Where do web surveys work?

A meta-analysis of response rate experiments across countries

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Cross-cultural research questions and thus cross-national datasets become increasingly important in globalized world

Large international surveys do still stick to traditional survey modes, however face-to-face surveys are cost-intensive and inflexible. Increasing number of offline recruited internet panels around the world and international attempts for web-based cross-cultural data collections (e.g., CRONOS Panel, OPPA)

Major challenges in web-based data collection: Nonresponse bias and coverage

Nonresponse rate is not equal with nonresponse bias. Nonetheless, those two concepts are strongly related and moderated by survey design features such as the survey population (Groves & Peytcheva 2008)
Existing meta-analytical research that aimed at explaining web response rates with survey design factors could not explain large parts of response rate heterogeneity (Manfreda et al., 2008; Shih & Fan, 2008; Daikeler et al., 2018)

- Found on average 12%-points lower web response rates compared to traditional survey modes

- Significant survey design factors (Daikeler et al., 2018):
  - survey prenotifications - are less effective in web modes
  - sample recruitment strategy - web surveys work in panels or pre-recruited lists better as for one time recruited subjects
  - solicitation mode - web surveys work better with an email solicitation compared to mail or telephone
  - target population - web surveys work better for students or members than for business association or the general population
  - number of contact attempts - more contact attempts work better in other modes than the web

- Explained effect size heterogeneity ≤ 8%
Cross-cultural differences affect response behavior (e.g., Johnson et al. 2005; Smith & Fischer, 2008; Stark et al. 2018)

At least three aspects why online survey response rates might differ across countries:

- Social and economic factors (e.g., Rammstedt et al. 2017; Stark et al. 2018)
  - Education
  - GDP
  - Annual population growth
  - Mean population age
- Technological factors (e.g., Mohorko, et al. 2013)
  - Internet Coverage
  - Cellphone Coverage
  - Internet users
- Country-specific survey climate (e.g., Babier et al. 2016; Beullens et al., 2018)
  - Frequency of surveys
  - Country-specific response behavior
To our knowledge no previous study attempted to examine web response and refusal behavior from a cross-cultural perspective.

Our research goals are to...

I. Examine whether there are cross-cultural differences in web response rates?

II. Explain those cross-cultural differences with country-based indicators such as social and economic factors, technological factors and the country-specific survey climate.
Supplemented by:
"response rate*" OR "return rate*" OR "participation rate*"

"web survey" OR "internet survey" OR "online survey" OR "web-based survey" OR "internet-based survey" OR "electronic survey"

Web of Science, Scopus, Proquest (ERIC, PsycInfo, Sociological Abstracts), ipl.org, reference search of collected papers, WebSM, Springerlink, Google Scholar, AAPOR, GOR, EconBiz, Snowballing, AAPOR & GOR Abstracts...

110 studies nested 64 manuscripts nested in 7 countries
Inclusion & Exclusion Criteria

- **Web-based survey**
  - Questionnaire on the web

- **Other survey mode comparison**
  - email, mail, telephone, fax, face to face, other

- **Response rates**
  - should be available or calculable
  - survey country must be reported

- **A split sample random experimental design**
  - respondents from the same population

- **No mode switching**
  - remain in the mode they were randomly assigned

- **The survey design**
  - should be the same for the compared modes (e.g., same questions)
Data Generation Model

Inference goal: generalizing beyond the studies included – **Random Effects Model** *(metafor – Viechtbauer, 2010)* *(no multilevel model possible due to too less variance on country-level)*

**Two Effect Sizes (Dependent Variable) and Metric** *(AAPOR 2000, Callegaro & DiSogra 2008)*

1. Web response rate (AAPOR RR5)
   \[ d = \frac{\text{number of web mode respondents}}{\text{number of invited and eligible subjects}} \]

2. Response Rate Difference Web and other Mode
   \[ d = \frac{\text{number of web mode respondents}}{\text{number of web mode invited and eligible subjects}} - \frac{\text{number of comp.mode respondents}}{\text{number of comp.mode invited and eligible subjects}} \]

