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Sleepers in LISS

date	05-12-2008
author(s)	Klaas de Vos
version	1
classification	sensitive

1 Introduction

Like any panel survey, the LISS panel suffers from attrition. At a certain moment, a household may leave the panel, for some reason or other. In a panel survey with monthly questionnaires, attrition often starts with a period of non-response. Without formally informing the panel managers, the household members no longer participate in any questionnaire. Effectively, they have already dropped out.

In LISS, panel members who haven't filled out a questionnaire for three months are called sleepers. When all panel members in a household are sleepers, the probability that these households will ever become active again is low. Therefore, it is important to know which households are the most likely to become sleepers. For one thing, this knowledge could provide indications how to prevent a household from becoming a sleeper. For another, it can serve to show whether recruitment of replacement households should focus on certain types of households (e.g., by stratification) or whether replacement households can be randomly drawn from the total population (if the sleepers as probable dropouts turn out not to be concentrated in specific population groups).

2 Characteristics of sleeper households

In this section we will compare sleeper households and non-sleeper households. On 21 November 2008, LISS contained 8202 active panel members in households whose general household information questionnaire had been filled out. 1088 (13%) of these panel members were in households where none of the household members had filled out a questionnaire for three months: sleeper households

In table 1 we show how the percentage of persons in sleeper households varies between groups with different characteristics. It turns out that there are significant differences between groups subdivided according to household size, age, education, type of tenure, occupation and level of urbanization. There are no significant differences between men and women.

The percentage of sleepers is high in the age groups 25-34 (20.3%) and 35-44 (17.1%), among single person households (17.8%) and three person households (16.9%), among tenants (17.4%), among persons with secondary vocational education (14.8%), among self-employed (18.9%) and unemployed (20.6%), and in very urban areas (16.5%). It is relatively low in the age groups below 25 (8.8%), between 55 and 64 (9.9%) and above 65 (8.1%), in five person households (9.1%), among persons with general secondary education (11.1%) and persons who did not yet complete their education (10.4%), and among students (6.7%) and pensioners (6.5%).

One notable feature of the LISS panel is that households are supplied with a broadband internet connection and/or a PC when these are lacking when the household is recruited. When we differentiate between households where LISS has provided the internet connection and/or the PC, and the other households we find that households with internet or PC provided by LISS are clearly less likely to become sleepers (6.2%) than the other households (13.8%).

Using the response to the Religion and Ethnicity (REE) questionnaire, we can also ascertain to what extent ethnic minorities are likely to become sleepers (table 2). It turns out that persons with an ethnic background are clearly more likely to become sleepers than persons whose parents were born in the Netherlands. Especially 1st and 2nd

generation non-western immigrants show high percentages of sleepers (19.0% and 17.9%, respectively). Given that they are already underrepresented in the panel, this is not good news. It suggests that special attention needs to be given to the response behaviour of ethnic minorities. Moreover, this group would need to be overrepresented in the replacement sample.

Notably, the highest percentage of sleepers (31%) is found among persons who did not fill out the REE questionnaire. In other words the response behaviour in early 2008 does a better job in differentiating between sleepers and non-sleepers in November than any of the other characteristics distinguished in table 1. To some extent, this could be expected given the definition of sleepers. However, the fact that households with respondents who do not fill out a certain questionnaire are much more likely to end up as sleepers more than half a year later than households where all panel members do fill out that questionnaire suggests that any non-response should be interpreted as a danger signal. Probably efforts to keep the panel members responding should start as soon as their membership of the panel starts.

Because of the large difference between the group of respondents where ethnicity is known and the respondents who did not fill out the REE questionnaire we have also subdivided both groups according to the characteristics distinguished in table 1. When ethnicity is known, the percentage of sleepers varies between 4.2% for panel members who use internet or PC provided by LISS and 15.1% for persons in the age group 25-34, not much higher than the average for the total population (13.3%). When ethnicity is not known, the percentage of sleepers rises to more than 50% for single persons and more than 70% for (the small group of) unemployed. Percentages of sleepers of more than 40% are also found for the age groups 25-34 and 35-44, persons with tertiary vocational education, self-employed persons, homemakers and persons with 'other' occupations. The lowest percentages of sleepers among the respondents who did not fill out the REE questionnaire are found for the partly overlapping groups of students and persons younger than 25. This is partly caused by 16 year olds who were not yet 16 when the REE questionnaire was submitted to the panel (i.e. who were not non-respondents by choice).

