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ORIGINAL PAPER

Perceived blood transfusion safety: a cross-European comparison

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Background and Objectives During the past decades, blood transfusions have become an ever safer clinical procedure in developed countries. Extensive donor screening together with improved infectious disease testing has led to a minimization of risks for transfusion recipients. Still, the general public perceives the process of blood transfusion as risky.

Materials and Methods This study tested variation in perceived transfusion safety across countries and explained it with individual and country factors. We examined whether individual demographic and macro-level factors (i.e. Human Development Index and Power Distance Index) explain variation within and across European countries. We applied multilevel models to 2009 Eurobarometer data collected in 26 countries (N = 20 874).

Results Results were largely in line with expectations derived from risk perception and power and status difference theories. Generally, women, older adults, the lower educated and those earning lower incomes perceived heightened risk. Most of the variation across Europe was explained by the Human Development Index. Risk perception regarding blood transfusions was lower in countries with higher Human Development Indices, that is countries with higher average education, life expectancy and Gross Domestic Product.

Conclusion This study provides new insights of how risk perception regarding blood transfusions is shaped within and across Europe. Both individual demographic factors and country characteristics play a role.

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Introduction

During the past decades, blood transfusions have become an ever safer clinical procedure in developed countries [1–3]. Donor screening methods, including extensive information collected during the donor health interview, together with improved laboratory techniques and enhanced infectious disease testing have led to a minimization of risks for blood donors and transfusion recipients. Still, the general public perceives the process of blood transfusion as a risky procedure [3]. Such a discrepancy between actual and perceived risk may exist in many countries, however at different levels.

This study examines variation in perceived transfusion safety across countries and seeks to explain it with individual (e.g. age, gender, education) and country factors (i.e. country performance in terms of health, wealth, education). In doing so, we contribute to the literature in two ways. First, we investigate variation in perceived transfusion safety across Europe. In particular, we consider current perception of transfusion safety compared to perceived safety 10 years ago. Second, and most importantly, we test whether certain individual and macro-level factors can help explaining this variation. We apply multilevel modelling to individual-level data on perceived transfusion safety collected in 26 countries in the 2009 special Eurobarometer [4].

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Perceived transfusion safety

Paradoxically, great efforts to improve medical and technological procedures are paralleled by increasing public concern about risks [5]. Studies on public risk perception show large discrepancies between the actual risk of certain (medical) processes and behaviours as described by experts and perceived risk as described by the general public [3]. The discrepancy in risk perception by experts in the field and by the public, partly due to different levels of knowledge about specific procedures, also holds for the issue of blood transfusions. Public perception of risks, while often not reflecting the actual nature of risk, can have considerable influences, although differently across cultures [6]. Various studies in different countries, mainly in North America and the United Kingdom, have shown that several factors are associated with perceived risk regarding blood transfusion safety. Similarly, to the perception of risks with regard to various clinical processes or other hazards, heightened perceptions of the risk of transfusion have been found among women [7–9], lower educated, persons with lower income, the married and people with minority background [3, 9, 10]. Results with regard to age have been less conclusive so far [9], but few studies suggest that higher ages associate with higher perceived risk.

Tajfel [11] stressed the fact that different social categories exist within society, often different in power and status. Members of these groups based on personal identification with the group might show similar values, opinions and beliefs [12–14]. Given the above-mentioned results, perceived risk might have partly to do with (perceived) power and status in these groups. The very noticeable result that, in general, white men perceive the least risks, strongly points towards this explanation. The higher perceived risks among women, minority groups, the lower educated and those earning smaller incomes, confirm the notion of power or status differences.

A qualitative systematic review of studies regarding perceived transfusion risks [3] concludes that the general public still perceives blood transfusion as a risky process. Such a perception is more prevalent among certain groups of the population. A recent Dutch study [15] has linked macro-indicators, for example Human Development Index (HDI) and Power Distance Index (PDI), to blood transfusion issues, that is number of donors, number of whole blood collections and number of red blood cell units. This study however remained on the macro-level. An empirical examination whether certain *individual* demographic and health-related factors are universal or contextual determinants of perceived transfusion risks across different countries and whether *macro*-indicators such as HDI qualify these associations has been missing so far.

