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The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation

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OUTLINE

"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

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SHAPING.
ONLINE.
RESEARCH.

1. Background
2. Literature
3. Goals & hypotheses
4. Data
5. Methodology
6. Results
7. Conclusions
8. Limits and further research
9. References

1. Background: the context

- **Web survey framework**
  - "unintended mobile respondents" (Peterson, 2012)
- **Mobile devices: not negligible** (Revilla et al., 2015)
  - Netquest panel (186 surveys): 1/3 mobile resp. (Revilla, 2016)
  - Devices characteristics (Sweeney & Crestani, 2006)
    - Virtual keyboard
    - Speed of Internet connection
    - Device & **screen sizes**
      - *Differences within the mobile devices*

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"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

3

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 (responses) (Peytchev & Hill, 2008)

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"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

4

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)
  - Frequent solution: **questionnaire optimization** (de Bruijne & Wijnant, 2013; Fischer & Bernet, 2014; Mitchel, 2014)

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"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

5

3. Goals & hypotheses: contribution

- **Focus on mobile devices only**
  - High diversity
- **Exact screen size**
  - Measured in inches (diagonal)
- **Optimization effect** (& interaction with size)
- **More complete view**
  - Different indicators (5) analyzed

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6

3. Goals & hypotheses: hypotheses

- **Effect of the <u>screen size</u> on:**
  - **(H1)** ➢ Completion time (*CT*)
  - **(H2)** ➢ Instructional Manipulation Check (*IMC*)
  - **(H3)** ➢ Answer Consistency (*AC*)
  - **(H4)** ➢ Survey Experience (*SE*) – "*Easy*" & "*Like*"

  Moreover (sub-hypotheses):

- **(H$_{opt}$)** ■ Questionnaire **<u>Optimization</u>** effect

- **(H$_{int}$)** ■ **<u>Interaction</u>** effect: size * optimization

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7

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4. Data: the experiment

- **Netquest panel** (**Spain**)   net quest
  - ➢ 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*
      - *MNO = participation using mobile devices (quest. non-optimized)*
      - *MO = participation using mobile devices (quest. optimized)*
  - ➢ Panelists analyzed here: **719** (mobile both waves)

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"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

8

4. Data: the questionnaire

- **Sensitive topics** (Mavletova & Couper, 2013)
  - >100 questions
    - Deviant behaviors, Immigration, Alcohol consumption, …
    - Survey experience
    - Background variables
    - …
  - Different layout/scale proposed
    - *E.g.: "yes/no", 11-point scale; grids/separate items*

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9

5. Methodology: analyses

- **Step 1: ANOVA**
  - Two way ANOVA (by group)
    - Direct effects (size & opt.) + interaction (size*opt.)
    - One way ANOVA & post-hoc (PH) test

- **Step 2: Regression**
  - Y = indicator, w1
    - Multiple regression (CT, AC[1])
    - Logistic regression (IMC)
    - Ordered logistic regression (SE)

Quart. Classes (*Size*)		%
Q1	(2.8-4.0]	34.6
Q2	(4.0-4.5]	19.9
Q3	(4.5-5.0]	32.6
Q4	(5.0-10.1]	12.9
TOTAL		**100.0**
Average		**4.62**
Std. dev.		**1.13**

[1] For this indicator w1 and w2 data are compared

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10

5. Methodology: analyses

- ### Step 1: ANOVA
- ### Step 2: Regression

N.B.: in regression models variables not significant (p >= .1) and their parameters are not listed.

