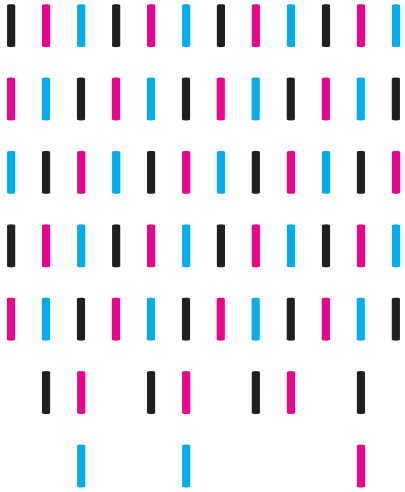

NEPS SURVEY PAPERS

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SAMPLE WEIGHTS AND NONRESPONSE: THE EARLY CHILDHOOD COHORT OF THE NATIONAL EDUCATIONAL PANEL STUDY (WAVE 1 TO 3)

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Samples, Weights, and Nonresponse: the Early Childhood Cohort of the National Educational Panel Study (Wave 1 to 3)

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Samples, Weights, and Nonresponse: the Early Childhood Cohort of the National Educational Panel Study (Wave 1 to 3)

Abstract

This report documents the target population, the sampling, the sample sizes, and the weighting procedures of the Waves 1 to 3 of the NEPS Starting Cohort 1 (SC1, Early Childhood). It introduces the target population of the Starting Cohort and the sampling design applied. Furthermore, the composition of the gross and the net samples of the different waves are detailed. The derivation of the sampling weights is described. This includes the computation of the design weights and the accordant nonresponse adjustments. In this context, the selectivity due to nonresponse and attrition is inquired into. This article concludes with a summary of the design variables and sampling weights as well as some comments regarding the usage of sampling weights in statistical analysis.

1. Prequel

This report documents the target population, the sampling, the sample size, and the weighting procedures of the Waves 1 to 3 of the NEPS Starting Cohort 1 (SC1, Early Childhood). Table 1 summarizes the study numbers, the survey modes, the periods of the studies as well as the numbers of participants in each panel wave available.[1] Table 2 completes the summary by detailing the composition of the distinct samples together with the numbers of nonrespondents and final dropouts. In all Waves, all parents of the panel cohort were asked to be interviewed (by CATI or CAPI).[2]

Table 1: Summary of waves.

Wave	Study number	Survey mode	Period	Number of Participants
1	B04	CAPI	2012/13	3,481
2	B05	CATI/CAPI	2013	2,862
3	B91	CAPI	2014	2,609

CATI: Computer-assisted telephone interview, CAPI: Computer-assisted personal interview.

Table 2: Case numbers, respondents, nonrespondents and final drop-outs.

Wave	Sub-sample	Gross sample	Participants	Participation proportion	Temporary dropouts	Final dropouts (within wave)	Final dropouts (after wave)
1	Total	8,483	3,481	0.410	0	5,002	50
2	**Total**	**3,431**	**2,862**	**0.834**	**456**	**113**	**37**
	CATI	3,431	2,849	0.830	480	102	48
	CAPI	1,893	1,510	0.798	340	43	21
3	Total	3,281	2,609	0.795	539	133	5

All of the children of the panel cohort were invited for direct measurements (i.e., competence tests) in Wave 1 and 3. In Wave 2, only a subsample of children was asked participating in the direct measurements, cp. Section 2.1. The accordant numbers are given in Table 3. This table details the used gross sample size, the number of participants in the interviews and in direct measurements, and the number of those who were actually weighted and available for analyzes. The percentages given refer to the number of participants among the used gross sample.

[1] More details on the studies are given in the reports of the survey institute 'infas' *Institut für angewandte Sozialwissenschaft GmbH* which conducted the corresponding interviews and tests; see Bauer, Bech, Gilberg, and Kleudgen (2013), Aust and Bauer (2014a, 2014b), and Bauer et al. (2015).

[2] CATI: Computer-assisted telephone interview, CAPI: Computer-assisted personal interview.

Table 3: Participation in direct competence measurements.

Wave	Study number	Used gross sample	Participants	Analyzable and weighted cases	%
1	B04	3,481	3,481	3,121	89.7
2	B05	1,893	1,510	1,417	93.8
3	B91	3,281	2,609	n.a.	-

Note: "-" not applicable; "n.a." not (yet) available.

