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Tax compliance across sociodemographic categories: Meta-analyses of survey studies in 111 countries.

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Tax compliance across sociodemographic categories: Meta-analyses of survey studies in 111 countries

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ABSTRACT

Tax compliance varies across sociodemographic categories. However, research on the relationships between compliance and age, sex, education as well as income level shows inconsistent results, both regarding the direction of the relationship and its size. The current meta-analyses target to merge findings in survey studies on age, sex, education, and income and estimate the strength of the impact on compliance by taking into account geographical regions. In four meta-analyses, comprising 459 samples ($N = 614,286$) from 111 countries published between 1958 and 2012, average estimated effect sizes were small, ranging from $r = 0.12$ for the relationship between compliance and age, $r = 0.06$ for sex, $r = -0.02$ for education to $r = -0.04$ for income. These effects are more pronounced in Western countries. It thus appears sociodemographic characteristics have little impact on compliance, but nevertheless should be controlled for in tax research.

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1. Introduction

Empirical studies suggest tax compliance to vary across sociodemographic categories (Ahmed & Braithwaite, 2004; Bobek, Roberts, & Sweeney, 2007; Kastlunger, Dressler, Kirchler, Mittone, & Voracek, 2010; Wenzel, 2007). While significant differences are confirmed between different occupational groups and their opportunities to evade, research on the relations between compliance and age, sex, education as well as income has yielded less clear results. While some studies (Ahmed & Braithwaite, 2004; Bobek et al., 2007; Kastlunger et al., 2010; Wenzel, 2007) show significant relations with compliance, others (Ashby, Webley, & Haslam, 2009; Braithwaite & Ahmed, 2005; Grasmick & Bursik, 1990; Muehlbacher, Kirchler, & Schwarzenberger, 2011) show no effect. As the impact of sociodemographic categories on tax compliance is not clear, some researchers include them in their studies (e.g., Ashby et al., 2009) and some neglect them (e.g., Muehlbacher & Kirchler, 2009). But sociodemograhics might confound with more complex variable connections and might even interact with some variables. Therefore, if there exists an impact of sociodemographics on tax compliance, it is essential to integrate them in research on tax compliance. The present study will give a clear picture of the impact of sociodemographics so that recommendations for the inclusion of them in tax compliance research can be made.

In the present paper we present four meta-analyses of survey studies which take into consideration the relationships between tax compliance and age, sex, education as well as income. As tax compliance has been found to differ across cultures

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and regions, we control for the geographical region (Western Europe, Eastern Europe & Central Asia, South Asia, East Asia & Pacific, Oceania, Middle East & North Africa, Sub-Saharan Africa, North America, Latin America & Caribbean).

2. Tax compliance in the light of sociodemographic characteristics

2.1. Age differences

The socialization of older generations differs from younger generations: social values, attitudes towards the state and towards taxes may change from one age cohort to another. Research on different age cohorts shows that socialization can take on dissimilar routes (Riley, Foner, & Warner, 1988). While based on shared life histories in one cohort, personal, social and societal norms might evolve which stimulate tax compliance, in other cohorts norms might evolve to undermine tax honesty. Hence, higher age might be related to more as well as to less tax compliance. With age the need for public goods such as social security and health care increases. Older citizens might, thus, treasure the benefits of taxes more than younger ones and be more compliant. Also, older persons might be in a better financial situation than younger ones. It is easier for them to afford being tax compliant due to fewer budget constraints. Having built up a comfortable home, having raised children, and earning more income than younger generations, gives them financial freedom which young citizens may lack (Kirchler, 2007). With increasing age taxpayers also accumulate experiences with their business, with taxes and tax authorities (Nordblom & Žamac, 2012). With increasing age, taxpayers acquire knowledge about the tax law which is associated with improved tax compliance (Eriksen & Fallan, 1996).