➤ *Independent variables' list*

- *Screen size (W1)*
  Optimization (W1)
  Size*Optim. (W1)
  Pixel density (W1)

| *Easy survey* |
| *Like survey* |
| *Felt easy* |
| *Perceived sensit.* |

→ **Survey experience**

| *How Long Acc. Int.* |
| *Freq. Acc. Int.* |
| *Fare-TimeUse* |
| *Fare-Wifi* |
| *Conn. speed satisf.* |

→ **Internet** (use/skill)

| *Public place* |
| *Lonely part.* |
| *Multitasking* |

→ **Survey context**

| *Age* |
| *Educ. Level* |

→ **Background**

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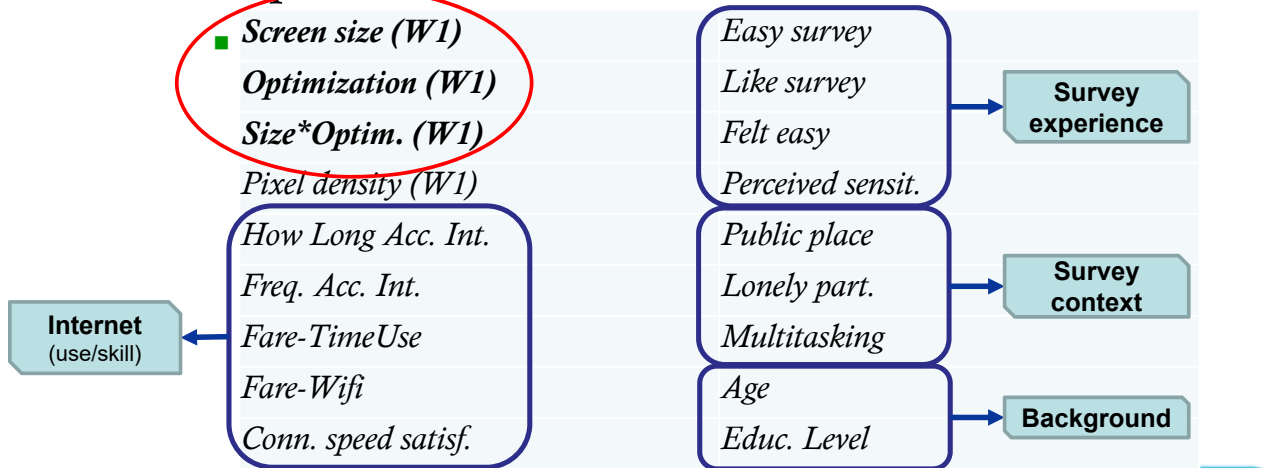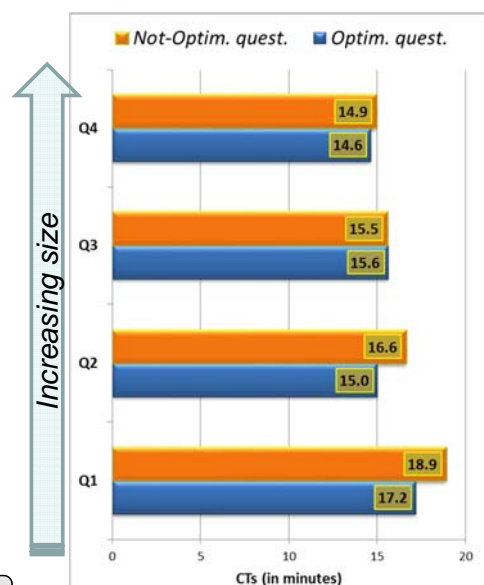
11

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6. Results: completion times   **H1**

- ### Two way ANOVA (w1)

Indicator: CT				
Effect	*F*	*df*	*p*	*Part. η^2*
Screen size *(qrt)*	10.17	3	**.000**	.043
Optimization	3.21	1	.074	.005
Size*Optimiz.	1.11	3	.344	.005

- **H1** supported
- **H1$_{opt}$** / **H1$_{int}$** not supported
- ✓ Smaller screen → longer CTs
- ✓ PH: **Q1** vs Q2, Q3, Q4 (-22.1%)

→ **Post-hoc**

Increasing size

■ Not-Optim. quest.   ■ Optim. quest.

