

# Determinants for Accepting Climate Change Mitigation Policies: A Meta-Analysis

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## Article

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# Abstract

Public acceptance is a precondition for implementing climate change mitigation policies. What, then, determines acceptance of these policies? Based on 76 datasets from 34 countries, generating a total sample of 146,817 participants, we report a series of meta-analyses assessing the importance of 15 determinants for accepting climate change mitigation policies. Results show the following: (a) Among policy-specific beliefs, perceived fairness is the most important factor. (b) Among climate change beliefs, knowledge about climate change is weakly related to acceptance. Climate change beliefs, environmental concern, and perceived risk of and problems associated with climate change are all related to acceptance. (c) Among psychological factors, trust is most important. (d) Finally, demographic variables show weak or no relationship with acceptance. These results inform climate policy researchers as to which determinants of acceptance to include in future analyses and provide advice to policymakers about which sentiments they should consider when introducing and communicating intended climate policies.

## Introduction

Policy intervention is a cornerstone in the efforts to mitigate climate change. Given the alarming threat of climate change (1, 2), it is urgent to increase the understanding of determinants of public acceptance of climate change mitigation policies. Policies such as fuel taxation have shown to efficiently reduce carbon emissions (3). Yet, public acceptance is crucial for successful policy implementations. If politicians perceive risks of public resistance, they will be reluctant to implement the policy because of both potential social unrest and policy evasion.

Research on determinants for accepting climate mitigation policies has generated numerous studies across various academic disciplines (4–8). This research has applied models proposing that policy-specific beliefs, climate change beliefs, and psychological factors determine acceptance (9, 10). Studies report that acceptance is linked to determinants such as perceived fairness, environmental concerns, and biospheric values (11–13).

This line of research is of utmost importance for policymakers in the process of designing and implementing climate policies. The particular question the research has to answer is *how much* the identified determinants matter. To date, no study has meta-analytically summarised the degree to which the determinants are related to people's propensity to accept climate change policy instruments. This study aims at filling this knowledge gap.

In a meta-analysis, we synthesise the predictive strength of determinants for accepting climate change mitigation policies. Based on 76 eligible datasets, we investigate the importance of 15 determinants that have been central in past research. The determinants of acceptance of climate change mitigation policies are organised into four categories: (1) policy-specific beliefs, (2) climate change beliefs, (3) psychological factors, and (4) demographic factors.

# Method

## Eligibility criteria

For inclusion in the meta-analysis, studies had to meet the following eligibility criteria:

1. Studies were included if reporting demographic variables, psychological variables, policy-specific variables, or climate change beliefs that can be correlated with accepting climate change policies. Studies were excluded if they did not report such variables or did not fulfill statistical criteria for performing correlational analyses.
2. Studies were included if reporting a measure of accepting a climate change mitigation policy. We excluded studies that measured (a) unspecific policies (for example, pro-environmental legislations or a new policy focusing on climate change research), (b) behaviors rather than policies (e.g., farming methods), (c) policies with ambiguous environmental benefits (e.g., land use regulations), and (d) support for a technique rather than a policy (e.g., carbon capture and storage, nuclear power, or support for renewable energy).
3. We included studies measuring attitudes or behavioral intentions toward accepting climate change policies (i.e., acceptance, acceptability, support, willingness to support, or voting intention). We excluded studies measuring willingness to pay and studies measuring pro-environmental behaviors (e.g., willingness to act and self-reported pro-environmental behaviors).
4. To assess dispersion of the determinants included in our random-effects meta-analysis, we set the cutoff for inclusion of a specific determinant to be represented by a minimum of six studies (14).
5. We excluded studies using between-group designs to assess influence on the dependent variable (e.g., testing whether framing effects, such as global warming versus climate change, influence climate change beliefs). We included studies using within-group design but analysed the data for only one measurement.
6. Included studies must be reported in English.
7. We excluded studies assessing acceptance of environmental policies by specific professional groups (e.g., farmers, policymakers).
8. Reports of studies (or authors) must provide unique data enabling us to retrieve at least one correlation coefficient.