2.2. Sex differences

In general, women are found to behave more morally than men do and be less likely to break the law (Betz, O'Connell, & Shepard, 1989; White, 1999). Based on that finding, personal, social and societal norms of women should focus stronger on tax compliance than men's norms. Women are also assumed to engage stronger in social cooperation. This is supported by results from ultimatum games in which women offer higher shares of their endowment to anonymous interaction partners than men do (Eckel & Grossman, 2001). The hypothesis that women are more tax compliant than men bases also on findings that women tend to be generally less risk seeking in financial decisions (Barber & Odean, 2001; Croson & Gneezy, 2009). Women may perceive sanctions for misbehavior as more severe and threatening than men. Thus, female taxpayers should be more tax compliant than males.

2.3. Education differences

Empirical results are unclear. Higher education is related to better knowledge of tax law. Therefore, higher educated people understand the law and filing rules, while low educated people with little understanding are likely to make mistakes when filing their taxes. Higher education is also associated with better access to information on schemes to avoid taxes. Therefore, higher education may be related to lower evasion but higher avoidance tendencies. Low financial literacy in general and little knowledge on taxes in particular, thus, limited understanding of one's duties and opportunities may breed distrust and consequently non-compliance. A low level of education may be related to low tax compliance (Bobek et al., 2007). However, it was also found that high tax complexity, thus, limited understanding of one's tax duties and high insecurity, fuel compliance (Kirchler, 2007).

2.4. Income effects

Classical tax theory (Allingham & Sandmo, 1972) is inconclusive in regard to income and its effect on tax compliance. Tax payments reduce the amount of available income and therefore specifically hurt low-income earners which might result in risk seeking behavior. Consequentially, low income categories are hypothesized to be less tax compliant than high income categories. On the other hand, high income earners are assumed to be more likely to evade taxes than low income earners. Chung and Trivedi (2003) assume that high income is related to low compliance. High income earners pay an absolutely and relatively higher amount of taxes than low income earners and risk higher fines in cases of detected evasion which should yield to risk aversion (Ahmed & Braithwaite, 2004; Chung & Trivedi, 2003). The inconsistent findings might also derive from the fact that in many countries taxation is progressive: the higher the income the higher the applied tax rate. From this view, it is probably not high-income earners in general who evade more taxes but rather taxpayers at the verge between two income brackets, who avoid paying their fair share to stay in the lower-income bracket and pay relatively lesser taxes (Slemrod, 1985).

3. Factors fostering or diminishing the predictability of tax compliance through sociodemographic characteristics

Specifics of data collection can alter the relation between tax compliance and sociodemographic characteristics differing over regions.

Different geographical regions are associated with varying extent of tax compliance (Alm & Torgler, 2006). Countries' distinct political and societal histories have produced special sentiments towards the state as well as towards the tax system and tax compliance. Thus, diverse tax laws and tax systems in countries shape tax compliance (poll tax vs. progressive tax) (Roberts, Hite, & Bradley, 1994); severity of sanctions and audit probability (for a review see Andreoni, Erard, & Feinstein, 1998)). In this vein also norms differ over countries. As research has shown, norms that back up tax compliance are related to higher tax compliance (Wenzel, 2004). Taxpayers' perception how fairly they are treated by tax authorities is another determinant of tax compliance (Hartner, Rechberger, Kirchler, & Schabmann, 2008) and an aspect to differ over countries. Thus, in the current meta-analyses the following regions are distinguished based on the taxonomy of the World Bank (2014): Western Europe, Eastern Europe & Central Asia, South Asia, East Asia & Pacific, Oceania, Middle East & North Africa, Sub-Saharan Africa, North America, and Latin America & Caribbean.

4. Overview of the meta-analysis

We present a meta-analytic review distinguishing the impact of sociodemographic aspects on tax compliance. Specifically, we investigate with four analyses whether age, sex, education and income are overall significantly related to tax compliance, and we take into account that data were collected in different geographical regions.