Q4: 14.9 / 14.6
Q3: 15.5 / 15.6
Q2: 16.6 / 15.0
Q1: 18.9 / 17.2

CTs (in minutes)

***Average CT** = 16.3 min.*

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12

6. Results: completion times — H1

Regression / CT (w1)

	R^2 / adj. R^2	.103 / .068
	n	469

Variables	Coeff.	*p*-values
(Constant)	1207.36	.000
Screen size (W1)	-34.87	.010
Optimization (W1)	-24.56	.450
Size*Optim.	19.61	.198
Freq. Acc. Int.	-6.06	.068
Age	5.82	.000

- **H1 supported** (smaller screens increases CTs)
  - *Previous literature findings confirmed*
- **H1$_{opt}$** (optimization shortens CTs) **not supported**
  - *Vertical scrolling more relevant*
- **H1$_{int}$ not supported**

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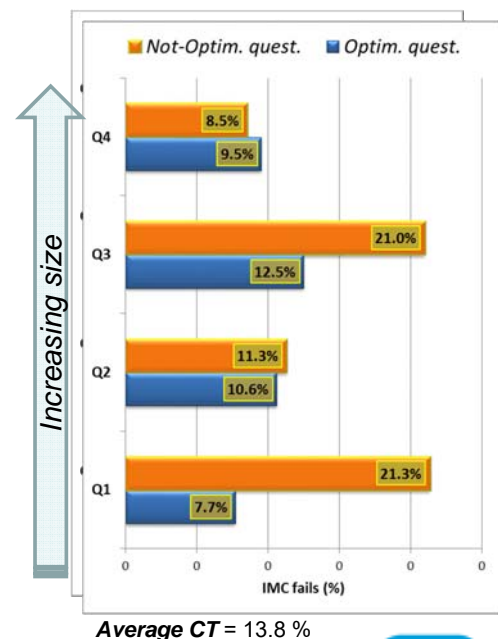
13

6. Results: instr. manipul. check — H2

Pearson χ^2 (w1)

Indicator: IMC			
Effect	χ^2	*df*	*p*
Screen size (quart.)	4.14	3	.247
Optimization	8.99	1	**.003**

- **H2** not (generally) supported
  - But **Q1** vs **Q4**: *+62.9% IMC fails*
- **H2$_{opt}$** supported
- ✓ Optimization reduces IMC fails
- ✓ PH: **Opt.** → -44.4% IMC fails

→ **Post-hoc**

Average CT = 13.8 %

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14

Logistic regression / IMC (w1)

Nagelkerke R^2	.165
n	469

Variables	Coeff.	*p*-values
(Constant)	-1.87	.265
Screen size (W1)	-.37	.071
Optimization (W1)	**-.62**	**.045**
Size*Optim.	.29	.185
Easy survey	**-.62**	**.015**
Age	**.04**	**.009**
Educ. level		.101
(4) – Professional	**.72**	**.033**

- **H2** (smaller screens increases IMC fail %) **not supported**
  - *No higher fail in reading instructions*

- **H2$_{opt}$ supported** (optimization reduces IMC fail %)
  - *Higher participation quality*

- **H2$_{int}$ not supported**

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15

Two way ANOVA (w2 vs w1)

Indicator: CT				
Effect	*F*	*df*	*p*	*Part. η^2*
Change of size[1]	1.189	2	.305	.004
Survey condit.[2]	.065	3	.978	.000
C.o.s. * S.c.	.441	6	.852	.004

- **H3** not supported
- **H3$_{opt}$ / H3$_{int}$** not supported
- ✓ No direct/interaction effect on AC
- ✓ PH: confirmed

1 = categories: «decrease», «no change», «increase»;

2 = categories: «SNO-SNO»; «SO-SO»; «SO-SNO»; «SNO-SO»

