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Ethnic Diversity and Social Trust: A Narrative and Meta-Analytical Review
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Online Supplement to

Ethnic Diversity and Social Trust

A Narrative and Meta-Analytical Review

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A Search Protocol and Sample Construction

Criteria for inclusion

The data for the meta-analysis is collected as a part of a larger project that seeks to systematize the literature on the relationship between social trust and ethnic diversity (Dinesen et al. 2019b). The present meta-analysis intends to investigate the following research question: What is the average effect of ethnic diversity on social trust?

Here we first identify the population of studies that may be meta-analyzed to answer this research question. We follow the guidelines of the Cochrane protocol (Higgins & Green 2008) in identifying the population of studies according to five criteria:

1. *Information of Interest*: The study must report a correlation or regression coefficient along with an inference statistic of this estimate (i.e., standard error, *t*-ratio, *p*-value, confidence interval, or at least include an indicator of the *p*-value, for instance in the form of an asterisk).
2. *Definition of the Outcome*: The outcome has to be some form of social trust. We define social trust as trust in groups of *non-professional human agents*. This includes people in general and specific groups (e.g. immigrants, friends, neighbors, family, countrymen), but excludes professionals (e.g. politicians, bureaucrats, police officers), non-human objects (e.g. institutions, companies, brands, goods, ideas), and a specific individual (e.g. your boss, your wife, another specific person). Furthermore, differential trust in different groups (e.g. ethnocentric trust) as well as other indicators of social cohesion more generally (e.g., socializing with neighbors, collective efficacy, etc.) will not be considered as outcomes in this meta-analysis.
3. *Definition of Observational Units*: We are interested in social trust of human agents. Observational units of the studies are therefore ideally individual human agents. However, studies may also be based on aggregates of human agents, such as cities, regions, and so on.
4. *Definition of the Predictor*: The predictor has to be a form of ethnic diversity. This entails clarification of three sub-aspects: what is ethnicity (a), what is diversity (b), and what unit is ethnic diversity a characteristic of (c)? Based on the following definitions, the central comparison is between human agents situated in different aggregate units (e.g., neighborhoods, workplaces, etc.), which vary in the degree to which the population differs by ethnic, linguistic, religious, phenotypical or national background.
    a. We follow Schaeffer (2014) in defining ethnicity as pertaining to language, religion, nationality, phenotype and ethnicity. Accordingly, ethnic diversity entails linguistic, religious, national, phenotypic and ethnic diversity. It does not entail other forms of social diversity such as income inequality, or gender composition.
    b. Ethnic diversity means the population of a specific aggregate unit differs with respect to ethnicity (as defined above). This variation may be captured by the percentage share of the minority or majority, by any diversity index (e.g., Hirschman-Herfindahl index, or index of polarization, etc.), or by categorical variables distinguishing different levels of diversity. It may also be human actor’s perceptions of ethnic diversity or diversity treatments in experimental studies.
    c. Ethnic diversity is a property of an aggregate unit of human actors, see point 3.
5. The study has to be published in English.

Search Protocol

To identify studies meeting our criteria, we started out by collecting studies through the Web of Knowledge electronic database. We restricted the search to journal articles, books, book chapters, letters, notes, preprints, early access publications and proceeding papers. We further restricted the search to English publications and to the subject field "Social Sciences". We collected our final Web of Knowledge based sample on 4 July 2018.

Three rules define how we collected our Web of Knowledge sample. First, because Putnam (2007) is arguably the seminal study in the literature, we collected all 1,175 studies citing it. Second, since there have been two review articles in the Annual Review of Sociology on the topic, we further collected all 72 studies citing Meer and Tolsma (2014), and all 98 studies citing Portes and Vickstrom (2011). Finally, we used the following search string to identify 3,003 further studies:

> TS = ((ethnic* OR racial* OR race OR religious OR linguistic* OR ethnoracial OR ethno-racial OR culture OR cultural OR immigration* OR "people born in a foreign country") AND (heterogen* OR homogen* OR polari?ation OR concentration OR segregation OR diversity OR fractionali?ation OR (relative NEAR position) OR proportion OR fragmentation) AND (trust* OR "social capital" OR cohesion OR community OR "hunker* down" OR disorganization OR "collective efficacy"))
> Refined by: WEB OF SCIENCE CATEGORIES: (SOCIOLOGY OR URBAN STUDIES OR POLITICAL SCIENCE OR SOCIAL SCIENCES INTERDISCIPLINARY OR PSYCHOLOGY SOCIAL OR ECONOMICS OR ETHNIC STUDIES)
> Indexes = SCI-EXPANDED, SSCI, A&HCI, ESCI Timespan = All years

Overall, we identified 3,944 non-duplicate studies that could potentially meet the five criteria for our meta-analysis.

Selection Based on Title and Abstract

We collected central information of all 3,944 potential studies: bibliographic information, title and abstract. The data collected from the Web of Knowledge also contained a "relevance" indicator, by which we sorted the data. Thus, lower entries were increasingly irrelevant. Although we do not know how this relevance score is generated by Web of Knowledge, it seemed to have face validity.

We then trained six student research assistants to code whether a study seems to meet our four criteria based on the study's title and abstract. Based on this coding procedure, we identified 3,748 studies as not meeting our protocol criteria, that is, we identified them as irrelevant for our meta-analysis. This means that we identified 196 as potentially relevant.

Selection Based on Full Articles

The next step was to check, whether the identified 196 studies meet our criteria based on the full information contained in the actual article. This led to another reduction of the potentially relevant studies to 76, which we eventually fully meta-coded.

Extension of the Sample

We finally extended our overall sample further to include studies that our original search had not identified, but that were cited as relevant by the studies that we had meta coded so far, or that we knew as researchers in the field. Via this strategy, we additionally identified 43 relevant studies, resulting in a total of 119 studies.

We then retrieved the estimates, their precision, and other relevant information (see below) from the 119 studies (including their appendices); this gave us 1,618 estimates.

Restriction of the Sample

Because we are interested in the average effect of ethnic diversity on social trust we would ideally only include estimates based on representative samples from the general population. This is not possible in practice given sampling bias etc. As a second-best option, we excluded estimates that refer to very specific or idiosyncratic populations. Such estimates may be the result of the sampling strategy in a given study (e.g. the sampling of “Mexicans from low/median income neighborhoods” in Franzini (2008)) or because the estimate was part of an interaction model estimating heterogeneous effects of diversity across very specific – and in some cases non-existing – subgroups based on individual-level or aggregate characteristics. We exclude, for instance, estimates for individuals with "low right-wing authoritarianism" (van Assche et al. 2016; 2018) or with zero income (Gereke et al. 2018) as well as estimates for individuals living in locations where the winning party won an election with a margin of zero (Kasara 2013). We do however keep estimates for more common subgroups like natives, immigrants, young people, older people etc. This choice reduced our sample by 207 estimates and 5 studies.