5. Method

5.1. Study criteria

Three research assistants and one of the authors (C.B.) started with an informal selection of literature which was gathered for a comprehensive tax book (Kirchler, 2007). We went on with a systematic literature search in the scientific data bases PsycARTICLES, PSYNDEXplus, PsycInfo, EconLit, EBSCO, Scopus and ISI Web of Science using the keywords 'tax' or 'taxation' in combination with 'compliance', 'cooperation', 'flight', 'evasion', 'morale', 'attitudes', 'social norm', 'personal norm', societal norm', or 'motivation'. We applied a series of criteria to include or exclude, respectively, certain studies from the meta-analyses. First, we admitted only studies that either presented statistical numbers on the relation between age, sex, education, or income (e.g., Kastlunger et al., 2010) or made data on age, sex, education, income and tax compliance available for further statistical analyses (e.g., World Values Survey, 1981–2008). Second, we incorporated only studies in the analyses in which the dependent variable corresponded with our definition of tax compliance. Studies were only included if tax compliance corresponded with either attitudes towards tax compliance, behavioral intentions to comply with tax law, or actual tax evasion and honest tax payments. Finally, we included only survey studies (excluding laboratory and field experiments) for three reasons: (a) For the respective period of time we found only nine studies using experiments and reporting sociodemographic characteristics of the participants. Specifically, field studies are a relatively new method in tax research and, thus, publication are scarce in the respective period of time. (b) In surveys usually the samples exist of a wide range of study participants (differences in sex, age, income, education, occupation, etc.), but in laboratory experiments mainly students are tested. (c) Also, survey studies have been conducted all over the world, whereas experiments were conducted mainly in economics departments in North America, Europe and Australia.

Overall, we gathered 1519 papers on tax research published between 1958 and 2012.[1] Applying the exclusion and inclusion criteria we ended up with overall 459 samples which were appropriate for the current analyses (see Appendix for the effect sizes, the region of data collection, and the kind of dependent variable for all samples). Overall, the studies assessed data in 111 countries from 614,286 individuals (for each of the meta-analyses: age: $k = 411$, $N = 550,194$, 111 countries; sex: $k = 451$, $N = 569,476$, 111 countries; education: $k = 341$, $N = 438,925$, 110 countries; income: $k = 334$, $N = 390,105$, 110 countries).

5.2. Coding procedure

The research assistants and one of the authors (C.B.) coded the remaining 459 samples according to the region where the data was collected. We used an established categorization (World Bank, 2014) and distinguished between samples from Western Europe ($k = 151$), Eastern Europe & Central Asia ($k = 114$), South Asia ($k = 7$), East Asia & Pacific ($k = 29$), Oceania ($k = 16$), Middle East & North Africa ($k = 15$), Sub-Saharan Africa ($k = 17$), North America ($k = 19$) and Latin America & Caribbean ($k = 83$).

5.3. Overview of the analyses

The Pearson r correlation coefficient was selected as the uniformly applied measure of effect size, indicating the direction and magnitude of linear associations between the respective sociodemographic variables (age; sex: male = 1, female = 2; education, income) and tax compliance in the different samples. The value of r ranges between −1 and +1, whereby a number close to +1 indicates that there is a strong positive linear relation between the sociodemographic characteristics and the

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[1] A list of all papers is available upon request from E.H.

tax compliance (e.g., the higher taxpayers' age the more they comply with tax law), a number close to −1 indicates that there is a strong negative linear relation (e.g., the lower taxpayers' age the more they comply with tax law), and a number close to 0 indicates absence of a linear relation.

In a first step we estimate the average effect sizes for the relation between age, sex, education and income, respectively, and tax compliance with a random-effects model. The application of a fixed-effects model was suspended (Lipsey and Wilson, 2001), because we assumed that we did not gather the entire population of the relevant studies, and that there will be systematic differences between the samples beyond sampling error (e.g., as discussed, region of data collection, slightly differing definitions of tax compliance). We used two indicators, of heterogeneity (I^2) and of homogeneity (Q). As with sociodemographics a publication bias can be expected, that is that a substantial number of findings are not reported because of insignificant findings, we used Duval and Tweedie's (2000) trim-and-fill approach (with random effects) to estimate the number of samples which are missing in the meta-analyses holding smaller or higher effect sizes than the computed value. Subsequently, we calculated another random-effects model and additionally an indicator of homogeneity between groups (Q^*bet) to assess the impact of the region and of the method of data collection on the relations of sociodemographics and tax compliance.

