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ORIGINAL PAPER

Are risk-tolerant individuals more trustful? A representative sample study

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Abstract
Based on a representative sample of the French population (n = 1,154), we show that there is a positive association between risk tolerance and trust. We rely on, the World Value Survey *WVS* binary trust measure, and a '0 – 10' scale that we decline in three domains: trust in *general, family*, and *co-workers*. We also vary the measure of risk tolerance, by considering an incentivized investment task, and a '0 – 10' stated preference scale that we decline in three domains: risk tolerance in *general*, in *finance*, and *health*. These variations allow us to test 16 different relations, by crossing four dependent trust variables with four different risk tolerance covariates. After adjusting for multiple testing, we found nine combinations with a strong positive link between risk tolerance and trust in the general population, and that stated risk tolerance measures predict stated trust better than elicited risk measures.

Keywords: Behavioral economics; generalized trust; preferences; risk-aversion

JEL codes: D810; D900; D910

1. Introduction

Trusting others is often considered as a risky decision, both in the economics and the psychology literatures. Individuals who are more risk tolerant may also be more trustful, and vice-versa. There are fundamental reasons why trust and risk tolerance are related. According to Rousseau et al. (1998) and Alós-Ferrer and Farolfi (2019) *'Trusting someone puts you in a vulnerable position.'* As a consequence, trusting others involves a risk: the risk of being betrayed (Bohnet et al., 2008; Bohnet & Zeckhauser, 2004; Fetchenhauer & Dunning, 2012). Dunning et al. (2012) provided evidence that their participants, who were involved in an experimental binary trust game (Fetchenhauer & Dunning, 2012), perceived trusting as a risky decision. By prompting participants to name words associated with the game, only four received majority endorsement: 'risk' (72.5%), 'faith in others' (63%), 'trust' (61%), and 'gambling' (52%).

The possibility of a risk tolerance confound, in studies emphasizing the role of trust in social capital, raises a fundamental issue. Trust has often been associated with higher growth and GDP per capita (Knack, 2003; Knack & Keefer, 1997; Porta et al., 1997; Zak & Knack, 2001). But if trust is mainly determined by risk tolerance, as suggested by Ben-Ner and Putterman (2001), these observations might have overstated the role of trust and its policy implications. If one aims to stimulate economic growth, it could be more appropriate to encourage entrepreneurship, and more generally, the propensity to take risks rather than building trust among citizens. In the same vein, the findings that females are less trusting than males (e.g. Buchan et al., 2008; Dittrich, 2015; Garbarino & Slonim,

2009) could simply reflect a gender difference in risk tolerance (see e.g. Schechter, 2007), although a difference in trust according to gender is debatable (see e.g. Croson & Gneezy, 2009).

Another issue is that many existing studies, in particular experimental ones, were conducted at the level of the lab with local subject pools, or at the village level in the case of lab-in-the-field experiments. Participants in these studies could have suspected that other participants were mainly peers, that is, student participants in the case of lab experiments or neighbours in the case of lab-in-the-field studies. Conclusions about trust, drawn from interactions among peers or in-groups, do not necessarily generalize to the population level, where individuals interact with very diverse people, for example, people from different genders, older or younger, more or less educated, more or less wealthy, and from the same or a different political orientation.

Empirical evidence about the association between trust and risk tolerance is mixed. Several papers reported a positive association between risk tolerance and trust (Chetty et al., 2021; Fairley et al., 2016; Sapienza et al., 2013; Schechter, 2007),[1] others found no correlation (Ashraf et al., 2006; Ben-Ner & Halldorsson, 2010; Corcos et al., 2012; Eckel & Wilson, 2004; Etang et al., 2011; Garapin et al., 2015; Houser et al., 2010; Slonim & Guillen, 2010), and some found mixed results (see Kanagaretnam et al., 2009).

Considering the present state of knowledge, it is reasonable to assert that the empirical evidence remains inconclusive. This could be attributed to multiple factors. Firstly, some theoretical explorations of the relationship between risk preferences and trust have been insufficiently developed. A major reason seems to be the inability to provide common axiomatic foundations (see Fudenberg & Levine, 2012).[2] Secondly, there are specific methodological challenges that may have influenced previous empirical research. This concern serves as the focal point of our paper.

From a methodological perspective, it is possible that empirical findings demonstrating a robust connection between risk tolerance and trust may have disregarded certain measurement issues. Experimental measures of trust, based on the investment game (Berg et al., 1995) or the binary trust game (Güth et al., 1997), reflect many dimensions: besides trust itself, they may also reflect other types of social preferences (Cox, 2004), as well as risk tolerance and expectations about others' behavior (Ashraf et al., 2006; Chetty et al., 2021; Houser et al., 2010; Sapienza et al., 2013). Similarly, stated trust methods, such as the General Social Survey (GSS thereafter) question and the World Value Survey (WVS thereafter), have been criticized to reflect other dimensions besides trust (e.g. Fehr, 2009; Sapienza et al., 2013).

In essence, the decision to trust appears to encompass both social preference and risk preference dimensions. However, whether these dimensions complement or substitute each other remains an open question. The lack of theoretical foundations for the notion of trust in economics is probably a major reason why multiple definitions and multiple measures coexist. This, in turn, is a major reason why existing studies addressing the relationship between trust behavior and risk tolerance are difficult to compare. The divergent outcomes in this body of literature might stem from variations in trust

[1] See also the meta-analysis by Colquitt et al. (2007).

[2] Several attempts have been undertaken to integrate risk preferences and social preferences within a unified theoretical framework (Fudenberg & Levine, 2012; Saito, 2013; Feldman & Vargas, (2023).). To the best of our knowledge, these attempts did not take trust into consideration. The theoretical underpinnings of the relationship between these preferences remain therefore an unanswered question. With that being said, there are substantial grounds to suspect that risk tolerance and trust have only a weak correlation. Firstly, neurobiological research suggests that trust is influenced by factors distinct from those affecting risk tolerance. Notably, these factors include the *Theory of Mind* (Vanderbilt et al., 2011; Prochazkova et al., 2018; Sun et al., 2022) and oxytocin (Kosfeld et al., 2005; Zak et al., 2005; Baumgartner et al., 2008; Fehr, 2009; Krueger et al., 2012). Second, separate neural processes seem to be associated to risk taking and to trusting others (McCabe et al., 2001; Krueger et al., 2007). Finally, the literature on betrayal aversion (Bohnet & Zeckhauser, 2004; Bohnet et al., 2008; Fetchenhauer & Dunning, 2012; Aimone et al., 2014) provided convincing evidence that most people treat differently the risk of being betrayed in human interaction from the same risk generated by a random device. Nevertheless, the argument put forth by Fehr (2009) that the connection between trust and standard economic primitives, such as preferences and beliefs (including risk preferences), has not been definitively tackled, seems to remain pertinent.

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measurement, disparities in assessing risk tolerance, differences in sample selection, or a combination of these factors.

In addition, numerous studies were centered on specific samples, with a notable proportion involving student participants. As a result, it becomes apparent that there is a scarcity of evidence concerning the correlation between risk tolerance and trust within the broader population. Thus, given the mixed results of prior research on this subject, our investigation serves as an exploratory endeavor, seeking to identify novel insights on the relationship between trust and risk tolerance. More specifically, our main objective is to assist in bridging this gap by highlighting the distinctive role of risk tolerance compared to other key variables that may impact trust, such as gender, age, or the level of education, as well as other variables that will be discussed in Section 2.

