How the Device Screen Size Affects Data Collected in Web Surveys

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ATTENTION SURVEY RESEARCHERS!

QDET2

International Conference on Questionnaire Design, Development, Evaluation, and Testing

November 9 – 13, 2016 | Miami, Florida

1. Background: the context

- **Web survey framework**
  - "unintended mobile respondents" (Peterson, 2012)

- **Mobile devices: not negligible** (Revilla et al., 2015)
  - Spain Netquest panel (186 surveys)
    - Average mobile participation: 1/3 resp. (Revilla, 2016)
  - Different devices characteristics (Sweeney & Crestani, 2006)
    - Virtual keyboard
    - Speed of Internet connection
    - Device & **screen sizes** → enhanced portability
      - *Differences within the mobile devices*

2. **Literature**: previous findings

- **Mobile devices → affect data collection**
  - ➢ Key factor: **screen size**
  - ➢ Higher portability (Brick et al., 2007)
    - ▪ Higher social desirability bias (Mavletova & Couper, 2013)
    - ▪ Multitasking (Toninelli & Revilla, 2016)
  - ➢ Quality and comparability potentially affected
    - ▪ Response rates reduced (Baker-Prewitt, 2013)
    - ▪ Increased breakoff rates (Buskirk & Andrus, 2014)
    - ▪ Longer response times (Mavletova, 2013; Liebe et al., 2015)
    - ▪ Undesirable differences in responses (Peytchev & Hill, 2008)

2. Literature: previous findings

- **Importance of the "screen size"**
  - Reduced visibility (scrolling) (Peytchev & HIll, 2008)
    - Higher effort/burden (de Bruijne & Wijnant, 2013)
  - Different completion times (Couper & Peterson, 2015)
    - Neg. link screen size/interview length (Liebe et al., 2015)
    - Positive correl. screen size/acquiescence tendency (Liebe et al., 2015)
    - U-shaped relation error variance/acquiescence tendency (Liebe et al., 2015)
  - Frequent solution: **questionnaire optimization** (de Bruijne & Wijnant, 2013; Fischer & Bernet, 2014; Mitchel, 2014)

3. Goals & hypotheses: contribution

- **Focus on mobile devices only**
  - ➢ High diversity

- **Exact screen size**
  - ➢ Measured in inches (diagonal)

- **More complete view**
  - ➢ Different indicators (4) analyzed

- **Optimization effect**

- **Updated view**
  - ➢ … quickly growing diversity of devices

3. Goals & hypotheses: hypotheses

Effect of the <u>screen size</u> on:

H1 ➤ Completion time (CT)
- Smaller screen size → longer CTs

H2 ➤ Instructional Manipulation Check (IMC)
- Smaller screen size → higher fail rate IMC

H3 ➤ Answer Consistency (AC)
- Smaller screen size → lower AC

H4 ➤ Survey Experience (SE)
- Smaller screen size → more negative SE

H_{sub} **Questionnaire <u>optimization</u> effect**

4. Data: the experiment

- **Netquest panel** (Spain)
  - ➤ Two-wave survey
    - Wave 1 (w1): Feb. 23rd - Mar. 2nd 2015
    - Wave 2 (w2): Mar. 9th - Mar. 18th 2015
    - Completes: 1,800 (w1; 54.3% of contacted); 1,608 (w2; 89.3%)
  - ➤ Experimental design
    - Survey condition randomly assigned (each wave):
      - *PC = participation using PC*
      - *MO = participation using mobile devices (quest. optimized)*
      - *MNO = participation using mobile devices (quest. non-optimized)*
  - ➤ Panelists analyzed here: **719** (mobile both waves)

4. **Data:** the questionnaire

- **Sensitive behaviors** (Mavletova & Couper, 2013)
  - ➢ >100 questions
    - ▪ Deviant behaviors (justified, done), Immigration (opinion), Alcohol consumption (frequency, done, judgement)
    - ▪ Background variables (e.g. Income, Internet access Frequency)
    - ▪ Perceived questions sensitivity
    - ▪ Survey experience (easy; liked)
  - ➢ Different layout/scale proposed
    - ▪ E.g.: yes/no to 11-point scale; grids/separate items

