SWEOLD 2014 – 2021

Analysis of Trend shifts, Non-Response and Attrition

Introduction

Longitudinal survey data is an important resource for the analysis of trends and changes over time in living conditions, behavior, attitudes and health of individuals. The Swedish Panel Study of Living Conditions of the Oldest Old (SWEOLD) provides insight into the oldest individuals living conditions in Sweden and has kept its data collection going since its first wave in 1992 with subsequent waves conducted in 2002, 2004, 2011, 2014 and 2021.

As panel data is collected over time, an aspect to be mindful of is non-response and attrition. These exit or non-participation behaviors exhibited by individuals in the panel can lead to a bias in the data, provided they are nonrandom in relation to the characteristics of interest.

The longitudinal data collected across multiple waves spanning the period of nearly three decades is bound to be affected by not only non-response bias but also attrition bias over time as respondents with different attributes have differing likelihoods of remaining in the sample. Analyzing the trends present in these phenomena can provide a greater understanding of its effects on the results based SWEOLD datasets as well as contribute to implementing various measures to reduce the attrition/non-response bias that accrues over time.

Motivation

The two waves observed in this report are SWEOLD2014 and SWEOLD2021. The period covered by these waves includes the COVID-19 pandemic, which could be a possible explanation as to why SWEOLD2021 had the highest non-response/attrition than any wave before it as the pandemic brought forth a plethora of recommended restrictions and lifestyle changes with disproportionally affected older adults. One of the perhaps most affected aspects of the daily life of older people was the restrictions on physical interactions with others, which hampered communication with peers and family members and likely especially affected individuals who were not well-versed in technological means of communication.

Due to the above-mentioned factors, it is of particular interest to explore the differences in the results from SWEOLD2014 and SWEOLD2021 when it comes to variables pertaining to mental health, feelings of loneliness and depression and self-rated health, as well as to what extent these patterns differ between men and women.

The impact of attrition and non-response bias could play a significant role in this case, as one could reasonably expect individuals with certain attributes such as poor health or depression to exhibit higher attrition rates than individuals without said attributes which in turn can make the results from wave comparisons biased. If, for instance healthy individuals were more likely than non-healthy individuals to remain between the waves, longitudinal results based on the data may be biased to the extent that they no longer provide an accurate depiction of reality.

Data overview

The SWEOLD sample is composed of individuals living in Sweden who were previously included in the Swedish Level of Living survey (LNU) but have aged out of the LNU which has an upper age limit of 75 years of age. The LNU is a nationally representative sample of the total adult population in Sweden and one of the longest-running longitudinal multipurpose surveys in the world (Lennartsson, Agahi, Hols Salen et al. 2014). From 2011 onwards, SWEOLD has been complemented by an additional sample that is representative of Swedish population aged 85-99. A significant strength of the SWEOLD sample is that it is obtained through the Swedish personal identification number system and as such it can be representative of the elderly population to a rather precise degree and various attributes such as type of dwelling do not affect the odds of being sampled.

In order to perform the attrition analysis, the SWEOLD datasets of 2014 and 2021 were merged and analyzed together.

Table 1. SWEOLD2014 and SWEOLD2021 response rates and interview types

Dataset	SWEOLD2014		SWEOLD2021	
	N	%	N	%
Total response rate	1,297	84.3	848	63.5
Face-to-face	-	-	-	-
Telephone	*1076*	*83.0*	*785*	*92.6*

Postal questionnaire	*63*	*17.0*	*40*	*4.7*
Both questionnaire and telephone	*-*	*-*	*23*	*2.7*
Direct interview	*1132*	*87.3*	*631*	*74.4*
Indirect interview	*139*	*10.7*	*203*	*23.9*
Mixed interview	*26*	*2.0*	*14*	*1.7*
Non-response	242	15.7	487	36.5
Sample	1539	100.0	1335	100.0

Table 2. Basic demographic characteristics of SWEOLD2014 and SWEOLD2021

Dataset	SWEOLD2014		SWEOLD2021	
	N	%	N	%
Women	720	55.5	445	52.5
Men	577	44.5	403	47.5
Age group: Below 77	575	44.3	-	-
Age group: 77-79	179	13.8	152	17.9
Age group: 80-84	240	18.5	240	28.3
Age group: 85+	303	23.4	456	53.8
Education: Grade school or lower	582	44.9	309	36.4
Education: Beyond grade school	667	51.4	497	58.6
Education: No answer	48	3.7	42	5.0

Table 3. Analytical samples of SWEOLD2014-2021

Dataset	Number of observations
SWEOLD2014	1,297
SWEOLD2021	848
SWEOLD2014-2021 Merged	1593

It is important to keep in mind the overlap between individuals in both datasets, as panel respondents get re-interviewed but additional sample respondents do not and new respondents "age into" SWEOLD from the LNU sample (more detailed information about the data collection and design can be found in the article by Lennartsson, Agahi, Hols Salen et al. (2014)). This is reflected in Table 4 below which shows that barely half of the total

respondents in our analytical sample have participated in both the 2014 and 2021 waves of SWEOLD.

Table 4. Respondents who participated in both SWEOLD2014 and SWEOLD2021

Participation	Number of observations
Present in both 2014 and 2021	552
Present only in 2014 or only in 2021	1041

At this stage, both additional sample respondents as well as respondents who have died or emigrated between waves are still included in the data, to provide an overview of shifts in the trends between 2014 and 2021. However, for the attrition analysis the additional sample respondents and the dead or emigrated panel respondents will be excluded, as their lack of participation in subsequent waves does not compromise the representativeness of the sample.

In cases where the respondent has not answered the analyzed question(s), their response is treated as missing and as such not included in the percentage column of the tabulation. The number of cases with no answer are detailed separately in order to show how many cases are omitted.