Fehr et al. (2002) proposed the first nation-wide study of trusting behavior, combining survey and experimental data, but did not elicit risk-references. Harrison et al. (2007) proposed the first representative population experimental study for risk preference (for the Dutch population), but did not address the trust issue. Bellemare and Kroger (2007) realized a representative study of the Dutch population, eliciting trust but not risk tolerance. Dohmen et al. (2011) document risk preferences both in a large representative sample of the German population ($n > 22,000$) and in a field experiment with the same population ($n = 450$), and Dohmen et al. (2008) reported trusting behavior in the same sample, but the two studies were disconnected. More recently, Falk et al. (2018) carried out nation-wide surveys in 76 countries in which they measured trust and risk preferences. Although they did not address the issue of the relation between trust and risk tolerance, their data contains evidence to which we can compare our own findings, and which we will exploit in the discussion 'Section 4'.

We take the case of France as our representative sample study. France is of particular interest, as it is often considered as the 'country of distrust' among european countries (Algan & Cahuc, 2007; Fukuyama, 1996), a fact that is reflected in many data sets, for example, the GSS and ESS surveys and Falk et al. (2018)'s GPS. We employ two measures of stated trust: the binary measure of the GSS question for the WVS (referred to as *WVS trust*), and a scale from 0 to 10 based on a general trust question resembling Dohmen et al. (2008), termed *General trust*. The latter general trust question was replicated twice, focusing on 'members of your family' (*Family trust*) and 'work colleagues' (*Co-worker trust*). For assessing risk tolerance, we also utilized two measures: an experimentally elicited measure of risk tolerance using the portfolio choice task by Gneezy and Potters (1997), and a general stated preference measure on a 0-10 scale (Dohmen et al., 2008). The latter measure is further applied to two specific domains: 'Finance' and 'Health,' identified as *Finance risk* and *Health risk* respectively.

In our analysis, we consistently treat trust as the dependent variable, while considering risk tolerance as the key covariate. Due to the diverse measures used for both trust and risk tolerance, we are able to test 16 distinct combinations of trust-dependent variables and independent risk tolerance variables. By methodically exploring these combinations, we bolster the robustness of our findings. We primarily focus on comparing different methods of measuring trust and risk tolerance. Our paper is also closely aligned with the literature on preference stability and the comparison of stated preferences (SP) and elicited preferences (EP) methods.

The study of risk preferences faces a significant challenge known as 'the risk elicitation puzzle' (Pedroni et al., 2017). In their research, Pedroni et al. (2017) test the consistency of six elicited preference (EP) methods across a large population, and discover a lack of consistency among the results from these methods. This inconsistency has been observed in various studies, as demonstrated by Charness et al. (2020). Recent research by Gaertner and Steinorth (2023) and Bokern et al. (2023) has corroborated these findings.

In the burgeoning experimental literature on preference stability, some studies evaluate whether decision-makers consistently make the same choices across elicitation tasks or procedures. Notable contributions in this field include studies by Brandts and Charness (2000), Crosetto and Filippin (2016), Dasgupta et al. (2017), Dave et al. (2010), Deck et al. (2008, 2013a, 2013b), Isaac and James

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Table 1 Main results

		Trust variables			
		General trust	WVS trust	Co-worker trust	Family trust
Risk variables	General risk	+***	+***	+***	+
	GP risk	+	+	+	+
	Health risk	+***	+***	+***	+
	Finance risk	+***	+***	+***	+

Legend: The '+' sign stands for a positive relation between the risk variable in the row and the trust variable in the column. Significance levels after Bonferroni corrections: * $p < 0.1/32$, ** $p < 0.05/32$, *** $p < 0.01/32$.

(2000), and Lönnqvist et al. (2015). While the findings of these studies vary, they suggest that choices may be influenced by the specific task and the domain under consideration.

Dasgupta et al. (2017) explored the stability of the Gneezy and Potters (1997) investment task (referred to as the GP task thereafter), by contrasting decisions made in a controlled laboratory environment with those made in a real-world setting. Their results indicate stability in the GP risk tolerance measure, aligning with similar findings for other preference types such as preference for giving (Benz & Meier, 2008; De Oliveira et al., 2012), voluntary contributions (Carlsson et al., 2014; De Oliveira et al., 2012), and risk tolerance (Arslan et al., 2020; Charness et al., 2020; Galizzi et al., 2016; Holden & Tilahun, 2022). However, numerous studies have demonstrated that SP methods consistently surpass elicited preference (EP) methods, especially concerning risk preferences (Rafaï et al., 2023). This raises significant concerns regarding the external validity of EP methods, specifically their ability to generate predictions applicable beyond laboratory settings (Charness et al., 2020; Frey et al., 2017; Hertwig et al., 2019).

The stability of various preference measures has also come under scrutiny, encompassing both EP methods (e.g. Bokern et al., 2023; Charness et al., 2020; Holzmeister & Stefan, 2021; Pedroni et al., 2017), and SP methods (e.g. Chuang & Schechter, 2015; Craig et al., 2017; Fossen & Glocker, 2017; Gaertner & Steinorth, 2023). Presently, there is heated debate over the superiority of EP methods in accurately capturing individuals' true preferences (Arslan et al., 2020). As a result, a recent wave of empirical research heavily relies on SP methods (Dohmen et al., 2011; Falk et al., 2018, 2023). Our study suggests that SP variables are better predictors than EP variables when the predicted outcome is also a SP variable.

The results of our analysis are summarized in Table 1. We discovered a significant positive correlation between the majority of the risk variables and the trust variables, with nine out of the 16 relationships proving statistically significant (after correction for multiple testing).

Our main finding is a consistent 'positive' relationship between stated trust and risk tolerance at the general population level. *General trust* is positively related, both to elicited and stated risk tolerance across all domains, and the relationship is highly significant for the SP risk variables.[3] Substituting *General risk*, either by *Health risk*, or by *Finance risk*, does not alter this conclusion about a positive and significant relation with *General trust*. Similarly, risk tolerance is positively related to the binary trust variable *WVS trust*, but the relation is significant only for stated risk tolerance; not for elicited risk tolerance.[4] Note that we do not consider the relationship between risk tolerance and trust as

[3] *GP risk's* relation with *General trust* was significant for $\alpha = 0.05$, but it became non-significant after Bonferroni adjustments (i.e. $p > 0.1/32 = 0.003125$).

[4] Also, substituting *Co-worker trust* to *General trust* does not alter the overall picture: the positive association between the various measures of risk tolerance and *Co-worker trust* remains significant. However, when we consider *Family trust*, the relationship breaks down, suggesting the existence of a specific and autonomous role of trust in family members, which is distinct from trust in others and in co-workers, and which is unrelated to risk tolerance. See Appendix G.

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causal, but rather highlight a remarkable correlation between these two dimensions in the general population.

The structure of the rest of the article is as follows: Section 2 introduces the survey design, Section 3 presents the results, and Section 4 provides a discussion and concludes.

2. Experimental and survey design

The task of implementing the stratified sampling procedure was assigned to a professional survey company, ViaVoice, in order to ensure representativeness based on three criteria: gender, age, and regional attributes (for further detail, please see Table 18 in Appendix H). Each participant received an individual link via email to complete the online survey we constructed. The survey was designed on oTree (Chen et al., 2016), and hosted on a secure dedicated server at the Center for Environmental Economics in Montpellier (France). The survey took approximately 30 minutes to complete and included declarative questionnaires, a discrete choice questionnaire, and incentivized experimental tasks. All participants who completed the whole questionnaire received a flat compensation from the ViaVoice recruitment agency. In addition, one out of four randomly selected participants received additional earnings based on their answer from one of the randomly selected experimental tasks. ViaVoice handled the disbursements. After the data collection phase, the data were extracted from the server, cleaned, and prepared for analysis. The analyses were conducted using the software Stata, R, and the data science libraries of the Python programming language.