To secure a stringent focus, we narrowed the sample down to estimates focusing on the residential context as defined in the main text (although we mention studies of non-residential contexts in the narrative review). Specifically, we excluded estimates based on diversity in the school setting (Dinesen 2011; Bădescu and Sum 2015; Janmaat 2015; Loxbo 2017), voluntary organizations (Achbari et al. 2018; van der Meer 2016) and workplaces (Dinesen et al. 2019a, Goldschmidt et al. 2017) as well as diversity in adjacent residential contexts (Tolsma and van der Meer 2017). We also excluded estimates where the outcome (social trust) was not measured at the individual level (e.g. Bjørnskov 2007; Delhey & Newton 2005; Knack & Keefer 1997; Schmid et al. 2014), to stringently focus on trust as an individual-level phenomenon. Additionally, we excluded estimates where the measure of diversity was based on self-reported data (as opposed to administrative data), because only very few studies rely on such measures (e.g. Rydgren et al. 2013). The exclusion of aggregate estimates and estimates based on self-reports is further motivated by the fact that their size is not straightforwardly comparable to the remaining estimates (see Section C, below). Finally, we excluded estimates where the relationship between the coefficient, the uncertainty statistics, and indications of significance levels led us to believe that there was an error in one or more of them. This excluded McKenna et al. (2018).

Final Sample

The final sample consists of 1,001 estimates from 87 studies with an average of 11.5 estimates per study (SD = 22.8). The number of estimates per study may appear high, but it partly reflects that some studies include many models with more than one measure of diversity per model; we use 172 estimates from 60 models from Abascal & Baldassarri (2015) for instance. Table D1 in Section D lists the included studies, the number of estimates used per study, and further details of the studies.

B Coding of Relevant Information

We had six students to capture the relevant information from the studies (including appendices). Along with the coefficient for the statistical association and the inference statistic, the students collected information about the direction of the effect, the type of coefficient, the type of the inference statistic, the number of observations, the number of variables, the name of the data set, the type of trust, the type of context, and control variables. Some information was straightforwardly retained (e.g. the coefficients), whereas other information (e.g. the size of the context or whether an estimate actually was comprised by our protocol) was obviously more open to interpretation. The student therefore coded the information under our supervision using a detailed codebook. The entries were subsequently checked by us, and in some instances, discussed among the three of us and/or corrected. We believe this procedure ensured highly reliable and valid data. However, with over a thousand estimates and associated information, we cannot rule out errors, or that other researches would have coded specific properties differently.

Coding of Variables

Coefficient: the size of the association and its type (e.g. regression coefficient, Pearson's correlation, odds ratio)

Inference statistics: the size of the inference statistics and its type (e.g. standard error, t-value, p-value, confidence intervals). Some studies only report significance levels (e.g. $p < 0.01$, $p < 0.05$ and insignificant, which in this particular case would imply that $p \geq 0.05$). In such cases we assigned a specific p-value randomly drawn from a uniform distribution within the relevant interval – e.g. $p = [0.05; 1]$ if $p \geq 0.05$. This was done because we need a specific estimate of uncertainty to calculate relevant statistics (see Appendix C below).

Direction of the effect: Some studies report the association between social trust and ethnic diversity, while others use ethnic homogeneity or mistrust instead. The latter two might report positive coefficients that in fact vindicate the general hypothesis of a negative effect. We therefore had our coders evaluate which direction a coefficient would need to take (negative or positive) to be in line with the negative diversity effect hypothesis. We used this information to transform all coefficients such that negative coefficients affirm the negative diversity effect hypothesis whereas positive ones do not.

Number of observations: The number of observations included in the estimation.

Number of variables: The number of variables included in the estimation including e.g. squared terms. and interaction terms. Categorical variables were counted as the number of categories (minus 1) and fixed effects was counted as the number of fixed effects.

Data: The name(s) of the data set(s) used in the estimation.

Type of trust: generalized social trust (e.g. trust in people in general, strangers), ethnic out-group trust (e.g. trust in immigrants (for natives), people belonging to other religious denominations or nationalities, or people speaking other languages), ethnic in-group trust (the opposite of out-group trust, i.e. trust in people from one's own group), and trust in neighbors (including "people in vicinity"), and a residual “other” category, which contain types of social trust (as defined in the protocol) not covered by the other targets, including composite scales mixing different types of social trust.

Context size: Neighborhood (locally defined neighborhoods, ego-hoods, census tracts), Municipality/regions (zip codes, districts, municipalities, MSA/PMSA's, counties, regions), and Country (countries).

Control variables: Whether the estimate was adjusted for a) interethnic contact, b) contextual socioeconomic disadvantage, c) level of contextual crime, d) respondent's socioeconomic status, e) whether the respondent is an ethnic minority, and f) other diversity predictors.

C Meta-Analytical Strategy

This section gives a more detailed description of out meta-analytical procedure. First, we give more background on the generation of partial correlation coefficients, their interpretation and the consequences of using them (i.e., having to drop non-multilevel aggregate studies and those relying on subjective assessments of ethnic diversity). We then explain our two-step meta-analytical estimation approach in more detail. We clarify that our approach is imperfect and cannot live up to the highest standards of meta-analysis found in meta-analysis of experimental studies, but that it also seems highly robust to alternative modeling approaches.

Outcome Variable: Partial Correlation Coefficient

The final sample of coded studies report various types of effects and related uncertainty estimates. For instance, some report linear slope coefficients and standard errors, others report logit coefficients and *t*-values. Because the aim of a meta-analysis is to estimate an overall coefficient, these different types of effect sizes need to be transformed to a common scale. In our project we do so by deriving a *t*-value, the number of observations, and the overall number of predictor variables contained in the respective regression model. From this information, we can finally derive a partial correlation coefficient and an associated standard error, by using the *escalc* function contained in the R package *metafor* version 2.1-0 (Viechtbauer 2010). Following Aloe and Thompson (2013), our meta-analysis thus relies on partial correlation coefficients along with their squared standard errors, and estimates the overall partial correlation between ethnic diversity and social trust. The advantage of this metric for our endeavor is that a partial correlation coefficient can be derived from every reported type of effect.

Formally, a partial correlation is the correlation between the residuals resulting from regressing both the dependent variable (i.e., social trust) and the predictor (i.e., ethnic diversity) on the control variables contained in a given regression (e.g., age, socio-economic status, neighborhood deprivation). A partial correlation is thus the correlation between ethnic diversity and social trust that is statistically adjusted for all other variables contained in the respective regression model. Like the common correlation, the partial correlation is bounded between -1 and 1, which respectively indicate a perfect negative or positive association.