All waves of SWEOLD feature a question about feelings of depression of the respondent in the last 12 months. This question has had three alternative answers: "No", "Yes, slight" and "Yes, severe". Starting from SWEOLD2014, a screening instrument for depression among older adults, the GDS-4 (Geriatric Depression Scale-4) was added to the questionnaire. The GDS-4 is composed of 4 (hence the name) questions with "Yes" and "No" answers which then can be summed into an index which can vary from 0 to 4 points where each answer that indicates depressive symptoms counts as 1 point.

4-Item Geriatric Depression Scale (GDS-4) (Answers that give 1 point are bolded)	
Are you basically satisfied with your life?	Yes **NO**
Do you feel that your life is empty?	**YES** No
Are you afraid that something bad is going to happen to you?	**YES** No
Do you feel happy most of the time?	Yes **NO**

The guidelines for interpreting the indexed results of the GDS-4 are as follows: 0 = likely not depressed, 1 = uncertain if depressed and 2-4 = likely depressed. The indexed answers have been coded into a new variable for both responses from 2014 and 2021 in order to see if there are any shifts in trend from 2014 to 2021. This variable is also used in the attrition analysis as a predictor for the probability of participating in both waves.

In cases where one or more of the GDS-4 questions haven't been answered, no assessment can be made at the observation is excluded from the analysis or percentage column of the tabulation.

Lastly, two additional variables have been slightly altered for the purpose of the attrition analysis. The variable for self-rated health in 2014 has been dichotomized, generating a new variable with simply the values "Good" and "Less than good" as opposed to the three categories in the original variable "Good", "Neither good nor bad" and "Bad". The variable containing age groups in SWEOLD2014 has also been used to generate a birth cohort variable. This does not change any of the information contained in either variable, but instead presents the same information in a more intuitive way, by presenting the differences based on birthyear instead of age in 2014 on predicted probability of participating in both SWEOLD2014 and SWEOLD2021.

Shift in trends surrounding loneliness, self-rated health and possible depression between SWEOLD2014 and SWEOLD2021

Table 5. Frequencies of GDS-4 index scores in SWEOLD2014. 95% confidence interval in parentheses.

GDS-4 (SWEOLD2014)	Frequency	Percent	Cumulative percent
Likely not depressed	303	52.2 (48.2 – 56.3)	52.2
Uncertain if depressed	171	29.5 (25.9 – 33.3)	81.7
Likely depressed	106	18.3 (15.3 – 21.6)	100.0
Total	580	100.0	100.0
No answer/indirect interview	142	-	-
Sum	722	-	-

*Note: Answers from *indirect* interviews are purposely discarded in order to liken the format to SWEOLD2021.

GDS-4 (SWEOLD2021)	Frequency	Percent	Cumulative percent
Likely not depressed	385	60.2 (56.4 – 63.9)	60.2
Uncertain if depressed	170	26.6 (23.3 – 30.2)	86.8
Likely depressed	84	13.2 (10.7 – 16.0)	100.0
Total	639	100.0	100.0
No answer/indirect interview	209	-	-
Sum	848	-	-

*Note: The GDS-4 questions were only asked in *direct* interviews during SWEOLD 2021.

The first thing to note in these trend comparisons is that part of the SWEOLD2014 sample has been excluded which are namely respondents aged 70-76 at the time of the interview as well as the answers from indirect interviews. This exclusion has been in made order to make the results from the different waves more comparable as the age groups match better as the youngest respondents in SWEOLD2021 are 77 at the time of interview.

At first glance, the differences between the GDS-4 score distributions of SWEOLD2014 and SWEOLD2021 shows a generally positive trend, with less respondents falling within the "Likely depressed" category which is around 5 percentage points smaller in 2021 compared to 2014. In turn, the "Likely not depressed" category encompasses around 8 percentage points more of the distribution in 2021 compared to 2014.

This trend implies that the conditions during the pandemic did not increase the share of likely depressed individuals in our sample. It in fact shows the opposite, namely that a smaller share respondents feel depressive symptoms in 2021 compared to 2014. It is however hard to draw definitive conclusions based on these comparisons as it is very possible that attrition effects contribute to biased results in favor of healthier/happier individuals while hard to reach or isolated individuals, who may be overrepresented among the non-responders, would've answered more negatively in terms of mental health.

Gender differences between GDS-4 score distributions both in 2014 and 2021 were also considered and can be found in Appendix 1. The same trends are present for both women and men, where generally a larger share of men is "likely not depressed" (over 60% of men who answered the GDS-4 questions in 2014 and 2021 fall within this category) compared to women who have generally larger shares of "Uncertain if depressed" and "Likely depressed" in both 2021 and 2014 relative to men. Both groups show reductions in percentage points of

the "Uncertain if depressed" and "Likely depressed" categories between 2014 and 2021 and increases in the "Likely not depressed" category which are very similar to the trend observed in the pooled results discussed above.

Moving on to feelings of loneliness, as indicated by the question "Are you ever bothered by feelings of loneliness?" in both 2014 and 2021.

Table 7. Frequencies and distribution of answers to "Are you ever bothered by feelings of loneliness?" in SWEOLD2014. 95% confidence interval in parentheses.

Loneliness (SWEOLD2014)	Frequency	Percent	Cumulative percent
Nearly always	23	3.3 (2.2 – 4.9)	3.3
Often	89	12.8 (10.5 – 15.4)	16.1
Seldom	169	24.2 (21.2 – 27.5)	40.3
Almost never	417	59.7 (56.0 – 63.3)	100.0
Total	698	100.0	100.0
No answer	24	-	-
Sum	722	-	-

Table 8. Frequencies and distribution of answers to "Are you ever bothered by feelings of loneliness?" in SWEOLD2021. 95% confidence interval in parentheses.