6. Results

We first report the average relation of age and tax compliance, followed by the average relations of sex, education and income, and tax compliance. Throughout the results section we report overall average relations and examine them depending on the regions and methods of data collection.

6.1. The relation of age and tax compliance

For calculating the average effect size of the relation between age and tax compliance 411 samples were incorporated in the meta-analysis. As expected a significant positive relation between age and tax compliance was found ($r = 0.12$, $p < 0.001$, 95% CI [0.11; 0.13]). The index ($I^2 = 86.66\%$)[2] indicated that there existed heterogeneity between the samples. Also, the average effect size distribution contained more variation than would be expected by chance ($Q(410) = 3109.97$, $p < 0.001$).[3] Thus, there is a rather small but significant relation between the age of taxpayers and their tax compliance. The older taxpayers are, the more they tend to comply with tax law.

Testing whether the overall effect size is impaired by a publication bias, the trim-and-fill approach (Duval & Tweedie, 2000) showed that 32 samples above the estimated effect size would be needed to have a symmetric distribution of samples. This leads to a slightly larger effect size than the original one ($r = 0.13$; 95% CI [0.12; 0.14]) suggesting that there existed a publication bias by underrepresenting larger effect sizes.

6.1.1. The relation of age and tax compliance considering region

The Cochran Q between (Q^*bet) the different regions (Western Europe, Eastern Europe & Central Asia, South Asia, East Asia and Pacific, Oceania, Middle East & North Africa, Sub-Saharan Africa, North America, Latin America & Caribbean) indicated whether relations of age and tax compliance differed over regions. It ($Q^*bet = 251.73$, $df = 8$, $p < 0.001$)[4] revealed that there was a stronger positive relation in Eastern Europe & Central Asia ($r = 0.16$, $p < 0.001$, 95% CI [0.14; 0.17]) and North America ($r = 0.17$, $p < 0.001$, 95% CI [0.14; 0.19]). Further, it showed that there was still a significant but lower positive relation in East Asia & Pacific ($r = 0.07$, $p < 0.001$, 95% CI [0.06; 0.08]), Sub-Saharan Africa ($r = 0.06$, $p < 0.001$, 95% CI [0.04; 0.08]), and Latin America & Caribbean ($r = 0.07$, $p < 0.001$, 95% CI [0.06; 0.08]) and that there was no relation between age and tax compliance in South Asia ($r = 0.02$, $p = 0.15$, 95% CI [−0.01; 0.04]). Thus, the relation between age and tax compliance depended on the region, where the data was collected (Table 1).

6.2. The relation of sex and tax compliance

Overall, 451 samples were applied for the calculation of the average effect size of the relation between sex and tax compliance. As expected a significant positive relation between sex and tax compliance was found ($r = 0.06$, $p < 0.001$, 95% CI [0.05; 0.06]); females tend to comply with tax law more than men, but the effect was rather small. The index ($I^2 = 70.10\%$) did not indicate heterogeneity between the samples. However, the average effect size distribution contained more variation than would be expected by chance ($Q(450) = 1,505.02$, $p < 0.001$). Thus, there is a rather small but significant positive relation between the sex of taxpayers and their tax compliance. Women tend to comply more with tax law than men.

Checking whether the overall effect size is influenced by a publication bias the trim-and-fill approach (Duval & Tweedie, 2000) revealed that 11 samples above the estimated effect size would be needed to have a symmetric distribution of sam-

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[2] I^2 represents effect size metric for heterogeneity across studies. Values > 75% indicate considerable heterogeneity.

[3] Cochran Q assesses, whether observed differences in results are compatible with chance alone. A significant Q ($p < 0.10$) points out clearly heterogeneity.

[4] Cochran Q between different subgroups assesses, how overall Q differs from Q of the subgroups. The closer Q is 0, the fewer differences between the subgroups there are.

Table 1
Average correlations between compliance and age, sex, education and income by geographic region.