For our analysis, it is, however, important to note that the partial correlations almost certainly cannot reach the extremes of -1 and 1. The reason is that we are largely dealing with results from multilevel analyses. That is, the dependent variable contains both within context-level (cluster) variation (i.e., variations in social trust between individuals living in the same social settings such as a neighborhood or a country) and between context-level (cluster) variation (i.e., variations in average levels of social trust between social settings). Typically, the between cluster variation of attitudinal variables such as social trust does not exceed 10% of the overall variation (Snijders & Bosker 2012). The predictor variable we are interested in only varies between clusters. It can hence only account for the share of between cluster variation of the dependent variable (i.e., approximately 10%). Inevitably, this severely limits the potential range of the partial correlation coefficient. The following back-of-the-envelope calculation might help to illustrate. In the highly unlikely event, where 10% of the dependent variable's variation (remaining after control variables have been accounted for) varies between clusters, and all of this between-cluster variation can be perfectly explained by ethnic diversity, we would have a partial correlation coefficient of $\rho_{xy \cdot z} = \sqrt{0.1} \approx 0.32$ and $R^2 = 0.1$, although the association is perfect.

This has two important implications. First, it means that the reported and overall meta effect sizes are actually larger than they might initially appear. Our overall meta estimate of $\rho_{xy \cdot z}$ =-0.0256 implies, after all covariates have been accounted for, an addition to the overall $R^2 = -0.0256^2 = 0.00066$. Against our back of the envelope calculation, this may best be regarded as an addition of ${0.00066}/{0.1} = 0.66\%$ to the model's aggregate between-cluster R^2, after all other covariates have been taken into account.

The second important implication is that estimates from aggregate-level analyses and analyses of subjective ethnic diversity measures are not straightforwardly comparable to other estimates. The reason is that in aggregate analyses, the dependent variable contains no within cluster variation, while subjective ethnic diversity measures do contain within-cluster variation. In consequence, both types of analysis could, in theory, produce absolute partial correlation coefficients of 1, whereas this is analytically impossible in the multilevel analysis set up (given that there is within variance, i.e., ICC < 1). This makes the partial correlation coefficients coming from the two former types of analyses incommensurable to the estimates from the vast majority of studies.

Meta-Analytical Procedure

To analyze our meta data, we use meta-analytical multilevel random effects models as implemented in the R *metafor* package version 2.1-0 (Viechtbauer 2010). We opted for a random effects meta-analysis because the variation across the partial correlation is clearly not exclusively driven by sampling variation, but by substantial differences in study design, many of which we are interested in as moderators of the overall meta estimate. Moreover, we use a recently-developed multilevel version of random effects meta-analysis that allows us to model dependencies between the estimates (Konstantopoulos 2011). In our meta-analysis, dependencies particularly arise from the fact that most studies perform secondary data analysis of widely-used survey data such as the European Social Survey (ESS) or the World Values Survey (WVS). Unfortunately, it is not possible to perfectly identify the dependencies between estimates. To illustrate, some analyze a single wave of the WVS (e.g., Park & Subramanian 2012) while others pool several waves of the WVS and European Values Survey (e.g., You 2012). The samples of these two articles are hence partly overlapping in a way that is not identifiable without having the actual data. Because of these difficulties we decided to add a random effect for the data used, which ignores the specific years of survey waves used. Thereby, we still hope to at least capture similarities that all, for example, WVS data share.

While the random effect captures some dependencies, it does not tackle the issue that our 1,001 partial correlations stem from 87 studies and within each study tend to differ only in terms of research design (e.g., type of social trust, context size) and model specification (i.e., control variables). This breaches the cardinal assumption of meta-analysis that the different effect estimates derive from independent samples. For reasons discussed in the previous paragraph, we are not able to solve this problem perfectly. In fact, we believe that the development of better strategies to meta-analyze questions such as the current one is an important task for future research. Here, we decide for what we believe is an imperfect, yet, in our view, best option given the current state of art. Following Card (2015), we apply a two-step procedure in which we first meta-analyze the coefficients of each study, thereby obtaining an overall meta-estimate per study that we collectively call *study-pooled estimate*s. In a second step we then meta-analyze these study-pooled estimates to get the overall meta estimate of the relation between ethnic diversity and social trust (Figure E.1 below compares the overall meta estimate based on our procedure and the one-step direct one based on all 1,001 coefficients).

In subsequent analyses, where we investigate how far a specific study characteristic such as the type of trust analyzed moderate the overall results, we slightly modify our two-step procedure. The first step derives study-pooled estimates for specific categories of the moderator. For instance, Stolle et al. (2013)

report estimates of the effect of ethnic diversity on both generalized social trust and out-group trust. We pool by study and by type of trust so that for this study we accordingly obtain two estimates. To acknowledge the dependency arising from this strategy, we add a third random effect (in addition to data used) for the study. An alternative to this strategy would be to estimate a multilevel random effects meta-analysis on all 1,001 estimates with the two (cross-classified) random effects and all moderators at once. Results based on this strategy are highly similar and displayed in Figure F.1 in Section F. Although clearly imperfect, our results are thus robust to a wide range of potential meta-analytical modeling strategies.

D Description of the Final Sample

Table D1 lists the included studies (sorted by author) and the number of estimates used per study. The table also lists the study-pooled estimates (see Section C) and the associated standard error (both multiplied by 100 to avoid loss of information). This information corresponds to the information in the forest plot reported in Figure 1 in the main text. The fourth column of Table D1 displays the average partial coefficient, which simply is the partial coefficient averaged within studies. The correspondence between the study-pooled partial coefficient and the average partial estimate is evident (in fact, the coefficients are identical for studies with only one estimate).

The last two columns of Table D1 show the modal type of context and the modal type of trust. At the study level, the most prevalent trust type is “Generalized trust”, which is the modal category in 47 studies (54% of all studies), while “Neighborhood” is the most frequently occurring type of context being the modal category in 36 studies (41 %).

This pattern is also evident at the estimate level. Table D2 shows that our sample contains 434 estimates from 57 studies for “Generalized trust” and 606 estimates from 37 studies where the context is “Neighborhood”. The fourth and fifth columns of Table D2 correspond to the predictions in Figure 3 and 4 in the main text.

Returning to the estimate-level, Table D3 shows the share of estimates that are adjusted for various co-variates (those described in Figure 5 in the main text). More than 3 out of 4 estimates are adjusted for contextual deprivation, individual socioeconomic status as well as immigrant status. Perhaps surprisingly, nearly 50% of the estimates are based on models that include more than one diversity predictor.