5. Methodology: analyses

- **Overview** (screen size)

- **Step 1: Analysis by group**
  - Quartiles "screen size" variable
  - ANOVA/t test (equality of means)

- **Step 2: Regression analysis**
  - Y = indicator, w1 (CT, IMC, AC*, SE)
    - Multiple regression (CT, AC*, SE)
    - Logistic regression (IMC)
  - Robustness: Std. var. + Forward/backward
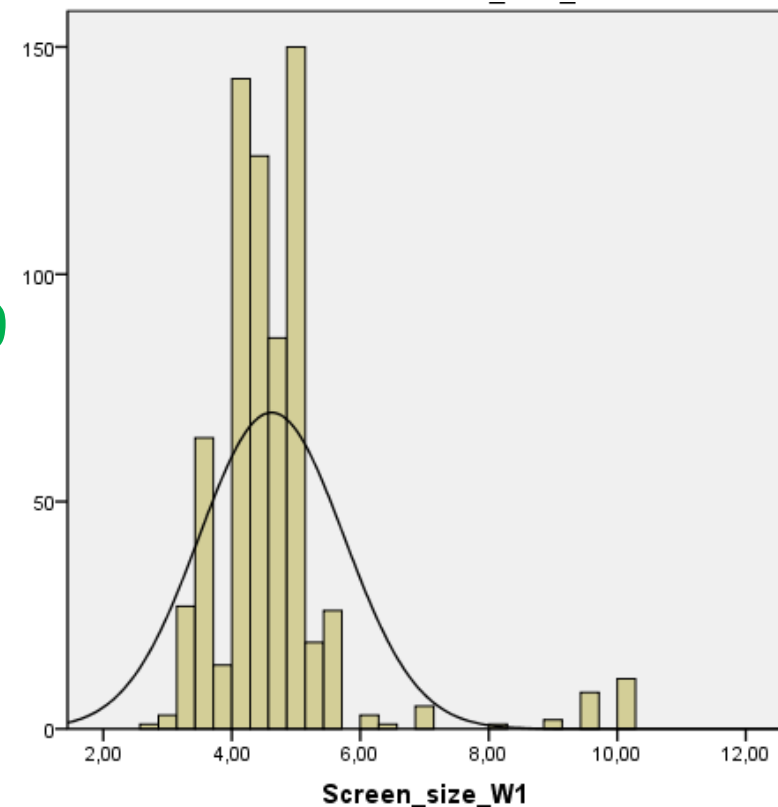
* For this indicator w1 and w2 data are compared

■ **Screen size stats** (w1 / n = 690 / inches)