Loneliness (SWEOLD2021)	Frequency	Percent	Cumulative percent
Nearly always	26	3.1 (2.1 – 4.6)	3.1
Often	94	11.3 (9.3 – 13.7)	14.4
Seldom	205	24.7 (22.0 – 27.7)	39.1
Almost never	505	60.9 (57.5 – 64.1)	100.0
Total	830	100.0	100.0
No answer	18	-	-
Sum	848	-	-

The distribution of answers pertaining to feelings of loneliness is remarkably similar between 2014 and 2021. This is also mirrored in the gender comparison tables between both waves found in Appendix 2. The most notable changes are a 1 percentage point decrease in the "Often" category in 2021 compared to 2014 as well the near doubling of the share of "Often" category for men between 2014 and 2021, where 7.7% of male respondents reported being

bothered by feelings of loneliness often in 2014 while in SWEOLD2021 11.4% of male respondents fall within this category.

The distribution of answers pertaining to self-rated health has also changed slightly between waves.

Table 9. Frequencies and distribution of answers to "How would you assess your own general state of health?" in SWEOLD2014

Self-rated health (2014)	Frequency	Percent	Cumulative percent
Good	306	42.8 (39.2 – 46.5)	42.8
Bad	109	15.2 (12.8 – 18.1)	58.0
Neither good nor bad	300	42.0 (38.4 – 45.6)	100.0
Total	715	100.0	100.0
No answer	7	-	-
Sum	722	-	-

Table 10. Frequencies and distribution of answers to "How would you assess your own general state of health?" in SWEOLD2021

Self-rated health (2021)	Frequency	Percent	Cumulative percent
Good	404	48.1 (44.7 – 51.5)	48.1
Bad	72	8.6 (6.8 – 10.6)	56.7
Neither good nor bad	364	43.3 (40.0 – 46.7)	100.0
Total	840	100.0	100.0
No answer	8	-	-
Sum	848	-	-

We can see that the share of respondents evaluating their own health as "Good" has increased by around 6 percentage points between 2014 and 2021. We also see a reduction of around 7 percentage points in the share of respondents evaluating their own health as "Bad" between 2014 and 2021 while the share of respondents who consider their health to be "Neither good nor bad" stays around the same level and only increases by 1 percentage point in 2021. In terms of gender differences (which can be found in Appendix 3), we find that women generally rate their health as "Good" slightly more often than men in 2014 (around 40% of women compared to 45% of men). This trend reverses in 2021, when around 50% of female respondents rate their health as "Good" while 45% of male respondents rate their own health

in that category. The share of female respondents rating their own health as "Bad" is substantially reduced in 2021 compared to 2014, going from 17.6% to 7.5% while the share of male respondents in the same category is slightly reduced from 12.2% in 2014 to 9.8% in 2021. Overall, the share of respondents rating their health as neither good nor bad stays roughly the same between waves in both groups.

The trend shifts between SWEOLD2014 and SWEOLD2021 in the observed questions seem to imply that the share loneliness and possible depression among the respondents has diminished over time while self-rated health has improved. While the results derived from the comparison of GDS-4 questions in 2014 and 2021 suffer from the large number of missing data, which can largely be attributed to the high number of indirect interviews, the results from the other observed questions pertaining to loneliness and self-rated health show a similar pattern to each other as well as to the GDS-4 questions while having very comparable non-response rates for these questions between 2014 and 2021.

In table 11 we assess how well the sample of SWEOLD2021 represents the national population of Sweden above 77, in terms of sex, age, and educational composition.

Table 11. Comparison of distribution shares between SWEOLD2021 and national statistics provided by SCB for 2019

Distribution	SWEOLD2021 (weighted)	SCB National Statistics
Men (%)	43.3	42.4
Women (%)	56.7	57.6
Ages 77-79 (%)	27.0	29.8
Ages 80-84 (%)	42.7	35.7
Ages 85+ (%)	30.3	34.5
Grade school (%)	35.5	41.0

According to Statistics Sweden (SCB), the Swedish population above the age of 77 at the time of the sample drawing for SWEOLD2021 is represented by 42.4% men and 57.6% women. This is well reflected in the SWEOLD sample, as the weighted gender distribution is 43.3% men and 56.7% women. When it comes to age groups, the representation differs a bit between the sample and the whole population. In the 80-84 age group, there is a slight overrepresentation in the sample, as it accounts for 42.7% of the sample while being only 35.7% of the population (above age 77) according to Statistics Sweden. The 77-79 age group is rather well represented in the sample, with a share of 27% compared to 29.8% in the

population. The 85+ age group slightly underrepresented in the sample, accounting for 30.3% of the population in the sample compared to 34.5% in the actual population at the end of 2019. Additionally, the SWEOLD sample seems to have slightly higher educated respondents on average compared to the national statistics, as the respondents who only have completed grade school only account for 35.5% of the sample compared to 41% of the actual population in 2019.

The results presented earlier raise the question of the presence and effect of non-response and attrition bias in SWEOLD2021. There is plausible theoretical reasoning for why the share of loneliness and possible depression should have been more prominent and self-rated health should have been negatively affected in SWEOLD2021 compared to SWEOLD2014, yet the opposite trend is observed. While the theoretical reasoning would predict a worsening of these attributes in the SWEOLD2021 wave, it does not mean that there necessarily was a worsening. However, the presence of the opposite trend could be a sign of the presence of attrition bias in the sample where individuals suffering from loneliness, depression and poor health were lost to follow-up while respondents who were healthy and feeling good were more likely to participate in the study.

This type of attrition bias would manifest as a positive change in trends which do not accurately represent the true characteristics of the actual population. Thus, an attrition/non-response analysis is needed before being able to make any statements based on the shift in trends observed in the tables presented thus far.