## Conceptual definitions

*Survey methodology.* We define survey methods as studies using questionnaires administered online, through the mail, face-to-face, or in telephone interviews that generated quantitative data.

*Determinants.* We define antecedents as measures of demographic factors or psychological characteristics fulfilling statistical criteria for performing a correlational analysis (e.g., age, education, income, problem awareness, fairness/justice, trust, values, perceived effectiveness of policy).

*Policy acceptance.* We define acceptance as measures of attitudes (negative versus positive, bad versus good intentions) or direct measures of accepting climate mitigation policies (do not accept/do not support versus accept/support).

*Climate mitigation policies.* We define a climate mitigation policy as a real or fictive policy with an explicit purpose of mitigating climate change. Hence, we included policies such as road pricing, carbon tax, and fuel tax.

## **Search strategies**

First, we searched for studies in databases by using two search strategies to assess studies published in political science, psychology, economics, and environmental science (see Table 1). Second, we searched the reference lists of four review articles (6–8, 15). Third, we identified and included unpublished studies by means of a call via the Environmental Psychology mailing list (December 2020), contacting authors via mailing lists from conferences and workshops (Centre for Collective Action Research Workshop on Environmental Policy Attitudes, 2019; Nordic Environmental Social Science Conference, 2019; Midwest Political Science Association), and scanning programs for relevant research conferences (BCEP 8th–10th, 2009–2013; ICEP 1st–2nd, 2017–19; NESS 6th and 14th, 2003 & 2019). The flow chart in Fig. 1 illustrates the inclusion or exclusion of studies based on these searches.

### *Search strategy 1*

Survey AND (“road pricing” OR “congestion charge” OR “environmental tax\*” OR “fuel tax\*” OR “carbon tax\*” OR “green deal” OR “water scheme” OR “carbon price\*” OR “climate policy” OR “climate change” OR “global warming” OR “CO<sub>2</sub> emissions reductions” OR “regulations” OR “mitigation policy” OR “adaptation policy” OR “climate change policy”) AND (“support” OR “accept\*” OR “public support” OR “policy support” OR “public accept\*” OR “policy accept\*” OR “public preferences” OR “policy preferences” OR “public attitudes” OR “policy attitudes” OR “public opinion” OR “willingness to act” OR “voting intention” OR “citizen support”)

### *Search strategy 2*

Survey AND (“road pricing” OR “congestion charge” OR “environmental tax\*” OR “fuel tax\*” OR “carbon tax\*” OR “green deal” OR “carbon price\*” OR “climate policy” OR “climate change” OR “global warming” OR “CO<sub>2</sub> emissions reductions” OR “regulations” OR “mitigation policy” OR “adaptation policy” OR “climate change policy” OR “greenhouse gas tax” OR “greenhouse gas” OR “CO<sub>2</sub>-tax” OR “carbon dioxide tax”) AND (“support” OR “accept\*” OR “public support” OR “policy support” OR “public accept\*” OR “policy accept\*” OR “public preferences” OR “policy preferences” OR “public attitudes” OR “policy attitudes” OR “public opinion” OR “willingness to act” OR “voting intention” OR “citizen support”)

Table 1  
Search log including databases, search strategies, search dates, and the number of hits

Database	Search strategy	Search date	Hits	Search strategy	Search date	Hits
EconLit	1	20-01-09	927	2	20-06-01	1404
GreenFILE	1	20-01-09	1210	2	20-06-01	1428
International Political Science Abstracts (IPSA)	1	20-01-09	64	2	20-05-29	138
International Bibliography of the Social Sciences (IBSS)	1	20-01-09	1043	2	20-05-29	1377
PsycINFO	1	20-01-09	1886	2	20-05-29	2226
ERIC	1	20-01-09	530	2	20-05-29	1070
<b>Total hits</b>			<b>5651</b>			<b>7644</b>
<b>Total hits after removing duplicates</b>			<b>4854</b>			<b>+ 29</b>
<b>Hits for second revision</b>			<b>89</b>			<b>+ 14</b>

## Data extraction and coding

For each study, we coded the following: author(s), year of publications, number of participants, assessed policy, and the Pearson product-moment correlation coefficients of all determinants fulfilling the eligibility criteria. For studies lacking sufficient statistical information, we contacted the authors(s) asking for statistics or raw data. All included studies and how variables were measured are described in Appendix A.

