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2004

Reference: DE KEULENAER, F. & LEVECQUE, K. (2004), *Mood and socio-economic status bias in survey non-response: results from an 11-wave panel* (working paper), Antwerpen: UA - OASeS.

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MOOD AND SOCIO-ECONOMIC STATUS BIAS IN SURVEY NON-RESPONSE: RESULTS FROM AN 11-WAVE PANEL

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In this paper we study attrition from the Panel Study of Belgian Households (PSBH) and test whether attrition probabilities are related to socio-economic status and depression, the most common mental disorder. We consider the panel over its 11-year history from 1992 to 2002 given the dynamics of entry and exit from the panel. In order to explain why certain households or individuals are at higher risk to attrite from the panel, we estimate year-by-year attrition probabilities using discrete-time logit models. The discrete-time logit approach is particularly effective at handling time-dependent covariates and covariate-time interactions. This makes it possible to incorporate changing respondent characteristics and to test if attrition behaviour changes with the duration of the panel. Our analyses revealed that the indicators of SES and depression assert a small but significant influence on attrition. The greatest amount of SES and depression bias occurs at the response stage.

Key words: depression, SES, attrition, Panel Study of Belgian Households

1 INTRODUCTION

For half a century, survey researchers have been studying survey non-response. A central question is whether those who cooperated with the interview differ to those who did not take part, in characteristics that are relevant to the topic of the survey or the research project. Attrition or the loss of respondents in the second or subsequent waves of panel collection will attract increasing attention as well known longitudinal community surveys continue to generate important results. Knowledge of the attrition process can help us to assess the internal and external validity of the research findings since non-response in later waves of a longitudinal survey can influence the efficiency and correctness of the estimates. When the loss of respondents is not selective, the results are not biased but precision of the estimates is reduced. When the probability of attrition is related to the change in the outcome, the effects observed among those who continue to participate do not equal the effects in the total sample.

In order to understand the differences between the respondents who attrite and those who continue to participate, we need to distinguish between three types of attrition, namely loss of contact (presumably dominated by residential mobility), refusal to participate and ‘other’ non-interviews. There are many examples of how socio-economic status is associated with each of these types of attrition. However, little empirical findings are available on the loss of respondents

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Acknowledgements: Femke De Keulenaer and Katia Levecque are associated with OASeS (Research Group on Poverty, Social Exclusion, and the City), and with the PSBH (Panel Study on Belgian Households), University of Antwerp, Belgium. Femke De Keulenaer is research assistant of the Fund for Scientific Research - Flanders.

due to psychopathological problems (Eaton, Anthony, Tepper, & Dryman, 1992; de Graaf, Bijl, Smit, Ravelli, & Vollebergh, 2000). Nevertheless, psychopathology may also be strongly associated with all three forms of attrition. Some forms of psychopathology (such as phobia and antisocial personality disorder) may be associated with attitudes towards social interaction and this may affect the rate of refusal to participate. Psychopathology may also be associated with residential mobility (Eaton et al., 1992).

In this paper, we investigate the effects of socio-economic status and the effects of the most common form of psychopathology, namely depression, on the probability of attrition from a general 11-wave population panel in Belgium (1992-2002). This panel, the Panel Study of Belgian Households (PSBH), is a representative survey of private households in which information is collected for every household and every adult household member aged 16 years or more. The outline of the paper is as follows. In the first section, we discuss a number of examples of studies that assessed whether attrition is related to socio-economic status or depression in a longitudinal context. Secondly, we provide a short introduction to the PSBH and we discuss attrition and attrition patterns in the panel. In the third section, the method is introduced. In order to explain why the risk of attrition is higher for certain individuals, we estimate year-by-year attrition probabilities using discrete-time logit models. We then go on to present the results of the statistical analyses, and we conclude with a short discussion of the results.

2 MOOD, SES AND ATTRITION: RESULTS FROM OTHER PANEL STUDIES

The survey literature contains many examples of non-response studies. However, most interesting are the examples that examine the different types of non-response separately. Groves and Couper (1998) stress that non-response is not a homogeneous phenomenon. They describe the non-response process as the outcome of two sequential events: firstly, the contact between the interviewer and the respondent and, secondly, when the contact was successful, cooperation of the respondent. Contacted respondents can refuse an interview, or can be unable to perform an interview. The authors point to the fact that these different types of non-response can be influenced by different social, economic, psychological, and situational factors. This is the case for non-response in cross-sectional surveys and in panel surveys.

In addition, we will only look at examples from panel surveys that study attrition. Lepkowski and Couper (2002) advocate that the non-response process in later waves of a panel survey differs in important ways from the initial wave. Once the first wave of data collection is completed, the survey organisation has much more information than basic design elements, for example they know what the best time is to contact the respondents. At the same time, sample persons have a lot more information about what the survey interview might entail, for example they know the required time commitment, and the type of information sought. It is not clear if the factors that influence non-response in later waves of a panel survey are the same as in the first waves.

A third caveat to remember when reading this part, is that panel surveys vary along several dimensions, such as the content of the survey, the sponsor organisation, the design of the sampling process, the time between two waves and the number of waves, the mode of data collection, and the follow-up rules. These differences have implications for panel attrition (Lepkowski & Couper, 2002) and can make comparisons about non-response bias on the variables we study between panels difficult.

2.1 Mood And Attrition

According to the World Health Organisation (WHO) depression is a mood disorder, characterised by several symptoms that occur for at least two weeks. Primary symptoms are a depressed mood, loss of interest or pleasure in activities, and loss of energy or increased fatigue. Other symptoms are loss of appetite, sleeping problems, psychomotor agitation or retardation, loss of self-confidence or self-esteem, inappropriate feelings of guilt or self-worthlessness, decreased ability to think or concentrate, recurrent thoughts of death or suicide (World Health Organisation [WHO], 2001).

Depression is especially relevant in the study of attrition patterns in general population surveys, since it is considered to be the most common mental health problem worldwide (WHO, 2001). As a mood problem, depression can affect the attrition process in several ways. Concerning forms of non-contact, depression may be related to a higher risk of longer-term absence (e.g. due to hospitalisation) or incapacity to react to approaches made by others. Concerning refusals to participate, the very nature of depression may inhibit survey response due to the loss of interest, concentration problems, increased fatigue, etc. In addition, depression might be associated with a fear of evaluation or a tendency to avoid social contact (Eaton et al., 1992).