Hypotheses

Based on the above-discussed literature, we formulate our following hypotheses.

H1: Individuals with more power, that is men, younger, higher educated, higher income, show lower perceived risks with regard to transfusion safety compared to women, older, lower educated and lower income individuals.

The theory of power and status differences may also have implications for cross-country variance in the perception of transfusion safety. Northern and Western European countries show fewer differences among social categories than Southern and Eastern European countries. Hence, we hypothesize:

H2: In countries, that are more developed, that is display less power differences among groups of individuals, the perception of risk regarding transfusion safety will be lower than in less developed, more unequal countries.

In addition, we hypothesize that the effects of individual variables, that is gender, age, education and income are weaker in countries, with more egalitarian power distribution. In other words:

H3: In countries, where there is more development, the effects of age, gender, education and income will be smaller.

Please note that for reasons of clarity and understanding in presenting our results, we hypothesized positive associations between our independent and dependent variables.

Materials and methods

Participants and procedure

The data for the current study stem from the 2009 round of the Eurobarometer [4]. The Eurobarometer is a repeated cross-sectional survey conducted in the large majority of European countries. The surveys are conducted on behalf of the European Commission and the responsible Directorate-Generals. Each survey consists of approximately 1000 face-to-face interviews in every country.1 The data cover the population of the respective nationalities of Europe, resident in each of the countries, aged 15 years or older and having a sufficient command of the national languages. The basic sample design applied in all states is a multistage, random (probability) one [4]. For the current

[1]The 2009 round of data collection includes the following countries in Europe: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Macedonia, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and Turkey.

study, data from Croatia, Macedonia and Turkey could not be used because they did not include the dependent variable.

Measures

Perceived transfusion safety

An individual's perception of the safety of blood transfusions was measured with the question 'Do you think that blood transfusions are safer, as safe or less safe than they were around 10 years ago?' Response options were 1 *less safe*, 2 *as safe* and 3 *safer*.

Independent variables at the individual level

Variables at the individual level included gender (0 *male*; one *female*), age (in years), education (0 *no completed education*, 1 *up to 14*, 2 *15*, 3 *16*, 4 *17*, 5 *18*, 6 *19*, 7 *20*, 8 *21*, 9 *22 years or more*), current partner status (0 *no partner*; one *partner*) and parent status (0 *no children in the household*; 1 *children in the household*). Income was measured with a proxy, indicating whether respondents had problems with paying the bills (1 *almost never/never*; 2 *from time to time*; 3 *most of the time*).

Independent variables at the country level

Because risk perception has been linked to education and income on the individual level, we consider an index referring to a country's performance regarding these indicators. We use the United Nation Development Programme (UNDP) Human Development Index (HDI), a composite statistic of a nation's health (i.e. a long and healthy life), education (i.e. access to knowledge) and income (i.e. a decent standard of living). The health component is assessed by life expectancy at birth using a minimum value of 20 years and maximum value of 85 years. The education dimension is measured by years of schooling for adults aged 25 years and expected years of schooling for children of school entering age. The standard of living dimension is measured by gross national income per capita [16]. Due to its composite nature, the HDI reflects both a country's economic as well as human development.

To account for power differences in countries, we use Hofstede's Power Distance Index (PDI) [15] to measure the extent to which the less powerful members of institutions and organizations accept that power is distributed unequally. Higher scores imply higher acceptance in the respective countries. Data on the PDI were not available for Cyprus. Hence, we excluded Cyprus from the analyses.

Statistical analyses

We performed descriptive analyses of the key variables for the whole sample and broken down by country. To test variation in the perception of transfusion safety, we compared the average perception of transfusion risk across European countries. To examine whether individual and contextual variables predicted perceived safety of blood transfusions, we conducted ordered multinomial multilevel analyses, using the software package MLwiN [17]. We examined the effects of individual and country characteristics on the perception of transfusion safety. A multilevel design was applied because of the hierarchical structure of the data, with individual respondents being nested within countries. The aim of the multilevel models was to estimate variance at the two levels, that is individuals and countries. Variance estimation at the country level indicated variation in perceived transfusion safety across countries.