## Assessing publication bias and dispersion

To assess publication bias, we first conducted fail-safe N and trim and fill analyses. Results from the fail-safe N report the number of missing studies with no effect needed to result in a trivial effect, defined as  $r < +/- .05$ . The trim and fill analysis reports the estimated number of missing studies imputed. Results showed that imputation was performed for one determinant, *self-enhancement values*. Imputing two estimated missing studies resulted in a minor adjustment of effect size  $r$  from  $r = -.09$  to  $r = -.07$ . In sum, analyses for assessing publication bias indicates that publication bias was not problematic. Finally, prediction intervals indicated substantial dispersion for some determinants; we followed this up by performing subgroup analyses when possible.

## Results

### Final sample

The final sample includes 61 articles and 76 datasets, from 34 countries, based on 146,817 participants.

## **Analyses**

We ran separate random-effects meta-analyses for each determinant using comprehensive meta-analysis, resulting in 15 meta-analyses, summarised in Table 2.

Table 2

Summary of the relationship between determinants and accepting climate change mitigation policies

Determinants	<i>r</i>	95% Confidence interval	95% Prediction interval	<i>p</i>	<i>n</i>	<i>k</i>	Fail-safe N	Trim & Fill
<b>Policy-specific beliefs</b>								
Fairness	<b>.64</b>	.56, .71	.07, .90	< .001	15328	26	474	0
Effectiveness	<b>.50</b>	.41, .57	.04, .79	< .001	29132	24	288	0
<b>Climate change beliefs</b>								
Beliefs	<b>.43</b>	.29, .55	-.18, .80	< .001	76457	11	58	0
Risk perception	<b>.39</b>	.26, .50	-.14, .75	< .001	28100	8	85	0
Concern	<b>.37</b>	.30, .44	-.01, .66	< .001	39497	20	160	0
Problem awareness	<b>.30</b>	.25, .35	.15, .44	< .001	5014	11	62	0
Knowledge	<b>.13</b>	.08, .19	-.09, .33	< .001	27210	15	20	0
<b>Psychological factors</b>								
Trust	<b>.33</b>	.24, .44	-.08, .65	< .001	71942	13	34	0
Political affiliation	<b>.28</b>	.20, .36	-.11, .59	< .001	97552	18	72	0
Self-transcendent values	<b>.27</b>	.21, .33	.02, .49	< .001	9187	14	67	0
Self-enhancement values	<b>-.07</b>	-.14, -.04	-.22, .08	< .001	4840	10	6	2
<b>Demographics</b>								
Education	<b>.11</b>	.09, .14	-.01, .23	< .001	94420	22	34	0
Gender (male-female)	<b>.07</b>	.04, .10	-.06, .20	< .001	118542	29	3	0

*Note:* 95% Confidence interval = the mean effect size with a 95% confidence interval, 95% Prediction interval = the true effect size in 95% of all comparable populations, *p* = probability value: the probability of giving these or more extreme results given that the null hypothesis is true, *n* = number of participants; *k* = number of studies, Fail-safe N = Orwin's fail-safe N: the number of missing studies reporting no effect needed to result in a trivial effect size defined as  $r < +/- .05$ , Trim and fill = the number of estimated missing studies imputed.

Determinants	<i>r</i>	95% Confidence interval	95% Prediction interval	<i>p</i>	<i>n</i>	<i>k</i>	Fail-safe N	Trim & Fill
Age	-.07	-.09, .04	-.24, .10	< .001	130015	45	3	0
Income	.01	-.04, .04	-.14, .16	.90	68568	19	0	0

*Note: 95% Confidence interval*= the mean effect size with a 95% confidence interval, *95% Prediction interval*= the true effect size in 95% of all comparable populations, *p* = probability value: the probability of giving these or more extreme results given that the null hypothesis is true, *n* = number of participants; *k* = number of studies, *Fail-safe N*= Orwin's fail-safe N: the number of missing studies reporting no effect needed to result in a trivial effect size defined as  $r < +/- .05$ , *Trim and fill*= the number of estimated missing studies imputed.