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16

6. Results: answer consistency $H3$
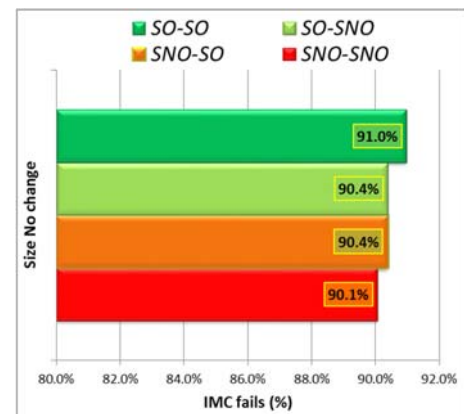
Multiple regr. / AC (w2 vs w1)

	R^2 / adj. R^2	.086 / .049
	n	589

Variables	Coeff.	p-values
(Constant)	.871	.000
Screen size (w1)	-.001	.509
Screen size change (Δ)	-.004	.097
SurveyCond_MO-MO	.009	.115
SurveyCond_MO-MNO	-.002	.727
SurveyCond_MNO-MO	-.001	.789
Easy particip. (w1)	.010	.034
Easy particip. (Δ)	.008	.025
Felt easy (Δ)	.007	.045
Perceived sensit. (w1)	-.012	.001
Perceived sensit. (Δ)	-.010	.005
Educ. level (w1)	.005	.020

- **H3** (smaller screens → affect AC) **not supported**
  - *Difficulty (small screens) does not affect consistency*
- **H3$_{opt}$** (optimization → affect AC) **not supported**
  - *Layout has no effects on consistency*

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"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

17

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6. Results: survey experience/1 $H4$

Two way ANOVA (w1)

Indicator: Easy				
Effect	F	df	p	Part. η^2
Screen size (quart.)	4.260	3	**.005**	.018
Optimization	11.836	1	**.001**	.017
Size*Optimiz.	1.921	3	.125	.008

1 = Result confirmed by the Kruskal-Wallis test (p = .001)

2 = Result confirmed by the Kruskal-Wallis test (p = .000)

- **H4/Easy** supported[1]
- **H4$_{opt}$/Easy** supported[2]
- **H4$_{int}$/Easy** not supported
- ✓ Smaller screens / not opt. quest. → Survey less easy
- ✓ PH: **Q1** vs Q3, Q4 (-7%) / **Opt.** (+6.3%)

→ Post-hoc

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"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

18

6. Results: survey experience/1 $H4$

■ Ordinal logistic regr. / Easy

	Nagelkerke R^2	.333
	n	469

Variables	Coeff.	p-values
Screen size (W1)	-.008	.927
Quest. not optim. (W1)	**-.805**	**.000**
Size*Optim.	.054	.564
Pixel density (W1)	**.003**	**.011**
Freq. Acc. Int.	**.047**	**.024**
Fare-Wifi	.847	.052
Conn. speed satisf.	**.527**	**.000**
Like survey	**1.290**	**.000**
Felt easy	.243	.071
Lonely part.	**.470**	**.042**

- **H4** (smaller screens → less easy) **not supp.**
  - *Higher scrolling not influencing perceived survey easiness*
- **H4$_{opt}$ supported** (no optimization → more difficult)
  - *Higher burden if not optimized*
- **H4$_{int}$ not supported**

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19

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6. Results: survey experience/2 $H4$

■ Two way ANOVA (w1)

Indicator: Like				
Effect	F	df	p	*Part.* η^2
Screen size *(quart.)*	2.103	3	**.099**	.009
Optimization	3.677	1	**.056**	.005
Size*Optimiz.	.277	3	.842	.001

1 = Result **NOT** confirmed by the Kruskal-Wallis test (p = .044)

2 = Result confirmed by the Kruskal-Wallis test (p = .028)

- **H4/Like** supported (sign.1%) [1]
- **H4$_{opt}$/Like** supported (sign.1%) [2]
- **H4$_{int}$/Like** not supported
- ✓ Bigger screens (but…)/ Opt. quest. → Survey more liked
- ✓ PH: **H4 not** supported / **Opt.** increases "*Like*" (+3.3%)

→ **Post-hoc**

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"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