Although it seems probable that depressive disorders influence the attrition process in longitudinal surveys, little empirical research has been done on this topic. The main reason is that there are only a few large-scale longitudinal studies of the general population informing about mental health. The best known of these are the Epidemiological Catchment Area (ECA) Study in the United States (Eaton, Regier, Locke, & Taube, 1981; Eaton et al., 1984), the Stirling County Study in Canada (Murphy, Monson, Olivier, Sobol, & Leighton, 1987), the Lundby Study in Sweden (Rorsman, Grasbeck, Hagnell, Isberg, & Otterbeck, 1993) and the Netherlands Mental Health Survey and Incidence Study (NEMESIS) (Bijl, Van Zessen, & Ravelli, 1998). Only the ECA and the NEMESIS Study reported extensively on the relation between psychopathology and attrition (Eaton et al., 1992; de Graaf et al., 2000). Usually the analysis was restricted to the respondents aged less than 65 years of age.

In the ECA Program, which consists of sample surveys at five research sites (New Haven, Baltimore, Saint Louis, Durham and Los Angeles), about 4000 household-residing individuals were sampled probabilistically at each site. Between 65% and 80% of those designated as respondents were successfully interviewed in the first wave of the surveys (Eaton, et al., 1984). The response rate varied by site and by a few other socio-demographic characteristics such as race, sex and age. After one year, an attempt was made to re-interview, in person, all those interviewed in the first wave. The follow-up response rate was 80.2% (Eaton et al., 1989). Focussing on the adults aged 18-64 years, Eaton et al. (1992) found that, after adjusting for socio-demographic variables, psychopathology had only a small to moderate effect on attrition. Panic and depression, as measured by the Diagnostic Interview Schedule (DIS), were associated with failure to locate, but no selected depressive symptoms or disorders were strongly or significantly associated with refusal to participate in the second wave (see also Badawi, Eaton, Myllyluoma, Weimer, & Gallo, 1994). Major depressive disorder, as the most common type of depressive disorder, was associated with refusal, but in the reverse direction than expected. Further analysis showed that it is the severity of illness, and not an attitude towards surveys or a personality style, which is the important aspect of depression regarding participation in a follow-up re-interview (Eaton et al., 1992).

In the Netherlands Mental Health Survey and Incidence Study (NEMESIS), a total of 7076 individuals aged 18-64 years were interviewed in the initial wave of the 3-wave prospective panel. NEMESIS is based on a multistage, stratified, random sampling procedure in which only

one respondent was randomly selected from each selected household. Depending on the method of calculation, the response rate was 64.2% or 69.7% in wave 1 and 79.4% in wave 2. Refusers in the first wave, tended to have a lower score on the General Health Questionnaire (GHQ)-12, indicating a better mental health. Psychopathology experienced by the panel respondents was assessed using the Composite International Diagnostic Interview (CIDI). Similarly to the ECA analysis and based on the extent of psychopathology in the 12 months prior to the first interview, de Graaf et al. (2000) found that psychopathology has no more than a weak-to-moderate effect on attrition once adjusted for demographic factors and that psychopathology is more strongly related to failure to locate respondents than to refusals. Concerning major depression, the Dutch study showed no significant association with attrition due to refusal, failure to locate or morbidity/mortality. Non-response due to morbidity/mortality was linked to dysthymia, a form of depression with less symptoms persisting for at least two years. When the analysis was carried out by using the presence of lifetime disorders instead of psychopathology in the 12 months prior to the interview, refusal was less often seen in subjects with lifetime major depression or dysthymia (de Graaf et al., 2000).

2.2 SES And Attrition

Socio-economic characteristics are part of most models for non-response. These comparisons portray non-respondents as what amounts to a socially isolated underclass (Goyder, 1987). Thus, non-respondents typically are less educated than respondents, hold lower occupational status, and are likely to have low incomes. This is also the case for the two studies discussed in the last paragraph. Eaton et al. (1992) found that in the Epidemiological Catchment Area (ECA) Study refusal to be re-interviewed is associated with a low educational level. In the Netherlands Mental Health Survey, de Graaf et al. (2000) found that persons not located and persons refusing at the one-year follow-up were more often poorly educated. Although these studies show interesting results, they are limited to attrition in the second wave of a panel. The following two examples study the relationship between attrition and socio-economic status in panels of longer duration. We already mentioned that it is not easy to generalise results from specific panels, however the panels that we will discuss next are very similar to the PSBH in design and method. The first example comes from the Panel Study of Income Dynamics (PSID), the second from the European Community Household Panel (ECHP). The PSBH became part of the latter in 1994. Both examples study attrition across several waves, however they do not examine the different types of non-response separately.

The first example that we want to discuss comes from the Panel Study of Income Dynamics (PSID)², conducted at the Survey Research Center, Institute for Social Research of the University of Michigan. The PSID is a nationally representative longitudinal study that started in 1968 with more or less 4800 families. As a consequence of low attrition rates and the success in following young adults as they form their own families, the PSID has by now collected information about more than 65,000 individuals spanning as much as 36 years of their lives. Nevertheless, by 1989 the PSID had experienced approximately 50 percent sample loss from cumulative attrition from its initial 1968 membership. Fitzgerald, Gottschalk, and Moffitt (1997) have studied the effect of this attrition on the distributions of several socio-economic variables. Their analysis shows that attrition is concentrated among lower socio-economic status individuals; attritors tend to have lower earnings and lower educational levels. However, they also find that these variables explain very little of the attrition in the

² For an introduction to the PSID, see Hill (1992).

sample. Consequently, despite the large amount of attrition, they conclude that they do not find strong evidence that attrition will seriously distort the representativeness of the PSID by 1989.

The European Community Household Panel (ECHP)³ is a standardised multipurpose annual longitudinal survey carried out at the level of the European Union. It is centrally designed and coordinated by the Statistical Office of the European Communities (Eurostat). The initial 1994 sample contains information on some 60,500 households and some 130,000 individuals. Countries participating in 1994 were Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, the United Kingdom and Spain. Austria joined the ECHP in 1995 and Finland in 1996, with Sweden remaining as the only EU member country not participating. The last wave of data was collected in 2000. The attractive features of the ECHP for socio-economic research are its comparability across countries and over time, and the range of economic and socio-demographic information it collects. Behr, Bellgardt, and Rendtel (2002) have analysed panel attrition in the ECHP for the period 1994-1998. The main result was that the extent and the determinants of panel attrition show high variability across countries and across different waves within the countries. They looked at the difference in response rates according to income, main activity status, and education. The most interesting finding was the opposing results for the influence of education across national samples of the ECHP. While respondents with high educational levels have lower attrition rates in Northern European countries, this relationship is reversed for Southern European countries. The authors conclude that attrition effects are very heterogeneous across different national samples of the European Community Household Panel.