Table 1. Percentages of sleepers subdivided by various characteristics

		All		Ethnicity known		Ethnicity unknown	
	Characteristic	% of sleepers	N	% of sleepers	N	% of sleepers	N
	total	13.3	8202	10.3	7021	31.2	1181
age	< 25	8.8	1119	8.2	803	10.4	316
	25- 34	20.3	1244	15.1	1015	43.2	229
	35- 44	17.1	1751	13.1	1503	41.5	248
	45 -54	12.8	1706	10.0	1515	34.6	191
	55- 64	9.9	1428	7.9	1308	32.5	120
	65 +	8.1	954	5.6	877	36.4	77
gender	woman	13.0	4346	10.0	3747	32.2	599
	man	13.5	3856	10.6	3274	30.1	582
household size	1	17.8	1144	12.4	992	53.3	152
	2	11.5	2954	8.5	2618	35.1	336
	3	16.9	1210	13.9	987	30.5	223
	4	12.6	1954	10.9	1681	23.4	273
	5	9.1	716	7.0	575	17.7	141
	6+	11.6	224	8.3	168	21.4	56

tenure	homeowner	11.9	6110	9.4	5313	28.2	797
	tenant	17.4	2040	12.9	1666	37.4	374
education	primary	12.0	410	10.4	297	15.9	113
	lower vocational	13.9	2135	11.2	1827	30.2	308
	general secondary	11.1	853	9.5	751	23.5	102
	vocational secondary	14.8	1921	11.2	1672	39.0	249
	vocational tertiary	11.5	1694	7.9	1513	41.4	181
	university	14.2	632	10.3	544	38.6	88
	other	17.7	277	14.2	232	35.6	45
	not yet compl	10.4	280	9.7	185	11.6	95
occupation	in paid employment	14.9	4307	11.8	3723	34.9	584
	family business	15.4	136	12.4	113	30.4	23
	self employed	18.9	498	14.3	412	40.7	86
	unemployed	20.6	136	13.4	119	70.6	17
	student	6.7	884	6.2	631	7.9	253
	homemaker	13.5	763	9.3	678	47.1	85
	pensioner	6.5	982	4.8	925	35.1	57
	disabled	13.7	285	9.8	246	38.5	39
	other	18.0	211	13.2	174	40.5	37
urban/rural	very urban	16.5	1119	12.6	925	35.1	194
	urban	12.8	2151	10.2	1844	28.0	307
	moderately urban	11.2	1818	9.3	1566	22.6	252
	hardly urban	13.6	1833	10.1	1588	36.3	245
	not urban	13.8	1280	9.8	1097	37.2	183
internet/PC	not provided by LISS	13.8	7619	10.7	6541	32.7	1078
	provided by LISS	6.2	583	4.2	480	15.5	103
household type	single	17.8	1144	12.4	992	53.3	152
	couple w.o. ch.	11.2	2743	8.4	2443	33.7	300
	couple w. ch.	13.2	3799	11.1	3181	23.8	618
	single parent	15.0	439	9.3	345	36.2	94
	other	14.3	77	10.0	60	29.4	17

Table 2. Percentage of sleepers subdivided by ethnicity

		% of sleepers	N
ethnicity	autochthonous	9.6	6162
	1st gen nonwestern	19.0	231
	2nd gen nonwestern	17.9	84
	1st gen western	12.2	205
	2nd gen western	12.4	339
	unknown	31.2	1181

Analysis performed by Jan van der Laan (Statistics Netherlands) who could make use of information on the ethnic background of most of the persons who did not respond to the REE questionnaire[1] confirms that persons in households with nonwestern migrants are almost twice as likely to end up in a sleeper household as persons in households with only autochthonous persons or western migrants (Table 3). Persons in households with nonwestern migrants are more likely than the other groups to become sleepers when

[1] Statistics Netherlands could make use of register information about the ethnic background of the households in LISS. The percentages in Table 3 are not completely comparable with Tables 1 and 2 because panel members from the pilot phase of LISS and split-off households could not be included in the analysis of register information.

they do fill out the REE questionnaire. However, among the households that did not fill out the REE questionnaire there is not much differences between households with various ethnic backgrounds, and all groups show a high percentage of sleepers.