20

■ Ordinal logistic regr. / Like

Nagelkerke R^2	.299
n	469

Variables	Coeff.	p-values
Screen size (W1)	.117	.155
Quest. not optim. (W1)	.006	.977
Size*Optim.	-.165	.077
Easy survey	**1.292**	**.000**
Felt easy	**.667**	**.000**
Perceived sensit.	.267	.087
Lonely part.	-.392	.081

- **H4** (smaller screens → lower "like") **not supp.**
- **H4**$_{opt}$ (optimization → higher "like") **not supported**
  - *Device size & optimization do not influence (directly) how much survey is liked*
- **H4**$_{int}$ **not supported**

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21

7. Conclusions: main findings

■ Does the factor affects the indicator?

	CT	IMC	AC	SE (Easy)	SE (Like)
H (screen size)	YES	NO	NO	Partially (ANOVA)	Partially (ANOVA)
H$_{opt}$ (optimizat.)	NO	YES	NO	YES	Partially (ANOVA)
H$_{int}$ (size*optim.)	NO	NO	NO	NO	NO

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22

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

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23

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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24

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25

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D. Toninelli, M. Revilla

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26

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Thank you

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Any question?

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Appendices: post-hoc tests

D. Toninelli, M. Revilla
"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

29

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6. Results: completion times   **H1**

- ## One way ANOVA (w1)

- ## H1 supported

Indicator: CT / **Test:** *Welch*	
p	**.00001**
Post-hoc	Q1 vs Q2,Q3,Q4

- o Post-hoc test (Tuckey): **Q1** vs…
  - *Q2 (p=.0030; -13.9%)*
  - *Q3 (p=.0001; -15.7%)*
  - *Q4 (p=.0001; -22.1%)*

- ✓ Smaller screen **(Q1)** → longer CTs

→ **Back**

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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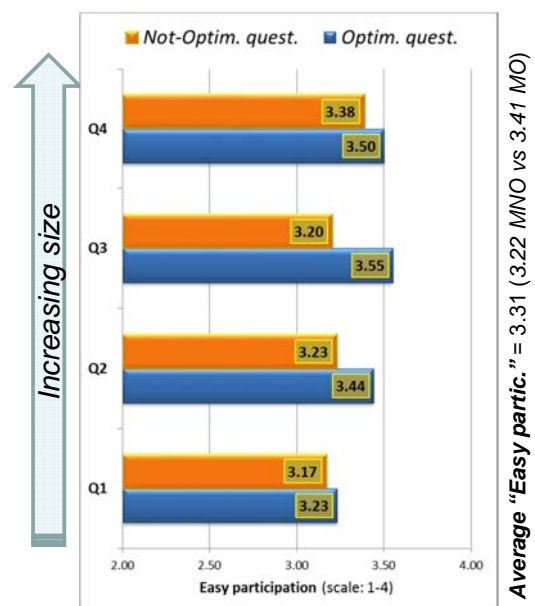**"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"**

30
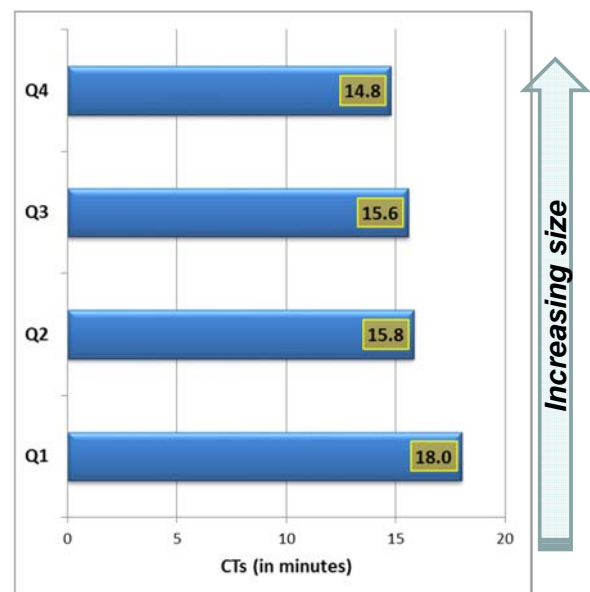
6. Results: instr. manipul. check **H2**