The remainder of this report is structured as follows: Section 2 documents the target population of the Starting Cohort and the applied sampling design. The composition of the gross and net samples of the different waves is described. In Section 3, the derivation of the sampling weights is described in detail. This includes the computation of the design weights and the accordant nonresponse adjustments. Section 4 concludes with a summary of the sampling weights provided and comments regarding the usage of sampling weights in statistical analysis.

2. Population, Sampling Design, and Sample Sizes

2.1. Population and Sampling Design

The target population of SC1 comprises children born in Germany from February 2012 to July 2012. To achieve valid measurements of infant development, surveyed children were required to be at least six months but no more than eight months old at the age of the survey. Access to this population had been gained via a register-based sample of addresses available at the level of municipalities. Based on data from the first half of 2009, the distribution of births in 2012 was expected to be highly unequal between municipalities, cp. Table 4.
To guarantee nevertheless a meaningful coverage of municipalities, the measure of size for selecting municipalities was determined to be proportional to the number of children born within these municipalities in the first half of 2009.[3] The selection of addresses was performed via a two-stage disproportional stratified sampling. As primary sampling units municipalities were drawn, explicitly stratified according to a classification of urbanization (BIK scale).[4] That is, all 6,472 municipalities concerned[5] were assigned to three strata:

1. Less than 50,000 inhabitants,
2. 50,000 to 500,000 inhabitants, and
3. 500,000 and more inhabitants.

As secondary sampling units addresses of newborns within the selected municipalities were sampled. Commonly, for administrative reasons within municipalities only multiples of a fixed

[3] At time of sampling only data from 2009 was available.
[4] Note that no stratification according to Federal States was considered. Such stratification would increase the number of stratification cells vastly and the number of observations in each cell would be remarkably low.
[5] These are all German municipalities registered in 2009, with exclusion of municipalities having less than ten births in 2009.

quantum of addresses can be sampled. Therefore, the overall goal to sample addresses of individuals was achieved via sampling artificial units called sample points. For SC1, a quantum of $\bar{c} = 300$ per municipality had been sampled. This number was expected allowing for achieving the planned net sample size even with unlikely low participation rates.[6] Given this design, simulation studies were used to determine the number of required municipalities to reach a planned sample size of approximately 3,000 newborns. In the end, 90 sampling points in 84 municipalities were found to be sufficient to reach a planned sample size of approximately 3,000 newborns. Within each explicit level the same number of sampling points had been sampled and between levels a different number of sampling points, cp. Table 4.
In the selected municipalities, addresses were then sampled from the 2010 register data within two tranches. Dividing addresses into tranches facilitated accounting for the time span registration offices need to register current births and to sample addresses, always minding the infants' age range required. The first tranche considered comprised births from February to April, whilst the second tranche comprised births within the months of May to July. Opposed to Wave 1, Wave 2 comprises two subsamples: (i) all participants from the Wave 1 parent interview with panel consent before Wave 2 and (ii) a random sample of the targets with direct competence measurements. The latter was established by drawing via simple random sampling 34 municipalities from the 84 municipalities of SC1. Here, all individuals with panel consent before Wave 2 were asked for participation. This way administrative burden and costs involved in individual home-testing of children could be reduced. In Wave 3 all panel respondents were asked for participation again.

Table 4: Distribution of births across municipalities.

	Municipalities with at least ten births in 2009	Number of semiannual births in the first half of 2009	
	abs.	abs.	%
Less than 50,000 inhabitants	6,285	178,993	55.3
50,000 up to 500,000 inhabitants	173	81,854	25.3
500,000 or more inhabitants	14	62,674	19.4
Total	6,472	323,521	100.0

2.2. Sampling Sizes

Starting from a gross sample size of 8,483 persons established via sampling of addresses within 84 municipalities, the realized sample size in Wave 1 is 3,481, corresponding to a response rate of 41%. The panel cohort reduced to 3,431 since 42 participants gave no panel consent in Wave 1 and 8 participants withdrew their panel consent before Wave 2. In Wave 2, 2,849 persons took part in the parent interview (CATI), corresponding to a participation rate of 83%. Additionally, in Wave 2 direct measurements and another interview were applied to a random subsample of the SC1 panel cohort. In total, 1,893 persons were asked for participation, of

[6] Further, (almost all) registration offices only provide samples of at most 50% of semiannual births.

whom 1,417 could be realized and are eligible for evaluation, corresponding to a participation rate of 75%. In Wave 3, 2,609 parent interviews have been realized.[7] The accordant gross and net samples sizes are given in Tables 3 and 2.