3 ATTRITION IN THE PANEL STUDY OF BELGIAN HOUSEHOLDS

3.1 The Structure of the PSBH

The Panel Study of Belgian Households (PSBH)⁴ is a national household panel survey of private households in Belgium. The PSBH began in 1992 and returned to re-interview households and individuals on an annual basis until 2002. The PSBH collects information at both the household and individual level. A household questionnaire is submitted to a reference person, usually the household head or the spouse or partner of the household head. Personal questionnaires are submitted to all eligible household members aged 16 years or over. At the household level the questionnaire covers subjects such as household composition, housing tenure and housing conditions, household income, and non-monetary poverty indicators. The individual questionnaire collects information on health status, social relations, leisure and education, employment and income. The household questionnaire was conducted by face-to-face interviewing, while for the individual questionnaire the respondents were given a choice between face-to-face interviewing and self-completion of the questionnaire, more or less half of the interviews was collected face-to-face. While the aim is to gain a full interview for every eligible adult, for a small portion of the sample a short version of the questionnaire was used as a means to gain information about as many respondents as possible.

At wave 1 10940 households were sampled. Of these 778 households have been

³ For an introduction to the ECHP, see Peracchi (2002).

⁴ For a detailed description of the Panel Study of Belgian Households consult the documentation available on <http://www.uia.ac.be/psbh>.

identified as ineligible. Among the remainder 4438 households were successfully interviewed. A household response rate of 43.7 percent was achieved, calculated as the product of the contact rate of 92.9 percent and the cooperation rate of 47.0 percent (American Association for Public Opinion Research [AAPOR], 2004). Of the 11565 individuals who belonged to these cooperating households, 2600 were younger than 16 and 8965 were 16 or older. Of these 8741 eligible adults were interviewed, giving a response rate of 97.5 percent. Since the beginning of the panel, the original households have undergone substantial changes and individuals enter and exit the PSBH in a variety of ways. Individuals enter the panel by being born to sample members, while others attach themselves to sample members in a different way, for example through marriage. Some individuals leave the panel because they are no longer eligible for follow-up; they have died, moved outside the country, or their household does not longer contain sample members⁵. A second group leaves because of attrition.

3.2 Participation Patterns

A central problem is that the family or household is not a unchanging entity over long periods of time. In this study, we largely ignore the family dimension and focus on individuals. Calculating longitudinal response rates is more complicated than calculating response rates for each cross-sectional wave. For carrying out substantive panel analyses, the respondents with continuous interview records provide the core longitudinal information. We will look at the original interviewed sample of 1992 and follow them through the panel until they attrite.

We define attrition as unit non-response of eligible cases that occurs after the first wave of the panel survey. The distinction between non-participation due to ineligibility and attrition of eligible cases is important, since movements due to ineligibility essentially reproduce the dynamics of the panel, while those due to attrition may cause selection problems for the representative sample. Eligible cases for which no interview is obtained consist of three types of non-response: (1) refusals, (2) non-contacts, and (3) others (AAPOR, 2004). The other non-interviews represent instances in which no interview is obtained because the respondent is physically and/or mentally unable to do an interview, because of language problems, or because of a number of miscellaneous other reasons.

Table 1 shows response and attrition rates of the original 1992 adult sample members. We look for each respondent at the first occasion of non-response. Because of the following rules adopted in the PSBH, non-respondents can re-enter the panel, however this happens in only a minority of the cases. The first column in the table shows the number of individuals remaining in the sample by year, with the response rate for each wave shown in parentheses next to each count. Of the 8741 respondents of the first wave of the panel, 7151 were re-interviewed in the second wave, which corresponds to a response rate of 82.6 percent. We see that the response rate goes up to a little more than 90 percent in wave 4 and stays around that level until the end of the panel. The table also shows the distribution of attritions by reason. Columns 3 until 6 show the actual number of attritions. The attrition rates are again shown in parentheses next to each count. The most important reason for attrition is refusal to participate again in the panel survey. The attrition rate is especially high in wave 2 and wave 3, respectively 12.0 percent and 9.8 percent. The non-contact rates and other non-interview rates are smaller and more constant in time. The non-contact rate is 3.2 percent in wave 2, and stays around 1 percent from wave 2 until the end of the panel. The other non-interview rate is

⁵ Sample members are all wave 1 respondents and their children.

2.2 percent in wave 2, and only 1 percent in later waves. The last column of table 1 shows the number of individuals that became ineligible, in total 544 respondents. On the last row of the table the cumulative response and attrition rates were calculated. The cumulative response rate after 11 waves was no more than 34.5 percent; this means that more or less 65 percent of the original 1992 adult sample members had left the panel by the time of wave 11. The corresponding cumulative attrition rates are 47.7 percent for the refusals, 9.5 percent for the non-contacts, and 8.3 percent for the other non-interviews.

Table 1. Attrition And Attrition Rates In The PSBH

Year	Remaining in sample	Attritions				Out of scope
		Total	Non-contact	Refusal	Other	
1992	8741 (-)	-	-	-	-	-
1993	7151 (.826)	1502 (.174)	274 (.032)	1037 (.120)	191 (.022)	88
1994	6162 (.869)	925 (.131)	124 (.017)	697 (.098)	104 (.015)	64
1995	5592 (.919)	493 (.081)	68 (.011)	360 (.059)	65 (.011)	77
1996	5115 (.922)	430 (.078)	61 (.011)	300 (.054)	69 (.012)	47
1997	4612 (.911)	448 (.089)	54 (.011)	339 (.067)	55 (.011)	55
1998	4127 (.905)	435 (.095)	38 (.008)	340 (.075)	57 (.012)	50
1999	3726 (.915)	347 (.085)	43 (.011)	270 (.066)	34 (.008)	54
2000	3425 (.928)	267 (.072)	34 (.009)	198 (.054)	35 (.009)	34
2001	3050 (.902)	330 (.098)	51 (.015)	241 (.071)	38 (.011)	45
2002	2831 (.937)	189 (.063)	30 (.010)	125 (.041)	34 (.011)	30
Total	2831 (.345)	5366 (.655)	777 (.095)	3907 (.477)	682 (.083)	544

Note: Figures in parentheses show response and attrition rates (AAPOR, 2004).