- **Pearson χ^2** (w1)
  - Post-hoc test (Beasley & Schumacker, 1995)

- **H2** not supported
  - No signif. differences
    - ps $\geq$ .1559

- **H2$_{opt}$** supported
  - *Optimized (p=.0125; -44.0%)*

- ✓ Optimization → reduces IMC fails

→ **Back**
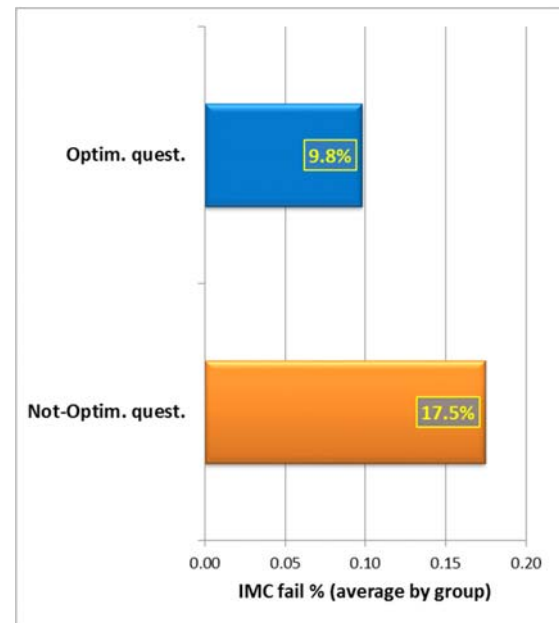
Average CT = 13.8 %.

D. Toninelli, M. Revilla
"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"

31

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6. Results: survey experience/1 **H4**

- **Two way ANOVA** (w1)

- Post-hoc test (Tuckey)

- **H4/Easy** supported:
  - Q1 vs…
    - Q3 *(p=.0110; -5.6%)*
    - Q4 *(p=.0174; -7.0%)*

- **H4$_{opt}$/Easy** supported:
  - **Optimized** vs not-opt. *(t = -4.13; p=.0000; +6.3%)*

- ✓ Smaller screen (**Q1**) and not-optimized questionnaire → less easy the survey

→ **Back**

Average "Easy partic." = 3.31 (3.22 MNO vs 3.41 MO)

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"The Role Played by the Device Screen Size and by the Questionnaire Optimization within the Mobile Survey Participation"
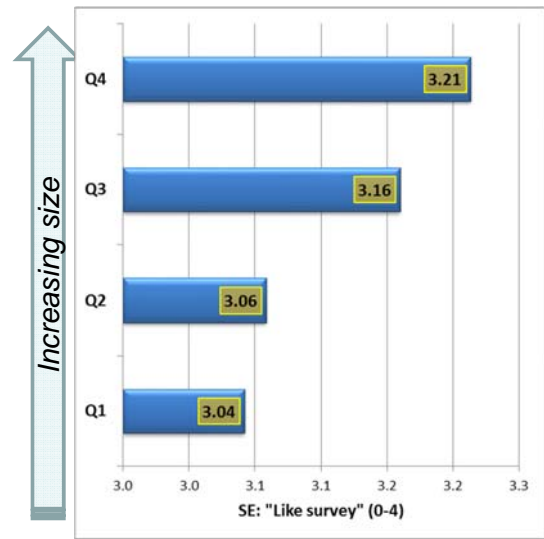
32

- **Two way ANOVA** (w1)

- Post-hoc test (Tuckey)
- **H4/Like** not supported:
  - **No significance** differences by quartile classes ($p \geq .1653$)
- **H4$_{opt}$/Like** supported:
  - **Optimized** vs not-opt. ($t = -2.07$; $p = .0385$; $+3.3\%$)
- ✓ Optimized questionnaire → survey more liked

Average "Like survey" = 3.11

→ **Back**

33