➢ Statistics

- Min.: 2.80 / Max.: 10.10
- Avg.: 4.62 (st.dev.: 1.13)
- Median: 4.50 / Mode: 4.00
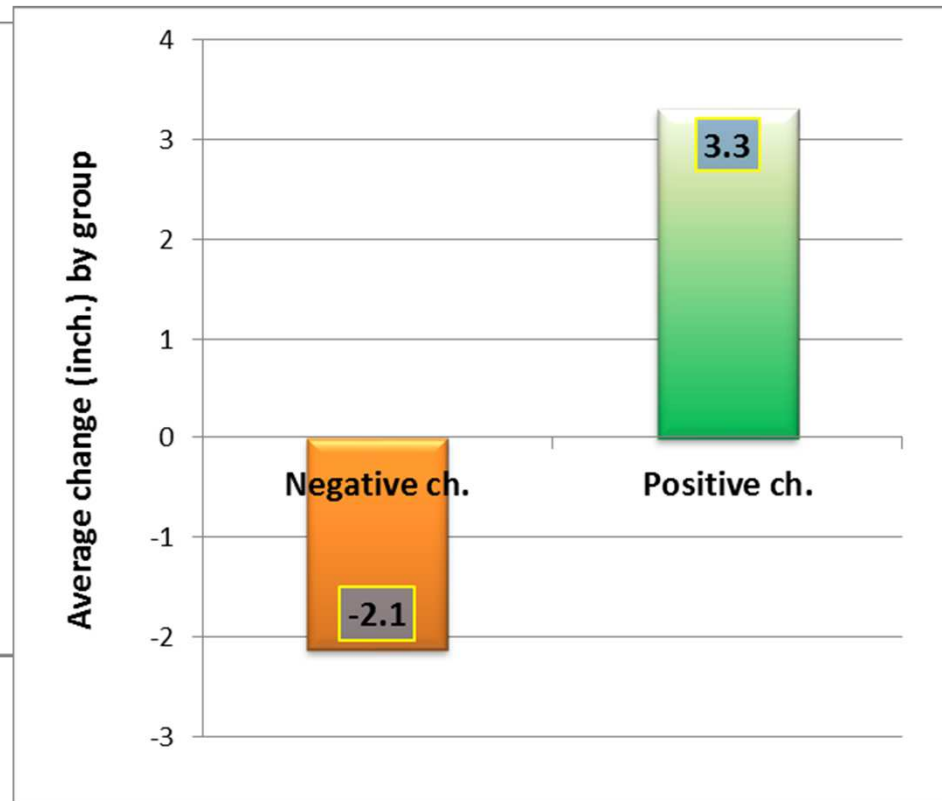
➢ By **quartile** (w1) distrib.
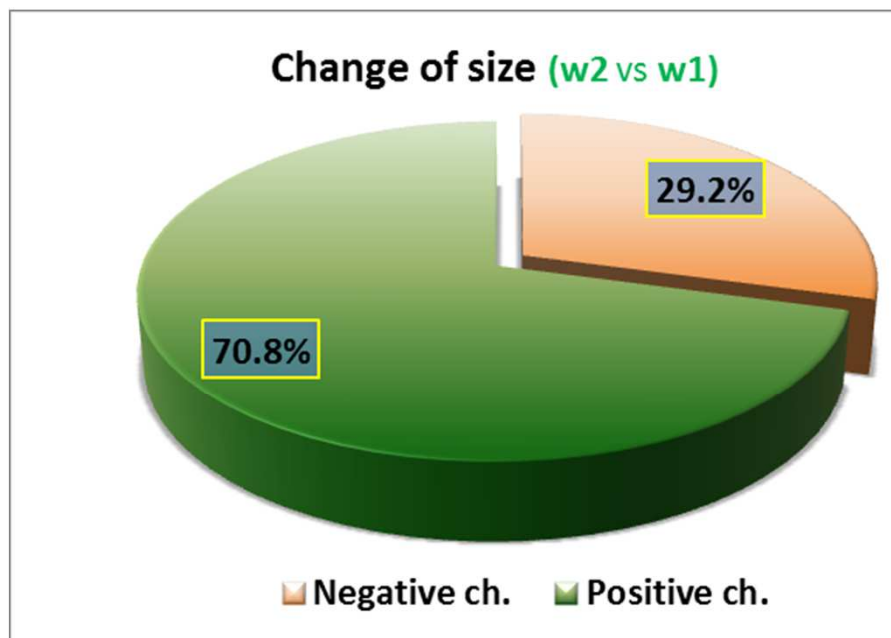
		Freq.	%
Q1	(2.8-4.0]	239	34.6
Q2	(4.0-4.5]	137	19.9
Q3	(4.5-5.0]	225	32.6
Q4	(5.0-10.1]	89	12.9
TOTAL		**690**	**100.0**

Screen_size_W1

6. Results: overview

- **Screen size change** (w2 vs w1 / n = 686)
  - ➤ Changes: 48 panelists (7,0%)

Change of size (w2 vs w1)

29.2%

70.8%

☐ Negative ch. ☐ Positive ch.