Results

Descriptive results

The means and standard deviations of all variables, broken down by country, are presented in Table 1. As can be seen in this table, considerable variation existed among countries with respect to individual variables and regarding the HDI and PDI.

The perception of transfusion safety clearly differed across Europe. Figure 1 shows that a large majority of respondents in Malta thinks that blood transfusions have become safer compared to ten years ago. In Bulgaria, however, only 27% of the respondents perceived blood transfusion as safer nowadays.

In Table 2 various subsets of countries that differ from other subsets regarding the perceived safety of blood transfusions are displayed. Interestingly, almost all Eastern European countries are represented in the first three subsets. Among the other countries, no clear geographical distribution could be detected.

Regarding the distribution of the HDI across Europe, a clear north–south and east–west gradient could be observed. In 2009, Human Development was highest in Ireland and the Netherlands and lowest in Bulgaria and Romania.

Multilevel results

To test our hypotheses, we estimated a number of multilevel models, presented in Table 2. The first model, the *intercept only* model (Model 1), tests whether there is a statistically significant amount of variation in perceived transfusion safety at the country level. Indeed, the variation of the constant is clearly statistically significant, indicating that the perception of transfusion safety varies across countries.

Table 1 Study characteristics broken down by Country

	Age M (SD)	Education M (SD)	Gender % female	Difficulty pay bills M (SD)	Current partner % yes	Children % yes	Perceived transfusion safety M (SD)	HDI	PDI
Austria (n = 816)	45·87 (17·18)	4·53 (2·21)	50·76	1·39 (0·59)	62·18	31·59	2·51 (0·63)	0·85	11·00
Belgium (n = 878)	48·67 (17·40)	5·61 (2·54)	52·08	1·38 (0·63)	67·73	40·51	2·54 (0·65)	0·87	65·00
Bulgaria (n = 602)	46·92 (17·00)	5·77 (2·43)	50·07	1·98 (0·74)	72·89	45·14	1·94 (0·78)	0·74	70·00
Czech Republic (n = 910)	46·11 (17·34)	5·48 (1·58)	52·28	1·43 (0·62)	64·33	41·21	2·44 (0·66)	0·84	57·00
Denmark (n = 906)	47·77 (17·93)	7·09 (2·58)	50·80	1·09 (0·32)	59·57	34·73	2·68 (0·53)	0·86	18·00
Estonia (n = 872)	44·52 (18·38)	5·98 (2·20)	55·01	1·41 (0·63)	61·70	39·29	2·53 (0·70)	0·81	40·00
Finland (n = 915)	46·70 (18·04)	6·71 (2·45)	51·21	1·25 (0·50)	68·29	35·01	2·45 (0·66)	0·87	33·00
France (n = 886)	47·49 (18·96)	5·38 (2·70)	52·29	1·42 (0·65)	62·90	36·47	2·66 (0·61)	0·87	68·00
Germany (n = 1320)	48·44 (18·08)	4·54 (2·52)	50·94	1·21 (0·48)	73·47	39·58	2·43 (0·69)	0·88	35·00
Great Britain (n = 816)	45·94 (19·00)	4·55 (2·54)	50·95	1·27 (0·54)	55·79	36·36	2·65 (0·62)	0·85	35·00
Greece (n = 901)	44·46 (18·38)	4·68 (2·61)	49·99	1·77 (0·71)	60·20	35·85	2·62 (0·63)	0·85	60·00
Hungary (n = 873)	46·49 (17·41)	4·48 (2·30)	53·56	1·66 (0·69)	70·16	38·88	2·43 (0·73)	0·80	46·00
Ireland (n = 690)	43·17 (17·07)	5·02 (2·38)	51·32	1·49 (0·66)	67·01	50·39	2·58 (0·69)	0·89	28·00
Italy (n = 836)	46·88 (16·96)	4·63 (2·73)	51·65	1·62 (0·65)	62·86	43·24	2·52 (0·69)	0·85	50·00
Latvia (n = 714)	42·64 (15·64)	5·56 (2·03)	56·53	1·71 (0·75)	67·71	45·31	2·29 (0·83)	0·77	44·00
Lithuania (n = 747)	43·82 (18·45)	5·84 (2·34)	55·16	1·68 (0·73)	55·08	39·93	2·54 (0·68)	0·78	42·00
Luxembourg (n = 407)	45·75 (17·04)	5·72 (2·83)	53·13	1·22 (0·48)	74·96	53·80	2·69 (0·60)	0·85	40·00
Malta (n = 412)	45·93 (17·06)	3·88 (2·33)	50·67	1·72 (0·77)	68·19	51·70	2·87 (0·42)	0·81	56·00
Netherlands (n = 852)	48·15 (16·77)	6·38 (2·55)	52·18	1·19 (0·47)	65·03	36·88	2·61 (0·61)	0·89	38·00
Poland (n = 714)	43·28 (17·69)	5·69 (2·11)	52·56	1·33 (0·57)	63·28	38·65	2·50 (0·67)	0·79	68·00
Portugal (n = 747)	45·58 (18·37)	3·20 (2·76)	54·24	1·67 (0·68)	64·70	38·48	2·70 (0·54)	0·80	63·00
Romania (n = 617)	45·74 (17·28)	5·27 (2·54)	51·50	1·58 (0·71)	72·94	38·72	2·24 (0·82)	0·76	90·00
Slovakia (n = 891)	43·26 (16·84)	5·64 (1·73)	52·42	1·35 (0·57)	65·16	51·18	2·44 (0·68)	0·82	100·00
Slovenia (n = 813)	46·91 (17·37)	5·62 (2·32)	51·31	1·44 (0·66)	69·18	46·59	2·56 (0·61)	0·83	71·00
Spain (n = 867)	45·76 (17·91)	4·06 (2·94)	50·28	1·48 (0·64)	65·57	42·58	2·67 (0·54)	0·86	57·00
Sweden (n = 869)	47·93 (18·19)	6·86 (2·46)	50·76	1·09 (0·35)	58·34	34·30	2·72 (0·53)	0·89	31·00
Total (N = 20 874)	46·00 (17·85)	5·32 (2·59)	51·96	1·44 (0·65)	65·18	40·62	2·53 (0·67)	0·84	49·68