3. Derivation of Design Weights

Calculation of design weights derives directly from the sampling design, that is, from the sampling probabilities. In more detail: the pure design weights are calculated as inverse inclusion probabilities, respecting the disproportional stratification. That is, assuming an individual inclusion probability π, its corresponding design weight is $1/\pi$. First stage sampling was performed based on an allocation of a fixed number s_l of sample points to each stratum $l = 1, \ldots, 3$. Each stratum comprises m_l municipalities summing up to $\sum_{l=1}^{L} m_l = 6,472$ (see Table 4). Because each sampling point corresponds to a fixed quantum of addresses, $s_l\bar{c} = 300s_l$ gives the number of addresses from which to sample within stratum l. A total of s_l municipalities was sampled from each stratum l with replacement, where each municipality is sampled proportional to size (pps). The respective measure of size is given as

$$N_{ml}/N_l, \quad m = 1, \ldots, m_l,$$

with N_{ml} denoting the number of semiannual births observed in the first half of 2009 within municipality m within stratum l, and N_l denotes the total number of addresses available in stratum l. Beware that this approach allows for a repeated sampling of individual municipalities. This implies assigning to a municipality m multiple sampling points, say s_{ml}. Then, a total of $\bar{c}s_{ml}$ addresses was sampled from the available N_{ml}. Thus, the sampling probability of an individual address i in stratum l in municipality m can be given as

$$\pi_{ilm} = \frac{\bar{c}s_{ml}}{N_{ml}} \frac{s_l N_{ml}}{N_l} = \frac{\bar{c}s_{ml}s_l}{N_l}.$$

(For reasons of clarity, subsequently the indices l and m are omitted. Thus, π_{ilm} simplifies to π_i.)

4. Weighting Adjustments for Wave Participation

Systematic refusals may arise and for this, the (non-)response and attrition processes of the sampled individuals have to be accounted for. Thus, for reasons of usability, commonly design weights are adjusted to account for nonresponse in the survey. For this purpose, the units' probabilities to participate in each survey wave are employed.[8] To highlight possible effects of participation on the sample, a comparison of the gross sample and the realized sample of Wave 1 is shown in Table 5. Note that only few characteristics of the newborns are known in

[7] The direct measurements of Wave 3 are not part of the current SUF release 4-0-0. Thus, accordant numbers are not reported here.

[8] In SC1 the target population are newborns but the respondents are their legal guardians. Hence, in this particular case it would be more appropriate to use the term realization probability instead of participation probability. Nevertheless, realization probability is not commonly used in the context of survey weighting, therefore it is waived.

advance from the registration offices. The descriptives are thus restricted to this set of model parameters. Only minor differences exist between the gross and the realized sample.

Table 5: Comparison of gross sample and realized sample of Wave 1

	Gross sample		Realized interviews	
	abs.	%	abs.	%
Federal state				
Schleswig-Holstein	325	3.8	125	3.6
Hamburg	645	7.6	249	7.2
Niedersachsen	461	5.4	205	5.9
Bremen	217	2.6	84	2.4
Nordrhein-Westfalen	2,330	27.5	893	25.7
Hessen	689	8.1	314	9.0
Rheinland-Pfalz	181	2.1	72	2.1
Baden-Württemberg	835	9.8	346	9.9
Bayern	1,029	12.1	461	13.2
Saarland	150	1.8	37	1.1
Berlin	867	10.2	358	10.3
Brandenburg	41	0.5	17	0.5
Mecklenburg-Vorpommern	153	1.8	75	2.2
Sachsen	353	4.2	158	4.5
Sachsen-Anhalt	168	2.0	72	2.1
Thüringen	39	0.5	15	0.4
BIK categories				
Less than 50,000 inhabitants	1,291	15.2	577	16.6
50,000 up to 500,000 inhabitants	3,517	41.5	1,345	38.6
500,000 or more inhabitants	3,675	43.3	1,559	44.8
Citizenship based on register data				
German	7,459	87.9	3,181	91.4
Non-German	555	6.5	151	4.3
Unknown	469	5.5	149	4.3
Gender of child/ target				
Male	4,390	51.8	1,774	51.0
Female	4,090	48.2	1,707	49.0
Unknown	3	0.0	0	-
Total	8,483	100.0	3,481	100.0