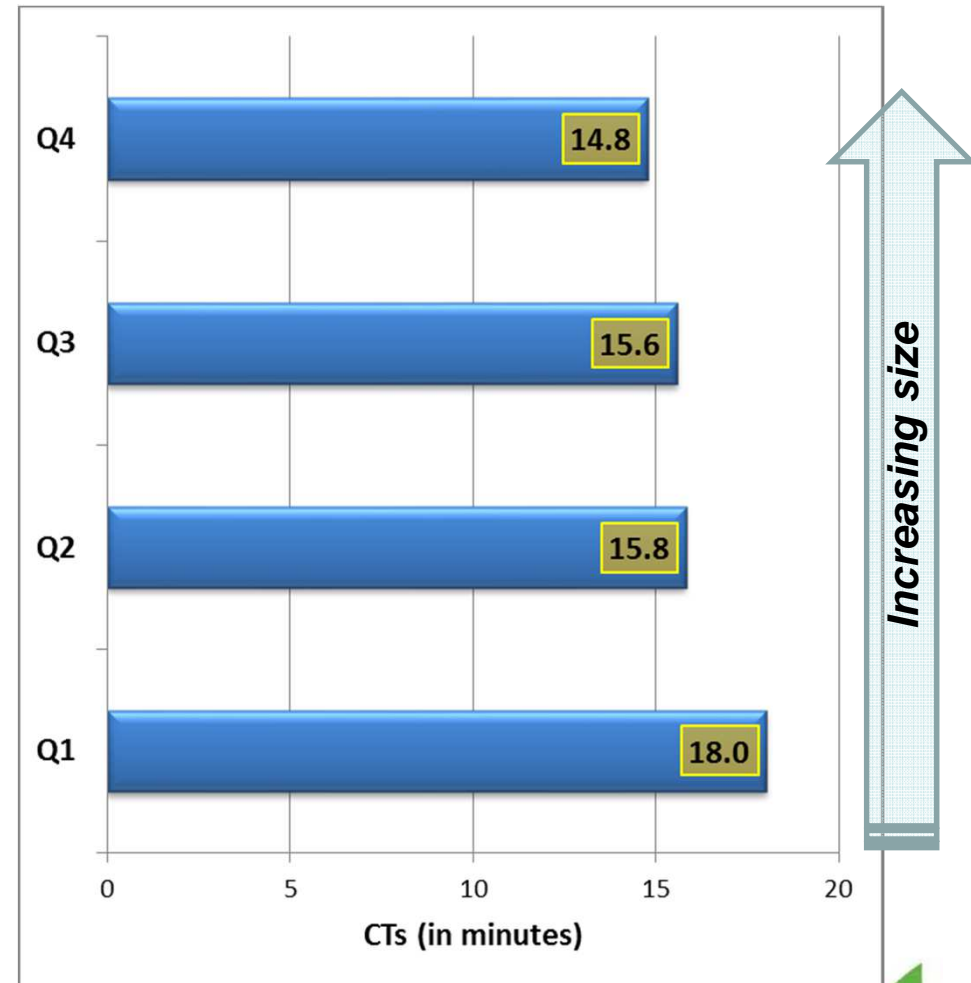

Average change (inch.) by group

3.3

Positive ch.

Negative ch.

-2.1

- **ANOVA**

  (quartile classes / w1)

  - ➤ Significantly different averages ($p = .000$)

  - ➤ The smaller the screen, the longer the CTs

  - ➤ **H1** supported

Increasing size

Q4 — 14.8
Q3 — 15.6
Q2 — 15.8
Q1 — 18.0

CTs (in minutes)

Average CT = 16.3 min.

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■ **Regression** $Y = CT$ (wave 1)

Variables	Coeff.	*p*-values
(Constant)	**1296.20**	**.000**
Screen size	**-37.96**	**.002**
Optimization	-34.10	.214
How Long Acc. Int.	1.81	.475
Freq. Acc. Int.	**-7.72**	**.004**
Fare-TimeUse	9.42	.896
Fare-Wifi	97.12	.092
Conn. speed satisf.	14.79	.376
Difficult participation	-52.32	.029
Dislike survey	24.82	.309
Felt easy	**37.07**	**.049**
Perceived sensit.	9.02	.687
Pixel density	-.27	.072
Age	**6.08**	**.000**
Educ. Level	-21.95	.138