Source: Study of Belgian Households, adult 1992 sample, waves 1992-2002

4 METHODOLOGY

4.1 Models And Methods

A simple approach to relate the incidence of attrition to a set of covariates is by means of a logit model, in which the binary dependent variable indicates whether attrition occurred within the 11 waves of the panel survey or not. However, such an approach has important drawbacks. First of all, this approach leads to a loss of information, since information on the timing of attrition, or non-occurrence of attrition from the panel survey is not used, (2) time variation of time-dependent covariates cannot be taken into account, and (3) it does not allow the covariate effects to vary by time (Yamaguchi, 1991). A better approach to study attrition is by means of event history analysis. The main characteristic of event history analysis is that it analyses information on the times at which individual transitions between a number of discrete states occurred (Vermunt, 1996). When the time variable is discrete, it is best to use a discrete-time logit approach. In a discrete time logit approach the time variable is modelled as any other explanatory variable and testing duration dependence becomes possible. The discrete-time logit approach is also particularly effective at handling covariates that change their values during the observation period. An example of a covariate that can change its value during the period of the panel is poverty. Looking at information on the poverty

situation of an individual closer to the moment of attrition might be more interesting than information at the beginning of the panel. With this approach it also becomes possible to include covariate-time interactions. Suppose for example that the effect of poverty changes with time and has only a positive effect on attrition in the first waves of the panel.

For discrete-time logistic regression analysis we need an event-oriented dataset. The dataset has one record for each year that each person was contacted. Thus, someone who attrited in the third wave gets two observations, while someone who was still participating at the time of wave 11 gets ten observations. There is no dependence among observations, because the creation of multiple observations follows directly from factoring the likelihood function for the data (Allison, 1995).

We separately fit models for refusals, non-contacts, and other non-interviews. Individuals that became ineligible during the duration of the panel survey are not taken into account. We use information of the current wave to estimate the probability of attrition in the next wave, in this way we allow the values of the covariates to change in time. Covariates can be considered in three groups: a depression variable, socio-economic status variables, and variables that describe the interview situation. Variables that we include in the analysis as control variables are: age, sex, household position, and region of residence. To fully capture duration dependence, we include a time variable in the analyses. To test whether attrition changes with the duration of the panel survey we include interaction terms in some of the models.

4.1 Dependent Variables

Depression

Depression is measured using a shortened version of the Health and Daily Living - Global depression scale (Moos, Cronkite, & Finney, 1982/1990), which is developed to tap the presence and severity of symptoms relating to the criteria for major depression as determined by the Diagnostic Manual for Mental Disorders (DSM-IV-TR) of the American Psychiatric Association (1994) and by the International Classification of Diseases (ICD-10) of the World Health Organization (2001). The scale is not widely used, but has a strong correlation with the well-known Beck Depression Inventory (Moos et al., 1982/1990; Holahan, Moos, Holahan, & Brennan, 1997; Moos, Cronkite, & Moos, 1998). In the present analysis we use information on 14 Likert-type items (with scores ranging from 1=never to 5=often), all tapping psychological/cognitive or behavioural/somatic depressive complaints experienced during the three months prior to the interview. The scale has adequate validity and excellent reliability (Dewilde, De Keulenaer, & Levecque, 2004; Levecque, 2004). Individual scale scores were calculated by a summated ratings procedure when information for at least 11 items was present. We corrected for the tolerated item non-response by multiplying the scale score based on the answered questions by the total number of scale items (see also Arrindell & Ettema, 2003; Levecque & Schotte, 2004). Remaining item non-response was negligible. Because the HDLF-scale covers a wide range of depression severity, and since our interest goes to more serious depressive experiences, we categorise the scale by a 10%-threshold, indicating the highest from lower scores in the depression scale distribution. Opting for a 10%-threshold was based on the knowledge that the six-month-prevalence of depression in Belgium has recently been estimated at 12.2% (Lepine, Gastpar, Mendlewicz, Tylee, 1997; Tylee, Gastpar, Lepine, & Mendlewicz, 1999).

Socio-Economic Status

Socio-economic status is a complex construct and many methods have been proposed to measure it. Education, employment status, and income are widely used as indicators of socio-economic status. Each of these measures can capture distinctive aspects of social position. Educational attainment is assessed in terms of earned degree. We distinguish between respondents with no degree or only a degree of primary education, with a degree of lower secondary school, with a degree of higher secondary school, or with an advanced degree, such as a university degree. A fifth category consists of the respondents that were still studying at the time of wave one. Since only a very small proportion of the sample changed degrees during their participation in the PSBH, we will consider it as a time-constant covariate. For the employment status variable we compare respondents in paid employment with those not in paid employment. Respondents not in paid employment are retired, not economically active, sick or disabled, or unemployed. Income poverty is measured in a way which is common in European poverty research, namely as an income level below 60% of the median population income. The income information used reports the 'usual' net household income as it is estimated by the household reference person. To adjust for differences in the size and composition of the households, we use the modified OECD-equivalence scale, which attributes a weight of 1 to the first adult, 0.5 to each additional adult and 0.3 to each child younger than 14 years. The equivalised income is then attributed to each household member, assuming a common standard of living within each household. Income poverty and employment status are considered time-varying covariates in our analysis.

Prior Wave Experience And Interview characteristics

Several authors (e.g. Lepkowski & Couper, 2002; Loosveldt & Carton, 2001) stress the importance of prior wave experiences as a factor in the explanation of cooperation in later waves of a panel survey. The respondent's willingness to cooperate with subsequent waves of the panel survey will not only be influenced by situational factors at the time of the request but also by their recollection of the previous interview. A negative experience in the prior wave can have a negative influence on cooperation in the next wave. Loosveldt and Carton (2001) assume when respondents have many difficulties answering the questions that the interview will be an unpleasant or a bad experience. There are not many possibilities in the PSBH to test whether attrition in the next wave is influenced by experiences in the last wave. We developed a variable for the number of item non-responses on a set of core questions as a variable for the difficulties in answering questions during the interview of the last wave. We also look at two variables that describe the current interview situation. We include interviewer continuity, measuring if the respondent is contacted by another interviewer than in the last wave, and we look at household continuity, measuring whether the household to which the respondent belongs has moved since the last wave or is a newly formed household.

5 RESULTS

In the following analysis of the PSBH we will conduct tests for the presence of attrition bias by estimating attrition equations, regressing first-period and last wave variables on attrition in the next wave. In a first step, we will present simple models comparing respondents who were not contacted, who refused, and who were not interviewed for another reason with those who

were interviewed. In a second step, we will test for changing effects in the course of the panel, by adding interaction effects to the models from the first step.