In the remainder of this section, we provide a brief overview of the structure of the online experimental questionnaires and key sample characteristics (Subsection 2.1), outline the dependent variables (Subsection 2.2), and detail the covariates and control variables (Subsection 2.3).

2.1. Online questionnaire and sample

We rely on a representative sample of the French population that was established in March 2020, during the first lockdown in France (April–May 2020)[5,6]. Experimental tasks and questionnaires were administered through a web-based platform. Each participant took part in four incentivized tasks: the portfolio choice task and three other tasks that are irrelevant for the present study.[7]

Additionally, participants completed three self-reported questionnaires to assess their risk tolerance in general, and specifically in the domains of finance and health. Similarly, several questions were targeted towards measuring trust (details below). Finally, they provided responses to a comprehensive socio-demographic questionnaire. As explained above, payments were randomized across subjects and across tasks.

We studied 1,118 out of the 1,154 participants. Those that we did not take into account were eliminated from the final sample either because of missing data, because of suspicions that there were mistakes in their answers, or because of a lack of statistical significance.[8] Our pool is nearly gender balanced (51.3% men), the mean age was 50 years (though 50% of the pool was aged between 18 and

[5]The questionnaire was designed to assess respondents' compliance with various restrictive measures, imposed by the government during the COVID-19 health crisis. Several experimental tasks and subsidiary questions were included in the overall questionnaire, in order to collect data about social preferences (altruism, cooperativeness, trustfulness) and individual preferences (risk and time preferences).

[6]It is also worth noticing that specific behavior could be expected from participants, as the experiment was run during the first lockdown.

[7]The additional incentivized tasks were designed to measure social preferences: a one-shot public good game, and the SVO task (Murphy & Ackermann, 2014) and impatience (using the CTB task as in Andreoni & Sprenger, 2012).

[8]Specifically, instances where respondents claimed to have improbable circumstances, such as one individual claiming to have 20 children on their charge while being 18 years old, were excluded. Additionally, groups with inadequate representation, such as those identifying outside of traditional gender binaries or from sparsely populated regions like Corsica, were removed. Finally, respondents who failed to provide essential residency information were also excluded from the analysis, ensuring the integrity and reliability of our findings.

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52 years). The oldest participant was 88. 50% of our participants' households earned 3,000€ or more per month. 34.08% of our participants stopped studying at the end of high-school, 29.88% obtained a professional degree (three years of superior studies), and 36.04% obtained at least a master's degree in university.

2.2. Dependent variables

We relied on two stated trust measures: a coarse measure, namely the standard binary *WVS* question: '*Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?*,' followed by a refined measure (*General trust* question): '*Could you place yourself on a scale from 0 to 10, where 0 means "can't be too careful in dealing with people" and 10 to "most people can be trusted"*.' The refined measure is closely related to the question proposed by Dohmen et al. (2008).[9] We thoroughly examine these two variables in our analyses.

2.3. Covariates and controls

We elicited risk tolerance based on the portfolio choice task of Gneezy and Potters (1997), *GP risk* thereafter. In the GP task, subjects had to allocate 20€ between a safe asset (i.e. keeping the money) and a risky asset, a lottery for which they could earn the tripled invested amount or zero, with equal probabilities. The amount invested in the risky asset is taken as a measure of risk tolerance. To make the scale of the GP task comparable to our other measures of risk tolerance, respondents could only choose to invest multiples of 2€, which allowed for 11 possibilities (0, 2, ..., 20). Stated risk tolerance was measured on a '0 – 10' scale (*General risk*), based on the questionnaire of Dohmen et al. (2011): '*How do you see yourself: are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means: "not at all willing to take risks" and the value 10 means: "very willing to take risks"*'.[10]

Our main control variables are gender, age, the level education, and political orientation. Besides the above main control variables, we take into account several additional variables that were previously associated with trusting behavior in the literature: monthly household income, socio-economic status (CSP),[11] and geographical location.[12] All these variables, as well as our main variables are reported on Table 2.

Evidence about gender differences in trust is mixed. Three high-powered studies reported that women trust more than men (e.g. Bellemare & Kroger, 2007; Dohmen et al., 2008; Falk et al., 2018), while other studies found the opposite result that men trusted more than women (e.g. Buchan et al., 2008; Dittrich, 2015; Garbarino & Slonim, 2009), or no gender difference in trust (e.g. Ben-Ner & Halldorsson, 2010; Croson & Buchan, 1999; Schwieren & Sutter, 2008).[13] However, van den Akker et al.'s (2020) meta-analysis of the investment game (Berg et al., 1995) showed that men are more

[9]We use a finer scale than Dohmen et al. (2008), who related on a four levels scale. Our scale was presented as follows: '*Could you place yourself on a scale of 0 to 10, where 0 corresponds to "being very careful in dealing with other people" and 10 to "be very confident in relationships with others"*.'

[10]Regarding the domains of health and finance, we added the following sentence: 'People can behave differently depending on the situations. How would you assess your willingness to take risks in the following situations?' 'With your health' – 'With your money/personal finances' – . The measurement scale was identical to that of *General risk*.

[11]The corresponding French nomemclature is called *Catégorie Socio-Professionnelle* (CSP). CSPs are used to categorize working population, according to the type of professional activities they do or did. They are usually divided between seven categories: *I. Farmer, II. Craftspeople, Traders, Business Ownerspeople, III. Executives and Upper-Level Intellectual Professions, IV. Intermediate-Level Professions, V. Employees, VI. Workers, VII. Other / Inactive*. Note that we added two more categories given that CSP's do not usually take into consideration the professional status: 'Retirees' and 'Not Specified.'

[12]France is divided into 13 administrative regions, called *Régions*, some of which have a strong identity. Taking this into consideration, we divided the country into nine geographical regions: *North, East, West, South-West, the Mediterranean coast, Parisian Region, Eastern Parisian Suburbs, and Western Parisian Suburbs*.

[13]Croson and Gneezy (2009) and Rau (2012) provide extensive surveys on gender differences in trust.

