

Netherlands Mental Health Survey and Incidence Study-3 (NEMESIS-3): attrition at the second wave

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Introduction

Attrition in prospective epidemiological studies can be selective, and consequently can bias the research findings. Therefore, knowledge of differences in characteristics between those who continue to participate and those lost to follow-up are of importance for a correct interpretation of the results. Moreover, this information can be used to construct a weighting factor to correct for attrition bias.

Within the second Netherlands Mental Health Survey and Incidence Study (NEMESIS-2; N=6,646; adults aged 18-64 years), attrition at first follow-up was associated with younger age, lower education, having no paid job, and non-Dutch country of origin (De Graaf et al., 2013). In NEMESIS-1, younger age and lower education were also predictors of the most frequent type of attrition, refusal to participate (De Graaf et al., 2000). Attrition at the first follow-up in NEMESIS-2 was not associated with any mood disorder, any anxiety disorder or any substance use disorder in the 12 months prior to baseline, after controlling for sociodemographic characteristics (De Graaf et al., 2013). This was in line with NEMESIS-1, where these main disorder categories were also not associated with refusal to participate at first follow-up, after controlling for sociodemographic characteristics (De Graaf et al., 2000).

In this short report, we give insight into the prevalence of different types of attrition (i.e., refusal, noncontact, unable to participate recorded by the interviewers at the last contact attempt) and sociodemographic and mental health predictors at baseline of all types of attrition combined between baseline and the first follow-up wave of NEMESIS-3.

Methods

NEMESIS-3 is a population-based cohort study with a multistage, stratified random sampling procedure. For the baseline wave, a random sample of municipalities was drawn, of which a random sample of individuals aged 18–75 years was obtained from the Dutch population register for these municipalities. Individuals with insufficient command of the Dutch language as well as institutionalized individuals (i.e., those living in hostels, hospices or prisons) were excluded. Individuals temporarily living in institutions were contacted for an interview upon returning home, if applicable.

At baseline (November 2019 to March 2022), 6,194 persons were interviewed (response rate 54.6%; average duration: 91 min). Respondents reflected the Dutch population reasonably well, but younger people, higher secondary educated people, those not living with a partner, people living in bigger towns, and people of non-Dutch origin were somewhat underrepresented (Ten Have et al., 2023).

All participants at baseline, except for those deceased, were approached for follow-up, on average two years and 310 days after baseline (1.041 days; standard deviation=147; from end of January 2023 to the end of November 2024). A description of the design and some results of the second wave of NEMESIS-3 can be found elsewhere (Ten Have et al., 2025).

Results

Of the 6,194 participants at baseline (T0), 1,506 could not be reinterviewed at the first follow-up wave (T1). Thus, the attrition rate was 24.3%. Refusal was the most common reason for non-response at the last contact attempt (Table 1: 62.9%), followed by noncontact (26.9%), inability to participate due to physical or mental problems or death (9.1%). If we define refusal not on the basis of the last

contact attempt but on ever having refused during the different contact attempts in the different fieldwork phases, refusal was more often seen (71.3%).

Younger age, lower education, higher urbanicity of place of residence and non-Dutch country of origin were significantly associated with attrition (Table 2). Any mental disorder, any mood disorder and bipolar disorder in the 12 months prior to baseline were also significantly associated with attrition at first follow-up, after controlling for sociodemographic characteristics (Table 3). Among those with a mental disorder, severity of the disorder(s) (aOR=1.22, 95% CI: 1.04,144) but not the number of disorders was significantly associated with attrition, after controlling for sociodemographic characteristics and the main disorder categories at baseline (i.e., any mood, any anxiety, any substance, or ADHD) (not described in a table). A less positive evaluation with the first interview and recruited during a later fieldwork phase at baseline were significantly associated with attrition at follow-up, after controlling for sociodemographic characteristics and the main disorder space at baseline were significantly associated with attrition at follow-up, after controlling for sociodemographic characteristics and the main disorder baseline were significantly associated with attrition at follow-up, after controlling for sociodemographic characteristics and the main disorder categories at baseline were significantly associated with attrition at follow-up, after controlling for sociodemographic characteristics and the main disorder categories at baseline (Table 4).