Screen Size:
- Significant
- + 1 inch ≈ - 38 seconds

- **H1 supported** (smaller screens → longer CTs)
- Previous literature findings confirmed

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■ **Regression** $Y = CT$ (wave 1)

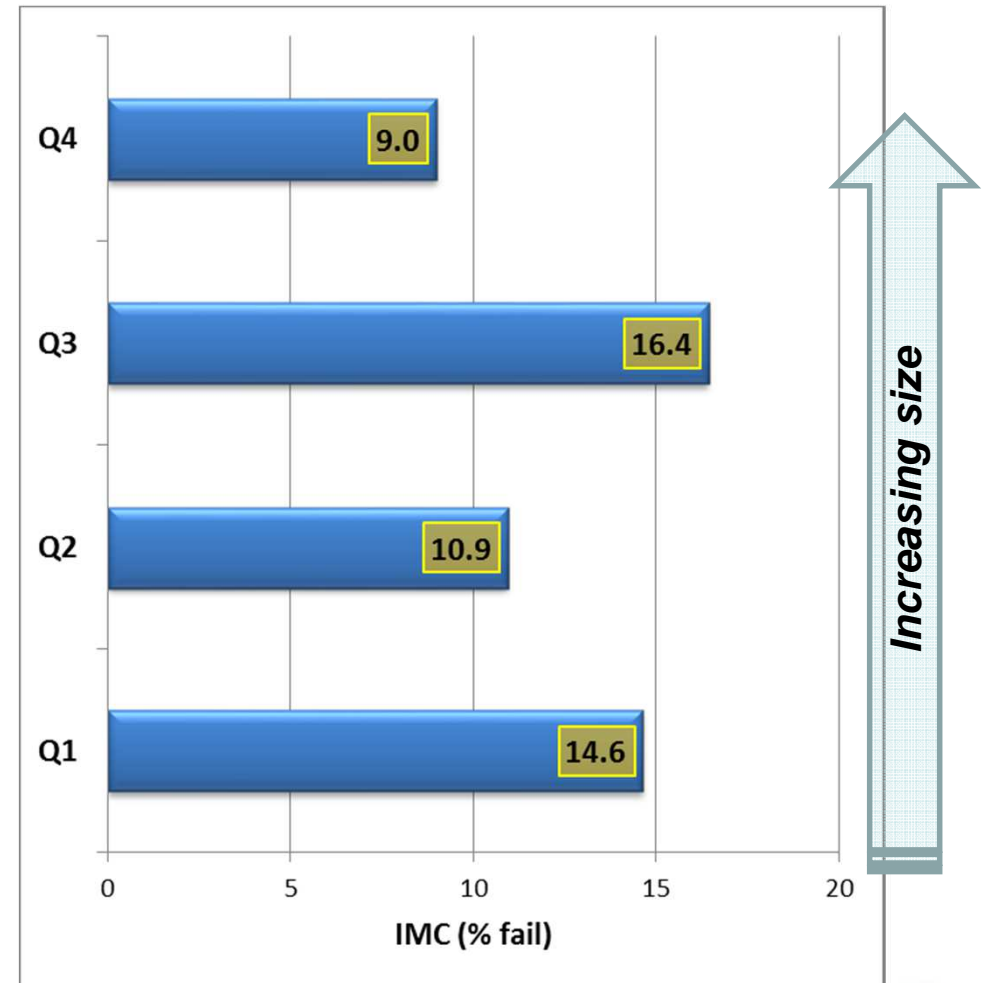| Variables	Coeff.	*p*-values
(Constant)	**1296.20**	**.000**
Screen size	**-37.96**	**.002**
Optimization	-34.10	.214
How Long Acc. Int.	1.81	.475
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Age	**6.08**	**.000**
Educ. Level	-21.95	.138

Optimization:

- Not significant
- Vertical scrolling more relevant

- **H1sub** (optimization → shortening CTs) **not supported**

- **ANOVA**
  (quartile classes / w1)

  - ➢ Non-significantly different averages ($p = .247$)

  - ➢ No direct link between IMC fail % and screen size

  - ➢ **H2** not supported

Increasing size

Average IMC = 13.6 %

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- **Logistic regression** $Y = IMC$ (wave 1)