SWEOLD2014-2021 Attrition and Non-response analysis

As mentioned previously, a significant strength of the SWEOLD sample is that it is obtained through the Swedish personal identification number system which allows for tracking of individuals in administrative registries, meaning that we can retrieve information about events between waves that impact future participation such as death and emigration. These tracking capabilities have been used to establish which respondents to exclude from the non-response/attrition analyses and are presented in Table 12.

Table 12. Panel respondents lost to other causes than attrition between 2014 and 2021

SWEOLD2014 Follow-up (excl. Additional sample)	Number of obs.	Percent
Alive & living in Sweden	781	63.7

Dead or emigrated	445	36.3
Total	1,226	100.0

As the additional sample is not intended to be re-interviewed, they are excluded from the tabulation above as well as all upcoming tables and analyses. An overview of the sizes and shares of the additional samples in SWEOLD2014 and SWEOLD2021 can be found in Appendix 4. The 445 panel respondents who participated in SWEOLD2014 and died or emigrated before 2021 are also excluded, as their lack of participation accurately reflect the development of the target population. This leaves us with a panel sample of 781 respondents who participated in SWEOLD2014 and were eligible to participate in SWEOLD2021. The retention between waves of this sample can be found below in Table 13.

Table 13. Retention of panel respondents between SWEOLD2014 and SWEOLD2021 exlcuding additonal sample and respondents lost to other causes

Retention between 2014 and 2021	Number of obs.	Percent
Participated in both waves	552	70.7
Lost to follow-up	229	29.3
Total	781	100.0

Binary logistic regressions were performed to analyze the effects of self-rated health and possible depression on retention between waves. Loneliness was initially included in the models but was eventually removed due to multicollinearity with the GDS-4 index variable. The analytical sample consists of 781 observations and in the final regression models, 20 male cases and 42 female cases were excluded due to missing answers on one or more of the variables of interest, leaving the final analytical sample in the regressions at 719 observations.

The final models control for age and education and the results pertaining to the variables of interest are presented as predicted probabilities, while the complete regression output with odds ratios can be found in Appendix 5.

Surprisingly, rather relatively differences are found in terms of predicted probability of participating in the next wave based on self-reported health in SWEOLD2014 among male respondents. The highest predicted probability for participating in the next wave is found among men who self-rated their health as "Neither good nor bad" in SWEOLD2014 at 0.77, followed by a predicted probability of 0.69 for men who self-rated their health as "Good" in SWEOLD2014. As expected, the lowest predicted probability for participating in SWEOLD2021 based on self-rated health among male respondents is found among the respondents who rated their own health as "Bad" in 2014 who have a predicted probability of .55 of participating in the next wave of SWEOLD. It is worth mentioning that this last category has a rather large confidence interval, resulting from the fact that this is a small group compared to the other groups.

Among the women in the sample, we see very similar patterns in terms of predicted probability of participating in the next wave based on self-reported health in SWEOLD2014.
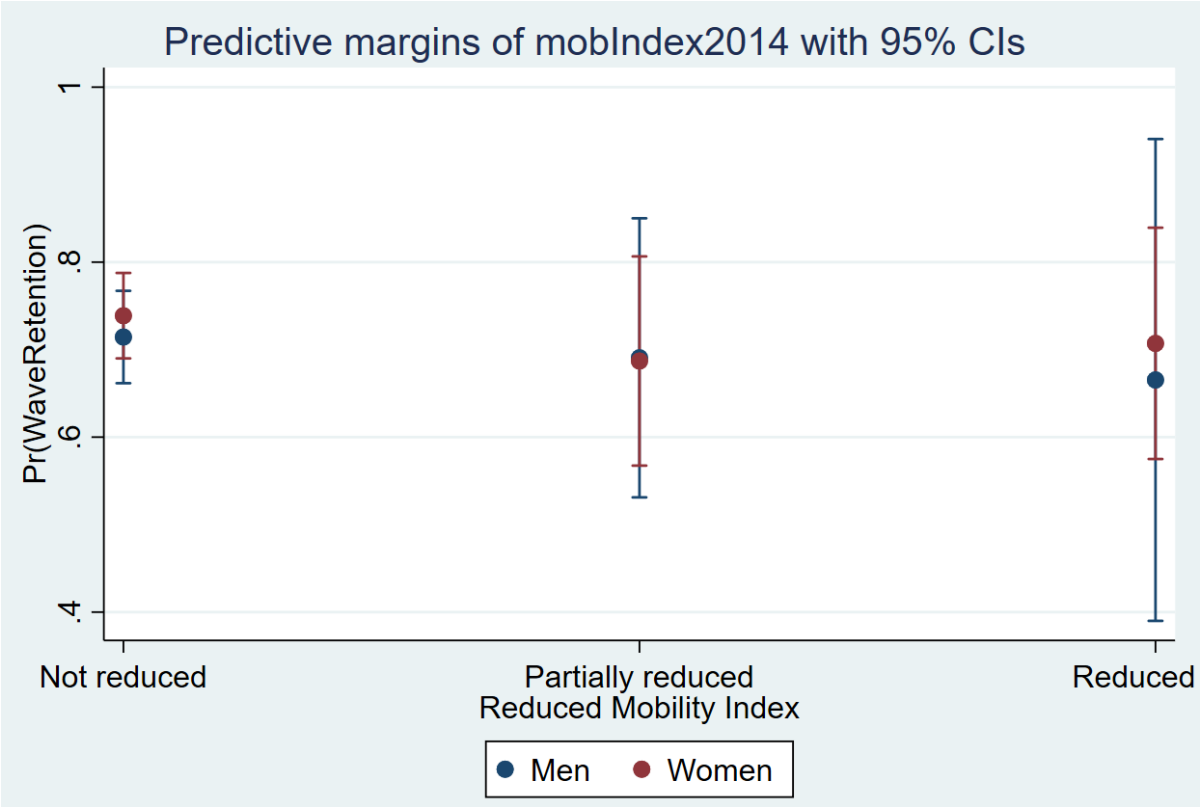
The highest predicted probability for participating in the next wave is once again found among women who self-rated their health as "Neither good nor bad" in SWEOLD2014 at 0.74, very closely followed by a predicted probability of 0.72 for women who assessed their health as "Good" in SWEOLD2014. Even for female respondents, the lowest predicted probability for participating in SWEOLD2021 based on self-rated health is found among the women who rated their own health as "Bad" in 2014, sitting at 0.70. The estimates from the female respondent model are closer to each other and have greater confidence intervals indicating that the association between self-rated health and predicted probability of participating in the next wave is weaker for women than for men.

