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Representativeness of web surveys to the general public

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Regular use of web surveys in the news: media-quotes

- *“Two thirds of the Flemings are against possible EU-membership of Turkey”* (09/03/2009; quality newspaper DS) > online access panel
 - *“20% of the Flemish people fear to be dismissed within three months”* (23/02/2009; public television (VRT-)news) > by e-mail invitation
 - *“Half of the Flemish people worry about the financial crisis”* (30/04/2009; commercial television (VTM-)news) > voluntary website visitors and online access panel
 - *“46% of the Belgians want to keep nuclear power stations open”* (16/03/2009; popular newspapers HLN & HNB) > F-2-F & online
- Due to minimal disclosure of methodology (cf. Sonck & Loosveldt, 2008) published web survey results seem to be representative or even claim to be so because of weighting



Content

- Main question: To what degree are web survey results representative of the general public?
 - Figures of Internet access & use in Flanders, Belgium 2008-09
 - Study of representativity: comparison between online access panel & random reference survey (Loosveldt & Sonck, 2008)
 - Significant differences in socio-demographic and attitude variables?
 - Possible bias mainly due to coverage, sampling design & selectivity of online panel
 - Solution: weighting? Post-stratification weighting & propensity score adjustment of online survey
 - Discussion & conclusion



Internet access & use

Recent figures of Internet access and use for adult Flemish population (15yrs & older) in Belgium

No internet access	25.87%
Internet access	74.13%

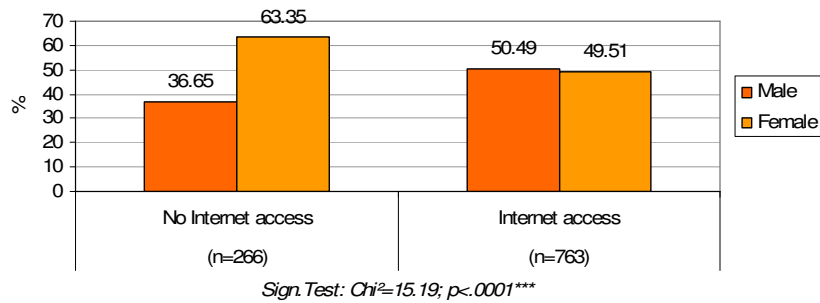
Personal use of Internet (if access=yes)	
Daily	53.20%
Weekly	24.11%
Less than weekly	7.08%
Never	15.61%

–Source: European Social Survey (ESS) 2008-09 (weighted by age*gender*education)