### Policy-specific beliefs

*Fairness.* Among all determinants, fairness was the most important for accepting climate mitigation policies ( $r = .64$ , 95% CI [.56, .71],  $p < .001$ ,  $k = 26$ ). In the primary studies, fairness was commonly assessed by using an overall (or scenario) measure: *how (un)fair is policy X*. Importantly, past research has distinguished among (a) fair procedures, (b) fair distributions, and (c) personal versus collective fairness (8). To investigate the effects of these components, we performed a subgroup analysis ( $Q = 55.40$ ,  $df = 3$ ,  $p < .001$ ). The fairness components most strongly associated with acceptance were overall fairness ( $r = .75$ , 95% CI [.62, .82],  $p < .001$ ,  $k = 8$ ) and distributional fairness ( $r = .71$ , 95% CI [.45, .86],  $p < .001$ ,  $k = 4$ ). A somewhat weaker relationship was found for procedural fairness ( $r = .49$ , 95% CI [.41, .56],  $p < .001$ ,  $k = 1$ ), and personal fairness was significantly weaker ( $r = .17$ , 95% CI [.08, .27],  $p < .001$ ,  $k = 4$ ).

*Effectiveness.* In essence, effectiveness measures people's beliefs that a policy can fulfill a specific aim (6). As an overall measure, we found effectiveness to be the second strongest determinant for acceptance ( $r = .50$ , 95% CI [.41, .57],  $p < .001$ ,  $k = 24$ ). Two components of effectiveness were identified in the primary studies: (1) effectiveness in changing behaviors (11, 16); and (2) effectiveness in mitigating climate change (17–19). A subgroup analysis comparing these subcategories found that effectiveness in mitigating climate change ( $r = .50$ , 95% CI [.38, .61],  $p < .001$ ,  $k = 4$ ) was a stronger determinant than effectiveness in changing behavior ( $r = .30$ , 95% CI [.16, .42],  $p < .001$ ,  $k = 2$ ,  $Q = 8.03$ ,  $df = 1$ ,  $p = .005$ ).

In sum, the most important aspect of fairness was *not* personal fairness (i.e., if a policy is “*fair for me*”), but whether the policy is perceived as *overall* fair and fairly *distributed*. Second, policies are more acceptable when perceived to effectively mitigate climate change than when perceived to effectively change people's behaviors.

### Climate change beliefs

*Knowledge.* Making informed pro-environmental choices is difficult if one has incorrect or no knowledge (20). Although knowledge can be regarded as a necessary but not sufficient precondition, past research confirms the importance of knowledge for environmental concern and pro-environmental behavior (21).

One crucial limitation of measuring knowledge is the incongruence between what people *think* is true and the actual evidence for the specific issue (22). Consequently, past research has reported that objective knowledge is positively related to environmental issues such as climate change belief and environmental risk perceptions, while smaller or even negative relationships have been reported for subjective knowledge (15, 23). Our meta-analysis found knowledge to be weakly yet significantly positively related to acceptance ( $r = .13$ , 95% CI [.08, .19],  $p < .001$ ,  $k = 15$ ). Following up on this finding, we found no significant difference of type of knowledge: objective knowledge ( $r = .16$ , 95% CI [.05, .27],  $p = .01$ ,  $k = 5$ ) and subjective knowledge ( $r = .13$ , 95% CI [.09, .18],  $p < .001$ ,  $k = 7$ ,  $Q = 0.23$ ,  $df = 1$ ,  $p = .63$ ).

*Climate change belief, problem awareness, concern, and risk perception.* We identified four types of climate change beliefs. First, in an overall measure, *climate change belief* assesses people's belief in anthropogenic climate change (15). Second, *problem awareness* assesses to what extent climate change is perceived as problematic (11). Third, environmental *concern* is a more general construct, measured as an evaluation or attitude toward the environment (24). Fourth, *risk perception* is a measure of personal or societal threats to people's well-being as a consequence of climate change (23).