4.1. Modeling Wave 1 Participation

The participation probability π_1 of Wave 1 is estimated by means of logistic regression. In the considered case, (as aforementioned) only a small set of explanatory variables is available, but with some additional information from the contact history. The number of attempts to contact a respondent is used to control for accessibility. That is, information for nonresponse adjustment refers predominantly to the characteristics of the newborns used for sampling. The set of variables incorporated within the regression and the resulting estimates with 95% confidence intervals (*CI*) are given in Table 8. Overall, the regression points to only modest selectivity with respect to the gross sample. Individuals with non-German citizenship show a slightly lower

probability of participation in the survey than individuals with German citizenship. The resulting nonresponse adjusted weight for Wave 1 is[9]

$$w_{t1} = \frac{1}{\pi_i \pi_1}.$$

Besides providing weights for participation in the Wave 1 parent interview, also weights are made available for attending the direct measurements. For this purpose, accordant participation probabilities π_{t1comp} are estimated. In contrast to the limited information available for the Wave 1 interview respondents, for persons asked to attend the direct measurements also selected socio-economic characteristics exist (namely, from the previous parent interview). These are included in the corresponding nonresponse model. The set of variables used for logistic regression as well as the estimates and *CI* are given in Table 9.[10]
The educational level of the respondent, measured as classification of education according to the CASMIN[11], has a clear effect on participation. That is, the higher the educational level the more willing is the respondent to take part in the direct measurements. Also the birth year of the parent, the migration background, and the number of children in the household have significant effects on the propensity attending in the direct measurements. Younger parents (born 1986 and later), persons with migration background, and persons with more than one child in the household show a significant smaller probability than their counterparts. The nonresponse adjusted weights for Wave 1 participation in direct competence measurements can be formalized as

$$w_{t1comp} = \frac{1}{\pi_i \pi_{t1comp}}.$$

4.2. Modeling Wave 2 Participation

By design, further wave participation was determined to be conditional on the accordant willingness of the Wave 1 participants.[12] In sum, fifty Wave 1 parent participants did not gave their consent to participate in future waves. Thus, directly before Wave 2 the panel cohort consisted of 3,431 children/ parents. To quantify the amount of selectivity due to panel attrition before Wave 2, an accordant (logistic) regression has been estimated. The set of variables incorporated within the regression and the resulting estimates with 95% confidence intervals (*CI*) are given in Table 10. As before, the CASMIN plays a major role in the decision for participation. The coefficients of the CASMIN categories indicating middle and higher educational level opposed to the lower educational level[13] point to strongly positive effects. Equally, persons living in the east of Germany and persons without migration background show a significantly higher panel propensity. Subsequently, the panel propensity before Wave 2 is denoted by π_{p2}.
In Wave 2, first the parents of the panel cohort were asked to participate in an interview (CATI). Then, a random subsample of parents and children was drawn to attend in direct competence measurements and an additional CAPI interview. To show that the subsample is not selec-

[9] Here, π_i denotes the sampling probability of an individual *i*, see Section 3.

[10] This set of variables was checked for multicollinearity. The variance inflation factor (VIF) always falls below 10, and the condition number κ does not exceed 20 indicating no problems with multicollinearity according to Belsley, Kuh, and Welsch (1980) as cited by Greene (2012, p.130).

[11] Short for "Comparative Analysis of Social Mobility in Industrial Nations".

[12] The corresponding consent was requested at the end of the Wave 1 interview.