Table 3. Percentages of sleepers differentiated by ethnic background

	All		Ethnicity known (from REE)		Ethnicity unknown	
	% of sleepers	N	% of sleepers	N	% of sleepers	N
Total	13.2	7,287	10.4	6,243	29.8	1,044
Autochthonous	12.4	5,812	9.7	5,058	30.8	754
Western immigrants	13.3	990	10.9	833	26.1	157
Nonwestern immigrants	22.5	485	20.2	352	28.6	133

When none of the household members responded to the REE questionnaire the probability that the household ends up as a sleeper increases to 44%. In fact 79% of the members of sleeper households without respondents to REE were already in a sleeper household in September 2008, but even the probability to become sleeper between September and November, given that they were not yet sleeping in September (15%), is much higher than for households with a member who responded to REE (5%).

More in general, once a household is a sleeper the likelihood that it stays a sleeper or becomes a sleeper again is much higher than that of a non-sleeper becoming a sleeper (table 4). Of the sleeper households of May 2008 more than 87% was still sleeping in September and of the latter group more than 91% was still sleeping in November. Moreover almost 82% of the sleepers of September who did not yet sleep in May still slept in November, whilst less than 6% of the households who were not sleeping in September or May had become sleepers on November 21. In addition, almost half of the small group of sleepers in May that did not sleep in September were sleeper (again) in November.

Table 3. Percentages of sleepers subdivided by sleeping history

sleeping history	% of sleepers (November)	N
did not sleep in May or September	5.6	7388
sleeper in May but not in September	47.1	34
sleeper in September but not in May	81.8	544
sleeper in May and September	91.5	236

Incidentally, the sheer number of sleepers (more than 13%) as compared to the non-response to individual questionnaires (25-30%) also shows that non-response behaviour between consecutive months is correlated. If this would not be the case, the number of sleepers (3 months of non-response of the entire household) should have been much lower.

In addition, since the number of sleepers increased considerably from September until November it is important to know whether there are notable differences between the early sleepers and the more recent ones. Table 5 compares the composition of the population of persons in households who were not categorized as sleeper in November with that of two groups of households categorized as sleepers: those who became sleeper between September and November (recent sleepers) and those who were already sleeper in September (older sleepers).

Table 5. Comparison of the composition of sleepers and non-sleepers

	Characteristic	non-sleeper	sleeper	recent sleeper	older sleeper
total		100.0	100.0	100.0	100.0
age	< 25	14.3	9.1	9.6	8.8
	25- 34	13.9	23.2	22.7	23.4
	35- 44	20.4	27.6	30.0	26.0
	45 -54	20.9	20.0	19.0	20.7
	55- 64	18.1	13.1	12.6	13.3
	65 +	12.3	7.1	6.1	7.7
gender	woman	46.9	48.0	48.2	47.8
	man	53.1	52.0	51.8	52.2
household size	1	13.2	18.8	17.3	19.7
	2	36.7	31.3	29.5	32.5
	3	14.1	18.8	18.5	19.1
	4	24.0	22.7	26.2	20.4
	5	9.2	6.0	6.8	5.4
	6+	2.8	2.4	1.6	2.9
tenure	homeowner	76.2	67.2	68.2	66.5
	tenant	23.8	32.8	31.8	33.5
education	primary	5.1	4.5	5.6	3.8
	lower vocational	25.8	27.3	25.1	28.7
	general secondary	10.7	8.7	8.9	8.6
	vocational secondary	23.0	26.2	27.4	25.4
	vocational tertiary	21.1	17.8	17.8	17.9
	university	7.6	8.3	8.7	8.0
	other	3.2	4.5	3.7	5.0
	not yet compl	3.5	2.7	2.8	2.6
occupation	in paid employment	51.5	59.0	62.3	56.9
	family business	1.6	1.9	1.9	2.0
	self employed	5.7	8.6	7.7	9.2
	unemployed	1.5	2.6	2.3	2.7
	student	11.6	5.4	5.6	5.3
	homemaker	9.3	9.5	8.2	10.3
	pensioner	12.9	5.9	5.9	5.9
	disabled	3.5	3.6	2.8	4.1
	other	2.4	3.5	3.3	3.6
urban/rural	very urban	13.1	17.0	15.9	17.7
	urban	26.4	25.3	26.7	24.4
	moderately urban	22.7	18.7	16.9	19.8
	hardly urban	22.3	22.9	25.1	21.5
	not urban	15.5	16.2	15.5	16.6
internet/PC	not provided by LISS	92.3	96.7	96.0	97.1
	provided by LISS	7.7	3.3	4.0	2.9
hhtype	single	13.2	18.8	17.3	19.7
	couple w.o. ch.	34.3	28.1	28.6	27.8
	couple w. ch.	46.4	46.0	48.2	44.6
	single parent	5.2	6.1	5.6	6.4
	other	0.9	1.0	0.2	1.5