While a pattern is found in terms of poor self-rated health leading to lower predicted probabilities for both men and women, the effect is most present among men who reported their health as "Bad" in 2014 and rather weak for the other groups. The results imply that the attrition across SWEOLD waves is not significantly affected by the self-reported health of the respondents in the previous wave except for men with poor self-rated health which is a group that quite possibly suffers from selective attrition between SWEOLD2014 and SWEOLD2021.

The predicted probability for participating in the next wave based on mobility was also explored, as it could serve as a more objective and narrow measure of physical health of the respondent in 2014 compared to self-rated health.

A reduced mobility index was created from the questions "Can you walk 100 meters fairly briskly without difficulty?" and "Can you walk up and down stairs without difficulty?" where respondents were assigned two points in cases where the respondent had answered "Yes" to both questions. Consequently, respondents were assigned one point if they were able to perform one of the tasks detailed in the questions but not the other and lastly respondents who answered that they were unable to do either of the tasks without significant difficulty were assigned zero points.
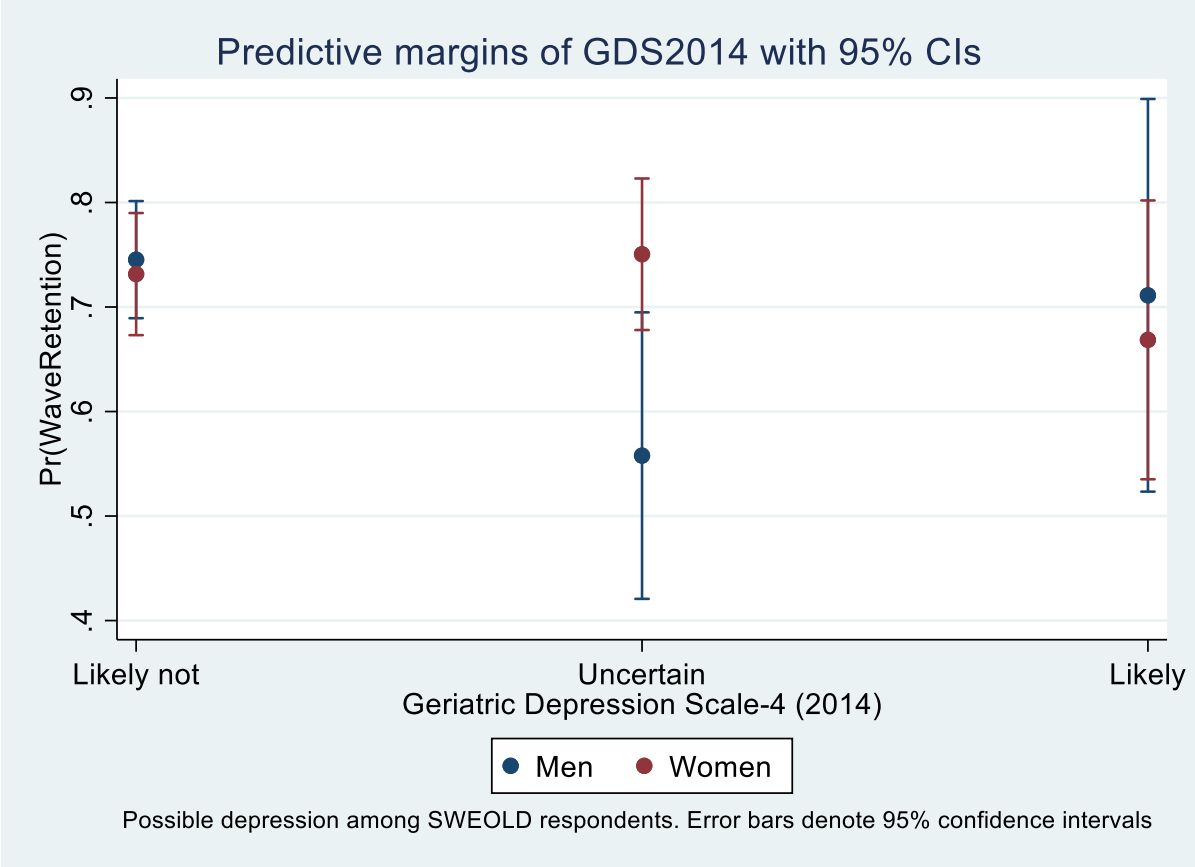
The highest predicted probability for participating in the next wave generally mirrors the results presented for self-rated health as women without reduced mobility have the highest propensity to participate in the next wave with a predicted probability of 0.74, followed by a predicted probability of 0.71 for men with no reduced mobility. Men with partially reduced mobility have a slightly higher predicted probability of participating in SWEOLD2021, at 0.70 compared to that of 0.68 that women with partially reduced mobility show. On the other hand, women with reduced mobility have a higher predicted probability of participating again than men in the same category, with a predicted probability of 0.70 compared to comparable men which have a predicted probability of 0.69 of participating in the next wave.