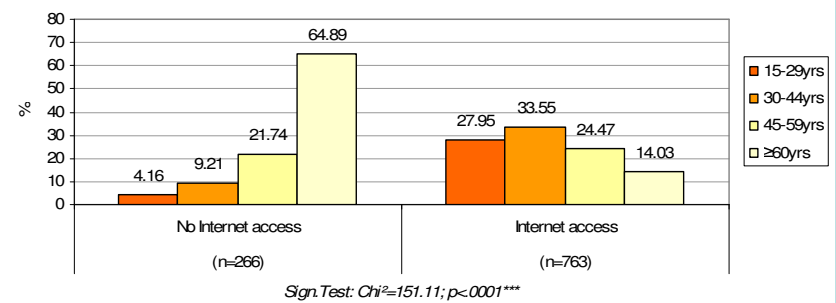


Internet access

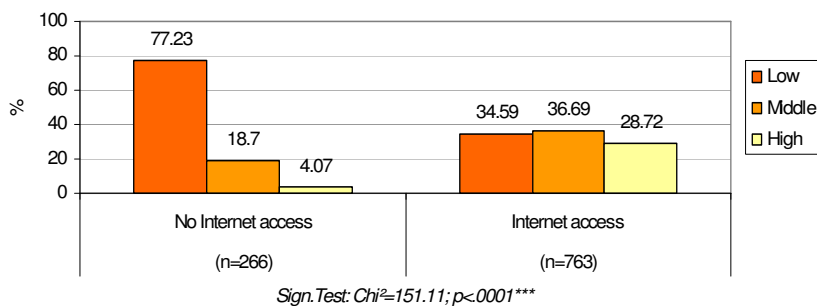
Gender



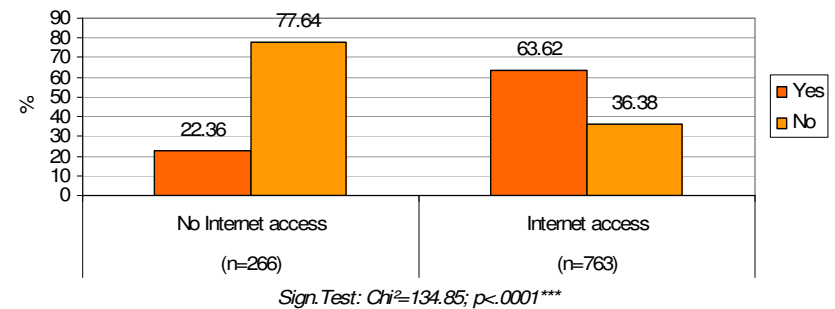
Age



Education



Having paid work

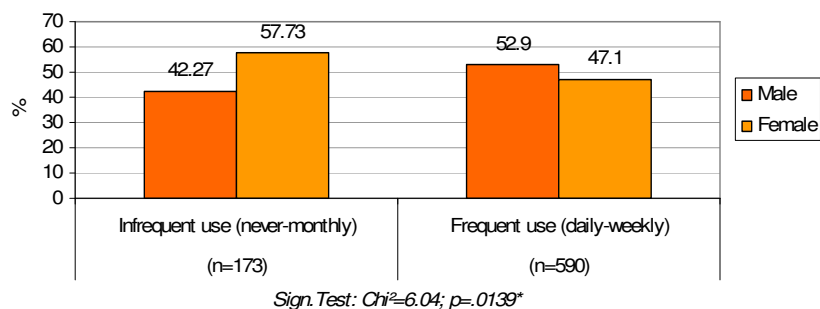


—Source: ESS-survey 2008-09



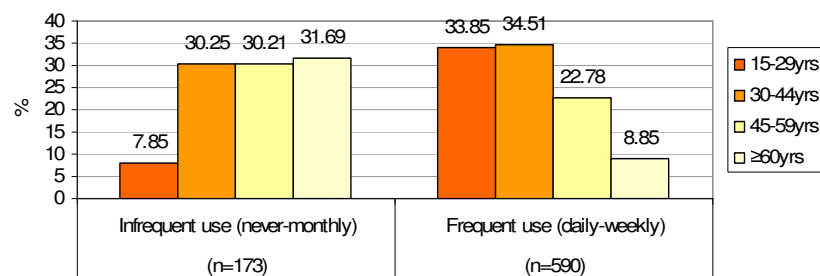
Internet use (access=yes)

Gender



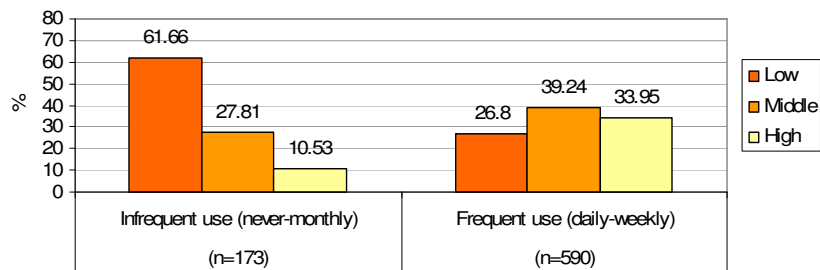
Sign. Test: $\chi^2=6.04$; $p=.0139^*$

Age



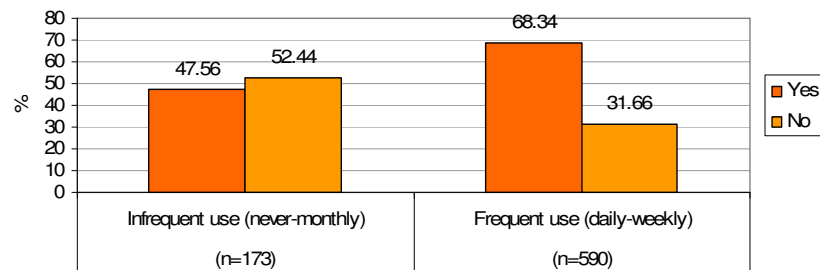
Sign. Test: $\chi^2=75.90$; $p<.0001^{***}$