Table D.1: Final sample of studies

Study	Number of estimates used	Study-Pooled Estimate (x100)	SE of Study-Pooled Est. (x100)	Avg. Partial Coefficient (x100)	Modal Type of Trust	Modal Context Type
Abascal & Baldassarri (2015)	172	-0.95	0.12	-1.03	Ethnic/religious out-group	Neighborhood
Aizlewood & Pendakur (2007)	6	0.53	1.22	0.53	Other	Municipality/Region
Alesina & La Ferrara (2002)	10	-1.98	0.91	-1.68	Generalized other	Municipality/Region
Anderson & Paskeviciute (2006)	6	-0.87	0.21	-0.88	Generalized other	Country
Ariely (2014)	8	-0.35	0.20	-0.35	Generalized other	Country
Bakker & Dekker (2012)	5	-1.76	1.14	-1.76	Neighbors/people in local area	Neighborhood
Buzasi (2015)	6	0.69	0.76	0.69	Ethnic/religious in-group	Municipality/Region
Bécares et al. (2011)	12	-0.32	0.84	-0.25	Neighbors/people in local area	Neighborhood
Costa & Kahn (2003)	4	-3.86	1.13	-3.86	Generalized other	Municipality/Region
Crepaz (2006)	1	-1.77	0.88	-1.77	Generalized other	Country
Demireva & Heath (2014)	12	-2.18	0.84	-2.84	2 or more modal values	Neighborhood
de Vroome et al. (2013)	2	-3.58	2.58	-4.24	Generalized other	Neighborhood

Study	Number of estimates used	Study-Pooled Estimate (x100)	SE of Study-Pooled Est. (x100)	Avg. Partial Coefficient (x100)	Modal Type of Trust	Modal Context Type
Dinesen (2013)	2	-1.49	0.92	-1.49	Generalized other	Country
Dinesen & Sønderskov (2012)	8	-0.86	0.59	-0.86	Generalized other	Municipality/Region
Dinesen & Sønderskov (2015)	9	-3.72	0.42	-3.69	Generalized other	Neighborhood
Dinesen et al. (2019a)	6	-4.57	0.72	-4.58	Generalized other	Neighborhood
Dingemans & van Ingen (2015)	2	1.02	0.29	1.02	Generalized other	Country
Dyck (2012)	2	-5.64	1.11	-5.66	Generalized other	Municipality/Region
Falk & Zehnder (2013)	2	-2.47	0.91	-2.47	Generalized other	Municipality/Region
Gereke et al. (2018)	5	-5.27	1.35	-4.18	Generalized other	Neighborhood
Gerritsen & Lubbers (2010)	12	0.17	0.11	0.38	Ethnic/religious out-group	Country
Gesthuizen et al. (2009)	6	-0.39	0.37	-0.39	Generalized other	Country
Gijsberts et al. (2012)	3	-0.70	2.02	-0.69	Generalized other	Neighborhood
Goldschmidt et al. (2017)	19	-5.78	1.10	-5.74	Neighbors/people in local area	Neighborhood
Guest et al. (2008)	12	-6.01	0.52	-6.01	Neighbors/people in local area	Neighborhood
Gundelach & Freitag (2014)	4	-10.94	1.90	-10.93	Neighbors/people in local area	Neighborhood

Study	Number of estimates used	Study-Pooled Estimate (x100)	SE of Study-Pooled Est. (x100)	Avg. Partial Coefficient (x100)	Modal Type of Trust	Modal Context Type
Gundelach & Manatschal (2017)	1	-6.20	1.48	-6.20	Generalized other	Municipality/Region
Gundelach & Traunmueller (2014)	14	-1.15	0.38	-1.15	Generalized other	Municipality/Region
Gundelach (2014)	5	0.77	0.34	0.77	Ethnic/religious out-group	Country
Gustavsson & Jordahl (2007)	18	-4.88	0.67	-5.89	Generalized other	Municipality/Region
Hooghe et al. (2009)	8	-0.70	0.19	-0.66	Generalized other	Country
Hou & Wu (2009)	58	-0.51	0.21	-0.63	Neighbors/people in local area	Neighborhood
Håkansson & Sjöholm (2007)	5	-16.68	1.23	-16.65	Generalized other	Municipality/Region
Ivarsflaten & Stømsnes (2013)	3	-2.81	0.75	-2.81	Generalized other	Municipality/Region
Iyer et al. (2005)	4	-7.94	0.33	-7.96	2 or more modal values	Municipality/Region
Kasara (2013)	10	0.57	2.67	0.57	Ethnic/religious out-group	Municipality/Region
Kesler & Bloemraad (2010)	1	0.29	0.39	0.29	Generalized other	Country
Kokkonen et al. (2014)	58	-1.71	0.08	-1.72	Generalized other	Country

Study	Number of estimates used	Study-Pooled Estimate (x100)	SE of Study-Pooled Est. (x100)	Avg. Partial Coefficient (x100)	Modal Type of Trust	Modal Context Type
Koopmans & Schaeffer (2015)	6	-3.64	0.97	-3.64	Neighbors/people in local area	Municipality/Region
Koopmans & Schaeffer (2016)	3	-6.19	1.47	-6.45	Neighbors/people in local area	Neighborhood
Koopmans & Veit (2014)	6	-6.50	0.84	-6.43	Neighbors/people in local area	Municipality/Region
Koster (2013)	6	-0.10	0.16	-0.10	Generalized other	2 or more modal values
Lancee & Dronkers (2008)	13	-3.53	1.10	-3.53	Neighbors/people in local area	Neighborhood
Lancee & Dronkers (2011)	30	-1.11	0.58	-1.11	2 or more modal values	Neighborhood
Laurence (2011)	2	-2.78	0.76	-2.78	Neighbors/people in local area	Neighborhood
Laurence (2013)	1	-4.02	1.29	-4.02	Neighbors/people in local area	Neighborhood
Laurence (2017)	2	-4.53	0.91	-4.53	Neighbors/people in local area	Neighborhood
Leigh (2006)	20	-2.62	0.65	-2.62	2 or more modal values	Municipality/Region
Levels et al. (2015)	3	0.20	0.40	0.22	Generalized other	Municipality/Region
Lolle & Torpe (2011)	14	0.04	0.20	0.12	Generalized other	Country

Study	Number of estimates used	Study-Pooled Estimate (x100)	SE of Study-Pooled Est. (x100)	Avg. Partial Coefficient (x100)	Modal Type of Trust	Modal Context Type
Lundåsen & Wollebæk (2013)	7	-4.09	0.57	-4.09	Neighbors/people in local area	Neighborhood
Marschall & Stolle (2004)	3	10.88	2.35	11.66	Generalized other	Municipality/Region
Mavridis (2015)	20	-0.68	0.31	-0.67	Neighbors/people in local area	Municipality/Region
McShane (2017)	3	-0.39	0.63	-0.39	Generalized other	Municipality/Region
Mendolia et al. (2016)	36	-2.23	0.35	-2.11	Generalized other	Neighborhood
Morales & Echazarra (2013)	102	-0.79	0.36	-0.53	2 or more modal values	Neighborhood
Olson & Li (2015)	2	-0.26	0.25	-0.26	Generalized other	Country
Park & Subramanian (2012)	2	-0.33	0.35	-0.33	Generalized other	Country
Pendakur & Mata (2012)	2	1.41	2.00	1.41	Other	Municipality/Region
Phan (2008)	1	0.68	0.56	0.68	Generalized other	Neighborhood
Posel & Hinks (2012)	2	-1.37	0.62	-1.37	2 or more modal values	Neighborhood
Putnam (2007)	2	-2.01	0.56	-2.01	Neighbors/people in local area	Neighborhood
Reeskens & Wright (2013)	4	-0.58	0.26	-0.58	Generalized other	Country