**Seven countries included**

Australia, Germany, The Netherlands, Slovenia, Sweden, United Kingdom, United States
# Independent Variables (Moderators)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Variable</th>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social and economic factors</td>
<td>Education</td>
<td>world bank</td>
<td>Education index</td>
</tr>
<tr>
<td></td>
<td>GDP</td>
<td>OECD</td>
<td>Gross domestic product (GDP) at market prices is the expenditure on final goods and services minus imports by year and country.</td>
</tr>
<tr>
<td></td>
<td>Annual population growth</td>
<td>world bank</td>
<td>Annual population growth in a country by year and country.</td>
</tr>
<tr>
<td></td>
<td>Population ages 65 and over</td>
<td>OECD</td>
<td>The elderly population is defined as the share of people aged 65 and over. and the working age (15-64 years) population by year and country.</td>
</tr>
<tr>
<td>Technological factors</td>
<td>Internet coverage</td>
<td>world bank</td>
<td>Individuals using the Internet (% of population) by year and country.</td>
</tr>
<tr>
<td></td>
<td>Cellphone coverage</td>
<td>world bank</td>
<td>Mobile cellular subscriptions by year and country.</td>
</tr>
<tr>
<td></td>
<td>Internet users in %</td>
<td>world value survey</td>
<td>using the internet (daily, weekly, monthly, less than monthly, never) by year and country.</td>
</tr>
<tr>
<td>Country-specific survey climate</td>
<td>Web response rate</td>
<td>calculated</td>
<td>Study-level of current paper</td>
</tr>
<tr>
<td></td>
<td>Other mode response rate</td>
<td>calculated</td>
<td>Study-level of current paper</td>
</tr>
<tr>
<td></td>
<td>Country-level aggregated Web response rate</td>
<td>calculated</td>
<td>Country-level aggregated value of current paper</td>
</tr>
<tr>
<td></td>
<td>Country-level aggregated other mode response rate</td>
<td>calculated</td>
<td>Country-level aggregated value of current paper</td>
</tr>
<tr>
<td></td>
<td>ISSP response rate</td>
<td>ISSP database</td>
<td>Response rate by year and country to the last ISSP round</td>
</tr>
</tbody>
</table>
### Methods

#### Response Rates

<table>
<thead>
<tr>
<th>Country</th>
<th>Web</th>
<th>Mail</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>19%</td>
<td>72%</td>
<td>19%</td>
</tr>
<tr>
<td>Germany</td>
<td>9%</td>
<td>-</td>
<td>-10%</td>
</tr>
</tbody>
</table>

#### Response Rate Difference

- **53%**
- **-10%**

#### Effect Sizes

- **Effect Size 1**
- **Effect Size 2**

### Results

#### Comparison Mode

<table>
<thead>
<tr>
<th>Mode</th>
<th>Mail</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Mail</td>
<td>72%</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>-</td>
<td>19%</td>
</tr>
</tbody>
</table>

#### Examples

- *Kirchner & Felderer (2016)*
Results: Descriptives

Experiments by country in %
More than 70% of the studies are US studies, followed by United Kingdom (11%) and the Netherlands (7%)
Web surveys are mostly compared to mail surveys (63%).

Sensitivity Analysis

Based on the strong presence of US studies and mode comparisons with mail, we conducted three sensitivity analyses:
- Two random samples with a selection of US studies
- Mail comparisons only
All analyses succeed in replicating the subsequent findings
## Are there cross-cultural differences in web response rates?

<table>
<thead>
<tr>
<th></th>
<th>Mean web response rate: 36%</th>
<th>Mean other mode response rate: 48%</th>
<th>Mean response rate difference: 12%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heterogenous effect size?</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Country</td>
<td>Significant **</td>
<td>Significant***</td>
<td>Significant **</td>
</tr>
<tr>
<td>Amount of heterogeneity explained by country</td>
<td>7%</td>
<td>20%</td>
<td>6%</td>
</tr>
<tr>
<td>Mode</td>
<td>-</td>
<td>Significant ***</td>
<td>not significant</td>
</tr>
<tr>
<td>Country*Mode</td>
<td>-</td>
<td>significant</td>
<td>not significant</td>
</tr>
</tbody>
</table>