Education



Sign. Test: $\chi^2=75.90$; $p<.0001^{***}$

Having paid work



Sign. Test: $\chi^2=6.04$; $p=.0139^*$

—Source: ESS-survey 2008-09



Study of representativity

- Comparison of answers to identical survey questions asked at a similar moment in time (2006-07) in the same region (Flanders, Belgium):
 - Online access panel: online self-administered survey with panel respondents previously recruited through online & offline channels
 - Random reference survey: randomly sampled respondents of the general population, face-to-face surveyed



(Dis)Advantages online panel

- **Main benefits:** time and cost reduction - the absence of an interviewer – convenience
- **Main methodological problems:**
 - (Non-)coverage: number of people having internet access + differences between the persons with and without internet access
 - Sampling design: no comprehensive list of Internet users to draw probability-based sample
 - Selectivity: self-selection mainly a problem in the phase of recruiting new panel respondents, people with specific characteristics participate in a volunteer online access panel



Previous research results: comparisons web – traditional method

- Significant differences observed:
 - Web respondents more intensive users of the Internet & other media, more technically-oriented persons (Bandilla et al., 2003; Vehovar et al., 1999)
 - Those with larger social trust and a greater subjective control over their lives tend to use the Internet more frequently (Lenhart et al., 2003)
 - Online panels comprise more politically and socially active respondents (Duffy et al., 2005)



Solution: weighting?

- Post-stratification weighting:
 - Aims to adjust for demographic under- and over-representations between sample and target population
 - Is necessary but has a rather limited impact (Vehovar et al, 1999): corrects for proportionality but not necessarily for representativity of substantive answers
 - Method: $\% \text{population (census)} / \% \text{sample} = \text{weighting coefficient}$
- Propensity score adjustment (PSA):
 - Originated from experimental studies (Rosenbaum & Rubin, 1983)
 - Aims to correct for differences due to the varying inclination to participate in online panel surveys
 - Mixed findings (Taylor, 2005; Duffy et al., 2005; Malhotra&Krosnick, 2007): some differences disappeared by demographic weighting, some only after additional propensity score adjustments and others continued to exist or became even larger after adjustment instead of smaller



PSA: method (Lee 2006; Schonlau et al. 2006)

- Merge in one datafile:
 - Online survey
 - Probability-based reference survey that is not conducted over the Internet, assumption of unbiased estimates (Betlehem&Stoop, 2007)
- Conduct logistic regression of people's probability to participate either in the online or the traditional survey mode by demographic and/or attitudinal variables → estimation of propensity scores
- Classification of respondents in (e.g. 5 or 10) groups with a similar propensity score
- Make distribution of these propensity scores similar for web survey and random sample = calculation of weights ($\%random / \%web$)
- → web survey and random sample do not differ significantly anymore for the variables used in the logistic regression for the propensity scores (what about other variables?)



Data

- Online panel sample (n=3235)
 - Sampled from panel database with background information
 - Panel members 18-74 yrs, Flemish region
 - Stratified according to age, gender, education
 - Over, under-sampled according to previous response rates
 - Online self-administered questionnaire
- Random sample (n=980) ~ *reference survey*
 - Sampled from national database
 - Adult population +15 yrs, Belgium > 18-74, Flemish
 - Stratified by provinces, in which persons are randomly sampled
 - Face-to-face survey with interviewer



Data collection

	Online Panel (n=3235)	Face-to-face Survey (n=980)
Response rate	(59.96%)	62.25%
	Self-selection unknown	
Fieldwork	1 month (1576 interviews completed during the first day)	4 months (11 interviews conducted during the first day)
Cost per completed interview	€3 (+fixed cost panel management)	€140