The table confirms the results of table 1 in identifying the groups where sleepers are overrepresented: 25-34 and 35-44 year olds, tenants, single person households and three person households, self-employed and unemployed, and persons whose internet/PC was not provided by Liss. The last two columns also suggest that there are some differences between recent and older sleepers: for instance, 35-44 year olds, and 4 person households are (more) overrepresented among recent sleepers than among older sleepers. However, in most cases, the groups where sleepers are overrepresented are the same in both groups of sleepers. Moreover, in statistical terms none of the differences between the two sleeper groups turn out to be significant, using a simple (Pearson) chi-square test.

When we look at the ethnic composition of both groups of sleepers (table 6), the differences between both groups of sleepers are significant. This is mainly caused by the decreasing percentage of sleepers of whom the ethnic origin is unknown. They are overrepresented in both groups of sleepers, but clearly less so among recent sleepers than among older sleepers.

Table 6. Composition of sleepers and non-sleepers by ethnicity

		non-sleeper	sleeper	recent sleeper	older sleeper
ethnicity	autochthonous	78.3	54.6	65.1	47.8
	1st gen nonwestern	2.6	4.0	4.7	3.6
	2nd gen nonwestern	1.0	1.4	1.4	1.4
	1st gen western	2.5	2.3	3.5	1.5
	2nd gen western	4.2	3.9	4.0	3.8
	unknown	11.4	33.8	21.3	41.9
	total	100.0	100.0	100.0	100.0

Analysis by Statistics Netherlands to eliminate the 'unknown' category suggests that persons in households with nonwestern migrants are overrepresented among the older sleepers and among the recent sleepers. Among the recent sleepers, households with western migrants are also overrepresented (Table 7).

Table 7. Composition of sleepers and non-sleepers by ethnic background of the household

	non-sleeper	sleeper	recent sleeper	older sleeper
Autochthonous	80.5	75.0	73.3	76.1
Western immigrants	13.6	13.7	16.8	11.7
Nonwestern immigrants	5.9	11.3	9.9	12.2

3 Multivariate analysis of sleepers

In the previous section we saw that sleepers are not distributed randomly across the population but that certain population groups are more likely to become sleepers than others. In this section we present multivariate analyses of the probability of becoming a sleeper. In doing so, we can see to what extent factors differentiating the probability of becoming a sleeper in a univariate analysis remain significant when other explanatory variables are also included in the analysis ("all other things being equal"). In some cases the significant differences found in table 2 may have been caused by other differences between the groups in question.

In table 8 we present four specifications of the logit analysis of the probability of becoming a sleeper. In the first specification, most of the variables that were seen to differentiate the percentage of sleepers in table 1 have been included. In the second, we also include the ethnic differentiation of table 2, including a dummy for non-response to the REE questionnaire and for persons aged 16. The third specification includes an additional dummy for nonresponse to the health questionnaire held in November 2007 (with a reminder in February 2008). The fourth and final specification adds a dummy variable for the presence of a student participating in LISS in the household.

In the first specification most but not all of the (dummy) variables associated with groups with a high or low percentage of sleepers in table 1 have significant coefficients with the expected sign. This holds for example for the age group dummies, the dummy variable for tenants, for self-employed, students, pensioners, for the provision of Internet/PC by LISS, and for single persons. Of the education dummies, reflecting the difference with people with lower vocational education, the dummy for secondary vocational education is significant with an unexpected negative sign. None of the dummies for the degree of urbanization are significant.