Because time is just another variable in the discrete-time logit models, we can specify the dependence of the hazard on time as different functions. We each time compared the fit of the model with an unrestricted effect of wave on the log-odds of attrition and a model where we constrained the effect of year to be linear on the log-odds of attrition. The linear model is each time acceptable, and since it has fewer coefficients than the unrestricted model, it has the edge of parsimony. Likelihood-ratio Chi-square tests showed no significant difference between the unrestricted models and the more restricted linear models.

5.1 Models Without Interactions

Table 2 shows the results of the first three models of year-by-year attrition, comparing non-contacts, refusals, and other non-respondents with respondents that stay in the panel. We present the estimates of the models that include only the significant effects we found. Removing the insignificant terms from the models did not change the estimates of the significant terms. We can assess the effects through odds ratios, calculated by exponentiating the logistic regression coefficients.

The greatest amount of SES bias occurs at the response stage. In the models for refusals and other non-interviews, all three SES variables show significant effects. While only the variable educational attainment is significant in the model for non-contacts. The effects for educational attainment go in the same direction for all three models, the odds for refusal compared to continued participation become smaller with each additional educational level. For example, compared to a respondent with no degree or a primary school degree, the odds for attrition are 1.3 times smaller for someone with a lower secondary school degree, and also 1.3 for someone with a higher secondary school degree, but 1.8 for someone with an advanced degree. Respondents who were still studying at the start of the panel are 2.1 times more likely to be non-contacted and 2.6 times more like to be unable to participate in comparison to respondents with no degree or a primary school degree, however they are only 1.6 times more likely to refuse. The effects of income poverty are more or less the same in the model for the refusals and in the other non-interviews model. The odds for attrition are between 34 and 46 percent higher for the income poor compared to the non-poor. Employment effects on refusals and other non-interviews are not the same, except that there is no significant difference in both models between the respondents in paid employment and the unemployed. Retired and inactive respondents have a lower chance for refusal but a higher chance to be a non-respondent for another reason. The odds for being a refusing respondent are 1.2 times lower for the retired and inactive respondents, while the odds for being a non-respondent for another reason are 1.4 times higher for the retired and the inactive respondents. The largest effects are found for the respondents that are sick or disabled, the odds for refusal are 36 percent higher for the sick and disabled compared to the respondents in paid employment. The corresponding odds for a non-interview for another reason are even higher, being sick or disabled means that your odds for being a non-interviewee for another reason are 2.7 times higher than for a respondent in paid employment.

Being depressed in the previous wave only showed a significant effect on attrition in the model for other non-interviews. Respondents scoring high on the depression scale have 40 percent more chance to be a non-respondent because they were for some reason unable to do an interview compared to respondents with low scores. This is similar with what we found for the effect of employment status on attrition, where the effect of being sick or disabled was the

largest in the other non-interview model.

For all three types of attrition, the variables interviewer change and household sample type have the highest effects of all variables in the models. Respondents belonging to a split-off household have 3.3 times less chance to be contacted and are 5.4 times more likely to be a non-respondent for another reason compared to members from original households. Belonging to a household that moved since the last wave, makes you 7.4 times more likely not to be contacted, 4.2 times more likely to refuse, and 10.3 times more likely to be a non-respondent for another reason. Respondents contacted by a different interviewer than in the last wave are more or less two times more likely not to be contacted, to refuse or to be a non-respondent for another reason than respondents contacted by the same interviewer. The effects for the item non-response variable are significant in the refusal and other non-interview model. A respondent that had missing values on the core questions in the last wave is almost 30 percent more likely to refuse or to be unable to participate in the next wave.

The variable position in the household asserts significant influence in all three models. Individuals that are not the reference person of a household or the partner of the reference person are 2.2 times more likely to be non-contacted, 1.8 times more likely to refuse, and 3.1 times more likely to be a non-respondent for another reason than reference persons and their partners. In the non-contact model we see that respondents in the middle age category have a lower chance to be non-contacted than respondents in the youngest age category. On the other hand, in the refusal and other non-interview models there is no difference between the middle age category and the ones younger than 25. We do see that respondents over 65 have 1.3 times more chance to refuse, and 2.1 times more chance be a non-respondent for another reason than respondents younger than 25. The effects for sex were significant in the non-contact and other non-interview model, but not in the refusal model, with women having an odds for attrition that is 1.3 times smaller than the odds for men. The effects of region are the highest in the model for non-contacts. Compared to respondents living in Brussels, the odds for non-contact of respondents living in Flanders and in the Wallonia are more or less 2.2 times lower. In the model for refusals there is no significant difference between Brussels and Flanders, however the odds for refusal are 1.2 times smaller in the Wallonia compared to Brussels. In the other non-interview model, the odds for attrition are 1.9 times smaller for respondents living in the Flanders, and 1.4 times smaller for respondents living in the Wallonia compared to respondents living in Brussels.

Overall, the effect of duration in the panel is highly significant. Each additional wave in the panel is associated with a decrease between 6 and 22 percent in the odds of attrition. For example, we calculate that the odds for non-contact in wave 7 are 2.7 times smaller and than the odds for non-contact in wave 2. The time dependence is the lowest in the model for refusal to participate again in the panel.