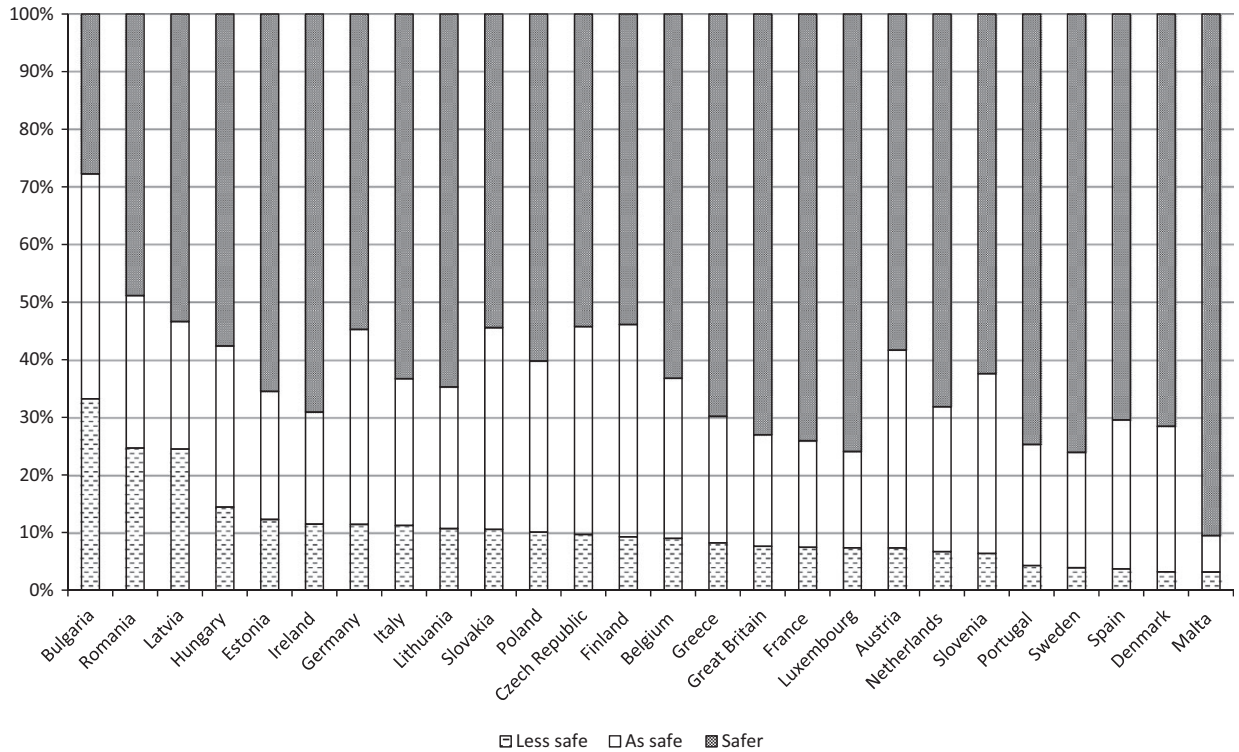

Fig. 1 Distribution of the perceived transfusion safety across countries.

In a next step (Model 2), predictors on the individual level (Level 1 predictors) were added to Model 1 as fixed effects. These fixed effects demonstrate the association between the predictors and the dependent variable (perceived safety of blood transfusions) and can be interpreted as regression coefficients [18]. The following models present the predicted log odds of reporting less perceived safety regarding blood transfusion compared to as safe and safer for the various independent variables. In line with the first hypothesis, gender, age, education and income significantly predicted perceived transfusion safety. Given the effects of the other predictors, women have 0·153 times lower log odds of reporting as safe or safer for perceived transfusion safety than men. Perceived risk associated with transfusion increased with age, in other words, older persons have 0·161 lower log odds to report as safe or safer compared to less safe than younger persons. The fact that the effect of age squared (not shown in the Table) was non-significant means that the increase in perceived risk occurred in a linear fashion. Parent and partner status did not predict perceived transfusion safety, meaning that there were no differences between individuals with and without partner/children. Education was positively associated with perception of blood transfusion safety. In other words, the higher educated individuals were the more likely they were to perceive the process of blood transfusion as safe or safer compared to lower educated (log odds = 0·037). Similarly, people with less difficulties paying bills perceived less risks regarding blood transfusions compared to those individuals with more difficulties paying bills. Adding predictors on the individual level reduced the random intercept variance between countries from 0·383 to 0·338. Random slopes of the individual-level predictors were added to the equation (results not shown) and provided significant results for age, gender, education and difficulties with paying bills.