The pseudo-R2 for the second specification, where we add dummy variables for ethnicity (including 'unknown', reflecting non-response to the REE questionnaire) is more than twice as high as for the first specification. Most of the dummy variables with a significant coefficient in the first specification still have a significant coefficient with the same sign. However, some of the education dummies are no longer significant. Non-western immigrants have a higher probability of becoming a sleeper than non-migrants, but the highest coefficient is found for the 'unknown' dummy, again reflecting the fact that earlier non-response is a better predictor of becoming a sleeper than any of the exogenous explanatory variables included in the analysis. Notably, the coefficient of the dummy variable for persons aged 16 has a strongly negative sign. Most of these persons were not yet 16 at the time of the REE questionnaire (and hence did not respond to this questionnaire) but became a participating household member once they turned 16. These new participants are less likely to become sleepers than the average participant.

Earlier non-response as predictor of becoming a sleeper is also observed in the third specification, where we include another dummy variable for even earlier non-response (to the Health questionnaire, held in November 2007 with a reminder in February 2008). Most of the other coefficients are hardly affected but including this variable increases the Pseudo-R2 by almost 15%.

Another explanatory variable which turns out to contribute significantly to the variance of the probability of becoming a sleeper is the presence in the household of a person in education as a participant to LISS. In this case most of the age dummies are also affected, reflecting that age and the presence of students in the household are correlated variables. In addition, being a couple with children now appears to decrease the probability of becoming a sleeper, in comparison to the reference group of couples without children. The fact that both age and household type dummies are affected also may reflect that these variables are correlated. It suggests that we cannot be sure which of these two variables is actually underlying the differences in the probability of becoming a sleeper.

Table 8. Logit analysis of becoming a sleeper, various specifications

	base		+ ethnicity		+ respondent health		+ student in household	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
age < 25	-0.283	0.166	-0.442 *	0.169	-0.517 *	0.171	-0.288	0.174

25-34	0.235	*	0.099	0.152		0.103	0.139		0.104	0.159	0.104
45-54	-0.381	*	0.098	-0.314	*	0.101	-0.305	*	0.102	-0.028	0.106
55-64	-0.615	*	0.124	-0.490	*	0.126	-0.470	*	0.127	-0.323 *	0.130
65+	-0.524	*	0.203	-0.446	*	0.207	-0.452	*	0.208	-0.329	0.209
tenant	0.406	*	0.081	0.312	*	0.084	0.325	*	0.085	0.326 *	0.085
primary education	0.088		0.172	0.117		0.181	0.108		0.183	0.113	0.184
general secondary	-0.268	*	0.132	-0.241		0.136	-0.231		0.137	-0.206	0.138
vocational secondary	-0.198	*	0.095	-0.142		0.098	-0.120		0.099	-0.102	0.100
vocational tertiary	-0.436	*	0.104	-0.379	*	0.107	-0.352	*	0.108	-0.335 *	0.109
university	-0.275	*	0.139	-0.250		0.142	-0.214		0.143	-0.214	0.144
other	0.222		0.174	0.163		0.181	0.189		0.183	0.211	0.184
not yet compl	-0.091		0.219	-0.111		0.228	-0.116		0.231	-0.125	0.233
family business	0.135		0.246	0.061		0.255	0.034		0.256	-0.008	0.258
self employed	0.379	*	0.126	0.294	*	0.131	0.284	*	0.132	0.252	0.133
unemployed	0.360		0.223	0.325		0.232	0.298		0.235	0.261	0.238
student	-0.908	*	0.197	-0.669	*	0.198	-0.682	*	0.200	0.465	0.238
homemaker	-0.002		0.122	0.016		0.126	0.023		0.127	0.009	0.129
pensioner	-0.510	*	0.201	-0.398		0.203	-0.374		0.204	-0.410 *	0.204
disabled	-0.092		0.186	-0.133		0.192	-0.134		0.194	-0.166	0.195
other	0.407	*	0.200	0.343		0.207	0.368		0.209	0.358	0.211
internet provided	-1.091	*	0.184	-1.277	*	0.189	-1.396	*	0.191	-1.429 *	0.192
very urban	0.152		0.108	0.090		0.112	0.063		0.113	0.043	0.114
moderately urban	-0.113		0.101	-0.090		0.104	-0.107		0.105	-0.094	0.105
hardly urban	0.168		0.097	0.211	*	0.100	0.197		0.101	0.206 *	0.102
not urban	0.159		0.107	0.204		0.111	0.203		0.112	0.212	0.113
single	0.390	*	0.105	0.461	*	0.109	0.461	*	0.110	0.218 *	0.111
couple w. ch.	-0.053		0.089	-0.034		0.091	-0.042		0.092	-0.271 *	0.094
single parent	0.101		0.151	0.091		0.156	0.070		0.158	0.084	0.161
other	0.301		0.340	0.187		0.351	0.182		0.358	0.102	0.367
1st gen nonw				0.630	*	0.184	0.579	*	0.187	0.674 *	0.189
2nd gen nonw				0.768	*	0.303	0.728	*	0.309	0.671 *	0.310
1st gen western				0.274		0.222	0.257		0.225	0.273	0.226
2nd gen western				0.260		0.174	0.238		0.175	0.242	0.176
unknown				1.566	*	0.082	1.109	*	0.093	1.119 *	0.094
age 16				-2.880	*	0.734	-3.033	*	0.735	-3.107 *	0.737
nonrespondent health							0.850	*	0.083	0.869 *	0.083
student among household particip.										-1.070 *	0.119
constant	-1.589	*	0.115	-1.981	*	0.123	-2.133	*	0.125	-2.014 *	0.126
Log likelihood	-3052.9			-2872.9			-2822.4			-2766.1	
Pseudo R2	0.049			0.105			0.121			0.138	
N	8202			8202			8202			8202	