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Table 2 Dictionary of variables

Type of variable	Variable's label	Label's values
Dependent variables	*WVS trust*	0, You can't be too careful – 1, Most of people can be trusted
	General trust Family trust *Co-worker trust*	Scale from 0, 'Being very cautious in relationships with other people' to 10,'Being very confident in relationships with others'
Risk variables (variables of interest)	*GP risk* *General risk* *Health risk* *Finance risk*	Scale from 0 to 20 (in intervals of 2) Scale from 0, 'Not at all willing to take risks' to 10, 'Completely willing to take risks'
Demographic variables	Gender (= 1 if male)	0, Female – 1, Male
	Highest degree of studies	0, No diploma – 1, CEP/Brevet de collèges – 2, BEP/CAP – 3, Baccalauréat – 4, Bac + 1 – 5, Bac + 2 – 6, Bac + 3 – 7, Bac + 4 – 8, Bac + 5 – 9, Bac + 8 –
	Political orientation (0 − 10)	Scale from 0, 'Very left' to 10, 'Very right'
	Age	The age of the participant at the time of the survey
F.E. on household income	Earns up to 1,000€; Earns between 1,000€ and 2,000€; Earns between 2,000€ and 3,000€; Earns between 3,000€ and 4,000€; Earns between 4,000€ and 5,000€; Earns between 5,000€ and 6,000€; Earns between 6,000€ and 7,000€; Earns between 7,000€ and 8,000€; Earns between 8,000€ and 9,000€; Earns between 9,000€ and 10,000€; Earns between 10,000€ and 15,000€; Earns more than 15,000€; Doesn't know how much	0, No – 1, Yes
F.E. on location	Lives in Parisian region; Lives in the East Parisian suburbs; Lives in the West Parisian suburbs; Lives in the East of France; Lives in Ile-de-France; Lives in the Mediterranean coast; Lives in the North of France; Lives in the West of France; Lives in the South-East of France; Lives in the South-West of France;	
F.E. on socio-professional category	Is a farmer; Is a crafts-person, a trader or a business owner; Is inactive/Other; Is a Senior worker or a liberal professional; Is an employee; Is a worker; Is an Executive or works at an Upper-level Intellectual Profession; Has an intermediate profession; Is a retiree	

trusting than women, although the effect size is small (Hedges' $g = 0.22$). Concerning education, Helliwell and Putnam (2007), Alesina and La Ferrara (2002), Leigh (2006), and Borgonovi (2012) report a positive association between the level of education and trust. Based on a stated measure of trust, Murtin et al. (2018) report that both left-wing and right-wing orientations exhibit higher levels of interpersonal trust compared to those who position themselves in the center of the political spectrum. Anderson et al. (2005) and Carlin and Love (2013) found no difference in trust between liberal-oriented and conservative-oriented subjects.[14]

The remaining control variables are treated as fixed effects, which were previously associated with trusting behavior in the literature: monthly household income, socio-economic status (CSP), and geographical location. Alesina and La Ferrara (2002) report a strong association between income and trust. According to them, a successful professional experience makes individuals more likely to trust. Similarly, Leigh (2006) found that individuals are more trustful in richer communities, and Falk et al. (2018) reported a positive correlation between individual trust and per capita income.[15] Beyond individual trust, there is also substantial literature that shows that trust at the country level is positively related to GDP per capita (La Knack, 2003; Knack & Keefer, 1997; Porta et al., 1997). With respect to socio-economic status, to the best of our knowledge, evidence about a relation between trust and the type of profession is missing. Loosely related however, Alesina and La Ferrara (2002) report that part-time occupation favors trust. In contrast Leigh (2006) found that more working-hours per week increased trust. Finally, it is also important to take into account regional dummies because French regions differ sharply in terms of ethnic diversity. Strong territorial identities have existed in some regions for a long time, and some other regions have experienced significant migratory flows in the past fifty years, which affected their ethnic diversity. Previous literature found that ethnic diversity had a negative impact on trust (Alesina & La Ferrara, 2002; Leigh, 2006).

3. Results

We adopt the following empirical strategy. Trust is our dependent variable, whether it is the binary measure (*WVS trust*), or the stated measure using the '0 − 10' scale (*General trust, Family trust*, or *Co-worker trust*). As for our key independent variable, risk tolerance, we also have several candidate measures: elicited risk tolerance (*GP risk*) and three variants for stated risk tolerance: *General risk, Finance risk*, and *Health risk*. Combining the dependent trust variables with the independent risk tolerance variables, allows for 16 different possibilities. We report eight of them below, the others are available in Appendix G.

Firstly, we regress *WVS trust* with: the elicited risk tolerance variable in the GP task (*GP risk*), the *General risk* variable, with the finance risk tolerance variable *Finance risk*, and the health risk variable *Health risk* (Subsection 3.1). Secondly, we use the same variables to regress *General trust* (Subsection 3.2). Other combinations of variables will be shortly discussed as robustness checks (the corresponding tables are available in Section F of the the Online appendix). Ultimately, after applying Bonferroni's adjustment to account for family-wise error rates across all our models, we discovered that all results remained significant except two.[16]

We take into account two layers of control variables. The first layer consists of variables that are related to trust based on the empirical evidence discussed in Subsection 2.3: gender, age, level of education, and political orientation. For these variables, we provide odds ratios and we will be discussing

[14]Interestingly, Hernandez-Lagos and Minor (2015) observed that Democrats were perceived as more trustful than Republicans, independently of the respondent's own political orientation.

[15]However, the effect is not robust to the inclusion of controls on their regressions (see regressions (3) and (4) from Table IX, on page 1683).

[16]We applied a Bonferroni correction taking into consideration the number of times we tested the interaction between all of our variables altogether (i.e. 32 times). Hence the type I error rate was divided by 32 for the three levels of significance. One of these results was the significance of *GP risk* in the regressions on Table 4. The other is the significance of *General trust* in the regressions on Table 17 on Appendix G. Both where significant for $\alpha = 0.05$.

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them in Subsections 3.1.2 and 3.2.2. The second layer consists of dummy variables that could potentially affect the respondents' level of trust but for which there is either a lack of empirical evidence or insufficient theoretical support: their income trench, their geographical location, and their socioeconomic status.[17] Table 2 summarizes the full list of variables used in our regressions. In all the result tables odd columns have no controls and even columns use all of the control variables.

3.1. WVS trust (binary measure)

In this section, we consider *WVS trust* as the dependent variable. Since *WVS trust* is a binary dependent variable, we rely on logit regressions with robust standard errors. Logit regressions also allow us to calculate odds ratios that provide meaningful interpretations, in contrast to other binary models, such as probit models.[18] We start by focusing on *General risk* as the main explanatory variable for *WVS trust*. Next, we consider the elicited risk tolerance variable, *GP risk*. Finally, we study stated risk tolerance by domain, that is, health and finance. All other independent variables are the same across all regressions reported in Table 3.

The regressions show a low Pseudo McFadden R^2 (values are between 0.111 and 0.154), which is below the levels of other studies. This could be due to missing variables such as civil status, ethnicity, religion, and other individual characteristics (physical and psychological) or environmental factors that are sometimes included in the analyses proposed in the trust literature (see for example Alesina & La Ferrara, 2002; Dohmen et al., 2008; Leigh, 2006; Rothstein & Uslaner, 2005). Some of these variables have been previously linked to risk-taking behavior, and thus their absence may contribute to a distortion in our estimates, though the way they could affect them is not always clear.[19] Nevertheless, our model shows globally goodness-of-fit[20] and display no specification issues.[21]

Taking this into consideration, we used odds ratios as indicators for the strength of the relation between our independent variables and *WVS trust*.

3.1.1. Risk tolerance variables

General risk: Results are reported in Table 3 (columns (1) and (2)). Our regressions show that there is a highly significant[22] impact of *General risk* on individuals' willingness to trust others. The odds of individuals stating *'most people can be trusted'* increase approximately by 13% as they state higher risk tolerance. In other words, someone who stated, say, 5 or more for the *General risk* question is 13% more likely to answer 'yes' at the *WVS trust* question than someone who answered 4 or less. This result clearly indicates that there is a positive relationship between trusting others and the willingness to take risks.

GP risk: For the elicited risk variable in columns (3) and (4), the findings are clear-cut. Our model indicates that there is no significant interaction between risk tolerance elicited with the GP task and

[17] We provided nonetheless some statistical analysis supporting a possible relation between these controls and our trust variables. See Appendix A.

[18] New computer software makes it easier to calculate other sorts of easily interpretable outcome for probit models, but we prefer to use logit's odds ratios for their intuitiveness.

