: ten conducted by my research group, six by Emma Levine (unpublished), one by Sheremeta & Shields (2013), three by Greenberg, Smeets, and Zhurakhovska (2015), and one by Dreber and Johannesson (2008).

The effect of gender

Figure 1 provides visual evidence that males lie more. This is confirmed by random-effects meta-analysis of honesty, which finds that females are more honest than males (effect size = 7.5%, 95% CI [0.008, 0.091], $Z = 2.31$, $p = 0.021$). This effect is robust after controlling, when possible, for age and level of education (95% CI [0.008, 0.093], $Z = 2.34$, $p = 0.017$). Furthermore, there is no evidence of heterogeneity in the true size of this interaction across studies ($\chi^2 = 21.47$, $p = 0.37$). No evidence of publication bias (Egger’s test: $t = 1.61$, $p = 0.12$; Begg’s test: $z = 1.09$, $p = 0.28$)
Figure 1. Males are more likely than females to tell black lies.

The effect of age

I exclude Dreber & Johannesson (2008) from this analysis, because they did not collect the age of the participants. Since some of the remaining studies were conducted online and some on the lab (with only students), there is a lot of heterogeneity in the distribution of age. Thus, random-effects meta-analysis is an inappropriate test. To analyze the effect of age, I thus proceed as follows. First I pool together all data, and then I run linear regression predicting honesty as a function of age. In doing so, I find a significant negative effect of age on honesty \( (F(1,1782)=5.440, \text{coeff}=-0.003, \ p=0.016, \ r^2=0.003) \). However, this effect does not retain significance when controlling for gender and level of education (coeff =-0.001, p=0.582). See Figure 2.
Figure 2. Older people are more likely than younger people to tell black lies, but this effect loses its significance after controlling for gender and level of education.

The effect of level of education

To analyze the effect of the level of education, I restrict the analysis to the dataset for which data about the level of education were collected (N = 1,452). I exclude from the analysis two subjects, who responded that their level of education was unknown. Median test shows a marginally significant overall effect of the level of education on honesty ($\chi^2(6)=11.144$, $p=0.084$). The effect is confirmed and actually strengthened by random-effects meta-analysis (without control on sex and age: 95% CI [-0.041, -0.002], $Z = 2.19$, $p = 0.028$; with control: 95% CI [-0.041, -0.001], $Z = 2.08$, $p = 0.038$). Pairwise rank-sum test reveals that this effect is mainly driven by subjects with less than high school diploma, who turn out to be more honest than
subjects with a graduate degree ($z = 2.428$, $p = 0.015$), than those with a bachelor’s degree ($z = 2.484$, $p = 0.013$), than those who attended college ($z = 1.992$, $p = 0.046$), and, marginally, than those with a high school diploma ($z = 1.915$, $p = 0.055$). Regarding the other categories, participants who attended the college are marginally significantly more honest than those with a bachelor’s degree ($z = 1.848$, $p = 0.064$). All other $p$’s > 0.1. See Figure 3.

![Bar chart showing honesty levels for different education levels: graduate degree, bachelor’s degree, attended college, vocational training, high school diploma, and less than high school.](image)

*Figure 3. Non-educated subjects are less likely to tell black lies than educated subjects.*

**Altruistic white lies**

Next I analyze the role of gender, age, and level of education on the decision to tell altruistic white lies, namely, lies that benefit another person at a cost for the liar. I include in this category also the case in which the cost of lying is zero.
Method

I analyze N = 2,940 distinct observations, in 20 experimental conditions: fourteen by my research group, and six by Emma Levine.

The effect of gender

Figure 4 provides visual evidence that males lie more than females. This is confirmed by random-effects meta-analysis of honesty, which finds that females are more honest than males (effect size = 7.6%, 95% CI [0.043,0.099], Z = 4.95, p < 0.001). This effect is also robust after controlling for age and, when possible, for the level of education (95% CI [0.048,0.104], Z = 5.26, p < 0.001). Furthermore, there is no evidence of heterogeneity in the true size of this interaction across studies (chi$^2$ = 26.80, p = 0.109). No evidence of publication bias (Egger’s test: t = -1.09, p = 0.29; Begg’s test: z = -0.78, p = 0.44).
The effect of age

In order to analyze the effect of age, I proceed in a similar way as before. I first pool the data together, and then I conduct linear regression predicting honesty as a function of age. In doing so, I find a significant positive effect of age on honesty ($F(1,2935)=16.46$, coeff=0.003, $p<.001$, $r^2=0.006$). However, this effect is totally driven by a positive correlation between sex and age, such that older participants are more likely to be females ($F(1,2938)=8.31$, coeff=1.188, $p<.001$, $r^2=0.003$). Indeed, when regressing honesty using sex, age, and education as independent variables, only sex retains significance (sex: coeff=0.087, $p<.001$; age: coeff=0.001, $p=0.116$; education: coeff=-0.005, $p=0.360$). See Figure 5.
Older people are significantly less likely than younger people to tell altruistic white lies. However, this effect loses its significance after controlling for sex and level of education.

The effect of level of education

In order to analyze the effect of the level of education, I restrict the analysis to the dataset for which data regarding the level of education were collected (N = 2,580). I exclude one subject from the analysis, because he or she declared that his or her level of education was “unknown”. Median test shows no overall effect of the level of education on telling an altruistic white lie ($\chi^2(6)=2.4409$, $p=0.875$). This is confirmed also by random-effects meta-analysis (without control on sex and age: 95% CI [-0.019,0.006], $Z = 1.06$, $p = 0.289$; with control: 95% CI [-0.018,-0.006], $Z = 1.01$, $p = 0.313$). In more detail, pairwise rank-sum reveals that the only
marginally significant effect is between participants who attended college and those with a vocational training ($z=1.760$, $p=0.078$). All other p’s $>0.1$. See Figure 6.