These results show a similar pattern pertaining to health and the propensity to participate in the next wave which has been observed earlier in this report when observing self-rated health, however the differentials between groups and sexes are notably very small and support the notion that the attrition across SWEOLD waves is not greatly influenced by the health of the respondents in the previous wave. Much like it has been discussed previously, a certain survivor bias is likely present in these analyses as the sickest with the most reduced mobility are likely to have perished between 2014 and 2021 and thus never had a chance to participate

in SWEOLD2021 while the healthiest mobility-impaired respondents are most likely featured in this sample and subsequent analyses.

Figure 3. Predicted probabilities by GDS-4 index score for respondents of SWEOLD2014.

Predictive margins of GDS2014 with 95% CIs

Possible depression among SWEOLD respondents. Error bars denote 95% confidence intervals

As touched upon earlier, the GDS-4 index indicates a likelihood of the respondent being depressed, which is shown in the figure above as either "Likely not" depressed, "Uncertain" if depressed and "Likely" depressed. Among the men in the sample the highest predicted probability for participating in the next wave is found for the likely not depressed based on their answers to the GDS-4 questions in SWEOLD2014, with a predicted probability of 0.74. Unexpectedly, the second-highest predicted probability for participating in the next wave is found among the male respondents deemed likely depressed by the GDS-4 index at with a predicted probability of 0.72. Lastly, the individuals categorized as uncertain if depressed based on their answers for the GDS-4 questions have the lowest predicted probability of participating in the next wave, namely 0.57.

The predicted probabilities for "Likely not depressed" and "Likely depressed" being so close to each other imply that SWEOLD does not lose possibly depressed male respondents to attrition at a substantially disproportionate rate and manages to retain both groups at similar

rates. The results for individuals who are assessed as potentially depressed (Uncertain if depressed) by the GDS-4 index are puzzling since even though it encompasses a rather large group, the predicted probability for this group is markedly lower than that of the other two groups.

When observing the results from the female respondents, we see that the highest predicted probability for participating in the next wave is found for women categorized as uncertain if depressed based on their answers to the GDS-4 questions in SWEOLD2014, with a predicted probability of 0.75. In turn, the second-highest predicted probability for participating in the next wave is found among women deemed likely not depressed with a predicted probability of 0.73. Lastly, the female individuals categorized as likely depressed based on their answers for the GDS-4 questions have the lowest predicted probability of participating in the next wave at 0.64.

It is interesting to see such few similarities between the results from the male and female respondents. Likely not depressed as well as likely depressed men have almost the same predicted probability of participating in the next wave while the male individuals categorized as "Uncertain if depressed" have considerably lower propensity to participate in the next wave. In turn, women in the sample who are either likely not depressed or uncertain if depressed have very similar predicted probabilities for participating in the next wave while the expected result of individuals who are likely depressed having the lowest propensity for participating in the next wave is present among women. The results from the male respondents certainly imply that GDS-4 index rating does not significantly impact the attrition between SWEOLD2014 and SWEOLD2021. Meanwhile, the results from the female respondents could potentially imply that likely depressed women are more likely to be lost to follow-up than non-likely depressed women but the large confidence interval which overlaps with the other categories means we must interpret this finding with caution.

An overview of the effect of education on predicted probability of participating in the next wave has also been included in this report.
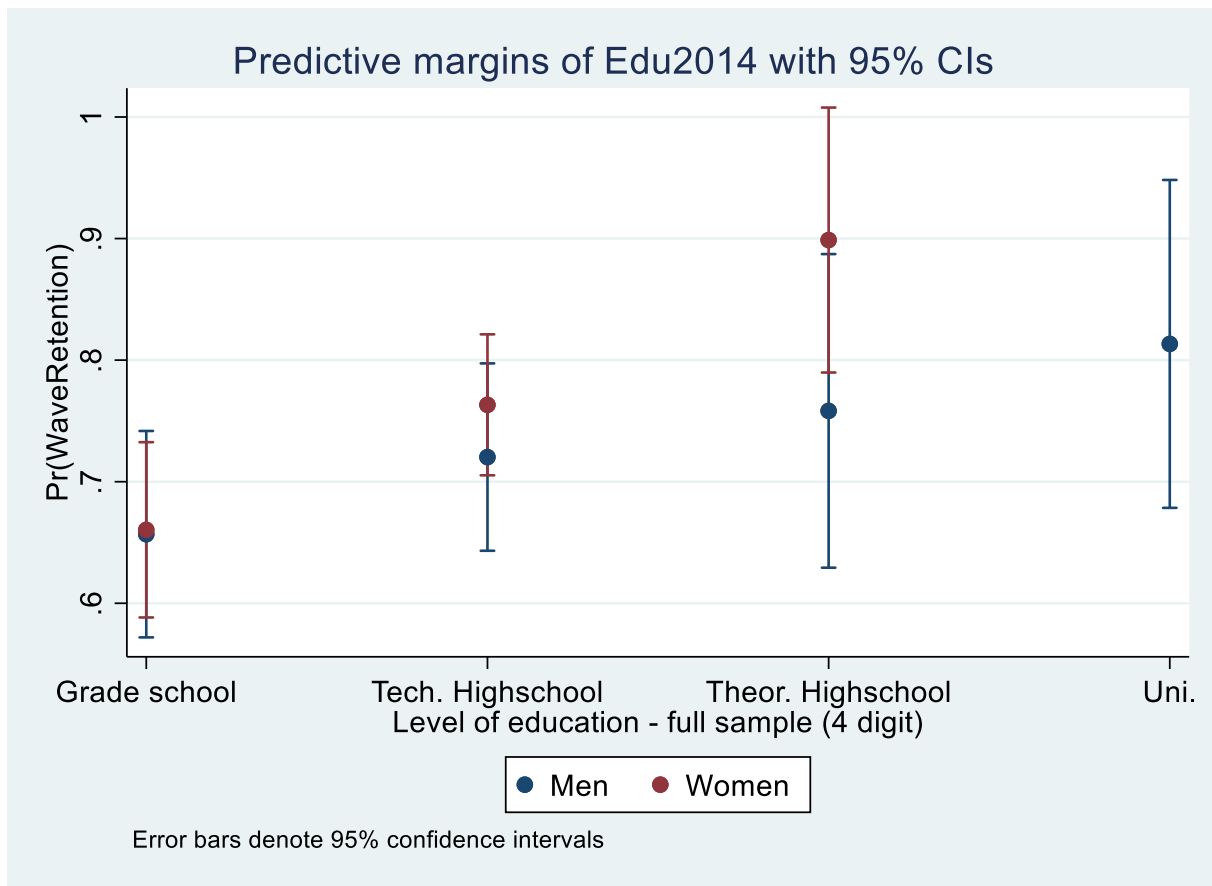
For men we see a linear increase in propensity of participating in the next wave based on level of education. The lowest predicted probability for participating in the next wave is found among men whose highest level of education in SWEOLD2014 was "Grade school" at 0.66, followed by "Technically oriented Highschool" at 0.73 and "Theoretically oriented Highschool" at 0.76 and finally men who held a university degree had the highest propensity to participate in the next wave with a predicted probability of 0.81.