[19] E.g. Gullone and Moore (2000) show that personality traits from the 5-factor model of personality correlate with risky behavior and risk perception in adolescence. More precisely, we suspect that agreeableness, which correlates positively with trust and negatively with risk perception, *may affect both individual preferences*. Also, we have phenomena such as inequality, which has previously been related (negatively) to trust (Alesina & La Ferrara, 2002; Leigh, 2006; Rothstein & Uslaner, 2005) that is not included in our model. Some studies (see e.g. Payne et al., 2017) show that risk taking is higher in areas with high income inequality.

[20] Pearson's χ^2 Test for goodness-of-fit. P-values ranged between 0.3373 and 0.5457. See Section E on the Online appendix for details.

[21] Link test for model specification under robust standard errors. All linear predictions ($\hat{y}$) were highly significant ($P\ (Z > |z|) < 0.01$); the squared predictor's ($\hat{y}^2$) were not significant, ranged between 0.203 and 0.918. See Section E on the Online appendix for details.

[22] That is, it is significantly different from 1.

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Table 3 Logit regressions on *WVS trust* variable using risk variables

WVS trust	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
General risk	1.132***	1.132***						
	(0.0296)	(0.0309)						
GP risk			1.012	1.010				
			(0.00906)	(0.00939)				
Health risk					1.152***	1.154***		
					(0.0322)	(0.0336)		
Finance risk							1.122***	1.122***
							(0.0320)	(0.0334)
Highest degree of studies	1.260***	1.227***	1.278***	1.243***	1.278***	1.244***	1.256***	1.229***
	(0.0370)	(0.0427)	(0.0372)	(0.0427)	(0.0377)	(0.0437)	(0.0367)	(0.0423)
Political orientation (0-10)	0.797***	0.796***	0.807***	0.806***	0.806***	0.806***	0.799***	0.800***
	(0.0276)	(0.0288)	(0.0276)	(0.0286)	(0.0279)	(0.0290)	(0.0281)	(0.0291)
1 if male	1.032	1.007	1.085	1.062	1.005	0.979	0.974	0.954
	(0.146)	(0.149)	(0.151)	(0.155)	(0.142)	(0.146)	(0.141)	(0.144)
Age	1.031***	1.037***	1.028***	1.033***	1.032***	1.038***	1.030***	1.035***
	(0.00468)	(0.00580)	(0.00463)	(0.00574)	(0.00476)	(0.00579)	(0.00463)	(0.00573)
F.E. Income	No	Yes	No	Yes	No	Yes	No	Yes
F.E. Socio-Professional categories	No	Yes	No	Yes	No	Yes	No	Yes
F.E. Region	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1118	1116	1118	1116	1118	1116	1118	1116
Pseudo R^2	0.125	0.150	0.111	0.137	0.128	0.154	0.121	0.147
AIC	1262.3	1278.7	1282.1	1298.0	1257.8	1274.0	1267.8	1284.3
BIC	1292.4	1444.3	1312.2	1463.6	1287.9	1439.6	1297.9	1449.9

Exponentiated coefficients; Robust standard errors in parentheses.
* $p < 0.1/32$, ** $p < 0.05/32$, *** $p < 0.01/32$.

WVS trust. Additionally, the odds ratio is only slightly above one (≈ 1.0115), suggesting a weak association with *WVS trust*.

Therefore, not only is there no substantial interaction between *GP risk* and *WVS trust*, but the information criteria clearly indicate that this model performs the poorest compared to the other models in Table 3 (notice that the odd columns are not comparable with the even columns because the number of observations varies for the AIC and the BIC).

Next, we replicate the main analysis for risk tolerance, by considering the domains of health and finance. The results are reported in Table 3, on the columns 5 – 8.

Health risk: Similar to *General risk, Health risk* is strongly related to participants' willingness to trust others. The odds ratio being equal to 1.152 (column (5)), there is an increase of about 15% of declaring higher degrees of trust as risk tolerance increases.

Finance risk: As for *Health risk*, the coefficient on the *Finance risk* – columns (7) and (8) – is highly significant, yet small. According to our model, one point increase in stated risk tolerance leads to an increase of the odds of being trustful of 12.2% (column (7)).

3.1.2. Covariates

There are some notable findings with respect to the covariates, which are robust to the inclusion of controls. First, there is no 'gender effect' in our sample: women and men are equally likely to state that they are willing to trust others, in contrast to several previous papers, for example, Alesina and La Ferrara (2002), Buchan et al. (2008), and Falk et al. (2018) that reported such effect.[23] Second, a higher level of education ('Highest degree of studies') has a positive impact on *WVS trust*, confirming previous findings (e.g. Alesina & La Ferrara, 2002; Borgonovi, 2012; Borgonovi & Pokropek, 2017; Helliwell & Putnam, 2007), showing that access to a higher level of education is a feature of highly trustful individuals. In fact, the variable 'Highest level of studies' has the strongest impact on *WVS trust*, with an odds ratio between 1.227 and 1.278. Also, left-wing respondents tend to be more trustful than right-wing respondents. Finally, our regressions show that older people are more trustful, in accordance to Bailey and Leon (2019); Alesina and La Ferrara (2002); Rothstein and Uslaner (2005), and Dohmen et al. (2008).

3.2. *General trust*: the ('0-10' scale) variable

In this subsection we report the estimates for the regressions on the *General trust* variable (see Table 4). The independent variables are the same as in the previous section. Table 4 summarizes the results: columns (1) and (2) correspond to *General risk*, columns (3) and (4) to elicited risk tolerance, columns (5) and (6) correspond to stated health risk tolerance, and columns (7) and (8) to stated financial risk tolerance.

The significant variables and the signs of their coefficients are the same as the ones observed for the binary trust measure. The main difference is one of interpretation. The variable *General trust* can be considered as a measure of the strength of trust in others, or alternatively, as the '*subjective probability*' that a person places on others' trustworthiness. Adopting such interpretation, we estimate how risk tolerance evolves with one's *subjective probability* to trust others. In order to provide a refined assessment, we rely on ordered logit regressions rather than overall linear effect or other models. Using ordered logit regressions allows us to interpret each modality of our dependent variable as a distinct category (that is, each participant determines how 'frequently' he is willing to trust others on a '0–10' scale). We prefer to rely on ordered logit rather than ordered probit in order to estimate odds ratios, which provide more intuitive interpretations.[24]

[23] It should be noted that Falk et al. (2018) found that the relation between gender and trust is only significant for 33% of the countries that were surveyed.

[24] It is not clear whether our data has truncation or not on the variable *General trust*. For this reason, we did not use Tobit models. Moreover, Tobit regressions with our data provide similar results than Ordered Logit regressions.