[13] Lower educational level incorporates 'no school leaving qualification', 'general elementary education', and 'intermediate general education', both without vocational training.

tive with respect to the (sampling) design variables and to the socio-economic characteristics available from the Wave 1 CATI and the Wave 2 CAPI interview, an accordant model has been estimated (namely, a logistic regression model). The results are depicted in Table 12. The variables used for this purpose and the results of the modeling endeavor are given in the Tables 11 and 13. In conclusion, the estimates of the logistic regression models show selectivity effects in the samples of respondents concerning the parent's birth year, the migration background as well as concerning the education of the parents. The corresponding nonresponse adjusted weights for the Wave 2 are

$$w_{t2} = \frac{1}{\pi_i \pi_{p2} \pi_{t2}} \quad \text{and} \quad w_{t2comp} = \frac{1}{\pi_i \pi_{p2} \pi_{t2comp}},$$

where π_{t2} denotes the probability attending the Wave 2 CATI interview and π_{t2comp} describes the probability participating in the direct measurements of Wave 2.

4.3. Modeling Wave 3 Participation

Directly on the onset of Wave 3, the panel cohort comprised 3,281 parents and children pairs. That is, 150 panel members withdrew their participation consent within Wave 2 or between the Waves 2 and 3. Subsequently, the accordant probability to stay in the panel is denoted by π_{p3}. The probability of parents (being part of the panel cohort directly before Wave 3) attending the Wave 3 interview (CATI) is denoted by π_{t3}. As before, both sets of probabilities are estimated by logistic regression. The Tables 14 and 15 give the corresponding variables and results.
Regarding panel willingness, as before the migration background and the gender of the parent show are clear effect on the participation probability. Beware that the variable "gender of interviewed person" captures two effects: first, the sex of a person, and second, the change of the previously contacted/ interviewed person from one interview/ test to the next. The employment status has now become highly significant, too (in comparison to the nonresponse models of the Waves 1 and 2 participation). The propensity of attending the CATI is significantly influenced by the gender of the interviewed persons[14] as well as by his/ her educational attainment, the migration background, and the employment status. Female respondents, employed respondents, those with higher education and persons without migration background are (still) more likely to participate. Concretely, being employed increases participation probability remarkably. The nonresponse adjusted weights for Wave 3 participation in the parent interviews can be formalized as

$$w_{t3} = \frac{1}{\pi_i \pi_{p2} \pi_{p3} \pi_{t3}}.$$

4.4. Modeling Participation in Consecutive Waves

In addition to the cross-sectional weights, also weights for participation in consecutive waves, i.e. longitudinal weights, are provided. This is the longitudinal weight for participation in the parent interview in all three waves on the one hand, and the longitudinal weight for participation in the direct measurements in the first two waves on the other hand. For this purpose, (logistic) regression models for attending all of the CATIs (in Wave 1, 2, and 3) as well as participating in both competence tests (in Wave 1 and 2) have been estimated. The Tables 16 and 17 give the corresponding variables and results. The coefficients of both models revive the picture

[14] Note that this effect might also be an effect of a change of the interviewed person.

that has emerged from modeling participation in the Wave 1, 2 and 3. The parent's birth year, gender[14], educational level, and migration status have a strong influence on continued participation in the parent interviews. In addition, alike in Wave 3, the employment status has a strong effect on continued participation. The picture when modeling the continued participation in the direct measurements is similar. Only the effect of the employment status diminishes. The corresponding nonresponse adjusted longitudinal weights are

$$w_{t123} = \frac{1}{\pi_i \pi_{p2} \pi_{p3} \pi_{t123}} \quad \text{and} \quad w_{t12comp} = \frac{1}{\pi_i \pi_{p2} \pi_{t12comp}}.$$

5. Calibration to External Benchmark Totals

For the considered population, only few relevant and valid benchmark totals are available. The typically used source for calibration to benchmark totals–the German microcensus as 1% sample of the total German population–lacks in precision for the considered population. However, a reasonable population total is given via the total number of births per month per municipality. When detailed information from the German statistical office based on the German census 2011 becomes available, accordingly calibrated weights can be provided. In meantime, weights calibrated to corresponding figures available for 2009 are provided upon request.

6. Summary and Use of Weights

To ease statistical analysis, all weights apart from the pure design weight (Wave 1) are provided in a trimmed and standardized form. Trimming was conducted at the 95*th* percentile in order to remove outliers. Standardized weights have mean one and sum up to the number of participants in the corresponding wave. Table 6 summarizes all types of weights that are provided and their accordant label. Table 7 presents some summary statistics for all weights provided.