When it comes to the women in the sample, we see an ascending predicted probability as the level of education increases, much like the results from the male respondents presented earlier. The lowest predicted probability for participating in the next wave is found among women whose highest level of education in SWEOLD2014 was "Grade school" at 0.66, followed by "Technically oriented Highschool" at 0.75 and "Theoretically oriented Highschool" at 0.89. All women with a university degree are excluded from the regression due to missing data in one or more of the other variables included in the model, however women at this level of education are considerably fewer than men (only 10 women with a university degree in the whole panel sample) and every one of them participated in both SWEOLD2014 and SWEOLD2021, so it is safe to assume that the increasing propensity

pattern by education found in the results from the male model would be found in the female model if it featured more women with university degrees.

These results are overall rather expected and indicate a stronger retention based on higher education. We see very similar patterns for both men and women, with a higher propensity for participating in the next wave found among women compared to men in every educational category except for "Grade school", where both men and women have almost identical predicted probabilities. For both men and women, but more so for men, the confidence intervals are once again rather large and as such should be interpreted with caution. However, these results do imply that SWEOLD is more likely to retain respondents with higher education between waves while respondents with lower education are more likely to be lost to follow-up.

Summary

The cross-sectional comparisons of the variables presented in this paper show generally increasing well-being in the SWEOLD panel between 2014 and 2021. This is seen through a 9 percentage point reduction in "Likely depressed" individuals in the panel (assessed using the GDS-4 index) and while the percentage points differ between sexes, this same pattern is present for both men and women in the sample. Loneliness has remained remarkably similar between waves but also shows a miniscule reduction in the share of respondents who reported feeling loneliness often. Lastly, we also see this trend of increased well-being when comparing self-rated health in SWEOLD2014 and SWEOLD2021, as the share of respondents reporting their health as "Good" increased while the share of respondents reporting their health as "Bad" decreased.

The attrition analyses in this paper show that selective attrition is quite likely present in the SWEOLD panel, even though it does not seem to be that strong of an effect. This selective attrition seems to predominantly affect respondents who previously indicated having generally worse health (both self-reported as well as assessed by the GDS-4 screening questions) but also manifests through an educational gradient for both men and women in the SWEOLD sample, where inter-wave retention becomes more likely as highest attained education increases. When it comes to the unwellness gradient, men and women are

remarkably close in terms of propensity to participate in the next wave of SWEOLD based on their GDS-4 scores and self-reported health, although men generally seem to have a lower propensity to remain in the study.

This last mentioned pattern is also seen quite clearly when observing the predicted probability for participating in the next wave based on highest attained education, where we see a linear increase as education increases with essentially equal predicted probabilities for both men and women whose highest attained education is "Grade school" and as highest education achieved increases so do both the predicated probability of remaining in the study as well as the distance between men and women in terms of propensity to participate in the next wave, with women having higher predicted probabilities than men in their educational category. While the women with university education in the sample are extremely scarce and unfortunately excluded from the analyses due to some missing answers, it is quite likely that they would have higher predicted probabilities of staying in the sample than the men with university education in the sample.

References

Lennartsson, C., Agahi, N., Hols Salen, L., et al., (2014). DATA RESOURCE PROFILE: The Swedish Panel Study of Living Conditions of the Oldest Old (SWEOLD). International Journal of Epidemiology, 43, 731–738, https://doi.org/10.1093/ije/dyu057

Appendix

1.

GDS-4 (SWEOLD2014) (Women)	Frequency	Percent	Cumulative percent
Likely not depressed	142	44.0	44.0
Uncertain if depressed	113	35.0	79.0
Likely depressed	68	21.0	100.0

Total	323	100.0	100.0
No answer/indirect interview	87	-	-
Sum	410	-	-

GDS-4 (SWEOLD2014) (Men)	Frequency	Percent	Cumulative percent
Likely not depressed	161	62.6	62.6
Uncertain if depressed	58	22.6	85.2
Likely depressed	38	14.8	100.0
Total	257	100.0	100.0
No answer/indirect interview	55	-	-
Sum	312	-	-

GDS-4 (SWEOLD2021) (Women)	Frequency	Percent	Cumulative percent
Likely not depressed	191	55.2	55.2
Uncertain if depressed	104	30.0	85.2
Likely depressed	51	14.8	100.0
Total	346	100.0	100.0
No answer/indirect interview	99	-	-
Sum	445	-	-

GDS-4 (SWEOLD2021) (Men)	Frequency	Percent	Cumulative percent
Likely not depressed	194	66.2	66.2
Uncertain if depressed	66	22.5	88.7
Likely depressed	33	11.3	100.0
Total	293	100.0	100.0
No answer/indirect interview	110	-	-
Sum	403	-	-

2.