When it comes to belief in climate change, denial has been reported in various cultures and is being fostered by doubt-mongering (25). It should, however, be noted that in 2020, 73% of Americans believed in climate change, while only 10% denied climate change (26). Our meta-analyses found a clear positive relationship between acceptance and climate change belief ( $r = .43$ , 95% CI [.29, .55],  $p < .001$ ,  $k = 11$ ).

Acceptance was positively related to problem awareness ( $r = .30$ , 95% CI [.25, .35],  $p < .001$ ,  $k = 11$ ), concern ( $r = .37$ , 95% CI [.30, .44],  $p < .001$ ,  $k = 20$ ), and risk perception ( $r = .39$ , 95% CI [.26, .50],  $p < .001$ ,  $k = 8$ ). When measuring concern, a key distinction is between local/personal concern and global concern. A subgroup analysis found no significant difference between global concern ( $r = .33$ , 95% CI [.20, .45],  $p < .001$ ,  $k = 8$ ) and local concern ( $r = .27$ , 95% CI [.22, .32],  $p < .001$ ,  $k = 2$ ,  $Q = 0.83$ ,  $df = 1$ ,  $p = .36$ ).

In sum, knowledge about climate change was weakly related to acceptance. Positive medium-sized relationships were found between acceptance and climate change beliefs, environmental concern, and perceived risk of and perceived problems associated with climate change.

### **Psychological factors**

*Trust.* Trust can be defined as a "psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another" (27). Public acceptance has been linked to both high and low levels of trust (28, 29), suggesting effects of trust as well as mistrust. Results from our meta-analysis found a positive relationship between trust and climate change mitigation policies ( $r = .33$ , 95% CI [.24, .44],  $p < .001$ ,  $k = 13$ ).

Studies measured trust in politicians, governments, institutions, science, authorities, and professionals (19, 30–32). A subgroup analysis found that trust in *political institutions* ( $r = .37$ , 95% CI [.27, .47],  $p < .001$ ,  $k = 9$ ) and *institutions in general* ( $r = .43$ , 95% CI [.34, .52],  $p < .001$ ,  $k = 2$ ) was more important than trust in

*professionals* ( $r = .06$ , 95% CI  $[-.01, .12]$ ,  $p = .07$ ,  $k = 1$ ) and *citizens* ( $r = -.03$ , 95% CI  $[-.05, -.01]$ ,  $p < .001$ ,  $k = 1$ ,  $Q = 114.47$ ,  $df = 3$ ,  $p < .001$ ).

*Political affiliation.* Meta-analytic results showed that identifying as politically left or liberal (versus right or conservative) was positively associated with acceptance of climate change mitigation policies ( $r = .28$ , 95% CI  $[.20, .36]$ ,  $p < .001$ ,  $k = 18$ ).

*Values.* Values are defined as desirable goals serving as guiding principles in people's lives (33, 34). Values have been shown to be antecedents for proximal determinants of pro-environmental engagement such as beliefs, personal norms (10, 12), and pro-environmental identity (35). Most primary studies measured self-transcendent values as the more specific biospheric values (describing a sense of connectedness with nature). Results showed a positive relationship with acceptance ( $r = .27$ , 95% CI  $[.21, .33]$ ,  $p < .001$ ,  $k = 14$ ). Results from self-enhancement values, measuring the extent to which people prioritise authority, social power, wealth, ambition, and influence, showed a weak negative relationship with acceptance ( $r = -.09$ , 95% CI  $[-.14, -.04]$ ,  $p < .001$ ,  $k = 10$ ). These results suggest, somewhat counterintuitively, that self-enhancement values are not a strong barrier to accepting climate mitigation policies.

In sum, trusting institutions, identifying as political left or liberal, and valuing nature were all positively associated with accepting climate mitigation policies. Interestingly, self-enhancement values showed only a weak negative relationship with acceptance, indicating that holding egocentric values is not a strong barrier to accepting mitigation policies.