In Model 3, our country level predictors, the HDI and PDI were added to the model. Given the effects of the other predictors, higher perceived risks associated with transfusions were found in countries with lower HDI scores. In other words, the more developed a country with regard to schooling, wealth and health, the less risky the process of blood transfusion was perceived among its citizens. This result supports our second hypothesis. The effect of PDI was not significant; that is, no differences in perceived safety of blood transfusion were found as a function of the acceptance of power differences in a country. PDI was removed from the model for the remaining analyses. Adding country level factors to the model decreased the random intercept variance between countries by 33%, from 0·338 to 0·228.

Table 2 Multilevel models with individual and country variables predicting perceived transfusion safety

	Model 1		Model 2		Model 3		Model 4	
	Estimate	**SE**	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**
Intercept (as safe)	2·115***	0·124	2·386***	0·127	2·663***	0·126	2·420***	0·106
Intercept (safer)	0·500***	0·122	0·654***	0·126	0·930***	0·124	0·683***	0·104
Individual level								
Gender[a]			–0·153***	0·053	–0·153**	0·053	–0·150**	0·053
Age			–0·161***	0·018	–0·161***	0·018	–0·160***	0·018
Partner status[a]			0·064	0·057	0·065	0·057	0·065	0·057
Parent status[a]			–0·052	0·058	–0·052	0·058	–0·058	0·059
Education			0·037***	0·011	0·036***	0·011	0·671***	0·201
Difficulties paying bills			–0·181***	0·041	–0·176***	0·041	–0·184***	0·041
Country level								
HDI					7·697***	2·694	7·930***	2·248
PDI					0·000	0·005	–	–
Cross-country interactions								
Education*HDI							0·847***	0·241
Random part								
Variance (intercept)	0·383***	0·110	0·338***	0·099	0·228***	0·069	0·205***	0·062
Variance (education)							0·000	0·001
Covariance							–0·004	0·005

[a]Gender, parent status and partner status are dummy coded such that 1 = *female, being a parent, having a partner.*
*$P < 0·05$, **$P < 0·01$, ***$P < 0·001$.