In table 9 we present two separate logit analyses, differentiating between respondents and non-respondents to the REE questionnaire. For the large group of respondents, the results are largely in line with the results of the last column of table 6, with significantly positive coefficients for tenants, first generation nonwestern immigrants, and non-respondents to the health questionnaire, and significantly negative coefficients for pensioners, users of internet/PC provided by LISS, couples with children, and students in the household. There are no significant differences between the age groups (including

persons aged 16), no significant effects of urbanization levels and no significant coefficient for single persons. Next to tertiary vocational, secondary vocational and university education have significant negative coefficients.

For the smaller group of nonrespondents to REE we also find a positive coefficient for tenants and negative coefficients for users of internet/PC provided by LISS, and for students in the household. In addition, we find positive coefficients for unemployed, homemakers, students, hardly urban and non-urban areas, and single persons and single parents, and negative coefficients for persons aged below 25, and persons aged 16. Notably, the intercept terms of the logit equations result in probabilities of becoming a sleeper of 14% and 29% when all dummy variables are zero for respondents and non-respondents to REE, respectively.

Table 9. Logit analysis of becoming a sleeper, differentiated between respondents and non-respondents to REE questionnaire

	Coef.		Std. Err.	Coef.		Std. Err.
age < 25	-0.006		0.211	-0.786	*	0.312
25-34	0.197		0.124	-0.042		0.208
45-54	-0.041		0.124	-0.038		0.225
55-64	-0.295		0.152	-0.294		0.276
65+	-0.409		0.254	-0.493		0.433
tenant	0.346	*	0.102	0.358	*	0.169
primary education	0.087		0.221	0.135		0.360
general secondary	-0.274		0.156	0.009		0.309
vocational secondary	-0.275	*	0.116	0.271		0.209
vocational tertiary	-0.575	*	0.130	0.424		0.225
university	-0.435	*	0.173	0.315		0.285
other	0.264		0.213	0.132		0.367
not yet compl	0.027		0.281	-0.161		0.419
family business	0.042		0.301	-0.144		0.499
self employed	0.263		0.159	0.198		0.258
unemployed	-0.082		0.293	1.441	*	0.570
student	0.125		0.286	1.259	*	0.460
homemaker	-0.229		0.154	0.896	*	0.274
pensioner	-0.568	*	0.244	0.655		0.459
disabled	-0.280		0.237	0.028		0.395
other	0.307		0.255	0.648		0.419
internet provided	-1.329	*	0.247	-1.747	*	0.329
very urban	0.055		0.136	0.112		0.226
moderately urban	-0.071		0.121	-0.077		0.222
hardly urban	0.065		0.120	0.662	*	0.216
not urban	0.033		0.135	0.696	*	0.232
single	-0.070		0.133	1.031	*	0.242
couple w. ch.	-0.365	*	0.112	0.072		0.187
single parent	-0.375		0.210	1.236	*	0.314
other	0.094		0.455	0.281		0.625
1st gen nonw	0.610	*	0.195			
2nd gen nonw	0.516		0.316			
1st gen western	0.316		0.229			
2nd gen western	0.213		0.179			
age 16	-1.811		1.046	-2.992	*	1.066

nonrespondent health	1.307	*	0.092	-0.268		0.159
student in household	-0.955	*	0.133	-1.402	*	0.263
constant	-1.843	*	0.142	-0.898	*	0.278
Log likelihood	-2094.7			-580.0		
Pseudo R2	0.098			0.208		
N	7021			1181		

As a follow-up of table 5 we also present a multivariate analysis where we differentiate between recent and older sleepers. Table 10 includes all explanatory variables of the final specification of table 8. The first column presents a logit analysis of the probability of being a sleeper household both in September and November; the second is a logit analysis of the probability of being a sleeper in November, among all other households.