***≤ 0.001; **≤ 0.05; *≤ 0.1
Are there cross-cultural differences in web response rates?

**Results:**

**Mean web response rate**

- **Australia:** 0.08 [-0.03; 0.18]
- **Germany:** 0.46 [0.18; 0.76]
- **Netherlands:** 0.33 [0.22; 0.45]
- **Slovenia:** 0.39 [0.14; 0.35]
- **Sweden:** 0.40 [-0.06; 0.86]
- **United Kingdom:** 0.46 [0.32; 0.59]
- **United States:** 0.36 [0.32; 0.41]
- **Total without Australia:** 0.38 [0.34; 0.41]
- **Total without US:** 0.37 [0.29; 0.45]
- **Total:** 0.36 [0.33; 0.40]

**Mean response rate difference**

- **Total:** -0.07 [-0.19; 0.05]
- **United States:** -0.04 [-0.13; 0.03]
- **Slovenia:** -0.25 [-0.37; -0.12]
- **United Kingdom:** -0.14 [-0.23; -0.06]
- **Total without US:** 0.19 [-0.32; -0.064]
- **Total without Australia:** -0.25 [-0.33; -0.17]
- **Netherlands:** -0.09 [-0.13; -0.04]
- **Sweden:** -0.11 [-0.15; -0.08]
- **Germany:** -0.18 [-0.23; -0.13]
- **Total:** -0.11 [-0.15; -0.08]
Do social and economic factors influence the success of web surveys?

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Education</th>
<th>GDP</th>
<th>Annual population growth</th>
<th>Population ages 65 and over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Response Rate</td>
<td>n.s.</td>
<td>n.s.</td>
<td>+ sig.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Response Rate Difference Web vs. Other Mode</td>
<td>n.s.</td>
<td>n.s.</td>
<td>+ sig.</td>
<td>- sig.</td>
</tr>
</tbody>
</table>
Do technological factors influence in the success of web surveys?

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Internet coverage</th>
<th>Cellphone coverage</th>
<th>Internet users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Response Rate</td>
<td>+ sig.</td>
<td>+ sig.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Response Rate Difference Web vs. Other Mode</td>
<td>- sig.</td>
<td>+ sig.</td>
<td>n.s.</td>
</tr>
</tbody>
</table>
Results:
Does the survey climate influence the success of web surveys?

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Web response rate</th>
<th>Other mode response rate</th>
<th>Country-level aggregated Web response rate</th>
<th>Country-level aggregated other mode response rate</th>
<th>Issp response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Response Rate</td>
<td>.</td>
<td>+ sig.</td>
<td>+ sig.</td>
<td>+ sig.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Response Rate Difference</td>
<td>+ sig.</td>
<td>- sig.</td>
<td>n.s.</td>
<td>- sig.</td>
<td>+ sig.</td>
</tr>
<tr>
<td>Web vs. Other Mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I. Are there cross-cultural differences in web response rates?

- Yes, the specific country has a significant influence on the success of a web survey. However, it can only explain less than 10% of the heterogeneity at country level.

II. Do social and economic factors influence the success of web surveys?

- The higher the population growth and the lower the proportion of older people in a country the better do web surveys work.

II. Do technological factors influence the success of web surveys?

- Internet and cellphone coverage show significant effects. The higher the Internet coverage, the higher is the web response rate and the smaller is the response rate difference. The higher the cellphone coverage, the better do web surveys work but the larger is the response rate difference.

II. Does the country-specific survey climate influence the success of a web survey?

- Yes, the higher the country-specific response rates, the better do web surveys work.
Limitations
- ~73% of all studies conducted in the US -> need further evidence from other countries (more statistical power & better understanding moderating factors)
- All countries have a similar cultural background
- Searched English speaking literature only -> language bias problem
- Great degree of heterogeneity remains still unexplained

Conclusion
- In summary, web surveys are particularly useful in countries with a younger, technology-oriented population that is generally open to surveys
- Our findings may help researchers who plan national and cross-national data collections to evaluate a web surveys response rate in comparison to other survey modes before the data collection


Thank you for your attention.
Prisma Flow Diagram (I)

Identification

- Manuscripts (m) identified through Replication of Manfreda et. al. (2008) (m = 25)
- Manuscripts identified through database searching (m = 45)
- Additional manuscripts identified through other sources (m = 38)

Screening

- Manuscripts after duplicates removed (m = 108)
- Manuscripts screened (m = 108)

- Manuscripts excluded (no fulltext available) (m = 5)
Prisma Flow Diagram (II)

Manuscripts assessed for eligibility (m = 103)