Study	Number of estimates used	Study-Pooled Estimate (x100)	SE of Study-Pooled Est. (x100)	Avg. Partial Coefficient (x100)	Modal Type of Trust	Modal Context Type
Robinson (2017)	16	1.00	0.24	2.39	2 or more modal values	Municipality/Region
Rothwell (2012)	27	1.20	0.78	1.21	Generalized other	Municipality/Region
Rudolph & Popp (2010)	3	0.81	2.07	0.81	Ethnic/religious out-group	Municipality/Region
Schaeffer (2013)	7	-2.86	0.76	-2.86	Neighbors/people in local area	Municipality/Region
Sibley et al. (2013)	2	-3.48	0.88	-3.48	Generalized other	Neighborhood
Soroka et al. (2007a)	8	-3.17	0.58	-3.03	Generalized other	Neighborhood
Soroka et al. (2007b)	1	-7.79	1.62	-7.79	Other	Neighborhood
Stolle & Harell (2013)	2	-1.65	0.51	-1.65	Generalized other	Neighborhood
Stolle et al. (2008)	5	-10.79	2.10	-9.90	Other	Neighborhood
Stolle et al. (2013)	8	-0.11	1.06	0.02	2 or more modal values	Neighborhood
Sturgis et al. (2011)	4	-4.16	1.56	-4.14	2 or more modal values	Neighborhood
Tatarko et al. (2017)	1	-2.01	2.21	-2.01	Generalized other	Municipality/Region
Tesei (2015)	12	-1.97	0.34	-1.97	Generalized other	Municipality/Region
Tolsma & van der Meer (2017)	40	-4.97	0.57	-4.95	2 or more modal values	Neighborhood

Study	Number of estimates used	Study-Pooled Estimate (x100)	SE of Study-Pooled Est. (x100)	Avg. Partial Coefficient (x100)	Modal Type of Trust	Modal Context Type
Tolsma et al. (2009)	2	-2.69	1.30	-2.69	Generalized other	2 or more modal values
Traunmueller (2011)	4	-0.37	0.63	-0.37	Generalized other	Municipality/Region
Uslaner (2011)	3	-3.34	1.94	-2.71	Generalized other	Municipality/Region
Vidyattama (2017)	16	-2.04	0.93	-2.01	Generalized other	Neighborhood
Wollebæk et al. (2012)	6	-2.71	1.18	-2.71	2 or more modal values	Neighborhood
Wu et al. (2018)	4	-2.34	0.46	-2.33	Neighbors/people in local area	Neighborhood
You (2012)	3	-0.31	0.15	-0.34	Generalized other	Country
Ziller (2015)	8	-0.53	0.19	-0.52	Generalized other	Municipality/Region
Ziller (2017)	3	-0.70	0.15	-0.70	Generalized other	Country
Öberg et al. (2011)	3	-7.90	1.51	-7.89	Neighbors/people in local area	Municipality/Region

Table D.2: Descriptive statistics across types of trust and contexts

Moderator	# estimates	# studies	Prediction (x100)	SE of prediction (x100)
<u>TRUST TYPE</u>				
Generalized trust	434	57	-1.82	0.44
Trust in neighbors	312	30	-3.78	0.53
Out-group trust	146	12	-1.31	0.76
Ethnic/religious in-group	54	5	-2.15	1.05
Other	55	9	-2.88	0.89
<u>CONTEXT TYPE</u>				
Neighborhood	606	37	-3.18	0.52
Municipality/Region	251	37	-2.25	0.54
Country	144	19	-1.33	0.75

Table D.3: Descriptive statistics, co-variate adjustment

Share of all estimates adjusted for…

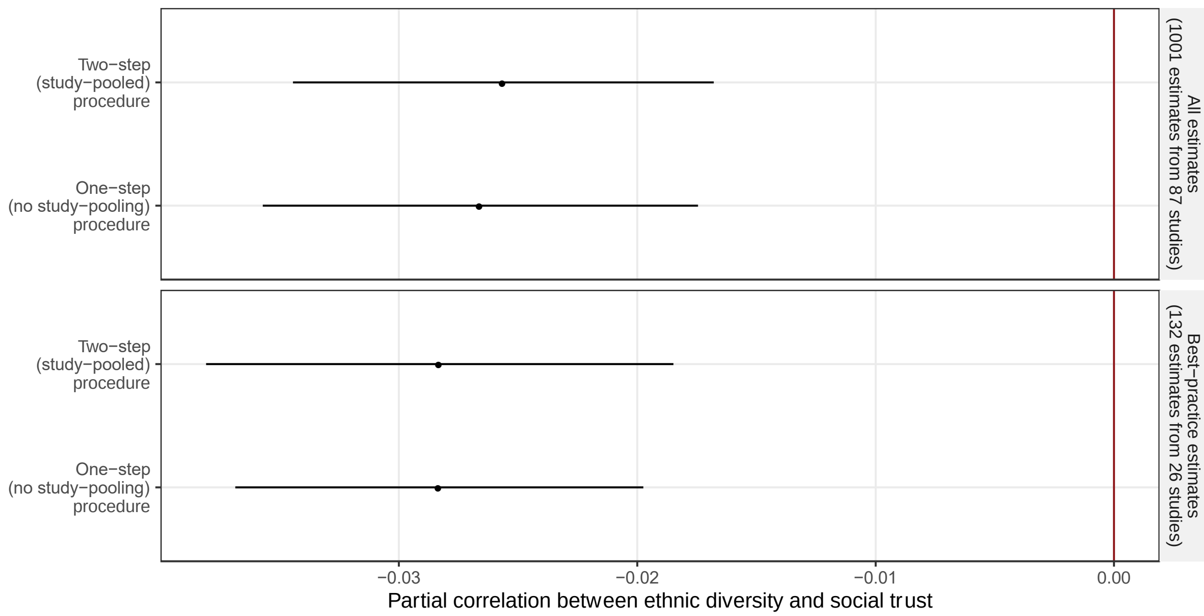
Interethnic contact	Contextual SES deprivation	Individual SES status	Contextual crime	Individual minority status	Additional diversity predictors
0.07	0.75	0.86	0.19	0.83	0.49

E The Overall Meta Estimate

As we explain in Section C, there are different ways how to estimate an overall meta coefficient of the association between ethnic diversity and social trust. All of these are imperfect, because we cannot fully address the dependencies between the various estimates reported across the 87 studies and their 1,001 estimates. That said, we can check to which extent the two approaches, which we discussed as most viable, produce diverging results. This is what this section discusses.