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Table 4 Ordered logit on general trust using risk variables

General trust	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
General risk	1.181***	1.176***						
	(0.0257)	(0.0258)						
GP risk			1.016	1.017				
			(0.00711)	(0.00723)				
Health risk					1.155***	1.157***		
					(0.0262)	(0.0265)		
Finance risk							1.116***	1.105***
							(0.0255)	(0.0257)
Highest degree of studies	1.161***	1.145***	1.182***	1.162***	1.179***	1.163***	1.165***	1.153***
	(0.0255)	(0.0295)	(0.0259)	(0.0299)	(0.0258)	(0.0300)	(0.0258)	(0.0297)
Political orientation (0-10)	0.872***	0.868***	0.884***	0.880***	0.885***	0.883***	0.883***	0.880***
	(0.0238)	(0.0244)	(0.0239)	(0.0246)	(0.0240)	(0.0246)	(0.0239)	(0.0246)
1 if male	1.049	1.005	1.152	1.098	1.075	1.031	1.034	1.003
	(0.113)	(0.112)	(0.123)	(0.122)	(0.115)	(0.115)	(0.113)	(0.114)
Age	1.018***	1.018***	1.014***	1.014***	1.017***	1.018***	1.016***	1.016***
	(0.00331)	(0.00414)	(0.00326)	(0.00413)	(0.00330)	(0.00415)	(0.00327)	(0.00412)
cut1	0.666	0.743	0.409**	0.460	0.569	0.674	0.465	0.589
	(0.177)	(0.809)	(0.105)	(0.500)	(0.150)	(0.745)	(0.121)	(0.651)
cut2	0.858	0.964	0.524	0.592	0.731	0.871	0.597	0.760
	(0.226)	(1.048)	(0.134)	(0.643)	(0.191)	(0.962)	(0.154)	(0.839)
cut3	1.399	1.591	0.840	0.963	1.181	1.427	0.962	1.241
	(0.366)	(1.729)	(0.213)	(1.044)	(0.307)	(1.575)	(0.246)	(1.369)
cut4	2.757***	3.192	1.621	1.892	2.299**	2.829	1.868	2.452
	(0.723)	(3.468)	(0.409)	(2.050)	(0.596)	(3.122)	(0.477)	(2.704)
cut5	4.080***	4.773	2.369**	2.797	3.379***	4.206	2.739***	3.630
	(1.076)	(5.186)	(0.600)	(3.031)	(0.881)	(4.642)	(0.701)	(4.004)

(*Continued*)

Table 4 (*Continued.*)

General trust	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
cut6	11.08***	13.39**	6.236***	7.627*	9.065***	11.70**	7.288***	9.968**
	(3.002)	(14.58)	(1.614)	(8.278)	(2.423)	(12.94)	(1.911)	(11.01)
cut7	18.09***	22.22***	10.06***	12.51**	14.77***	19.38***	11.83***	16.43**
	(4.982)	(24.23)	(2.642)	(13.60)	(4.010)	(21.46)	(3.151)	(18.18)
cut8	52.64***	66.08***	28.59***	36.38**	42.79***	57.42***	33.84***	48.00**
	(15.08)	(72.28)	(7.794)	(39.65)	(12.09)	(63.79)	(9.365)	(53.27)
cut9	218.7***	277.7***	116.8***	150.6***	177.9***	241.5***	138.6***	198.7***
	(70.54)	(306.6)	(36.13)	(165.6)	(56.73)	(270.7)	(43.40)	(222.5)
cut10	421.7***	536.0***	224.5***	289.7***	342.8***	465.7***	266.3***	382.0***
	(152.2)	(598.2)	(78.34)	(322.1)	(122.5)	(527.4)	(93.85)	(432.2)
F.E. Income	No	Yes	No	Yes	No	Yes	No	Yes
F.E. Socio-Professional categories	No	Yes	No	Yes	No	Yes	No	Yes
F.E. Region	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1118	1118	1118	1118	1118	1118	1118	1118
Pseudo R^2	0.034	0.044	0.023	0.033	0.030	0.041	0.026	0.036
AIC	4737.7	4746.7	4792.2	4796.4	4755.9	4761.3	4774.1	4783.8
BIC	4813.0	4962.5	4867.5	5012.3	4831.2	4977.1	4849.3	4999.6

Exponentiated coefficients; Standard errors in parentheses.
* $p < 0.1/32$, ** $p < 0.05/32$, *** $p < 0.01/32$.

As for '0 - 10' trust scale, the *Pseudo-McFadden* R^2 are low, but the models remain significant. Generally speaking, our models are well specified,[25] and overall the included variables provide a good fit.[26]

3.2.1. Risk tolerance variables

General risk: The results are reported in the first and second columns of Table 4. As *General risk* increases, the frequency with which an individual trusts others (i.e. *General trust*) also increases. Individuals that state low (resp. high) risk tolerance have a higher probability to distrust (resp. trust) others more frequently. In terms of odds ratios, this means that an individual who answered, for instance, 7 or more to the *General risk* question has roughly between 17.6% and 18.1% more chances to choose a larger level of stated trust.

Zooming into our risk variable, we observe that as risk tolerance increases, the probability of choosing a low trust option (0–5) *grows smaller*, and the probability to choose a high trust category (6–10) of *General trust* becomes higher. However, as stated risk tolerance increases, the increase in probability of trusting others becomes smaller.[27] In short, our results allow us to characterize individuals as follows: individuals who are more risk averse are also less frequently trustful, while those who are more risk tolerant tend to trust others more often, though the chances to have very high levels of trust grow smaller. Further support for this interpretation is provided by the conditional marginal effects.[28]

GP risk: Replacing elicited risk tolerance (*GP risk*) with *General risk* yields a non-significant outcome (p-value equal 0.025 in the third column and 0.015 in the fourth column of Table 4). Additionally, the odds ratios presented in columns (3) and (4) of Table 4, being close to 1, indicate that the likelihood of participants selecting a high level for *General trust* does not significantly rise with *GP risk* increments: a one-point increase in *GP risk* only marginally increases the probability by 1.7% for an individual to choose a higher value for *General trust*. Consequently, the odds ratio for this variable is approximately 10 times lower than that of *General risk*. Furthermore, the model exhibits lower quality compared to columns (1) and (2). Based on the AIC and BIC measures, it is the least suitable candidate for describing the relationship between risk tolerance and trust. Other factors may contribute to the insignificance of the elicited risk tolerance (EP), including the narrow focus on just three investment levels (0, 5, and 10).[29] However, discerning this effect from the methodology itself presents a challenge.

Next we replicate the main analysis for risk tolerance, by considering the two domains, health and finance. The results are reported in columns 5 – 8.

Health risk and Finance risk: Analogous to our results in the previous section, *Health risk* scores an odds ratio averaging 1.156, which is fairly close to the odds ratio of Table 3 for this same variable. Again, our variable is highly significant. It implies that as risk tolerance in the health domain increases, there is approximately a 15.6% greater chance that an individual would indicate trusting others more frequently. In simpler terms, less risk-tolerant individuals tend to express lower levels of trust. The results for *Finance risk* are presented in columns (7) and (8). The odds ratios are highly significant

[25] P-value for our linear predictor varies from less than 3.90e-07 to 0.004; the quadratic predictor's p-value ranged between 0.162 and 0.912. See the Online appendix (Section E) for detail.

[26] We performed two goodness-of-fit tests: The ordinal Hosmer–Lemeshow test and the Lipsitz test. Respectively, the p-values for both tests ranged between 0.0295 and 0.1233 (regression (2)), and 0.0473 and 0.0256 (regression (4)). Their 'twin' regressions – i.e. regressions (1) and (3) – did not show lack of fit, suggesting the problems came from the addition of control variables. See the Online appendix (Section E) for detail.

[27] All detail is provided on columns (1) and (2) from Table 3 in the Appendix B. At first, the conditional marginal effects are negative for the lowest levels of trust, then they become positive starting from level 6 up to the 10th level, increasing from the 6th to the 8th, but then become ten times smaller for levels 9 and 10.

[28] We also observe a similar trend for the other risk variables. See Tables 4 and 5 from Appendix B.

[29] We thank the editor for pointing out this possibility.