Manuscripts included in synthesis (m = 64)

110 effect sizes, nested in 80 studies, nested in 64
Manuscripts included in quantitative synthesis (meta-analysis) (m=64, s=80, k=110)

Manuscripts excluded, with reasons (no randomized experiment, mixed mode, different samples, and no response rates calculable) (m = 39)

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>Web Mode: Response Rate in % (No. of eligible units contacted, No. of responses)</th>
<th>Other Mode: Response Rate in % (No. of eligible units contacted, No. of responses)</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinclair et al.</td>
<td>2012</td>
<td>1,4; (7000/101)</td>
<td>6,65; (4000/266)</td>
<td>Australia</td>
</tr>
<tr>
<td>Sinclair et al.</td>
<td>2012</td>
<td>2,9; (10000/289)</td>
<td>9,3; (5500/511)</td>
<td>Australia</td>
</tr>
<tr>
<td>Sinclair et al.</td>
<td>2012</td>
<td>2,9; (10000/289)</td>
<td>27,3; (1000/273)</td>
<td>Australia</td>
</tr>
<tr>
<td>Allum et. al.</td>
<td>2014</td>
<td>85,4; (945/807)</td>
<td>97,1; (509/494)</td>
<td>England</td>
</tr>
<tr>
<td>Auspurg et. al.</td>
<td>2013</td>
<td>58,5; (1072/627)</td>
<td>64,7; (543/351)</td>
<td>England</td>
</tr>
<tr>
<td>Baghal &amp; Lynn</td>
<td>2015</td>
<td>56,3; (1432/807)</td>
<td>92,6; (716/663)</td>
<td>England</td>
</tr>
<tr>
<td>Blom et al.</td>
<td>2015</td>
<td>64,6; (1126/727)</td>
<td>95,3; (554/528)</td>
<td>England</td>
</tr>
<tr>
<td>de Leeuw et al.</td>
<td>2012</td>
<td>47; (349/164)</td>
<td>73; (282/206)</td>
<td>England</td>
</tr>
<tr>
<td>de Leeuw et al.</td>
<td>2012</td>
<td>47; (349/164)</td>
<td>96,1; (314/217)</td>
<td>England</td>
</tr>
<tr>
<td>Denscobe</td>
<td>2009</td>
<td>60; (460/276)</td>
<td>60; (460/276)</td>
<td>England</td>
</tr>
<tr>
<td>Jones &amp; Pitt</td>
<td>1997</td>
<td>18,5; (200/37)</td>
<td>34; (200/68)</td>
<td>England</td>
</tr>
<tr>
<td>Park &amp; Humphrey</td>
<td>2014</td>
<td>55; (1000/550)</td>
<td>55; (1000/550)</td>
<td>England</td>
</tr>
</tbody>
</table>
## List of studies per country cntnd.