Figure E.1 shows four overall meta estimates, which differ in two dimensions. First, they differ with respect to whether we use the outlined two-step procedure (see Section C), or whether we analyze all 1,001 partial correlations in a single model with two cross-classified random effects and their inter-correlation. Second, they differ with respect to whether the overall meta estimate is based on all partial correlations (upper panel), or whether it is based on a subset of studies that conform to the best-practice criteria we conclude in the main article (lower panel).

Figure E.1: Overall meta estimates using different procedures



Note: Predictions and 95% confidence intervals based on two types of multivariate multilevel random effects meta-analyses.

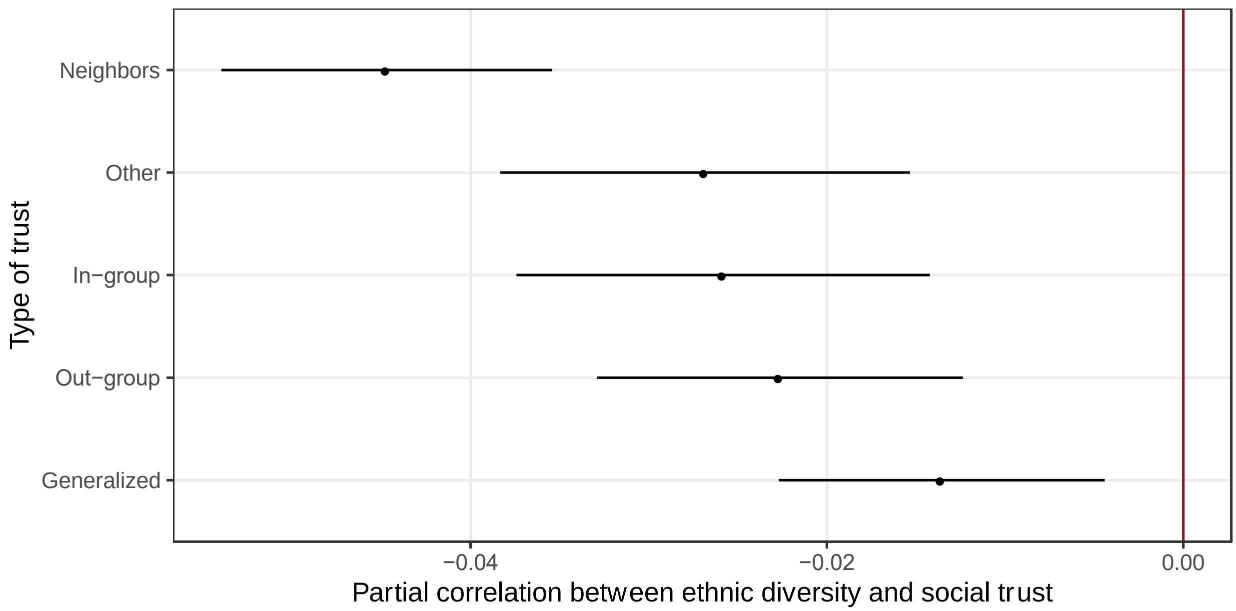
Focusing on the upper panel, that is, the overall meta estimates based on all partial correlations, we see that the two different estimation procedures result in highly similar estimates. This suggests that the results we report are pretty robust to two complementary modeling procedure, a conclusion that is further supported in Section H.

The lower panel focuses on partial correlations that live up to our best-practice conclusions. That is, the sample of partial correlations includes only such estimates that are conditioned on individual socio-economic status, contextual socio-economic deprivation, and minority status, which are not conditioned on alternative diversity predictors, which may or may not be conditioned on crime or inter-ethnic contacts, and which are finally based on small-scale neighborhood contexts and predict either trust in neighbors or generalized trust. As we discuss in the main article, this subsetting hardly alters the overall meta estimates but of course decreases their precision somewhat due to a much smaller number of partial correlations that can be pooled. For this section, it is important to notice that the two meta-analytic procedures again result in highly similar results, including the fact that the procedure we rely on gives the more conservative (i.e., weaker) overall meta estimate of -0.0256 (SE = 0.0044) as compared to -0.0266 (SE = 0.0047) for the one-step procedure.

F Moderation Results Based on the One-Step Procedure

The one step multilevel meta-analytic random effects model is not only an alternative to the estimation of the overall meta coefficient. It may also be used to investigate the moderators in one single overall model. This has the advantage that the results are conditioned on the other moderators in a multivariate way. At the same time, this approach has the down-side that studies which report a much higher number of coefficients (e.g., many robustness tests of the same relationship) will be weighted more strongly. Here we report the results of this approach and compare them to the ones reported in the main article. As in the main article, we report predicted values based on the overall model along with confidence intervals that test against the null hypothesis of no effect (i.e., a true coefficient of zero). Estimates are a bit more difficult to compare because the single reference category differs from the three reference categories of the three separate analyses on which the results reported in the main article depend. We thus only report predicted values here.

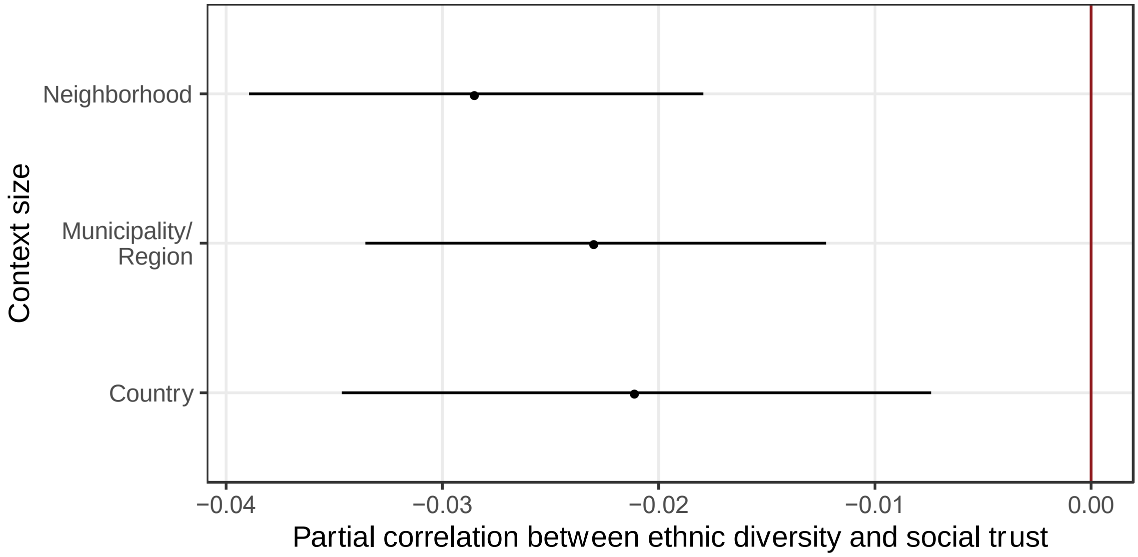
Figure F.1: Replication of Figure 2 using the one-step procedure



Note: Predictions and 95% confidence intervals based on a multivariate multilevel random effects meta-analysis based on 1,001 estimates from 87 studies.