To test whether the effect of gender, age, education and difficulties paying bills on perceived transfusion safety varied across different levels of Human Development, cross-level interactions between these individual predictors and HDI were added to the model (Model 4). Only the interaction between education and HDI was found to be significant. Probing this interaction effect revealed that the educational gradient is larger in more developed countries compared to less developed countries.

Discussion

The aim of this study was to examine whether the perception of risks associated with blood transfusions varies across Europe, and if so, explain this variation with individual and country factors. As our results have shown, considerable variation across European countries exists with regard to perceived risks of blood transfusions. In addition, this study with its country-comparative design showed that there are certain individual factors that are consistently associated with heightened risk perception regarding blood transfusion safety. This result, which is mostly in line with our first hypothesis, points to the fact that certain demographic and social characteristics are universal correlates of risk perception. These characteristics, for example higher education and male gender may be seen as indicators of more power and status in several of the included countries, pointing to the importance of power and status differences when estimating risk perception with regard to medical procedures. The strength of the effect of demographic and social individual characteristics varied across different countries.

Importantly, our country factor, the Human Development Index was strongly associated with perceived risks of blood transfusion. In countries with higher HDI scores, the risks associated with blood transfusions were perceived lower compared to countries with lower levels of Human Development. This result supports our second hypothesis that in more developed countries, with less status and power differences within the population, the perception of risks with respect to blood transfusions is lower.

The fact that PDI did not show significant results in predicting perceived transfusion safety across countries is not easy to interpret. Contrary to hypothesis 2 and what De Kort *et al.* [16] have shown, power difference and its acceptance did not reduce variation in transfusion issues in the current study. One possible explanation might be that PDI a measure on the macro-level is able to predict transfusion issues on the country level but to a lesser extent variation in the individual perception of transfusion safety.

In our third hypothesis, we stated that the effects of individual predictors would be lower in more developed countries. This hypothesis was not supported by our results. The only significant interaction effect between an individual and country factor was the one between education and HDI. Probing this effect revealed that the

educational gradient in perceiving risks of transfusions is stronger in more than in less developed countries. Given the fact that education was the only individual factor that significantly interacted with HDI and its predictive power on the individual level, we might interpret education as a central indicator of knowledge, probably associated with power and status, and very important with respect to perceiving risks.

Taken together, our results corroborate important knowledge to both clinicians and policymakers. Awareness of factors that foster a higher perception of risks as well as knowledge about the contextual nature of these factors increases understanding how people think and feel about blood transfusions [10]; especially for clinicians, increased consciousness of age-, gender- and education-specific attitudes and behaviour may ease treatments and increase trust in the health and care system.

Our study explored an issue that received only limited attention thus far: perceived transfusion risks in a comparative perspective. To investigate variation in risk perception across countries, one needs micro-level data about perceived risks of blood transfusions from individuals across various countries, enriched with potentially important macro-level factors. The Eurobarometer data are one of the few surveys that offer this opportunity. These strengths noted that the current study is not without limitations.

First, the Eurobarometer is a survey with relatively small sample sizes. The number of respondents per country was too small to analyse data on separate countries in a meaningful way. 'Zooming in' on specific interesting groups of countries requires larger and more detailed datasets including information on individual perceived risks regarding blood transfusions as well as more comprehensive individual background information and data on macro-factors associated with, for example blood banking systems and transfusion practice.

Second, it can be questioned whether the HDI is the best indicator of country development. Although a composite score, it has an important weakness. Until 2010, the HDI does not adjust for inequality in a country. Therefore, the HDI represents a measure of potential human development in a country but does not so much refer to actual human development. Given our theoretical argument of power and status differences, it would have been better to use an inequality adjusted HDI. Such an index is published since 2010 by the United Nations Development Programme, but was not available for the current study. Similarly, the use of the PDI refers to the acceptance of power differences in a country instead of reflecting actual power differences.