Table 2. Coefficients Of The Discrete-Time Logistic Models Predicting Attrition

	Non-contact			Refusal			Other		
	<i>Estimate</i>	<i>S.E.</i>	<i>OR</i>	<i>Estimate</i>	<i>S.E.</i>	<i>OR</i>	<i>Estimate</i>	<i>S.E.</i>	<i>OR</i>
Intercept	-1.57***	.22		-2.01***	.12		-3.00***	.27	
Wave	-.19***	.02	.82	-.06***	.01	.94	-.13***	.02	.88
Income poverty									
Not poor				-	-	-	-	-	-
Poor				.29***	.06	1.34	.38**	.12	1.46
Education									
Primary education	-	-	-	-	-	-	-	-	-
Lower secondary	-.41**	.13	.66	-.22***	.06	.80	-.33*	.13	.72
Higher secondary	-.54***	.12	.58	-.29***	.06	.75	-.38**	.13	.68
Advanced education	-.59***	.12	.56	-.60***	.06	.55	-.83***	.15	.44
Student	-.76***	.19	.47	-.46***	.10	.63	-.93***	.23	.39
Employment status									
Paid work				-	-	-	-	-	-
Retired				-.21**	.06	.81	.33*	.15	1.40
Inactive				-.19**	.06	.83	.33*	.15	1.40
Sick or disabled				-.31**	.12	1.36	.97***	.25	2.65
Unemployed				.03	.08	1.03	.23	.20	1.25
Mood									
Not Depressed							-	-	-
Depressed							.35**	.13	1.42
Sex									
Male	-	-	-	-	-	-	-	-	-
Female	-.27***	.08	.76				-.30**	.09	.74
Age									
<25	-	-	-	-	-	-	-	-	-
25-64	-.45**	.14	.64	-.08	.08	.92	-.29	.17	.75
>64	-.31	.19	.73	.28**	.10	1.33	.72**	.22	2.05
Household position									
Reference or partner	-	-	-	-	-	-	-	-	-
Other	.77***	.12	2.17	.61***	.06	1.84	1.12***	.12	3.05
Region									
Brussels	-	-	-	-	-	-	-	-	-
Flanders	-.87***	.11	.42	-.07	.07	.83	-.62***	.14	.54
Wallonia	-.75***	.12	.47	-.18*	.07	.83	-.33*	.14	.72
Number of missing									
No missings				-	-	-	-	-	-
One or more				.21***	.05	1.24	.25*	.10	1.28
Interviewer change									
No change	-	-	-	-	-	-	-	-	-
Change	.76***	.09	2.15	.75***	.04	2.11	.74***	.10	2.10
Household type									
Original household	-	-	-	-	-	-	-	-	-
New household	1.18***	.13	3.26	.15	.09	1.17	1.68***	.13	5.38
Household moved	2.01***	.16	7.43	1.43***	.11	4.19	2.33***	.20	10.28
Number of person years (unweighted)	30453			40958			29251		
LR Chi ² test of global null hypothesis	705.10 (df=14)			1100.18 (df=19)			738.55 (df=20)		
Pseudo R ²	p<.0001			p<.0001			p<.0001		
	0.12			0.06			0.14		

* 0.05 > p ≥ 0.01; ** 0.01 > p ≥ 0.001; *** p < 0.001

Note: Probability modelled is attrition (refusal - non-contact - other non-interview). Sample weights used, these weights reflect the sample design of the PSBH.

Source: Panel Study of Belgian Households, adult 1992 sample, waves 1992-2002

5.2 Models With Interactions

We first performed a ‘chunk’ test in which the fit of the model with all two-way interaction terms included is contrasted with the fit of the model with none of the interaction terms. Application of the chunk test for all three models reveals a nontrivial difference in model fit, this suggests that at least one interaction term is important to retain. At this point, we systematically evaluate each interaction. Testing of individual interaction terms capitalises on chance, so we corrected for multiple testing. Tables A, B, C in the appendix show the coefficients for the three models after including the interaction effects. We added interaction terms for educational attainment, region, interviewer change, and household sample type in the non-contact model. In the refusal model we added interaction terms for educational attainment, and for household position, region and interviewer change. For the other non-interview model we only found significant interaction effects for the educational attainment variable. In the last column of the tables we calculated the odds ratios. The odds ratios for the variables that did not interact with duration, did not change compared to the models without interaction terms. The first set of odds ratios for each covariate that interacts with time compares the odds for attrition compared to participation for the reference category and a non-reference category at the time of wave 2. The odds ratios for the interaction terms indicate the multiplicative factor by which the odds ratio comparing the reference category and a non-reference category changes given one additional wave of participation in the panel. In order to be able to compare the effects of the different covariates on attrition for different waves in the panel, we need to calculate the corresponding odds ratios. In table 3, we repeat the odds ratios for wave 2 and calculate the odds ratios for wave 7 and wave 11.

We first look at the interaction terms for the non-contact model. The effects of educational attainment on the odds for attrition become smaller with each additional wave in the panel survey, however not all of the individual effects are significant. Comparing the difference in the odds for non-contact between respondents with no degree and an advanced degree, we see that the odds for non-contact are 3 times lower for the respondents with an advanced degree compared to the respondents with no degree in the second wave of the panel, this difference in odds drops to 2 in the seventh wave, and by the time of the eleventh wave the difference in odds between the two educational groups is 1.2. The effects of household sample type on the odds for attrition also decrease with each additional wave in the panel. We see that the odds for non-contact in the second wave are 5.3 times higher for a new household and 20.7 times higher for a moved household compared to the odds of an original household, by the time of wave 11 the corresponding odds have dropped to 2.0 and 2.5. Notwithstanding the large decrease in odds ratios between waves, the difference in odds at the last wave is still substantial. The effects of interviewer change on the odds for attrition on the other hand become more important with each additional wave in the panel survey. Respondents contacted by a new interviewer are only 1.3 times more likely to be non-contacted after the first wave compared to 3.4 times after the tenth wave. The interaction terms for the regional variable are less significant. The difference in odds for non-contact between Flanders and Brussels were ignorable in wave 2, but in later waves of the panel the odds were smaller in Flanders.

We then go on to look at the significant interaction terms for the refusal model. The results for the variable interviewer change are the same as in the non-contact model. In this model the variable household position interacts with time in a comparable way as the interviewer change variable. A respondent that is not the reference person or his or her partner is 1.4 times more likely to refuse after the first wave compared to 2.4 times after the tenth wave. The findings for the educational variable also go in the same direction as in the non-

contact model, but this time almost all of the individual interaction terms are significant. For example, comparing the odds for refusal between respondents with no degree and a higher secondary school degree, we see that the odds ratio is 0.5 in wave 2, this odds ratio becomes 0.7 in wave 7, and there is no difference in odds at wave 11. The effect of educational attainment on the decision to refuse becomes ignorable towards the end of the panel. The interaction between region and time is not significant for the comparison between Brussels and Flanders. Wallonia had smaller odds for refusal in wave 2, but has higher odds for refusal in wave 11.

Looking at the other non-interviews, only educational attainment interacts with duration. The interaction terms comparing respondents with lower secondary degrees and higher secondary degrees and respondents without degree or a degree of primary school were significant. As an example, we compare this time the odds for a respondent without degree and a respondent with a lower secondary degree, these odds ratios are 0.3, 0.7, and 1.3 respectively for wave 2, wave 7, and wave 11. This means that a respondent with a lower secondary educational degree has a lower odds for attrition compared to a non-educated respondent in wave two, but a higher odds for attrition in wave 11.