Figure F.1 shows results for the different types of trust. In general, we see the same pattern as in Figure 2 of the main article. The primary divergence is that generalized trust, based on this analysis, comes out with the weakest association to ethnic diversity of all types of trust. However, this is because all other forms of trust appear to show overall more negative associations as when we apply our two-step procedure. In other words, the predictions for generalized trust are in fact pretty similar across procedures, but the one-step procedure produces stronger estimates for all other types of trust. This again confirms that we chose the more conservative procedure. Another difference in the one-step procedure results is that we observe significant negative associations between ethnic diversity and all forms of trust, including out-group trust, which thus supports Putnam's (2007) anomie mechanism further.

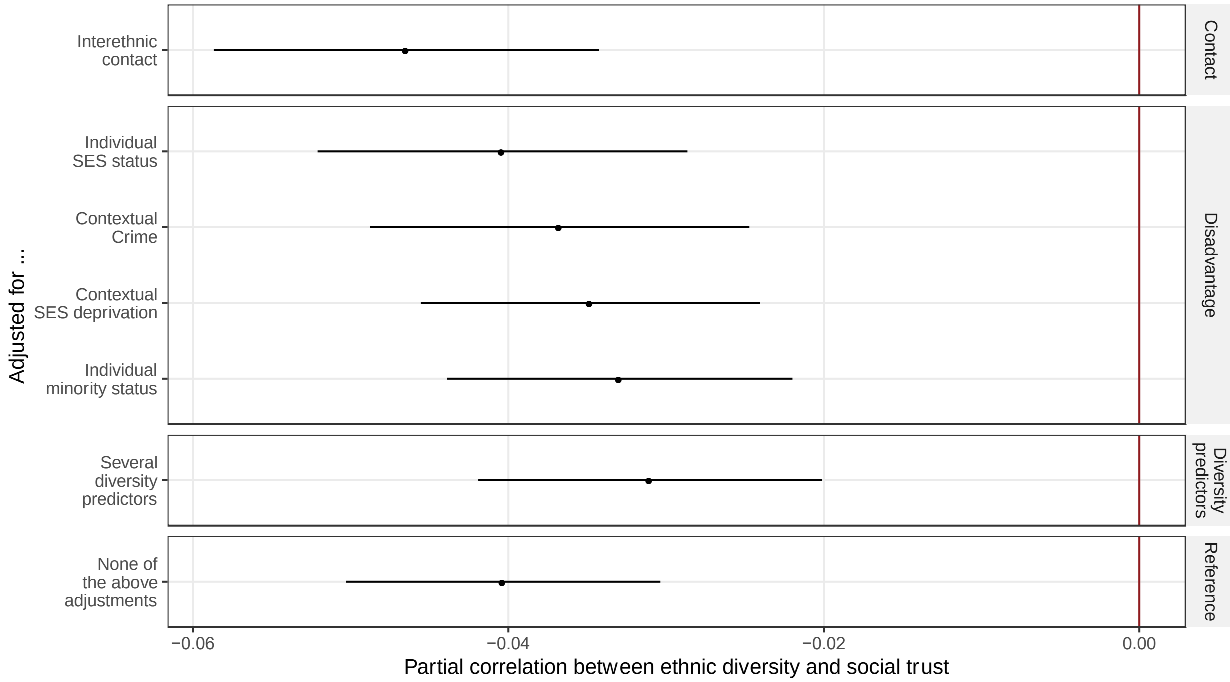
Figure F.2: Replication of Figure 3 using the one-step procedure



Note: Predictions and 95% confidence intervals based on a multivariate multilevel random effects meta-analysis based on 1,001 estimates from 87 studies.

Figure F.2 shows results for context size. Here the pattern of results mirrors those reported and discussed in the main article. The smaller the contextual unit, the stronger the negative relation between ethnic diversity and social trust. The primary difference between the one-step and two-step analysis is that country analysis come out as providing significant support of a negative association between ethnic diversity and social trust, which is not the case based on our two-step procedure. We are therefore cautious to conclude that there is systematic evidence for the country level.

Figure F.3: Replication of Figure 4 using the one-step procedure



Note: Predictions and 95% confidence intervals based on a multivariate multilevel random effects meta-analysis based on 1,001 estimates from 87 studies.

Figure F.3 finally replicates Figure 4 of the main text. Without going into too much detail, Figure F.3 supports all results discussed in the main article. Generally speaking, conditioning on various indicators of socioeconomic disadvantage only changes the association between ethnic diversity and social trust little. Conditioning on interethnic contact even slightly strengthens the relationship. Including several indicators of ethnic diversity is the most consequential at it reduces the relationship between ethnic diversity and trust by about a fourth.

In conclusion, the general patterns and insights discussed in the main article hold irrespective of whether we employ the two-step meta-analytical procedure on which results in the main article are based or the one-step model used here. The major difference is that the applied two-step procedure results in overall weaker and hence more conservative estimates.

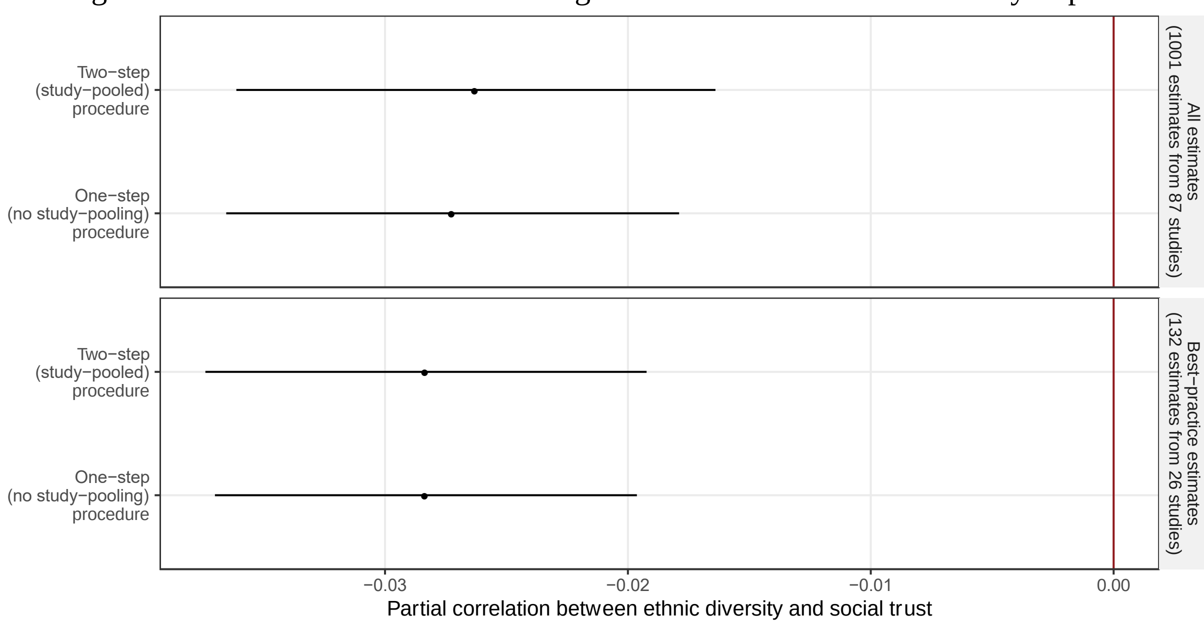
G Results Based on Fixed Effects Meta-Analysis