Third, it is important to note that our dependent variable was coded as a relative measure, that is compared to 10 years ago. Ten years ago, however, may mean very different things in the various countries, especially for human and cultural development. Due to formulation of this variable, we could show that a considerable proportion of individuals in specific countries perceives the safety of blood transfusions as worse compared to ten years ago. This might be important information for policymakers in these specific countries, as growing distrust in certain medical procedures might have implications for compliance and co-operation. As has been shown before, public perception of risks may determine priorities and legislative agendas [19].

Fourth, as stated in our introduction, minority status is one important individual characteristic that may predict risk perception. However, due to data restrictions, we could not add any cultural or ethnic background measure to our model.

In conclusion, the totality of the presented theory and data suggests that the perceived risks of blood transfusion vary strongly across social categories within and across countries in Europe. Country context (i.e. HDI) has been shown to be an important factor in explaining part of this variation. The current study is a first attempt to examine the complex interplay between individual and context factors in shaping risk perception with regard to blood transfusion across various European countries. Given the importance of public risk perception to policymaking and shaping public agendas, work detailing when universal and when country-specific mechanisms determine risk perceptions with regard to blood transfusions is a key agenda for health scientists and policymakers.

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All authors have been involved with the manuscript as follows: Substantial contributions to research design, or the acquisition, analysis or interpretation of data. Drafting the paper or revising it critically. Approval of the submitted and final versions.

References

1 Amin M, Wilson K, Tinmouth A, *et al.*: Does a perception of increased blood safety mean increased blood transfusion? An assessment of the risk compensation theory in Canada. *BMC Public Health* 2004; **4**: 20–24

2 Lee DH, Mehta MD, James PD: Differences in the perception of blood transfusion safety risk between laypeople and physicians. *Transfusion* 2003; **43**:772–778

3 Ngo LT, Bruhn R, Custer B: Risk perception and its role in attitudes toward blood transfusion: a qualitative

systematic review. *Trans Med Rev* 2013; **27**:119–128
4 European Commission. *Eurobarometer 72.3 (Oct 2009). TNS Opinion & Social*. Brussels: Köln: GESIS Datenarchiv; 2012
5 Slovic P: Trust, emotion, sex, politics and science: surveying the risk-assessment battlefield. *Risk Anal* 1999; **19**:689–701
6 Gierlach E, Belsher BE, Beutler LE: Cross-cultural differences in risk perceptions of disasters. *Risk Anal* 2010; **30**:1539–1549
7 Flynn J, Slovic P, Mertz CK: Gender, race, and perception of environmental health risks. *Risk Anal* 1994; **14**:1101–1108
8 Chiavetta JA, Driezen P, O'Brien SF, *et al.*: Blood donors' perception of transfusion safety. *Transfusion* 2002; **42**:S71–S72
9 Lee D: Perception of blood transfusion risk. *Trans Med Rev* 2006; **20**:141–148
10 Finucane ML, Slovic P, Mertz CK: Public perception of the risk of blood transfusion. *Transfusion* 2009; **40**:1017–1022
11 Tajfel H: Social psychology of intergroup relations. *Ann Rev Psychol* 1982; **33**:1–39
12 Skevington S, Baker D (eds): *The social identity of women*. London, Sage, 1989
13 Sachdev I, Bourhis RY: Power and status differentials in minority and majority group relations. *Eur J Soc Psychol* 1991; **21**:1–24
14 Wilder DA: Perceiving persons as a group: Effects on attribution of causality and beliefs. *Soc Psychol* 1978; **1**:13–23
15 De Kort W, Wagenmans E, Van Dongen A, *et al.*: Blood collection and supply: a matter of money? *Vox Sang* 2010; **98**:e201–e208
16 UNDP: *The Human Development Report, Overcoming barriers: human mobility and development*. New York, United Nations Development Programme, 2009
17 Rasbash J, Steele F, Browne WJ, *et al.*: *A user's guide to MLwiN*. Centre for Multilevel Modelling, University of Bristol, UK, 2015
18 Jenkins JM, Rasbash J, O'Connor T: The role of the shared context in differential parenting. *Dev Psychol* 2003; **39**:99–113
19 Aprili G: Safety in transfusion medicine. *Blood Transfus* 2008; **6**:121–126