Variables	Coeff.	p-values
(Constant)	**-2.499**	**.009**
Screen size	-.359	.064
Optimization	**-.546**	**.029**
How Long Acc. Int.	-.012	.718
Freq. Acc. Int.	.047	.102
Fare-TimeUse	.898	.082
Fare-Wifi	.092	.860
Conn. speed satisf.	-.110	.426
Easy participation	-.378	.064
Like survey	.048	.828
Felt easy	-.084	.632
Perceived sensit.	.369	.064
Pixel density	.002	.152
Age	**.028**	**.013**
Educ. Level		.172

Screen Size:
- Not significant

- **H2** (smaller screens → higher IMC fail %) **not supported**

Logistic reg. $Y = IMC$ (wave 1)

Variables	Coeff.	*p*-values
(Constant)	-2.499	.009
Screen size	-.359	.064
Optimization	**-.546**	**.029**
How Long Acc. Int.	-.012	.718
Freq. Acc. Int.	.047	.102
Fare-TimeUse	.898	.082
Fare-Wifi	.092	.860
Conn. speed satisf.	-.110	.426
Easy participation	-.378	.064
Like survey	.048	.828
Felt easy	-.084	.632
Perceived sensit.	.369	.064
Pixel density	.002	.152
Age	**.028**	**.013**
Educ. Level		.172

Optimization:
- Significant
- Optimized questionnaire → ≈ - 54.6 percentage points in IMC fails %
- Higher participation quality

- **H2sub** supported (optimization → lower IMC fail %)
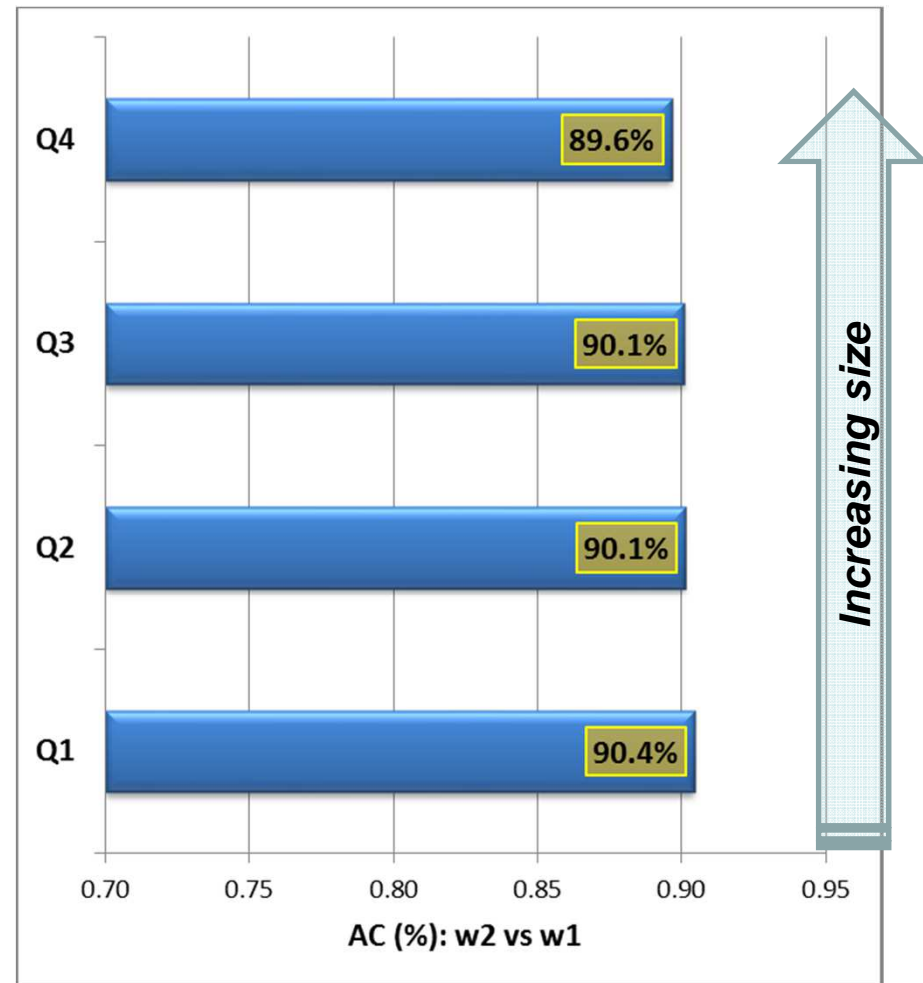
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- **ANOVA** (no size change) (quartile classes/survey condition)
  - ➢ Non-significantly different averages (p = .689/.089)
  - ➢ No link between AC and screen size/ survey condition
  - ➢ **H3** & **H3sub** not supported