### **Demographics and acceptance**

Education, age, and gender showed significant yet small relationships with accepting climate mitigation policies, while income was not associated with acceptance. Level of education was a somewhat stronger determinant ( $r = .11$ , 95% CI  $[.09, .14]$ ,  $p < .001$ ,  $k = 22$ ) than age and gender. We found that acceptance was negatively associated with age and positively associated with gender, indicating that being younger ( $r = -.07$ , 95% CI  $[-.09, -.04]$ ,  $p < .001$ ,  $k = 45$ ) and female was associated with higher acceptance ( $r = .07$ , 95% CI  $[.04, .09]$ ,  $p < .001$ ,  $k = 29$ ).

In sum, being educated, younger, and female was weakly associated with accepting climate mitigation policies. Income was not related to acceptance.

## **Discussion**

In a meta-analysis, we analysed 15 determinants for accepting climate change mitigation policies, extracted from 76 datasets comprising a total of 146,817 participants from 34 countries. The results show that the demographic determinants age, gender, education, and income are weakly or not significantly related to accepting climate change mitigation policies, while data from political affiliation showed a medium-sized relationship. Among all determinants, perceived fairness and effectiveness were

strongly positively associated with acceptance, while the weakest relationships were found for knowledge and self-enhancement values.

Past studies have reported mixed findings for determinants such as age, gender, income, and trust (6). Here, we provide highly powered estimates, reporting a nonsignificant and close to zero correlation for income, weak yet significant relationships for age and gender, and a medium-sized positive relationship between trust and climate change mitigation policy acceptance.

The meta-analysis did, however, report substantial dispersion for a number of determinants, calling for further analyses. Consequently, we conducted a number of subgroup analyses, examining how subcomponents of fairness, effectiveness, and concern, for example, were related to acceptance.

Studies have reported the influence of a number of determinants not examined in the meta-analysis, such as infringing on personal freedom of choice (11, 13), emotions (36, 37), and pro-environmental identity (32, 38). Our inclusion criteria were based on methodological considerations (14). Still, it should be noted that we did not analyse the full list of determinants for primary studies. We encourage future research to consider these determinants.

The present meta-analysis tests proximal determinants of policy acceptance. This is important to consider, as determinants showing weaker direct correlations might be indirectly related to acceptance. For example, studies have found that trust is indirectly linked to acceptance via risk perception (39), and that problem awareness is indirectly linked to via fairness and effectiveness (18).

It should also be noted that most of the included studies used data from the global north (40). There is an empirical gap in the multidisciplinary research field of climate policy acceptance, and we still do not know whether, or to what extent, the results are valid for the global south. For example, the results may differ in contexts where the division between left and right is not the central political conflict line.

## Conclusion

Based on 76 datasets from 34 countries generating a total sample of 146,817 participants, we report on a series of meta-analyses assessing the importance of 15 demographic and psychological determinants for accepting climate change mitigation policies. Policy-specific beliefs were most important for acceptance. Specifically, perceiving mitigation policies as *overall* fair or fairly *distributed* was strongly related to acceptance. For climate change beliefs, knowledge about climate change was weakly related to acceptance. Positive medium-sized relationships were found between acceptance and (a) beliefs in climate change, (b) environmental concern, (c) perceived risks, and (d) climate change problem awareness. Regarding psychological factors, trusting institutions, identifying as political left or liberal, and valuing nature were all positively associated with accepting climate mitigation policies. Self-enhancement values were only weakly negatively related to acceptance. Finally, weak associations were found for the demographic variables education, age, and gender. Income was not related to acceptance. At a general level, the variables assessing the policy measure show higher correlations with acceptance

than variables unrelated to the policy. These variables are often referred to as policy-specific beliefs and evaluate the attributes of the policy itself, such as whether it can be perceived as fair or efficient. These results inform scholars of climate policy acceptance as to which determinants to include in future analyses, and they also advise policymakers as to which sentiments they should consider when introducing and communicating intended climate policies.