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Country</th>
<th>Sample Size</th>
<th>Participation Rate</th>
<th>Country</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jones &amp; Pitt</td>
<td>1997</td>
<td>England</td>
<td>18,5; (200/37)</td>
<td>72; (100/72)</td>
<td>England</td>
<td>England</td>
</tr>
<tr>
<td>Kirchner &amp; Felderer</td>
<td>2016</td>
<td>Germany</td>
<td>19,4; (12400/2400)</td>
<td>19,4; (12400/2400)</td>
<td>Germany</td>
<td>Germany</td>
</tr>
<tr>
<td>Roberts et. al.</td>
<td>2016</td>
<td>Germany</td>
<td>70,5; (600/423)</td>
<td>70,5; (600/423)</td>
<td>Germany</td>
<td>Germany</td>
</tr>
<tr>
<td>Roberts et. al.</td>
<td>2016</td>
<td>Germany</td>
<td>65,4; (500/327)</td>
<td>65,4; (500/327)</td>
<td>Germany</td>
<td>Germany</td>
</tr>
<tr>
<td>Pötschke</td>
<td>2002</td>
<td>Germany</td>
<td>37,1; (380/141)</td>
<td>50,7; (402/204)</td>
<td>Germany</td>
<td>Germany</td>
</tr>
<tr>
<td>Boschmann et al.</td>
<td>2012</td>
<td>Slovenia</td>
<td>44,7; (293/131)</td>
<td>44,7; (293/131)</td>
<td>Slovenia</td>
<td>Slovenia</td>
</tr>
<tr>
<td>Lozar Manfreda et al.</td>
<td>2000</td>
<td>Slovenia</td>
<td>77; (200/154)</td>
<td>89; (200/178)</td>
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<td>Slovenia</td>
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<tr>
<td>Vehovar et al.</td>
<td>1999</td>
<td>Slovenia</td>
<td>26; (300/78)</td>
<td>51,9; (747/388)</td>
<td>Slovenia</td>
<td>Slovenia</td>
</tr>
<tr>
<td>Vehovar et al.</td>
<td>1999</td>
<td>Slovenia</td>
<td>26; (300/78)</td>
<td>39,2; (222/87)</td>
<td>Slovenia</td>
<td>Slovenia</td>
</tr>
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<td>Vehovar et. al</td>
<td>1999</td>
<td>Slovenia</td>
<td>26; (300/78)</td>
<td>21,6; (76/24)</td>
<td>Slovenia</td>
<td>Slovenia</td>
</tr>
<tr>
<td>Woo et al.</td>
<td>2015</td>
<td>South Korea</td>
<td>26,4; (500/132)</td>
<td>85,6; (500/428)</td>
<td>South Korea</td>
<td>South Korea</td>
</tr>
<tr>
<td>Bech &amp; Kristensen</td>
<td>2009</td>
<td>Sweden</td>
<td>16,9; (4900/829)</td>
<td>42,5; (5000/2123)</td>
<td>Sweden</td>
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</tr>
<tr>
<td>de Leeuw et al.</td>
<td>2012</td>
<td>The Netherlands</td>
<td>19,7; (6134/1207)</td>
<td>60,4; (2000/1207)</td>
<td>The Netherlands</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Klausch et al.</td>
<td>2012</td>
<td>The Netherlands</td>
<td>28,7; (2200/631)</td>
<td>49,8; (2199/1095)</td>
<td>The Netherlands</td>
<td>The Netherlands</td>
</tr>
</tbody>
</table>
List of studies per country contnd.

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Dataset 1</th>
<th>Dataset 2</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klausch et al.</td>
<td>2012</td>
<td>28.7; (2200/631)</td>
<td>64.8; (2182/1413)</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Klausch et al.</td>
<td>2012</td>
<td>28.7; (2200/631)</td>
<td>67.5; (2200/1485)</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Zuidgeest, M. et. al.</td>
<td>2011</td>
<td>60.5; (400/242)</td>
<td>64; (400/256)</td>
<td>The Netherlands</td>
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<tr>
<td>Al-Subaihi, AA</td>
<td>2008</td>
<td>34.6; (26/9)</td>
<td>100; (26/26)</td>
<td>UAE</td>
</tr>
<tr>
<td>Andrew et al.</td>
<td>2015</td>
<td>64.3; (2345/1509)</td>
<td>63.1; (2366/1494)</td>
<td>USA</td>
</tr>
<tr>
<td>Bason</td>
<td>2000</td>
<td>15.5; (742/115)</td>
<td>23.9; (674/161)</td>
<td>USA</td>
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<tr>
<td>Bason</td>
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<td>27.8; (735/204)</td>
<td>USA</td>
</tr>
<tr>
<td>Bason</td>
<td>2000</td>
<td>15.5; (742/115)</td>
<td>17.4; (736/128)</td>
<td>USA</td>
</tr>
<tr>
<td>Bates</td>
<td>2000</td>
<td>55.7; (1571/875)</td>
<td>44.2; (1569/694)</td>
<td>USA</td>
</tr>
<tr>
<td>Beach &amp; Musa</td>
<td>2012</td>
<td>67.9; (627/426)</td>
<td>63.9; (627/401)</td>
<td>USA</td>
</tr>
<tr>
<td>Beach &amp; Musa</td>
<td>2012</td>
<td>52.9; (627/332)</td>
<td>41.9; (627/263)</td>
<td>USA</td>
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<tr>
<td>Beach et al.</td>
<td>2008</td>
<td>60.4; (1966/1188)</td>
<td>55.4; (1967/1090)</td>
<td>USA</td>
</tr>
<tr>
<td>Borkan</td>
<td>2009</td>
<td>21; (1000/210)</td>
<td>44.2; (500/221)</td>
<td>USA</td>
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