Table 6: Types of weights provided

Type of weight	**Label**
Design weight Wave 1	`w_t1ext`*
Nonresponse adjusted weight Wave 1	`w_t1`
Nonresponse adjusted weight Wave 1, test/child	`w_t1comp`
Nonresponse adjusted weight Wave 2, parent	`w_t2`
Nonresponse adjusted weight Wave 2, test/child	`w_t2comp`
Nonresponse adjusted weight Waves 1 and 2, test/child	`w_t12comp`
Nonresponse adjusted weight Wave 3, parent	`w_t3`
Nonresponse adjusted weight Waves 1 to 3, parent	`w_t123`

*The superscript `ext` indicates that this weight can be used to extrapolate to the target population.

Table 7: Summary statistics for all weights provided.

Label of weight	Number of individuals	Min.	Lower Quart.	Median	Mean	Upper Quart.	Max.
w_t1ext	3,481	26.346	40.685	49.754	93.061	67.926	656.490
w_t1	3,481	0.285	0.440	0.538	1.000	0.734	4.790
w_t1comp	3,121	0.272	0.433	0.549	1.000	0.763	4.810
w_t2	2,862	0.251	0.418	0.538	1.000	0.780	4.820
w_t2comp	1,417	0.262	0.437	0.584	1.000	0.869	4.840
w_t12comp	1,362	0.255	0.433	0.577	1.000	0.857	4.840
w_t3	2,609	0.224	0.380	0.531	1.000	0.889	4.820
w_t123	2,427	0.220	0.379	0.529	1.000	0.904	4.840

No general recommendations are at hand concerning the usage of design and nonresponse adjusted weights. Whether and how weights should be used depends on the analysis considered. While the use of weights is recommended in descriptive analysis, there are no general results available on how to use nonresponse adjusted design weights in statistical inference, see Rohwer (2011) for a general discussion. The use of weights may possibly help to highlight important features of the analysis under consideration, not least serving as a robustness check for the analysis performed.

Generally, models have to be tested for their dependence on the sampling design. Concretely, this means that the user has to ensure that the way of sampling has no or only a negligible effect on the model results or/and that the sampling design is considered in the model definition adequately. A general description of how to test and account for the sampling design is given in Snijder and Bosker (2012, pp. 216-246), for example.

Two possible strategies exist to include weights in the analysis. First, in the model-based approach, all variables employed for constructing the weights are included as explanatory variables into the model under consideration. In the second (design-based) approach design information and weights are directly included into the model. As a guideline, we recommend the first strategy. Here, it is advised to include all of the variables found to have significant effects on the participation propensities in the Waves (studies) yielding the samples used should be included as covariates in the analysis model.

The *survey* package[15] of Stata allows defining the survey design of the sample at hand, and thus conducting design-based inference in an appropriate way (Valliant, Dever, & Kreuter, 2013). An example of an accordant command for the sample of parents who participated in all three waves is

```
svyset psu [pweight=w_t123], strata(stratum)
```

In this command, `psu` contains the first stage sampling units and `w_t123` describes the corresponding (calibrated) survey weight to be part of the sample that participated in all waves so far. The term `stratum` is self-explanatory. All subsequent analysis has to be preceded by the prefix `svy`. Also the statistical software R provides a survey package to deal with design-based inference, see Lumley (2004, 2011). Here, the definition of a design object is similar to the one asked for in Stata.

For further information on weighting please contact `methoden@lifbi.de`.

[15] See http://www.stata.com/manuals13/svy.pdf.

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A. Results of Nonresponse Modeling

Table 8: Results of the logistic regression model for Wave 1 participation (parents).