Q4 — 89.6%
Q3 — 90.1%
Q2 — 90.1%
Q1 — 90.4%

AC (%): w2 vs w1

Increasing size

Average AC = 90.1 %

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6. **Results:** answer consistency

- ## **Multiple regression** $Y = AC$ (wave 2 vs wave 1)

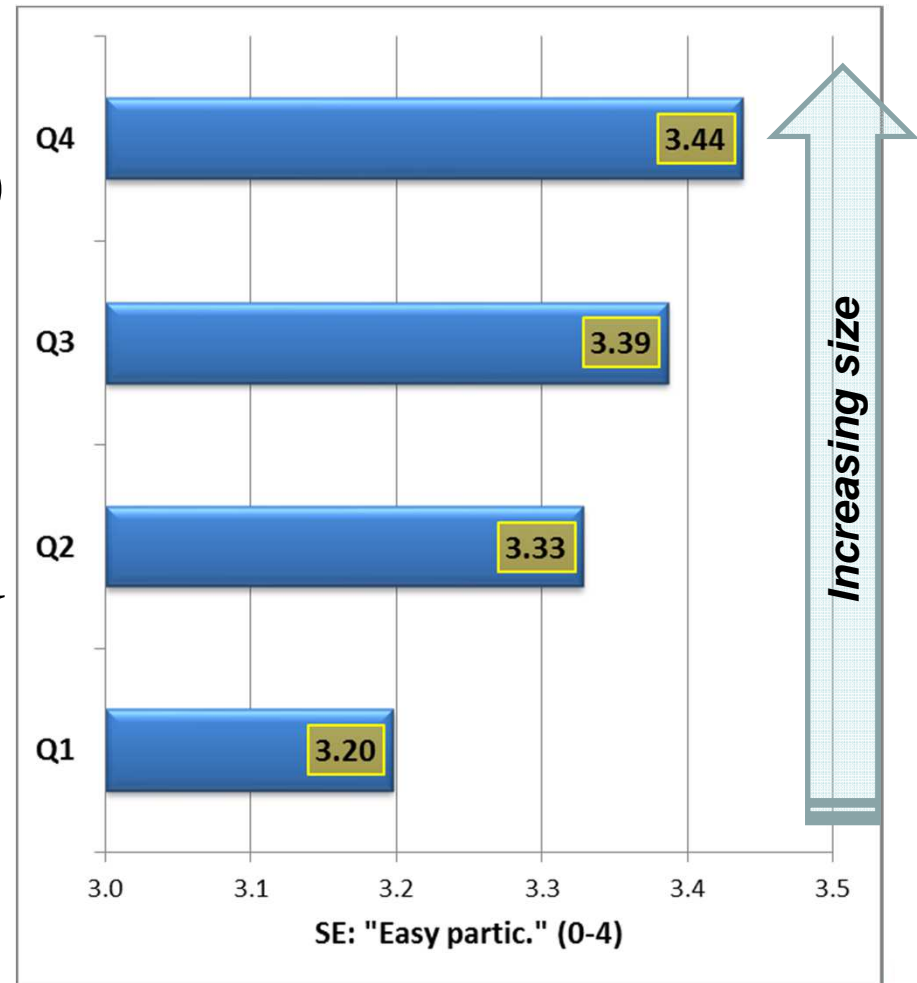| Variables	Coeff.	*p*-values
(Constant)	.873	.000
Screen size (w1)	-.001	.509
Screen size change (Δ)	-.004	.097
Educ. level (w1)	.005	.020
Easy participat. (w1)	.010	.034
Easy participat. (Δ)	.008	.025
Felt easy (Δ)	.007	.045
Perceived sensit. (w1)	-.012	.001
Perceived sensit. (Δ)	-.010	.005
SurveyCond_MO-MO	.009	.115
SurveyCond_MO-MNO	-.002	.727
SurveyCond_MNO-MO	-.001	.789