Loneliness (SWEOLD2014) (Women)	Frequency	Percent	Cumulative percent
Nearly always	12	3.1	3.1
Often	65	16.5	19.6
Seldom	97	24.6	44.2
Almost never	220	55.8	100.0
Total	394	100.0	100.0
No answer	16	-	-
Sum	410	-	-

Loneliness (SWEOLD2014) (Men)	Frequency	Percent	Cumulative percent
Nearly always	11	3.6	3.6
Often	24	7.9	11.5
Seldom	72	23.7	35.2
Almost never	197	64.8	100.0
Total	304	100.0	100.0
No answer	8	-	-
Sum	312	-	-

Loneliness (SWEOLD2021) (Women)	Frequency	Percent	Cumulative percent
Nearly always	14	3.2	3.2
Often	49	11.3	14.5
Seldom	114	26.3	40.8
Almost never	257	59.2	100.0
Total	434	100.0	100.0
No answer	11	-	-
Sum	445	-	-

Loneliness (SWEOLD2021) (Men)	Frequency	Percent	Cumulative percent
Nearly always	12	3.0	3.0
Often	45	11.4	14.4
Seldom	91	22.9	37.3
Almost never	248	62.7	100.0

Total	396	100.0	100.0
No answer	7	-	-
Sum	403	-	-

3.

Self-rated health (SWEOLD2014) (Women)	Frequency	Percent	Cumulative percent
Good	161	39.7	39.7
Bad	73	17.9	57.6
Neither good nor bad	172	42.4	100.0
Total	406	100.0	100.0
No answer	4	-	-
Sum	410	-	-

Self-rated health (SWEOLD2014) (Men)	Frequency	Percent	Cumulative percent
Good	145	46.9	46.9
Bad	36	11.7	68.6
Neither good nor bad	128	41.4	100.0
Total	309	100.0	100.0
No answer	3	-	-
Sum	312	-	-

Self-rated health (SWEOLD2021) (Women)	Frequency	Percent	Cumulative percent
Good	225	50.9	50.9
Bad	33	7.5	58.4
Neither good nor bad	184	41.6	100.0
Total	442	100.0	100.0
No answer	3	-	-

	Frequency	Percent	Cumulative percent
Sum	445	-	-

Self-rated health (SWEOLD2021) (Men)	Frequency	Percent	Cumulative percent
Good	179	44.9	44.9
Bad	39	9.8	54.7
Neither good nor bad	180	45.3	100.0
Total	398	100.0	100.0
No answer	5	-	-
Sum	403	-	-

4.

SWEOLD2014 Sample	Frequency	Percent	Cumulative percent
Additional Sample	71	5.5	5.5
LNU Panel	1,226	94.5	100.0
Total	1,297	100.0	100.0

SWEOLD2021 Sample	Frequency	Percent	Cumulative percent
Additional Sample	269	31.7	31.7
LNU Panel	579	68.3	100.0
Total	848	100.0	100.0

5.

Final logistic regression, output with Odds Ratios.

WaveRetention	OR.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Self-rated health							
Bad	1 (Reference)	.	.	.	.	.	
Neither good nor bad	2.837	1.778	1.66	.096	.831	9.688	*
Good	1.967	1.223	1.09	.276	.582	6.652	
Sex							

Men	1 (Reference)						
Women	1.701	1.340	0.67	.500	.363	7.970	
Self-rated health # Sex							
Neither good nor bad # Women	.427	.334	-1.09	.276	.092	1.976	
Good # Women	.556	.432	-0.76	.449	.121	2.546	
Level of education							
Grade school	1 (Reference)	.	.	.	.	.	
Tech. Highschool	1.425	.404	1.25	.212	.817	2.485	
Theor. Highschool	1.754	.743	1.33	.185	.765	4.023	
University degree	2.350	1.203	1.67	.095	.862	6.408	*
Level of education # Sex							
Tech. Highschool # Women	1.136	.418	0.35	.728	.553	2.337	
Theor. Highschool # Women	2.599	1.993	1.25	.213	.578	11.685	2.6
University degree # Women	1 (Empty)						
Birth cohort							
1939-1944	1 (Reference)	.	.	.	.	.	
1935-1938	.693	.253	-1.01	.314	.339	1.416	
1930-1934	.399	.223	-1.65	.100	.134	1.191	*
1909-1929	.794	.738	-0.25	.804	.128	4.912	
GDS-4 Index							
Likely not depressed	1 (Reference)	.	.	.	.	.	
Uncertain if depressed	.453	.153	-2.35	.019	.233	.878	**
Likely depressed	.895	.464	-0.21	.830	.324	2.469	
GDS-4 Index # Women							
Uncertain if depressed # Women	2.449	1.042	2.11	.035	1.06	5.639	**
Likely depressed # Women	.733	.454	-0.50	.617	.218	2.469	
Age							
Age	3.59	2.266	2.02	.043	1.04	12.374	**
Age squared	.992	.004	-1.96	.050	.984	1	**

*** $p<.01$, ** $p<.05$, * $p<.1$

Note: For level of education, "Grade school" is corresponds to 6-8 years of total education, "Technical oriented highschool or equivalent" corresponds to 11-14 years of total education, "Theoretical oriented highschool or equivalent" corresponds to 11-14 years of total education and "University degree" corresponds to 14-20 years of total education.