![Bar chart showing honesty levels for different educational backgrounds](image)

*Figure 6. There is no overall effect of the level of education on the decision to lie.*

**Pareto white lies**

Finally, I explore the effect of gender, age, and level of education on the decision to tell Pareto white lies, namely, lies that benefit both the liar and another person.

**Method**

I analyze $N=1,627$ distinct observations, in 9 experimental conditions: eight by my research group, and one by Gneezy, Rockenbach, and Serra-Garcia (2013).
**The effect of gender**

Figure 7 provides visual evidence of a weak gender effect on lying. This is confirmed by random-effects meta-analysis of honesty, which shows a marginally significant overall effect of gender on honesty, at least when one control for age and level of education (without control: 95% CI [-0.007,0.072], Z=1.59, p=0.111; with control: 95% CI [-0.004,0.076], Z=1.75, p=0.08). Furthermore, there is no evidence of heterogeneity in the true size of this interaction across studies (chi$^2 = 9.12, p = 0.332). No evidence of publication bias (Egger’s test: t = -0.83, p = 0.433; Begg’s test: z = -1.25, p = 0.21).

![Figure 7. Males are marginally significantly more likely than females to tell Pareto white lies.](image)

**The effect of age**
To analyze the effect of age, I proceed in a similar way as before. I pool all data together, and then I run linear regression predicting honesty as a function of age. In doing so, I find no significant effect of age on honesty (without control on sex and level of education: F(1,1625)=1.56, coeff=0.001, p=0.211, r^2=0.001; with control on sex and level of education: F(3,1611)=2.78, coeff=0.001, p=0.238, r^2=0.005). See Figure 8.

![Figure 8](image)

*Figure 8. Age has no effect on the decision to tell Pareto White Lies.*

**The effect of level of education**

To analyze the effect of level of education, I restrict the analysis to the dataset for which data regarding the level of education were collected (N = 1,615). I exclude one subject from the analysis, because he or she declared that his or her level of education was “unknown”. Median
test reveals an overall effect of the level of education on honesty ($\chi^2(6) = 15.3423, p = 0.018$). This is confirmed also by random-effects meta-analysis (without control on sex and age: 95% CI [-0.036, -0.002], $Z = 2.15, p = 0.032$; with control: 95% CI [-0.037, -0.002], $Z = 2.19, p = 0.028$). Pairwise rank-sum test highlights that this overall effect is driven by participants with a high school diploma, who tend to be more honest than those with a bachelor’s degree ($z = 2.525, p = 0.011$) and, marginally, than those with a vocational training ($z = 1.675, p = 0.094$), and by the fact that those who attended college tend to be more honest than those with a bachelor’s degree ($z = 2.641, 0.008$). All other $p$’s > 0.1. See Figure 9.

![Figure 9. Non-educated subjects are less likely to tell Pareto white lies than educated subjects.](image)

**Conclusion**

In this work, I have analyzed the role of gender, age, and level of education on honesty using a dataset of 6,508 distinct observations, collected in 50 experimental treatments, from 6
research groups. I have found that: (i) males are more likely than females to tell black lies; (ii) males are more likely than females to tell altruistic white lies; (iii) males are marginally more likely than females to tell Pareto white lies; (iv) age has no effect on the decision to tell black lies; (v) age has no effect on the decision to tell altruistic white lies; (vi) age has no effect on the decision to tell Pareto white lies; (vii) educated subjects are more likely than non-educated subjects to tell black lies; (viii) level of education has no effect on the decision to tell altruistic white lies; (ix) educated subjects are more likely than non-educated subjects to tell Pareto white lies.

To the best of my knowledge, this is the first meta-analysis of the role of gender, age, and level of education on honesty, which also takes into account the fact that these effects may depend on the consequences of lying. The closest work I am aware of is indeed a meta-analysis of studies implementing the die-rolling paradigm (Abeler, Nosenzo & Raymond, 2016), which, in line with the current analysis, reports that males are more likely than females to lie, and that age has no effect on lying. However, Abeler, Nosenzo and Raymond (2016) do not control for the consequences of lying. I believe that taking into account the consequences of lying is important, especially in light of the work by Erat and Gneezy (2012), suggesting that males may be more dishonest than females only in case of black lies, while the correlation between gender and honesty may even reverse in case of altruistic white lies. The current analysis shows that this reversal of correlation does not happen and, in fact, males tend to be more dishonest than females independently of the consequences of lying (although the effect in case of Pareto white lies is only marginally significant). Similarly, the current analysis shows that age has no effect on lying independently of the consequences of lying. Furthermore, this work extends the analysis of Abeler, Nosenzo and Raymond (2016) also by exploring the role of education on lying and
demonstrating that non-educated subjects are less likely than educated subjects to tell black and Pareto white lies.

In conclusion, the results presented in this paper, together with those reported by Abeler, Nosenzo and Raymond (2016), make a first step into a new field of research that is likely to be rich and flourishing. And important: A classification of demographic variables in terms of their effects on honesty will eventually lead to a unified theory of “who” lies, which can eventually lead us develop a better understanding of the origins of human honesty.
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