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and close to 1, indicating that an increase in financial risk tolerance raises the likelihood of scoring higher in trust by an average of 10.5%.

To summarize the interaction between risk tolerance and *General trust*, the variable *General risk* is the best predictor according to the information criteria, followed by *Health risk*.

3.2.2. Covariates

Here we analyze the results pertaining to our covariates and their interactions with all of our dependent variables (see Table 3 rows 5 – 8). The significant variables are the same as for *WVS trust* (see Table 3). First, results are robust across all of our regressions, since all the variables are significant but one: gender. Second, most variables have a weak effect, whether we take into account controls or not.

The level of education and political orientation, both have a highly significant effect on individuals' frequency with which they trust others, with an average odds ratio of 1.2519 and 0.8021, respectively.[30] On one hand, a higher level of education has a positive effect on trust: individuals who achieved a higher level of studies tend to trust others more often that those who ended their studies earlier. On the other hand, left-oriented people trust more frequently others than those who are right oriented.

The effects of gender and age on *General trust* are similar than those found for *WVS trust*: gender is non-significant and age has a negligible effect. Our findings about age and gender are consistent with existing literature. Indeed, the existing body of literature on the correlation between age and trust generally suggests that trust tends to increase with age (see Bailey & Leon, 2019). On the topic of trust and gender, the majority of available studies indicate that women are equally or less trusting than men, a few studies have noted that women tend to be more trustful (Croson & Gneezy, 2009).

4. Discussion and conclusion

Overall, our results suggest that there is a 'positive' relationship between risk tolerance and trust[31]. This finding may be linked to the differentiation between 'affection-based' and 'cognitive-based' trust. Social distancing affects the strength of trust and trustworthiness between individuals (Song et al., 2012). It also seems that the strength of trust in others differs sharply between kin and non-kin. While altruism motivates trust towards kindred, reciprocity motivates trust towards friends. Also, it is likely that other factors motivate trust towards strangers (Vollan, 2011). It could be possible that affection-based trust is influenced by a completely different set of variables, which would explain the contrast with the rest of our findings. Our interpretation is that the relationship demonstrates that risk aversion calls for distrust: the lower the risk tolerance, the higher the probability for an individual to be distrustful. This is true both for the binary trust variable and for the '0 – 10' scale stated trust variable. For the latter variable, we also observe that the effect of risk tolerance 'dilutes' as risk tolerance increases, that is, the increase of the probability of scoring 'higher' decreases with the level of risk tolerance (as seen on Table 3 from the Online appendix B).

With regards to methodology, we consistently found that the interaction of stated risk tolerance variables with three out of our four trust variables was highly significant, indicating superior performance compared to the elicited risk variable we examined. This may constitute our most significant finding. Furthermore, as demonstrated in the previous section, *GP risk* exhibited a positive impact on the general trust variables, yet it was both non-significant and too marginal (refer to Tables 3

[30]The averages where calculated by adding the coefficients from column (1) to (8), and then dividing by the total amount of columns (i.e. 8).

[31]On another note, we found that *Family trust* was affected by none of the variables taken into account in our study (the results are reported on Table 16 from Appendix G). Moreover, the p-values of all but one variable are far greater than the type I error rate after Bonferroni correction for all 'potentially significant' coefficients in this Table. Only the degree of studies remain significant for the regressions that do not include fixed effects.

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and 4).[32] Findings regarding *GP risk* in Tables 3 and 4 prompt a current discourse surrounding the efficacy of EP methods in predicting individual behavior. Indeed, recent studies have uncovered inconsistencies in EP measures, both at a methodological level and in terms of the stability of such preference measurements.[33] Results concerning *GP risk* in Table 4 align with this notion. Therefore, our research lends support to the notion that stated preferences may possess greater predictive accuracy than EP methods.

Overall, the experimental literature indicates that behavioral risk tolerance does not appear to influence trust decisions in laboratory settings. However, there are some important nuances to consider. Chetty et al. (2021) compiled a comprehensive summary of previous findings (see Table 1 in Chetty et al., 2021). Among the 12 papers, which encompassed their own study that investigated the relationship between trust and risk tolerance, only four identified a significant correlation (Chetty et al., 2021; Fairley et al., 2016; Sapienza et al., 2013; Schechter, 2007). It is crucial to examine why these papers reported a significant correlation when compared to others. Notably, all the papers that found no correlation, that is, Eckel and Wilson (2004); Ashraf et al. (2006); Ben-Ner & Halldorsson (2010); Slonim and Guillen (2010); Houser et al. (2010); Etang et al. (2011); Corcos et al. (2012); Garapin et al. (2015), relied on a multiple price list type of method, primarily the Holt and Laury (2002) task. In contrast, the papers reporting a significant correlation between risk tolerance and trust employed a 'risk game' to elicit risk tolerance.

Various versions of the risk game have been developed, but they all share a common objective: neutralizing the human interaction inherent in the trust game while keeping everything else comparable. For instance, in Schechter (2007), risk tolerance was assessed by replacing the trustee in the trust game with a random device (the roll of a die). A similar investment game structure was employed in other studies that discovered a positive correlation between risk tolerance and trust (see Fairley et al., 2016; Houser et al., 2010). Interestingly, Houser et al. (2010) and Fairley et al. (2016) made the striking observation that trusting decisions appear unrelated to risk tolerance when measured using the Holt-Laury task, but show a connection when risk tolerance is assessed through a modified trust game, which replaces human interaction with a computer. However, a crucial distinction between the trust game and its single-player counterpart, the risky trust game, lies in the knowledge of return probabilities. In the risky trust game, return probabilities are known, whereas in the baseline trust game, they remain unknown. Therefore, the absence of a correlation between risk tolerance measures based on probabilities and trust might be attributed to a distinct aspect of the trust game, where return probabilities are uncertain. In fact, Corcos et al. (2012) demonstrated that trust decisions are significantly linked to ambiguity aversion but not to risk aversion. This makes a lot of sense as return probabilities in the trust game are unknown. It is probable that a similar observation applies to the GP task used in our study, but additional evidence would be required for confirmation, especially given that this is the only attempt we are currently aware of.

Nevertheless, Sapienza et al. (2013) reported a surprising positive correlation between trust measured using the standard trust game of Berg et al. (1995) and risk tolerance assessed through a multiple price list method. Furthermore, Chetty et al. (2021) identified a positive correlation between risk tolerance and trust in the lab. In contrast to conventional experimental studies that rely on single-point estimates of risk tolerance, Chetty et al. (2021) employed a structural expected utility model featuring the CRRA power function y^r. Using the risk preference interface developed by Hey and Orme (1994), involving 40 diverse choices between two lotteries from the fundamental set proposed by Loomes and Sugden (1998), they could estimate individual values for r based on maximum likelihood. While this approach offers the advantage of calculating a standard error for r, it also comes with a notable drawback: the intricacy of lottery comparisons, which is a significant potential source

[32]We note a minimal effect for *GP risk* in Tables 16 and 17 in the Online appendix; however, following Bonferroni's adjustment, *GP risk* no longer retains significance in any regression.

[33]see Arslan et al. (2020).

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of error. Subjects were required to make intricate comparisons involving lotteries with three different outcomes, spanning payoffs from R0 to R280 (in Rands, the South African currency) and associated probabilities in 0.05 increments. This added complexity compared to the simpler Holt-Laury task, where probabilities remain constant across binary lotteries, likely contributed to even higher error rates.