	Age				Sex				Education				Income			
	r	LL/UL	k	I^2 (%)	r	LL/UL	k	I^2 (%)	r	LL/UL	k	I^2 (%)	r	LL/UL	k	I^2 (%)
Total	0.12***	0.11/0.13	411	86.82	0.06***	0.05/0.06	451	70.10	−0.02***	−0.03/−0.02	341	79.44	−0.04***	−0.04/−0.03	334	80.67
Region																
Western Europe	0.14***	0.13/0.15	127	84.07	0.09***	0.08/0.10	151	70.63	−0.02**	−0.04/−0.01	88	84.60	−0.03***	−0.04/−0.02	114	70.83
Eastern Europe & Central Asia	0.16***	0.14/0.18	104	88.80	0.06***	0.05/0.06	114	59.00	−0.04***	−0.05/−0.03	92	72.64	−0.07***	−0.08/−0.06	102	78.36
South Asia	0.02	0.00/0.04	7	51.11	0.05**	0.02/0.08	7	69.17	−0.04	−0.09/0.01	7	88.12	−0.02	−0.07/0.04	7	90.22
East Asia & Pacific	0.07***	0.06/0.08	27	3.55	0.03***	0.01/0.04	29	59.21	−0.03**	−0.05/−0.01	24	66.33	−0.004	−0.02/0.01	27	55.74
Oceania	0.13***	0.08/0.17	17	87.80	0.08***	0.05/0.10	16	70.90	0.02	−0.02/0.05	12	74.44	−0.01	−0.05/0.03	14	81.10
Middle East & North Africa	0.10***	0.07/0.13	15	82.98	0.05***	0.02/0.08	15	79.66	−0.02	−0.05/0.01	14	80.26	−0.03*	−0.06/0.00	13	69.63
Sub-Saharan Africa	0.06***	0.04/0.08	17	69.95	0.02*	0.00/0.04	17	62.98	−0.03**	−0.05/−0.01	15	59.01	−0.03	−0.07/0.01	16	89.23
North America	0.17***	0.14/0.19	20	67.13	0.10***	0.08/0.11	20	12.47	0.01	−0.03/0.05	11	78.30	−0.03*	−0.06/0.00	15	74.39
Latin America & Caribbean	0.07***	0.06/0.08	82	58.15	0.03***	0.02/0.04	83	50.23	−0.002	−0.02/0.01	78	76.54	0.007	−0.02/0.03	29	82.81

Note: sex: male = 1, female = 2; df = N − 1 for all subgroups; LL/UL ... 95% confidence interval with lower limit/upper limit, k ... number of studies, I^2 ... percentage of heterogeneity of the studies.
  * p < 0.01.
  ** p < 0.05.
  *** p < 0.001.

ples. This shows an effect size slightly larger than the original one (r = 0.06; 95% CI [0.05; 0.06]) suggesting that there exists a very small publication bias by underrepresenting larger effect sizes.

6.2.1. The relation of sex and tax compliance considering region

The Cochran Q between the different regions showed that there was a difference over regions regarding the relation between sex and tax compliance ($Q*bet$ = 133.63, df = 8, p < 0.001). The relation was slightly stronger in Western Europe (r = 0.09, p < 0.001, 95% CI [0.08; 0.10]) and North America (r = 0.10, p < 0.001, 95% CI [0.08; 0.11]). Additionally, there were significant but lower correlations in East Asia & Pacific (r = 0.03, p < 0.001, 95% CI [0.01, 0.04]), in Sub-Saharan Africa (r = 0.02, p < 0.05, 95% CI [0.00; 0.04]), and in Latin America & Caribbean (r = 0.03, p < 0.001, 95% CI [0.02; 0.04]). Thus, the relation between sex and tax compliance depended on the region in which the data was gathered (Table 1).

6.3. The relation of education and tax compliance

Calculating the average effect size of the relation between education and tax compliance, 341 samples were applied. Contrary to expectations, a small but significant negative relation between education and tax compliance was found (r = −0.02, p < 0.001, 95% CI [−0.03; −0.02]). The index (I^2 = 79.44%) suggested heterogeneity between the samples, and additionally, the average effect size distribution contained more variation than would be expected by chance (Q(341) = 1,654.03, p < 0.001). Thus, there is a rather small but significant negative relation between education of taxpayers and their tax compliance. Higher educated respondents tend to comply less with tax law than less educated.