Table 5 shows the distribution of sociodemographic variables at baseline of those who participated at the second wave (first column) and the total population at baseline according to Statistics Netherlands (i.e., 1-1-2020; www.cbs.nl) (last column). The respondents at the second wave reflected the Dutch population reasonably well. However, people of 18–34 years, higher secondary educated people, those not living with a partner and people living in bigger towns were somewhat underrepresented. People of non-Dutch origin were also underrepresented. That is partly because individuals with insufficient command of the Dutch language in the population were excluded from the study.

To facilitate generalization of the data to the Dutch general population at baseline, based on poststratification, a weighting factor was constructed to correct for differences in the probability of selection in phase 3 of the baseline wave (Ten Have et al., 2023) and for different response rates in the various sociodemographic and mental disorder groups between baseline and first follow-up. Therefore, sociodemographic characteristics of the population at baseline obtained from Statistics Netherlands were used – sex, age (six categories), partner status (living with or without partner), educational level (three categories) and urbanicity (six categories) – as well as the weighted prevalences of any 12-month mental disorder and country of origin of sample at baseline. After this, the distribution of the sociodemographic characteristics at baseline of those who participated at the second wave came very close to that of the Dutch population at baseline (Table 5). The weighting factor was constructed with the statistics programme R (R Core Team, 2021), using the "survey" package (Lumley, 2010).

Discussion and conclusion

The attrition rate at follow-up (24.3%) was higher than in the previous NEMESIS-studies (in NEMESIS-2: 20.2%; NEMESIS-1: 20.6%), which is in line with an international trend towards declining response rates in all types of surveys (De Leeuw et al., 2018). Similar to the previous NEMESIS-studies (De Graaf et al., 2000; 2013), younger age and lower education were significantly associated with attrition. Whereas the previous NEMESIS-studies (De Graaf et al., 2000; 2013) found no association between psychopathology at baseline and attrition at the first follow-up after controlling for sociodemographic characteristics, in the current study any mental disorder and any mood disorder in the 12 months prior to baseline were significantly associated with attrition at first follow-up, after controlling for sociodemographic characteristics. After weighting for selective nonresponse at baseline and attrition at follow-up, the distribution of the sociodemographic characteristics at baseline of those who participated at the second wave came very close to that of the Dutch population at baseline.

Tables

Table 1. Attrition at first follow-up of the Netherlands Mental Health Survey and Incidence Study-3 (NEMESIS-3), 2023-2024¹

	n	%
Respondents at baseline	6,194	100.0
Attrition at first follow-up	1,506	24.3
Reasons of attrition		
Refusal	948	62.9
Noncontact	405	26.9
Failure to contact	106	7.0
Moved to untraceable address ²	253	16.8
Moved abroad	46	3.1
Unable	137	9.1
Due to physical reasons	36	2.4
Due to mental/cognitive reasons	42	2.8
Deceased	59	3.9
Other causes ³	16	1.1

1: Reasons for attrition are based on the last contact attempt.

2: Moved to untraceable address (210), unknown at the address (24), or invalid address (19).

3: Other causes: partial interview (1), unavailable during fieldwork (9), language problems (6)