Screen Size (w1 and Δ) & Survey condition:
- Not significant
- Optim. effect for grids
- **H3** & **H3sub** (smaller screens / optimization → affect AC) **not supported**

Other variables not significant (*p*-values>.05) are not listed

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- **Easy participation**
- **ANOVA** (quartile cl./w1)
  - Significantly different averages (p = .005)
  - Indirect link between "*easy participation*" and screen size
  - **H4/a** supported
  - **H4sub/a** supported

Q4 3.44
Q3 3.39
Q2 3.33
Q1 3.20

3.0 3.1 3.2 3.3 3.4 3.5
SE: "Easy partic." (0-4)

Increasing size

Average = 3.32

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H4

H4$_{sub}$

■ **Multiple regression** *Y = "easy participation"*

Variables	Coeff.	*p*-values
(Constant)	2.275	.000
Screen size	.026	.218
Optimization	.226	.000
How Long Acc. Int.	.001	.813
Freq. Acc. Int.	.012	.010
Conn. speed satisf.	.189	.000
Perceived sensit.	.174	.000
Pixel density	.000	.149
Age	.000	.933
Educ. level	-.057	.031

Screen Size:
- Not significant
- **H4** (smaller screens → less easy) **not supp.**

Optimization:
- Significant
- **H4sub** **supported** (optimization → more easy)

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- **Like survey**
- **ANOVA** (quartile cl./w1)
  - ➤ Not significantly different averages (p = .085)
  - ➤ No link between "*like survey*" and screen size
  - ➤ **H4/b** not supported
  - ➤ **H4sub/b** supported

Increasing size

Q4 — 3.21
Q3 — 3.16
Q2 — 3.06
Q1 — 3.04

SE: "Like survey" (0-4)

Average = 3.11

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- ## **Multiple regression** *Y = "like survey"*

Variables	Coeff.	*p*-values
(Constant)	**2.323**	**.000**
Screen size	.037	.090
Optimization	**.117**	**.019**
How Long Acc. Int.	.008	.093
Freq. Acc. Int.	.004	.421
Conn. speed satisf.	**.129**	**.000**
Perceived sensit.	**.220**	**.000**
Pixel density	.000	.673
Age	-.001	.754
Educ. level	-.037	.167

Screen Size:
- Not significant
- **H4** (smaller screens → lower like) **not supp.**

Optimization:
- Significant
- **H4sub supported** (optimization → higher "like")

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7. Conclusions: main findings

	CT	IMC	AC	SE
H (screen size)	Affected	Not Affected	Not Affected	Partially Affected (ANOVA "easy")
Hsub (optimizat.)	Not Affected	Affected	Not Affected	Affected

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7. Conclusions: discussion

- **... thus?**
  - Small sized devices do not affect **data quality**...
    - Even if the burden (CTs) and the SE can be affected
  - ... moreover potential issues (IMC, SE) can be attenuated using **optimized** questionnaires
    - Positive for the willingness in participating again
    - Differently applied by different survey developers
  - ... current **issues** are becoming less important
    - Bigger devices; higher resolutions; advanced technol.
  - Focus on **mobile**: wider data collection options

8. Limits and further research

Limits...

- Non-probability based panel
- Focus on Spain
- Topics not sufficiently studied in depth
- Quick evolution of phenomenon/ technology

... & further research

- General population studies
- Replication studies
- E.g. trends of experience in using mobile devices
- Keep on monitoring it (enhanced indicators, detailed and systematic paradata collection)

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Thank you

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Any question?

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