Samples vs. population

Unweighted data

		Online Panel	Random reference	Census
Characteristic		% (n)	% (n)	% (n)
Gender		<i>N.S.</i>	<i>N.S.</i>	
	Male	51.11 (1629)	50.41 (494)	50.10 (2 184 010)
	Female	48.89 (1558)	49.59 (486)	49.90 (2 175 348)
Age		***	<i>N.S.</i>	
	18-24	7.37* (237)	13.06 (128)	11.41 (497 600)
	25-34	17.81* (573)	13.67* (134)	17.57 (766 149)
	35-44	19.02* (612)	22.35 (219)	21.43 (934 037)
	45-54	23.22* (747)	19.49 (191)	20.08 (875 557)
	55-65	25.02* (805)	16.53 (162)	15.95 (695 246)
	65-74	7.55* (243)	14.90 (146)	13.55 (590 768)
Educational degree		<i>N.S.</i>	***	
	Lower Secondary	36.83 (1 151)	28.88* (283)	36.39 (1 586 175)
	Higher Secondary	34.72* (1 085)	57.65* (565)	37.37 (1 629 120)
	Higher Education	28.45* (889)	13.47* (132)	29.76 (1 144 062)

Significance levels: *N.S.* $p \geq .05$; * $p < .05$; ** $p < .01$; *** $p < .001$



Weighting applied

- Unweighted, raw data
- Post-stratification on both samples: weighted by demographic variables age*gender*education
- Propensity score adjusted online access panel by variables age, gender, education, paid work, living area
 - Logistic regression of probability to participate in online survey with these variables → propensity scores
 - Categorization of whole dataset (online & f-t-f) in 10 groups of each 10% respondents with similar propensity scores
 - Weights applied to make this distribution of propensity scores equal between online and random sample



Main findings

- Research objective: evaluating impact of post-stratification weighting & propensity score adjustment
- Expectation: disappearance of significant differences between online panel & random reference survey (if weighting is 'successful', online panel data can be adjusted to be representative of general public)
- But if differences remain to exist, it may be due to:
 - Selection effect: unique group of people who are willing to participate regularly in online access panel surveys (not representative of general public)
 - Mode effect: respondents may answer differently when responding to the (non-) verbal communication of an interviewer (e.g. explanation of questions, social desirable responses) or when sitting in front of a computer (e.g. more anonymity)
- Comparison of different kinds of questions with varying social desirability
 - Factual questions (paid work; living area)
 - Attitudinal questions about work satisfaction
 - Attitudinal questions about politics
 - Attitudinal questions towards immigrants



Factual questions

	Unweighted		Post-stratification weighted		Propensity weighted
	Online Panel	Random reference	Online Panel	Random reference	Online Panel
Paid work	%	%	%	%	%
Paid work	55.56	59.80	56.09	62.02	58.59
No paid work	44.44	40.20	43.91	37.98	41.41
<i>Chi² (df= 1); p</i>	<i>5.47 ; *</i>		<i>10.71 ; ***</i>		<i>0.45 ; N.S.</i>
Living area	%	%	%	%	%
(Sub)urban	52.48	35.41	53.61	36.21	36.03
Rural	47.52	64.59	46.39	63.79	63.97
<i>Chi² (df= 1); p</i>	<i>87.46 ; ***</i>		<i>90.34 ; ***</i>		<i>0.12 ; N.S.</i>



Work satisfaction (job=yes)

	Unweighted		Post-stratification weighted		Propensity weighted
	Online Panel	Random ref	Online Panel	Random ref	Online Panel
	Mean	Mean	Mean	Mean	Mean
Q. How satisfied are you with... (<i>0 very dissatisfied – 10 very satisfied</i>)					
with current work	7.654	7.637	7.661	7.621	7.656
<i>t ; p</i>	<i>0.19;</i>	<i>N.S.</i>	<i>0.46;</i>	<i>N.S.</i>	<i>0.21 ; N.S.</i>
with time balance	6.922	6.268	6.958	6.201	6.979
<i>t ; p</i>	<i>6.50;</i>	<i>***</i>	<i>7.56;</i>	<i>***</i>	<i>7.00 ; ***</i>
Q. How often do you find that your job... (<i>0 never – 6 all the time</i>)					
job is interesting	4.401	4.591	4.392	4.596	4.350
<i>t ; p</i>	<i>-3.20;</i>	<i>***</i>	<i>-3.45;</i>	<i>***</i>	<i>-3.92 ; ***</i>
job causes stress	3.324	3.359	3.283	3.393	3.259
<i>t ; p</i>	<i>-0.46;</i>	<i>N.S.</i>	<i>-1.44;</i>	<i>N.S.</i>	<i>-1.29 ; N.S.</i>