In summary, experimental measures of risk tolerance obtained from lotteries are typically not relevant for assessing non-probabilistic risk in human interaction, such as the trust game. In addition, as suggested by Charness et al. (2013), given the framing that experiments demand, the levels of risk aversion obtained from the elicited methods may not have predictive power for behavior across domains. As an illustration, Rafaï et al. (2023) found that SP consistently outperforms elicited preference measures in predicting compliance with prophylactic measures during the COVID-19 lockdown. This could explain why elicited risk tolerance fails to be correlated with stated trust in contrast to stated risk tolerance. We suspect that the lack of predictive power arises more likely in studies that mix elicited and stated methods. In other words, stated risk tolerance may be a valid predictor for stated trust, while elicited risk tolerance would be a valid predictor for elicited trust.

Moreover, as stated in Rafaï et al. (2023), SP methods are 'exposed to a multiplicity of possible combinations of questions, framings and contexts, without any theoretical framework to guide the researcher' (see page 4 of their paper). The absence of randomizing the order of questions pertaining to risk and trust adds another layer of concern regarding the reliability of respondents' answers. Nevertheless, recent literature shows that SP methods often perform better than EP methods. Notably, SP methods evaluating risk preferences tend to perform better than EP methods that measure this same type of preferences (Charness et al., 2020; Frey et al., 2017; Hertwig et al., 2019).

Also, we did not evaluate the interaction between the SP risk variables and an EP trust variable. This is a matter that we think needs to be analyzed in further studies.

Recent studies have raised concerns regarding EP methodologies, highlighting their tendency to exhibit inconsistency (Charness et al., 2020; Gaertner & Steinorth, 2023; Pedroni et al., 2017). Conversely, when it comes to risk preferences, self-reported measures demonstrate high convergent validity, test-retest reliability, and predictive validity, while EP methods are often complex and may be incomplete (Steiner et al., 2021). Similarly, a recent study with a large sample size found that SP methods correlate with various types of field behavior to a significant extent, while EP methods show, at best, weak correlations with field behavior, even when accounting for measurement error (Bokern et al., 2023). Our findings are consistent with these results, and support those of Arslan et al. (2020), suggesting that stated preference (SP) methods outperform EP methods in many cases.

Thus, in terms of measures of trust, our logit model also best describes the relationship between risk tolerance and *WVS trust*. The implications of the latter statement depend on the interpretation of our trust variables. We proposed to interpret the scaled trust variable as the *subjective frequency* by which individuals decide to trust others, whereas it is likely that our binary variable represents one-self's belief about others' trustworthiness. This interpretation is, of course, open to discussion. Generally speaking, *WVS trust* variable is interpreted as an individual's belief on global trustworthiness. Yet, other interpretations have been given: for example Rothstein and Uslaner (2005) argue that trust is related to an individual's view on the moral standards of their society. If we followed this train of thought, we could argue that *WVS trust* is an overall (dis-)approval on moral standards, and that *General trust* could also represent a quantitative assessment on how many people are 'well-intentioned' [and thus trustworthy] according to the surveyed person. *General trust* can be interpreted as one-self's belief about others' trustworthiness, as a variable that measures the intensity of such belief. Falk et al. (2018) compared the *WVS trust*'s question to their *Global Preference Survey*

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(GPS) variable, which is fairly similar to our *General trust* variable, though their question is not the same than ours.[34]

When it comes to the other covariates, there are also some elements for discussion. In contrast to Falk et al. (2018)[35] and Alesina and La Ferrara (2002), we found no significant gender effect in trustfulness in our sample. Could this phenomenon be attributed to what is often referred to as 'France, the country of distrust'? Nonetheless, it appears improbable that this is the sole explanation, as the difference in trust levels between men and women in the French population might be too insignificant to reach statistical significance. Additionally, other studies have observed that even when a significant gender effect exists, it tends to be relatively minor (Dohmen et al., 2008; Leigh, 2006). On a different note, Croson and Gneezy (2009) suggests that women exhibit greater variability in their levels of trust compared to men. This variability could potentially serve as an additional explanation for the absence of statistical significance in the gender-based differences in trust levels.

Moreover, we found that age has a small positive effect on trust, as Alesina and La Ferrara (2002); Bailey and Leon (2019); and Rothstein and Uslaner (2005). One explanation proposed by Sutter and Kocher (2007) is that the number of social interactions with strangers increases over the lifetime, which in turn increases the potential for individuals to become trustful.[36]

We also observed that individuals with higher studying degrees are more likely to be more trustful and to trust more often in accordance with previous literature (Alesina & La Ferrara, 2002; Borgonovi, 2012; Borgonovi & Pokropek, 2017; Helliwell & Putnam, 2007). These papers suggest that education enhances social capital, creating an 'ideal situation,' in which increased trust in others becomes more favorable. Furthermore, the strength of the relationship between education and trust depends on the degree of heterogeneity within the population (i.e. the marginal effect of a supplementary year of study on general trust depends on how low is the level of trust of those who are the most distrustful; see Alesina & La Ferrara, 2002; Borgonovi, 2012).

Lastly, political orientation is highly related to trustfulness, as right-wing individuals tend to be more distrustful than left-wing oriented voters. This could be because of the stereotypes of behavior that are reinforced by certain political views, thus having an impact on one's capability to trust others (Hernandez-Lagos & Minor, 2015).[37] To illustrate, a study by Lubbers and Scheepers (2002) revealed that voters of the *Front National*, a far-right political party in French politics, tend to hold unfavorable views of out-groups and exhibit some degree of authoritarianism. These behaviors are usually associated with low levels of trust. More recently, Berthet et al. (2020) showed that the level of redistributive behavior depends on the political views. More precisely, participants who voted for (presumably) left-wing candidates redistributed more money than the voters of Emmanuel Macron, who is (presumably) more liberal. Knowing that redistributive behavior is strongly related to prosocial behavior, and more precisely to trust, this establishes a clear distinction on the levels of trust that can be associated across the political spectrum. In sum, our results fall in line with the articles

[34]In their survey, Falk et al. (2018) used a Likert scale of 11 items for the following statement: 'As long as I am not convinced otherwise, I assume that people have only the best intentions,' just like what we did with our *General trust* variable. We think this question is closer to those that are done in the European Social Survey (ESS) to measure trust: 'Most people try to take advantage of you, or try to be fair.' Nonetheless, both these questions are strongly correlated to the WVS question, as well as Falk et al.'s question.

[35]Note however that in the data from Falk et al. (2018) there is no gender effect on trust within the French population, even though they report a significant gender effect on a more 'global' scale. For detailed results,please refer to Online appendix C.

[36]On another note, we found that the interaction's on Table 17 from Appendix G, between age and *Co-worker trust*, become non-significant after applying Bonferroni's adjustment. This is also true for the interaction of age and *Co-worker trust*, as well as gender and *Co-worker trust*.

[37]On an interesting note, Haidt & Graham (2007) have has conducted research on how individuals make moral judgments and their connection to political beliefs. They found that in moral judgment, 'liberal individuals' are primarily focused on fairness and care. In contrast, conservatives, while still concerned about fairness and care, take into account additional elements when making moral judgments. These additional elements include loyalty, respect, and sanctity, and conservatives consider them to be as important as fairness and care. See, for example, Graham et al. (2009); Haidt and Graham (2007).

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mentioned above, suggesting that trust is higher for the left-wing participants and that the level of trust decreases as the spectrum goes to the far-right due to the differences in redistributive preferences across political parties, as well as the differences in their views on the society as a whole.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.17605/OSF.IO/9P5X7.

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