Our analyses rely on (multilevel) random effects meta-analyses, with the alternative being (multilevel) fixed effects meta-analysis. The difference between the two approaches is that a fixed effects meta-analysis assumes that all reported estimates are estimates of the same population parameter and that they differ only because of sampling variation. A random effects meta-analysis by contrast adds a second form of error stemming from heterogeneity between the studies. Studies might have been conducted in different countries or used different operationalizations of the outcome or predictors. This is obviously the case for our meta-analysis, which is why we chose to use the random effects approach.

A potential critique of the random effects approach is, however, that the second form of error is constant across studies. By adding this constant error, the relative difference between precise and less precise estimates is effectively shrunk. In other words, fixed effects meta-analysis may be regarded as weighting unreliable estimates down even more than its random effects counterpart.

Given this potential concern, we here report overall meta estimates that are completely based on multilevel fixed effects meta-analysis (i.e., for both steps of our two-step procedure). Figure G.1 displays the results and can be directly compared to Figure E.1. Figure G.1 shows that based on multivariate multilevel fixed effects meta-analyses we come to the same conclusion of a moderately-sized significantly negative overall meta estimate of the relation between ethnic diversity and social trust. The two-step procedure based on all study-pooled estimates is -0.0263 (SE = 0.0050) and -0.0283 (SE = 0.0044) if based on the best-practice estimates. The one-step procedure suggests an overall coefficient of -0.0272 (SE = 0.0048) if based on all estimates, and -0.0283 (SE = 0.0044) if based on the best-practice estimates. If at all, the fixed effects approach suggests an even slightly more negative relationship. In other words, the main article is based on the more conservative approach.

Figure G.1: Overall meta estimates using different fixed effects meta-analysis procedures



Note: Predictions and 95% confidence intervals based on two types of multivariate multilevel fixed effects meta-analyses

H Testing for Publication Bias

Meta-analysis is a powerful tool to systematize the overall results of a quantitative literature field. If that pattern is, however, driven by publication bias (i.e., null-findings are not being published), the results of a meta-analysis can be affected by that bias, too. Stanley and Doucouliagos (2008; 2015) suggest to analyze publication bias by using an estimate's standard error as a predictor in a regression that is weighted by the inverse of the variance of that estimate $1/_{\mathrm{Var}(\rho_{yx\cdot z})}$. If the standard error significantly predicts the size of the partial correlation $\rho_{yx\cdot z}$, this is a sign of publication bias. That is, estimates that are suggesting a particularly strong relation between ethnic diversity and trust would be systematically less precise and trustworthy. Despite publication bias, the evidence from a literature can nevertheless suggest an overall systematic association if the intercept is significantly different from zero. The idea here is that the intercept is the expected $\rho_{yx\cdot z}$, when the standard error is zero. That is, the expected $\rho_{yx\cdot z}$ of a perfectly-precise association. Note that this test is obviously rather stringent, since a standard error of zero is an impossible scenario. For a recent application of these techniques in the social sciences, see Auspurg et al. (2019).

Table H.1 presents results of such models. Model 1 is a simple weighted least squares model based on the 87 study-pooled estimates. It perfectly applies the technique suggested by Stanley and Doucouliagos (2008; 2015), but thereby does not take dependencies into account that arise from articles relying on the same populations (e.g., The ESS or WVS). In line with our main article, Model 2 is a random intercept model with random effects for this type of clustering. Model 3 and Model 4 are also random intercept models, but they are based on all 1,001 single estimates rather than the study-pooled estimates. Model 3 mirrors Model 1 in that it only considers clustering by article, Model 4 mirrors Model 3 and additionally takes clustering of study populations into account, too.

Table H.1: Weighted regressions testing for publication bias

	Study-Pooled Estimates		**Single Estimates**	
	Model 1 WLS	Model 2 WML	Model 3 WML	Model 4 WML
Intercept	-0.005*	-0.002	-0.023***	-0.028***
	(0.002)	(0.003)	(0.004)	(0.005)
Standard error	-2.134**	-2.544***	0.167	0.225
	(0.658)	(0.683)	(0.170)	(0.171)
Estimates	87	87	1001	1001
Samples		51		52
Articles			87	87

Note: ***p < 0.001, **p < 0.01, *p < 0.05; standard errors in parentheses.
Results are weighted by the inverse of the variance of the partial correlation coefficients.
WLS is a weighted least squares regression, and WML are weighted multilevel (i.e., random intercept) regressions.

Across the four models we find inconsistent evidence suggesting publication bias. The two models that are based on the study-pooled estimates find significant evidence of publication bias. Studies with a rather imprecise study-pooled estimate tend to have more negative study-pooled estimates. When we look at the single 1,001 effect estimates reported in the 87 studies, however, we find no such pattern; the coefficient testing for publication bias is not only insignificant but even shows in the opposite direction.

Do the results suggest that there is nevertheless evidence of a significant association between ethnic diversity and trust, despite this weak indication of a potential publication bias? The answer is overall 'yes'. Three of the four intercepts are statistically significant, thereby suggesting that even for the highly-unlikely scenario of perfectly-estimated (i.e., standard error of zero) the overall results suggest a significantly negative $\rho_{yx\cdot z}$. Model 2 deviates from this pattern. One should note however, that statistical power for a model based on 87 cases and a random effect is rather low. This is particularly true since Model 3 and Model 4 estimate intercepts that basically reflect our overall results.

In conclusion, there is tentative evidence of publication bias, but overall stronger evidence of a modest but systematic negative association between ethnic diversity and social trust as reported in the article.

I Replication data

All data necessary to replicate empirical results are available from [to be updated during typesetting].

J Acknowledgements

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