Value	Reference Category	Estimate	95%-*CI*
Attempts to contact person	1 up to 3 attempts		
4 up to 6 attempts		0.636	[0.533,0.739]
7 up to 10 attempts		0.158	[-0.043,0.356]
11 or more attempts		-0.089	[-0.467,0.276]
Birth month	April		
No information		-0.257	[-0.505,-0.011]
February		0.105	[-0.042,0.253]
March		0.120	[-0.026,0.267]
May		0.071	[-0.079,0.222]
June/ July		-0.195	[-0.348,-0.043]
Gender of child/ target	Female		
Male		-0.063	[-0.152,0.025]
Citizenship	German		
No information		-0.486	[-0.707,-0.270]
Non-German		-0.692	[-0.891,-0.497]
Federal state	Nordrhein-Westfalen		
Schleswig-Holstein		0.176	[-0.075,0.425]
Hamburg		-0.173	[-0.378,0.031]
Niedersachsen		0.250	[0.038,0.460]
Bremen		-0.102	[-0.408,0.200]
Hessen		0.244	[0.067,0.421]
Rheinland-Pfalz		0.212	[-0.112,0.530]
Baden-Württemberg		0.212	[0.014,0.411]
Bayern		0.125	[-0.037,0.287]
Saarland		-0.636	[-1.040,-0.253]
Berlin		-0.085	[-0.271,0.101]
Brandenburg		-0.062	[-0.723,0.578]
Mecklenburg-Vorpommern		0.309	[-0.028,0.645]
Sachsen		0.133	[-0.113,0.379]
Sachsen-Anhalt		0.124	[-0.204,0.448]
Thüringen		-0.277	[-0.968,0.383]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 500,000 inhabitants		-0.207	[-0.352,-0.061]
500,000 or more inhabitants		0.038	[-0.118,0.195]
Number of cases	8,483		

Table 9: Results of the logistic regression model for Wave 1 participation in direct measurements (target).

Value	**Reference Category**	**Estimate**	**95%-*CI***
Birth month	February		
March		-0.094	[-0.445,0.257]
April		-0.127	[-0.470,0.215]
May		-0.058	[-0.528,0.412]
June/July		-0.300	[-0.654,0.056]
Year of birth of parent	1986 and later		
Before 1975		0.500	[0.100,0.900]
1976-1980		0.509	[0.142,0.876]
1981-1985		0.208	[-0.049,0.465]
Gender of interviewed person	Female		
Male		-0.345	[-0.858,0.168]
Federal region	East (including Berlin)		
West		0.050	[-0.317,0.416]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 100,000 inhabitants		-0.445	[-1.338,0.448]
100,000 up to 500,000 inhabitants		-0.495	[-1.309,0.319]
500,000 or more inhabitants		-0.682	[-1.447,0.083]
CASMIN of interviewed person	1a, 1b, 2b		
1c, 2a		0.598	[0.225,0.972]
2c		0.749	[0.403,1.095]
3ab		0.848	[0.421,1.275]
Employment status of interviewed person	Unemployed		
Employed		0.034	[-0.395,0.463]
Migration background of interviewed person	No		
Yes		-0.680	[-0.903,-0.457]
Number of persons in household	2		
3		0.011	[-0.512,0.535]
4+		0.616	[-0.071,1.303]
Number of children in household	1		
2		-0.704	[-1.353,-0.054]
3		-0.940	[-1.651,-0.228]
4+		-1.127	[-1.852,-0.402]
Number of cases	3,481		

Table 10: Results of the logistic regression model for panel participation before Wave 2.

Value	**Reference Category**	**Estimate**	**95%-*CI***
Birth month	February		
March		-0.275	[-1.039,0.489]
April		-0.864	[-1.504,-0.224]
May		-0.278	[-1.364,0.808]
June/July		0.023	[-1.299,1.345]
Year of birth interviewed person	1986 and later		
Before 1975		0.040	[-1.066,1.145]
1976-1980		-0.566	[-1.299,0.166]
1981-1985		-0.380	[-1.141,0.380]
Gender of interviewed person	Female		
Male		0.815	[-1.032,2.663]
Federal region	East (including Berlin)		
West		-0.938	[-1.833,-0.044]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 100,000 inhabitants		-0.561	[-2.750,1.627]
100,000 up to 500,000 inhabitants		-0.544	[-2.594,1.505]
500,000 or more inhabitants		-1.061	[-3.088,0.966]
CASMIN of interviewed person	1a, 1b, 2b		
1c, 2a		1.628	[0.769,2.486]
2c		2.195	[1.527,2.863]
3ab		2.153	[1.217,3.090]
Employment status of interviewed person	Unemployed		
Employed		0.005	[-0.825,0.834]
Migration background of interviewed person	No		
Yes		-0.732	[-1.464,-0.000]
Marital status of interviewed person	Single		
Married		1.628	[-0.394,3.651]
Divorced/widowed		2.599	[-0.269,5.467]
Number of persons in household	2		
3		-1.029	[-2.392,0.333]
4+		-0.488	[-2.290,1.314]
Number of children in household	1		
2		0.065	[-1.373,1.503]
3		-0.024	[-1.895,1.847]
4+		-0.561	[-2.138,1.016]
Number of cases	3,481		

Table 11: Results of the logistic regression model for Wave 2 participation (CATI of parents).