	Sample	Attrition at follow-up				
	at					
	baseline					
	n	n	%	OR [95% CI]	aOR [95% CI]	
Sex						
Male	3071	743	24.2	1	1	
Female	3123	763	24.4	1.01 [0.90,1.14]	1.00 [0.89,1.13]	
Age at interview						
18-24	665	229	34.4	2.35* [1.89,2.91]	2.37* [1.84,3.06]	
25-34	938	274	29.2	1.84* [1.51,2.26]	2.03* [1.59,2.58]	
35-44	1003	247	24.6	1.46* [1.19,1.79]	1.59* [1.25,2.02]	
45-54	1097	264	24.1	1.42* [1.16,1.73]	1.51* [1.19,1.90]	
55-64	1266	268	21.2	1.20 [0.98,1.46]	1.24 [1.00,1.55]	
65-75	1225	224	18.3	1	1	
Education						
Primary education,						
lower secondary	1367	381	27.9	1.40* [1.20,1.63]	1.73* [1.47,2.04]	
Higher secondary	2259	569	25.2	1.22* [1.07,1.39]	1.30* [1.13,1.49]	
Higher vocational,				1	1	
university	2568	556	21.7			
Living situation						
With partner	4163	921	22.1	1	1	
Without partner	2031	585	28.8	1.42* [1.26,1.61]	1.11 [0.97,1.28]	
Employment situation						
Paid job	4181	1033	24.7	1	1	
No paid job	2013	473	23.5	0.94 [0.83,1.06]	1.00 [0.86,1.18]	
Urbanicity						
Very low	570	96	16.8	1	1	
Low	1414	302	21.4	1.34* [1.04,1.73]	1.31* [1.01,1.69]	
Medium	994	239	24.0	1.56* [1.20,2.03]	1.54* [1.18,2.00]	
High	1819	465	25.6	1.70* [1.33,2.16]	1.61* [1.26,2.06]	
Very high	1397	404	28.9	2.01* [1.57,2.57]	1.79* [1.39,2.31]	
Country of origin						
Dutch	5125	1176	22.9	1	1	
Non-Dutch	1069	330	30.9	1.50* [1.30,1.73]	1.29* [1.10,1.50]	

Table 2. Sociodemographic predictors at baseline of overall attrition between the baseline and first follow-up wave of NEMESIS-3, unweighted data, row percentages and odds ratios

OR= odds ratio; aOR=adjusted OR for all other variables in the table; CI= confidence interval.

	Sample at baseline	Attrition at follow-up			
12-month disorders at baseline	n	n	%	OR [95% CI]	aOR [95% CI]
Any mood disorder	550	179	32.5	1.57* [1.30,1.90]	1.31* [1.08,1.60]
Major depressive disorder	476	146	30.7	1.42* [1.16,1.74]	1.19 [0.97,1.47]
Persistent depressive disorder	191	57	29.8	1.34 [0.98,1.83]	1.15 [0.83,1.60]
Bipolar disorder	67	29	43.3	2.40* [1.48,3.91]	1.87* [1.14,3.09]
Any anxiety disorder	878	256	29.2	1.34* [1.14,1.57]	1.15 [0.97,1.35]
Panic disorder	120	33	27.5	1.18 [0.79,1.78]	0.94 [0.62,1.42]
Agoraphobia	109	33	30.3	1.36 [0.90,2.05]	1.10 [0.72,1.68]
Social phobia	316	101	32.0	1.50* [1.17,1.91]	1.21 [0.94,1.56]
Specific phobia	456	131	28.7	1.28* [1.03,1.58]	1.13 [0.91,1.40]
Generalised anxiety disorder	220	58	26.4	1.12 [0.82,1.52]	0.97 [0.71,1.32]
Any substance use disorder	418	128	30.6	1.41* [1.13,1.75]	1.11 [0.89,1.39]
Alcohol use disorder	323	92	28.5	1.26 [0.98,1.61]	1.02 [0.79,1.33]
Drug use disorder	123	42	34.1	1.63* [1.12,2.38]	1.15 [0.78,1.69]
ADHD	184	61	33.2	1.57* [1.15,2.14]	1.30 [0.94,1.79]
Any mental disorder	1507	446	29.6	1.44* [1.26,1.64]	1.19* [1.04,1.37]

Table 3. Mental health predictors at baseline of overall attrition between the baseline and first followup wave of NEMESIS-3, unweighted data, row percentages and odds ratios

OR= odds ratio; aOR=adjusted OR for all sociodemographic variables in table 2; CI= confidence interval; ADHD= Attention deficit hyperactivity disorder; Any mental disorder= any mood disorder, any anxiety disorder, any substance use disorder and/or ADHD.