## Declarations

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### Data available

All data is available online: <https://osf.io/q6r3a/>

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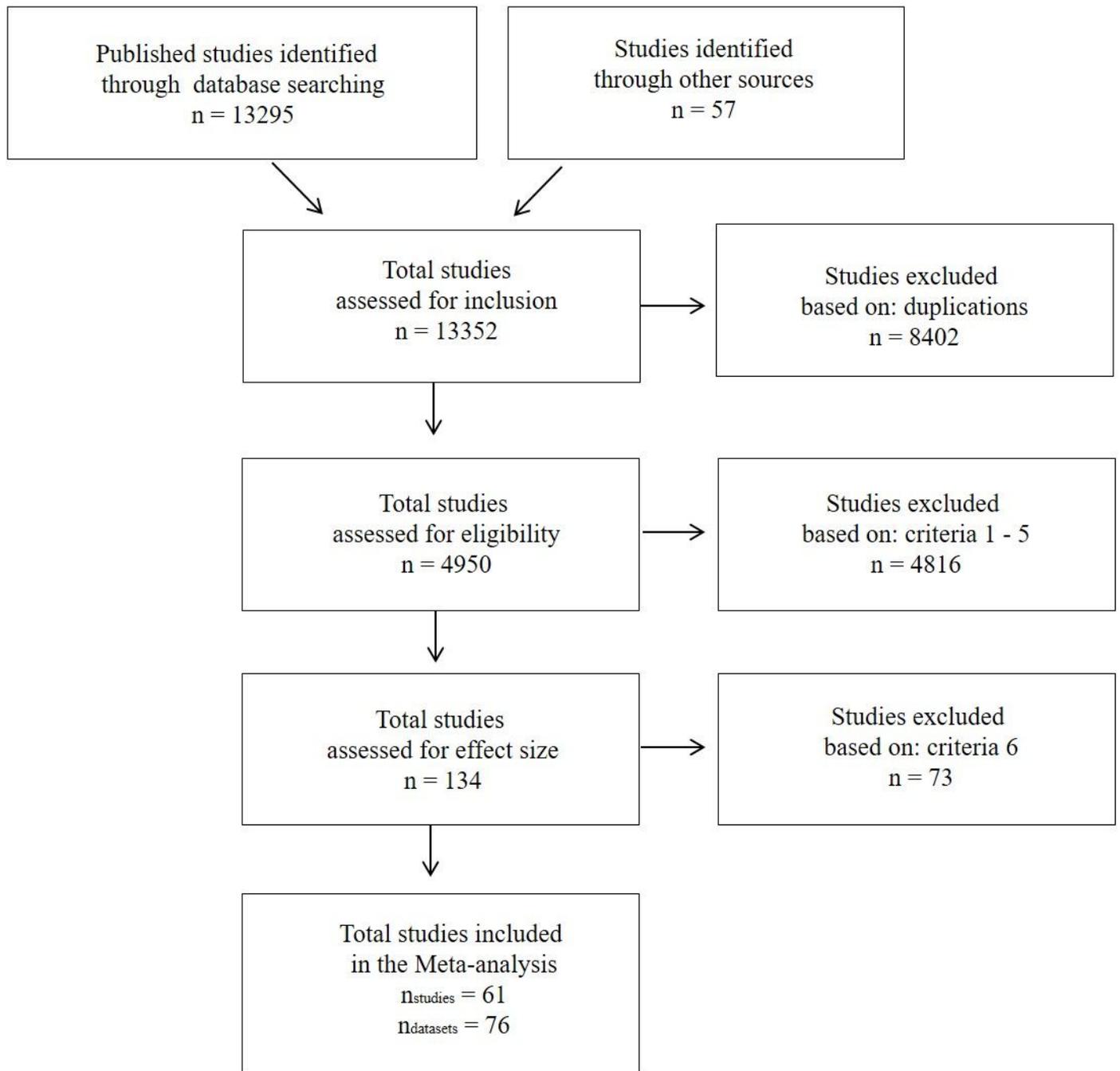
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## Figures



**Figure 1**

Flow chart for inclusion/exclusion of studies

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