Table 3. Odds ratios for attrition compared to participation across waves 2, 7, and 11

	Non-contact			Refusal			Other		
	<i>Wave 2</i>	<i>Wave 7</i>	<i>Wave 11</i>	<i>Wave 2</i>	<i>Wave 7</i>	<i>Wave 11</i>	<i>Wave 2</i>	<i>Wave 7</i>	<i>Wave 11</i>
Education									
No or primary vs.									
- lower secondary	.70	.67	.64	.61	.82	1.03	.34	.71	1.29
- higher secondary	.79	.54	.41	.53	.74	.97	.38	.67	1.05
- advanced	.33	.56	.84	.31	.54	.86	.36	.44	.51
- student	.37	.52	.68	.55	.64	.72	.49	.38	.31
Household position									
Reference or partner vs.									
other				1.40	1.87	2.36			
Region									
Brussels vs.									
- Flanders	1.31	.38	.14	1.00	.90	.83			
- Wallonia	.44	.46	.48	.43	.79	1.29			
Interviewer change									
No change vs.									
change	1.32	2.22	3.38	1.29	2.07	3.04			
Household type									
Original household vs.									
- new household	5.32	3.14	2.06						
- moved household	20.7	6.38	2.48						

Note: The parameters of the odds ratios in italic were not significant at the 0.05 level.

Source: Panel Study of Belgian Households, adult 1992 sample, waves 1992-2002

6 DISCUSSION AND CONCLUSION

In this paper we studied attrition from the Panel Study of Belgian Households (PSBH) and test whether attrition probabilities are related to depressive mood and socio-economic status. We also looked at the effects of characteristics of the interview situation. We considered the panel over its 11-year history from 1992 to 2002. At the time of wave eleven, attrition has

cumulated to almost 70 percent of the original 1992 adult sample. In order to explain why the risk of attrition is higher for certain individuals, we estimated year-by-year attrition probabilities using discrete-time logit models. The discrete-time logit approach is particularly effective at handling time-dependent covariates and covariate-time interactions. This made it possible to incorporate changing respondent characteristics and to test if attrition behaviour changes with the duration of the panel.

The covariates explaining the different types of attrition were not the same, suggesting that different factors are playing when contacting respondents and when asking respondents to cooperate with the survey. The effects of depression were prevalent only in the model for non-interviews. Respondents suffering from depression are more often unable to do an interview than healthy respondents. The socio-economic status variables were more important for cooperation than for contact. Only educational attainment is important when contacting respondents. The same goes for prior wave experiences, respondents with item non-response in the last wave are not more likely to be non-contacted, but they are more likely to refuse or to be unable to participate in the next wave. In the following paragraphs we will discuss some of these results in more detail.

Although depression is the most prevalent mental health problem worldwide, and it can affect the attrition process in several ways, its effect on survey non-response has seldom been studied before. The scarce studies published have concentrated on attrition in the non-elderly adult population and focussed on a two-wave attrition process. In our study we considered the non-elderly, as well as the elderly adult population and looked at the effect of mood on attrition in ten consecutive panel waves. Our analysis showed no significant associations between depression and attrition due to non-contact or due to refusal. However, there was a significant positive association with attrition due to 'other non-interviews', such as non-interviews due to physical or mental (temporary) incapacity to participate. In general, our findings are consistent with the attrition process observed in the Dutch NEMESIS Study, where major depression did not show any significant association with attrition due to refusal, failure to locate or to morbidity/mortality. However, dysthymia, a form of depression with less symptoms persisting for at least two years, was linked to non-response due to morbidity/mortality. Our categorised scale measure of depression taps a high level of depression severity, which can be seen as a precondition for a depressive disorder, but it is not clear what the strength of the correlation is between our indicator and either 'major depression' or 'dysthymia' as assessed in the NEMESIS-survey.

Concerning socio-economic status, our analyses revealed that the indicators of SES do assert a significant influence and show that attrition is not just at random. The greatest amount of SES bias occurs at the response stage. Non-respondents who refused or were unable to give an interview have a lower SES status than respondents; they are more often income poor and they have lower educational levels. Respondents who were sick or disabled had also higher probabilities for refusal and for inability to do an interview. We suspect that the fact that someone who is sick or disabled is unable to do an interview is similar to what we found for the effects of depression on the inability to do an interview. The effects of being retired or economically inactive were opposite for refusal and inability to do an interview.

In this paper the focus was on the effects of mood and socio-economic status on different forms of attrition, however the effects of the interview situation asserted the largest influence on attrition; interviewer continuity and household continuity were the most important factors in all three models. This is similar to what Behr, Bellgardt, and Rendtel (2002) found for the ECHP, they also found that the difference in response is strongest when households moved since the last wave and whether the interviewer has changed. This finding illustrates that success of a panel to achieve high response rates depends on the ability and

commitment of the interviewers, who are the main mean of contact with the respondent.

The possibility to include time-covariate interactions made it possible to test if the effects of our covariates change in time, and our analyses showed that there is high variability in attrition behaviour across waves. The effects of socio-economic status decrease with each additional wave in the panel. A low socio-economic status only played a role in explaining attrition in the first waves of the panel, and became less important as a determinant of attrition in later waves of the panel. The effects of household sample type also declined in the course of the panel. Both findings might again be an indication of the importance of a feeling of commitment to the panel. Once the respondent has build up a relationship with the interviewer and the survey organisation, factors that influence attrition in the first waves become less important. The fact that a household moves or changes is of less influence for non-contact in later waves, can also be explained by the fact that the interviewer becomes more experienced in contacting that specific household with each additional waves of the panel. This stresses again the importance of interviewer continuity. We found that the effects of interviewer change increased with each additional wave in the panel. Once the respondents have build up a relationship with the interviewer, a change in interviewer has a more negative effect on attrition.

Our analyses also revealed that there is positive duration dependence; with each additional wave of participation in the panel the chance for attrition becomes smaller. This might have to do, for instance, with the fact that the interview process becomes less time consuming as the respondent becomes more familiar with the interview process, or with the fact that the respondent develops a sense of loyalty to the survey and hence feels more inclined to continue trough time. However, the fact that the attrition probabilities decrease with time is not necessarily a proof for the hypothesis that longer participating households are less likely to attrite. The results are equally consistent with the hypothesis that respondents differ in their initial probability to participate. It might be that the decreasing probabilities are caused by unobserved heterogeneity; or in other words that important variables that explain attrition are not included in our models. The possibility of unobserved heterogeneity needs to be further explored in future research.

Although our results clearly demonstrate that attrition in the PSBH is not at random, the seriousness of mood and socio-economic status bias is difficult to judge. The R-squared values in all our models were small, suggesting that the effects of socio-economic status and depression on the different types of attrition are not very important. Nevertheless, even if the bias is small, the cumulative attrition rates were very large, as a consequence caution is needed when analysing data of the panel. We suggest that the issue of selective attrition is considered carefully by each user of the data.