Political attitudes

	Unweighted		Post-stratification weighted		Propensity weighted
	Online Panel	Random ref	Online Panel	Random ref	Online Panel
Political interest	%	%	%	%	%
Very interested	11.20	8.16	10.90	8.60	11.60
Quite interested	27.95	41.12	28.55	42.31	30.09
Hardly interested	43.66	29.59	43.92	27.47	43.23
Not at all interested	17.19	21.12	16.64	21.62	15.08
<i>Chi² ; p</i>	<i>91.51 ; ***</i>		<i>108.94 ; ***</i>		<i>86.86 ; ***</i>
Difficulty making up mind about politics	%	%	%	%	%
Very difficult	5.63	6.76	5.54	7.29	5.26
Difficult	23.93	35.31	24.26	34.92	25.12
Neither difficult nor easy	43.04	33.67	42.65	32.81	43.56
Easy	23.06	21.29	23.05	22.28	22.15
Very easy	4.34	2.97	4.50	2.70	3.91
<i>Chi² ; p</i>	<i>58.08 ; ***</i>		<i>58.99 ; ***</i>		<i>50.19 ; ***</i>



Attitudes towards immigration

	Unweighted		Post-stratification weighted		Propensity weighted
	Online Panel	Random ref	Online Panel	Random ref	Online Panel
Immigration improves or worsens... (<i>scale recoded: 0 improving– 10 worsening</i>)					
economy	6.544	6.275	6.500	6.230	6.675
<i>t ; p</i>	<i>2.87; **</i>		<i>2.87; **</i>		<i>4.31; ***</i>
cultural life	5.908	5.249	5.836	5.243	6.015
<i>t ; p</i>	<i>6.53; ***</i>		<i>5.86 ; ***</i>		<i>7.67; ***</i>
place to live	6.843	6.193	6.771	6.186	6.938
<i>t ; p</i>	<i>6.75; ***</i>		<i>5.72 ; ***</i>		<i>7.77 ; ***</i>



Discussion & conclusion

- Similar 'completion' rates (but online panel members previously agreed to participate)
- Major advantages of web surveys: time (large bulk of data collected on the first fieldwork day of panel survey) and cost-reduction (low cost per completed interview)
- Panel sample deviates from general population regarding age despite pre-stratification:
 - 18-24 yrs (!) & 65-74 yrs underrepresented
 - 55-65 yrs (!) overrepresented: new group of internet users? (important to continuously monitor internet access & use – may be rapidly changing)



Discussion & conclusion

- Significant differences in attitudinal answer patterns observed for different themes (political attitudes, work satisfaction, attitudes towards immigrants,...)
- Possible explanations:
 - Characteristics respondents: e.g. panel members living in (sub)urban area, easier to form political opinion
 - Characteristics modes: e.g. panel members more negative attitudes towards immigrants (mode effect – social desirability)



Discussion & conclusion

- Impact weighting
 - Post-stratification weighting: no substantial impact
 - Propensity score adjustment: only minimal adjustments, some differences became larger instead of smaller (?!)
- weighting based on simple demographics does not make online panel data more comparable to the general population (not representative)
- mainly problematic for social-scientific survey research that aims to represent the general public – less problematic for other types of research, e.g. commercial marketing research (target group might be represented by Internet users)
- Possible solutions:
 - Other and more variables have to be taken into consideration for weighting
 - Providing respondents with Internet access (time and cost-reduction disappears)
 - Non-representative use of online panel data: e.g. for experiments, exploratory studies



The end

- Questions?
 - Suggestions?
 - Comments?
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