Regarding a possible publication bias that might affect the overall effect size, the trim-and-fill approach (Duval & Tweedie, 2000) showed that additionally 55 samples below the estimated effect size would guarantee symmetry. This leads to a slightly larger effect size than the original one (r = −0.04; 95% CI [−0.05; −0.03]) indicating that there existed a publication bias by underrepresenting larger effect sizes.

6.3.1. The relation of education and tax compliance considering region

The Cochran Q between the different regions showed that there was a difference over regions regarding the relation between education and tax compliance ($Q*bet$ = 31.31, df = 8, p < 0.001). However, lower and upper limits of the relation between education and tax compliance in nearly all regions overlapped with the limits for the overall average effect size.

Only in Oceania an average effect size indicated a deviant positive relation between education and tax compliance (r = 0.02, p = 0.19, 95% CI [−0.02; 0.05]), but this relation was not significant. Thus, the relation between education and tax compliance depended only very slightly on the region in which the data was gathered (Table 1).

6.4. Effects of income

Overall, 334 samples were applied for the calculation of the average effect size of the relation between income and tax compliance. As expected a significant negative relation between income and tax compliance was found (r = −0.04, p < 0.001, 95% CI [−0.04, −0.03]), but the effect was rather small. The index (I^2 = 80.67%) suggested heterogeneity between the samples, and additionally, the average effect size distribution contained more variation than would be expected by chance ($Q(333)$ = 1722.51, p < 0.001). Thus, there is a rather small but significant negative relation between the income of respondents and their tax compliance. Higher-income earners tend to be less tax compliant than individuals earning low income.

Testing whether the overall effect size was impaired by a publication bias, the trim-and-fill approach (Duval & Tweedie, 2000) showed that 66 samples above the estimated effect size would be needed to have a symmetric distribution of samples. This leads to a smaller effect size than the original one (r = −0.01; 95% CI [−0.02; −0.01]) and indicates a publication bias underrepresenting smaller effect sizes.

6.4.1. The relation of income and tax compliance considering region

The Cochran Q between the different regions showed that there was a difference over regions regarding the relation between sex and tax compliance ($Q*bet$ = 57.26, df = 8, p < 0.001). The negative relation was slightly stronger in Eastern Europe & Central Asia (r = −0.07, p < 0.001, 95% CI [−0.08; −0.06]). Additionally, there were lower correlations in East Asia & Pacific (r = −0.004, p = 0.67, 95% CI [−0.02; 0.01]), and in Latin America & Caribbean (r = 0.007, p = 0.58, 95% CI [−0.02; 0.03]), but these relations were not significant. Thus, the relation between income and tax compliance depended slightly on the region in which data was gathered (Table 1).

7. Discussion

The four meta-analyses show that there indeed are relations between sociodemographics and tax compliance, but that any such relations are comparatively small. We find a positive relation between age and tax compliance as assessed in survey studies. Although age holds the highest average effect size regarding the relation with tax compliance, still only slightly more than one percent of the variance in tax compliance can be explained by taxpayers' age. These results support the hypothesis that older taxpayers are more compliant than younger ones. The findings further indicate that sex can explain a small percentage (about 0.36%) of variance of tax compliance. Women tend to hold higher tax compliance than men. The statistically significant negative relation between education and tax compliance is explaining negligible 0.04% of the variance of tax compliance. According to the analysis individuals with lower education tend to be more tax compliant than highly educated taxpayers. Finally, we found income to be negatively related to tax compliance, but also income explains a negligible percentage (0.16%) of the variance of compliance. Although the examined sociodemographics correlate significantly with tax compliance their predictive power is limited for age and sex, and negligible for education and income.

This low predictive power results partly from the fact that research with stronger effects is missing in the current meta-analyses. As the results of the trim-and-fill approach suggests, research with stronger effect sizes regarding the impact of age, sex and education must exist, but are not published. However, also if the relation between compliance and sociodemographic characteristics are corrected for publication biases, the effect sizes do not change much.