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APPENDIX

Table A. Coefficients Of The Discrete-Time Logistic Models Predicting Non-Contact, Interactions

		Non-contact		
		<i>Estimate</i>	<i>S.E.</i>	<i>OR</i>
Intercept		-1.99***	.31	
Wave		-.11*	.05	.89
Educational attainment	No or primary education	-	-	-
	Lower secondary	.37	.23	.70
	Higher secondary	-.23	.24	.79
	Advanced education	-1.12***	.24	.33
	Student	-1.00**	.32	.37
	Dummy lower secondary * wave	-.01	.05	.99
	Dummy higher secondary * wave	-.07	.05	.93
	Dummy advanced * wave	.10*	.04	1.11
	Dummy student * wave	.07	.06	1.07
Sex	Male	-	-	-
	Female	-.28***	.08	.76
Age	<25	-	-	-
	25-64	-.42**	.14	.66
	>64	-.27	.19	.77
Household position	Reference person or partner	-	-	-
	Other	.81	.12	2.24
Region	Brussels	-	-	-
	Flanders	.27	.23	1.31
	Wallonia	-.81**	.25	.44
	Dummy Flanders * wave	-.25***	.04	.78
	Dummy Wallonia * wave	.01	.04	1.01
Interviewer change	No change	-	-	-
	Change	.28	.14	1.32
	Dummy change * wave	.11***	.15	1.11
Household sample type	Original household	-	-	-
	New household	1.67***	.26	5.32
	Household moved	3.03***	.33	20.73
	Dummy new household * wave	-.11*	.05	.90
	Dummy household moved * wave	-.24***	.07	.79
	Number of person years (unweighted)	30453		
	LR Chi ² test of global null hypothesis	823.56 (df=23)	p<.0001	
	Pseudo R ²	0.14		

* 0.05 > p ≥ 0.01; ** 0.01 > p ≥ 0.001; *** p < 0.001

Note: Probability modelled is non-contact. Sample weights used, these weights reflect the sample design of the PSBH.

Source: Panel Study of Belgian Households, adult 1992 sample, waves 1992-2002

Table B. Coefficients Of The Discrete-Time Logistic Model, Refusals, Interactions

		Refusal		
		<i>Estimate</i>	<i>S.E.</i>	<i>OR</i>
Intercept		-1.35***	.18	
Wave		-.19***	.03	.83
Income poverty	Non-poor	-	-	-
	Poor	.30***	.06	1.35
Educational attainment	No or primary education	-	-	-
	Lower secondary	-.49***	.12	.61
	Higher secondary	-.64***	.11	.53
	Advanced education	-1.17***	.13	.31
	Student	-.59**	.19	.55
	Dummy lower secondary * wave	.06**	.02	1.06
	Dummy higher secondary * wave	.07***	.02	1.07
	Dummy advanced * wave	.11***	.02	1.12
	Dummy student * wave	.03	.03	1.03
Employment status	Paid work	-	-	-
	Retired	-.19**	.07	.83
	Inactive	-.19**	.06	.83
	Sick or disabled	.30*	.12	1.34
	Unemployed	.03	.08	1.03
Age	<25	-	-	-
	25-64	-.10	.08	.90
	>64	.26*	.10	1.30
Household position	Reference person or partner	-	-	-
	Other	.34**	.12	1.40
	Dummy other * wave	.05**	.02	1.06
Region	Brussels	-	-	-
	Flanders	.00	.14	1.00
	Wallonia	-.85***	.15	.43
	Dummy Flanders * wave	-.02	.02	.98
	Dummy Wallonia * wave	.12***	.03	1.13
Number of item missings	No missings	-	-	-
	1 or more	.22***	.05	1.24
Interviewer change	No change	-	-	-
	Change	.25**	.08	1.29
	Dummy change * wave	.10***	.01	1.10
Household sample type	Original household	-	-	-
	New household	.15	.09	1.16
	Household moved	1.44***	.11	4.23
Number of person years (unweighted)		40958		
LR Chi ² test of global null hypothesis		1293.13 (df=27) p<.0001		
Pseudo R ²		0.07		

* 0.05 > p ≥ 0.01; ** 0.01 > p ≥ 0.001; *** p < 0.001 Note: Probability modelled is refusal. Sample weights used, these weights reflect the sample design of the PSBH. Source: PSBH, adult 1992 sample, waves 1992-2002

Table C. Coefficients Of The Discrete-Time Logistic Model, Other Non-Interviews, Interactions

		Other non-interview		
		<i>Estimate</i>	<i>S.E.</i>	<i>OR</i>
Intercept		-2.66***	.29	
Wave		-.20***	.03	.82
Income poverty	Non-poor	-	-	-
	Poor	.38**	.12	1.46
Educational attainment	No or primary education	-	-	-
	Lower secondary	-1.08***	.28	.34
	Higher secondary	-.97***	.26	.38
	Advanced education	-1.04***	.30	.36
	Student	-.71	.41	.49
	Dummy lower secondary * wave	.14**	.05	1.16
	Dummy higher secondary * wave	.11**	.04	1.12
	Dummy advanced * wave	.04	.05	1.04
	Dummy student * wave	-.05	.07	.95
Employment status	Paid work	-	-	-
	Retired	.31*	.16	1.36
	Inactive	.24	.16	1.27
	Sick or disabled	.94***	.25	2.57
	Unemployed	.21	.20	1.24
Mood	Not Depressed	-	-	-
	Depressed	.33*	.13	1.46
Sex	Male	-	-	-
	Female	-.27**	.09	.76
Age	<25	-	-	-
	25-64	-.30	.17	.74
	>64	-.72**	.23	2.05
Household position	Reference person or partner	-	-	-
	Other	1.12***	.12	3.07
Region	Brussels	-	-	-
	Flanders	-.62***	.14	.54
	Wallonia	-.33*	.14	.72
Interviewer change	No change	-	-	-
	Change	.74***	.07	2.09
Number of person years (unweighted)		29251		
LR Chi ² test of global null hypothesis		754.47 (df=24) p<.0001		
Pseudo R ²		0.15		

* 0.05 > p ≥ 0.01; ** 0.01 > p ≥ 0.001; *** p < 0.001

Note: Probability modelled is other non-interview. Sample weights used, these weights reflect the sample design of the PSBH.

Source: Panel Study of Belgian Households, adult 1992 sample, waves 1992-2002