Table 4. Associations between respondents' experiences with the baseline interview and overall attrition between the baseline and first follow-up wave of NEMESIS-3, unweighted data, row percentages and odds ratios

	Sample at baseline	Attrition at follow-up		ollow-up
Baseline interview	n	n	%	aOR [95% CI]
Experience of baseline interview				
Pleasant	5131	1192	23.2	1
Neutral, unpleasant	1062	313	29.5	1.34* [1.15,1.56]
Length of baseline interview				
< 90 min	3336	781	23.4	1
90-119 min	1586	391	24.7	1.03 [0.89,1.20]
120 or longer	898	253	28.2	1.15 [0.95,1.38]
Contact phase of baseline interview ¹				
Phase 1	5312	1178	22.2	1
Phase 2	674	255	37.8	2.00* [1.68,2.38]
Phase 3	208	73	35.1	1.78* [1.32,2.40]

OR= odds ratio; aOR=adjusted OR for all sociodemographic variables in table 2 and the main categories of mental disorders (any mood, any anxiety, any substance use, and ADHD) in table 3; CI= confidence interval.

1: Respondents recruited in the first phase were the easiest to enrol in the baseline wave of the study, whereas the respondents in the third phase were the most difficult.

	NEMESIS-3		Dutch population
	Unweighted	Weighted	
Sex			
Male	49.7	49.9	50.0
Female	50.3	50.1	50.0
Age at baseline interview			
18-24	9.3	12.0	12.0
25-34	14.2	17.5	17.5
35-44	16.1	16.2	16.2
45-54	17.8	19.4	19.4
55-64	21.3	18.6	18.6
65-68	21.3	16.3	16.3
Education			
Primary education, lower secondary	21.0	23.2	23.2
Higher secondary	36.1	42.2	42.2
Higher vocational, university	42.9	34.6	34.6
Living situation			
With partner	69.2	63.0	63.0
Without partner	30.8	37.0	37.0
Employment situation			
Paid job	67.2	68.9	68.4
No paid job	32.8	31.1	31.6
Urbanicity			
Low, medium	49.9	43.6	43.6
High	50.1	56.4	56.4
Country of origin			
Dutch	84.2	81.2	75.2
Non-Dutch	15.8	18.8	24.8

Table 5. Demographic characteristics at baseline of those who participated at the second wave (n=4,688) and of the Dutch population at baseline (i.e., 2020) according to Statistics Netherlands, in column percentages

References

De Leeuw E, Hox J, Luiten A (2018). International nonresponse trends across countries and years: An analysis of 36 years of labour force survey data. Survey insights: Methods from the field. https://doi.org/10.13094/SMIF-2018-00008. Retrieved from https://surveyinsights.org/?p=10452

Graaf R de, Bijl RV, Smit F, Ravelli A, Vollebergh, WAM (2000). Psychiatric and sociodemographic predictors of attrition in a longitudinal study. The Netherlands Mental Health Survey and Incidence Study (NEMESIS). Am J Epidemiol; 152: 1039-1047.

Graaf R de, Dorsselaer S van, Tuithof M, Have M ten (2013). Sociodemographic and psychiatric predictors of attrition in a prospective psychiatric epidemiological study among the general population. Results of the Netherlands Mental Health Survey and Incidence Study-2. Comprehensive Psychiatry; 54: 1131-1139.

Have M ten, Tuithof M, Dorsselaer S van, Schouten F, Graaf R de (2023). Netherlands Mental Health Survey and Incidence Study-3 (NEMESIS-3): Objectives, methods and baseline characteristics of the sample. International Journal of Methods in Psychiatric Research; 32(1942). DOI: 10.1002/mpr.1942

Have M ten, Tuithof M, Dorsselaer S van, Korteling S, Luik AI (2025). Netherlands Mental Health Survey and Incidence Study-3 (NEMESIS-3): fieldwork of the second wave. <u>NEMESIS</u>.

Lumley T (2010). Complex surveys: A guide to analysis using R. John Wiley and Sons.

R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing. Retrieved from <u>http://www.R-project.org/</u>