The results show additionally that data collection features such as the region in which data was collected, have an impact on relation between sociodemographics and tax compliance. Specifically, age and sex, and with minor effects education and income differed in their relation to tax compliance over regions. While in some countries of the northern hemisphere (Western Europe, Eastern Europe & Central Asia, North America) age, sex and income are stronger predictors of tax compliance, in some countries of the southern hemisphere (East Asia & Pacific, Sub-Saharan Africa, Latin America & Caribbean) age, sex and income are rather weak predictors of tax compliance. Regarding education there is no big difference between regions of data collection, solely Oceania deviates from the overall negative relation of education and tax compliance.

The differences over regions can be explained by various national distinctions. Although certainly cultural differences are responsible for some of these deviant results, it has to be taken into account that at least four different cultures (Western, Asian, African, Latin American) are represented by the regions. These cultures vary in aspects such as the tax systems, the social norms and the economic wealth. Another explanation would be that European samples are overrepresented in the current analyses, so that the average effect size actually represents the effect size in Europe, and with that it is more likely that data from non-European regions differ from the average effect size. The findings confirm that regional differences have an impact on the strength of the relation between sociodemographics and tax compliance, but that these relations do not profoundly differ over regions (observed ranges of r for age: 0.02 < r < 0.17; sex: 0.02 < r < 0.10; education: −0.04 < r < 0.01; income: −0.07 < r < 0.01).

The current meta-analyses have determined the impact of sociodemographics on tax compliance and the differences over regions, but the underlying mechanisms, why age, sex, education and income have an impact, are unclear. From a theoretical point of view, the impact of sociodemographics should be attributed to underlying psychological and economic factors as mentioned in the introduction (tax knowledge, values, financial resources, etc.). For instance, in a representative study of private and self-employed taxpayers in the Netherlands it was found that female private taxpayers were more tax compliant than male taxpayers, but that between self-employed women and men no difference existed (Gangl et al., 2013). Thus, the type of occupation and its interaction with sex were relevant for the effect. Research explaining the impact of sociodemographics is rare and should be tackled in future research.

7.1. Strengths & limitations

The current meta-analytic study certainly holds its strengths; specifically, answering how strongly the sociodemographics age, sex, education, and income are related to tax compliance has been an overdue task. Interpreting these relations, one has to be careful, due to the large sample sizes also weak relations become significant, but nevertheless even these weak relations need to be considered in research on tax compliance. Taking into account data from several large-scale international and European surveys expands the validity of the findings further. With them data from several usually in tax research unrepresented countries, such as Bolivia, Moldova, Tanzania, and Thailand, are included. Nevertheless, these large-scale samples are also a limitation of the study. In these surveys specifically data from several European countries were collected now over-representing effects in Europe but overlooking effects in non-European countries. Further, in the current study the different sociodemographics are examined independently. Nevertheless it can be assumed that they are interconnected. For example, the income level might be related to the age of the respondents as well as their education and their sex. Additionally, sex might be related to the level of education. With the current data it was not possible to investigate these interconnections. Additionally, it might be a limitation that only survey studies but no laboratory or field experiments are included in the meta-analysis. Laboratory and specifically field experiments would allow for a clear causal relationship between sociodemographics and tax compliance, but there are only few experiments reporting socio-demographic effects and specifically field experiments have been conducted only recently with very few studies on socio-demographics so that meta-analyses with experiments are left for future research, when there are more experimental studies available for meta-analytic approaches. The limitations of the study leave room for future research, while the study's strength underlines its theoretical and practical significance.

7.2. Concluding remarks

Summarizing the results, especially two sociodemographic characteristics of taxpayers, that is age and sex, are crucial in tax research. Although the relation between age or sex and tax compliance is rather weak (but still larger than with other sociodemographics) and differs over regions, tax researchers are highly recommended to look explicitly for age and sex effects in their research. Particularly, tax studies in Europe and North America, the regions in which the relation between age or sex and tax compliance is strongest, should include taxpayers' age in their study designs.

Acknowledgement

Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.joep.2017.06.005.

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