Table 10. Logit analysis of being early and late sleepers

	Early sleepers			Late sleepers		
	Coef.		Std. Err.	Coef.		Std. Err.
age < 25	-0.292		0.215	-0.269		0.248
25-34	0.206		0.129	0.090		0.149
45-54	0.102		0.131	-0.147		0.155
55-64	-0.162		0.161	-0.488	*	0.194
65+	-0.013		0.253	-0.749	*	0.328
tenant	0.264	*	0.104	0.347	*	0.125
primary education	-0.241		0.240	0.523	*	0.249
general secondary	-0.223		0.171	-0.133		0.204
vocational secondary	-0.144		0.123	-0.016		0.147
vocational tertiary	-0.322	*	0.134	-0.290		0.163
university	-0.275		0.179	-0.097		0.210
other	0.229		0.217	0.155		0.286
not yet compl	-0.255		0.290	0.049		0.335
family business	0.034		0.316	-0.003		0.381
self employed	0.314	*	0.159	0.122		0.200
unemployed	0.368		0.282	0.104		0.356
student	0.588	*	0.298	0.319		0.348
homemaker	0.158		0.155	-0.150		0.197
pensioner	-0.444		0.254	-0.296		0.312
disabled	0.018		0.229	-0.366		0.316
other	0.334		0.255	0.414		0.312
internet provided	-1.602	*	0.254	-1.045	*	0.269
very urban	0.107		0.140	-0.049		0.167
moderately urban	0.038		0.130	-0.266		0.159
hardly urban	0.159		0.129	0.242		0.145
not urban	0.271		0.140	0.090		0.166
single	0.303	*	0.136	0.103		0.165
couple w. ch.	-0.247	*	0.117	-0.270	*	0.137
single parent	0.172		0.195	0.018		0.239
other	0.599		0.390	-1.426		1.027

1st gen nonw	0.676	*	0.239	0.605	*	0.262
2nd gen nonw	0.788	*	0.376	0.435		0.457
1st gen western	-0.070		0.335	0.517		0.286
2nd gen western	0.341		0.220	0.100		0.263
unknown	1.504	*	0.111	0.314	*	0.154
age 16	-3.126	*	1.030	-2.724	*	1.040
nonrespondent health	0.672	*	0.103	1.007	*	0.123
student in household	-1.053	*	0.153	-1.004	*	0.176
constant	-2.818	*	0.159	-2.681	*	0.183
Log likelihood	-1959.2			-1494.4		
Pseudo R2	0.148			0.089		
N	8202			7541		

In both cases, being a tenant increases the probability of becoming a sleeper, but using internet/PC provided by LISS decreases it, as does belonging to a couple with children. Moreover, ethnicity, age 16, nonresponse to health and having a person in education in the household have the expected signs. On the other hand, in both cases, collectively, the education and urbanization dummies do not provide a significant contribution to the explanation of the probability of becoming a sleeper. Furthermore, being a single person, self-employed or a student significantly increases the probability of belonging to the older sleepers but not that of having become a sleeper recently. By contrast, the age group dummies do not have significant coefficients in the 'older' column but significantly contribute to the explanation in the 'recent' column.

All in all, four variables have similar significant coefficients in all specifications of the logit equations of becoming a sleeper in which they are included: tenants (positive), 1st generation nonwestern immigrants (positive), users of internet/PC provided by LISS (negative) and the presence of students in the household (negative). For the other differentiating factors there are differences between respondents to REE and non-respondents to REE and/or between becoming a sleeper earlier and later.

Additional analysis by Jan van der Laan (Statistics Netherlands) where he could use register information on the ethnic background of the households produces similar results. In accordance with table 7. households with nonwestern immigrants are more likely to become sleepers than households without migrants. However, this holds more strongly for the probability of becoming a sleeper early than for the probability of becoming a sleeper more recently.