Value	**Reference Category**	**Estimate**	**95%-*CI***
Birth month	February		
March		-0.085	[-0.387,0.217]
April		0.122	[-0.151,0.394]
May		0.141	[-0.157,0.438]
June/July		0.178	[-0.144,0.500]
Year of birth interviewed person	1986 and later		
Before 1975		0.664	[0.307,1.020]
1976-1980		0.631	[0.321,0.940]
1981-1985		0.391	[0.093,0.689]
Gender of interviewed person	Female		
Male		0.019	[-0.594,0.633]
Federal region	East (including Berlin)		
West		0.327	[-0.148,0.802]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 100,000 inhabitants		-0.090	[-0.705,0.526]
100,000 up to 500,000 inhabitants		-0.178	[-0.832,0.477]
500,000 or more inhabitants		-0.008	[-0.625,0.610]
CASMIN of interviewed person	1a, 1b, 2b		
1c, 2a		0.618	[0.302,0.933]
2c		0.879	[0.562,1.196]
3ab		1.561	[1.214,1.908]
Employment status of interviewed person	Unemployed		
Employed		0.018	[-0.300,0.335]
Migration background of interviewed person	No		
Yes		-0.458	[-0.712,-0.204]
Marital status of interviewed person	Single		
Married		-0.415	[-2.350,1.519]
Divorced/widowed		-0.591	[-2.580,1.399]
Number of persons in household	2		
3		0.439	[-0.095,0.973]
4+		0.511	[-0.187,1.208]
Number of children in household	1		
2		-0.119	[-0.616,0.378]
3		-0.245	[-0.782,0.293]
4+		-0.123	[-0.806,0.560]
Number of cases	3,431		

Table 12: Results of the logistic regression model for being part of the Wave 2 subsample (asked for direct measurements and CAPI).

Value	**Reference Category**	**Estimate**	**95%-*CI***
Birth month	February		
March		0.138	[-0.051,0.326]
April		-0.072	[-0.297,0.153]
May		-0.004	[-0.223,0.215]
June/July		0.028	[-0.191,0.247]
Year of birth interviewed person	1986 and later		
Before 1975		0.120	[-0.192,0.432]
1976-1980		0.115	[-0.117,0.348]
1981-1985		0.143	[-0.071,0.356]
Gender of interviewed person	Female		
Male		-0.292	[-0.699,0.114]
Federal region	East (including Berlin)		
West		-0.417	[-1.598,0.764]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 100,000 inhabitants		0.200	[-2.042,2.441]
100,000 up to 500,000 inhabitants		-0.164	[-1.480,1.151]
500,000 or more inhabitants		0.226	[-1.029,1.480]
CASMIN of interviewed person	1a, 1b, 2b		
1c, 2a		-0.154	[-0.448,0.139]
2c		0.032	[-0.203,0.267]
3ab		0.338	[-0.005,0.681]
Employment status of interviewed person	Unemployed		
Employed		-0.023	[-0.263,0.217]
Migration background of interviewed person	No		
Yes		0.027	[-0.202,0.256]
Marital status of interviewed person	Single		
Married		0.618	[-0.523,1.758]
Divorced/widowed		0.601	[-0.618,1.820]
Number of persons in household	2		
3		0.341	[-0.069,0.751]
4+		0.058	[-0.470,0.586]
Number of children in household	1		
2		0.173	[-0.219,0.565]
3		0.309	[-0.088,0.706]
4+		0.151	[-0.337,0.638]
Number of cases	3,431		

Table 13: Results of the logistic regression model for Wave 2 participation in direct measurements (of children).

Value	**Reference Category**	**Estimate**	**95%-*CI***
Birth month	February		
March		-0.104	[-0.371,0.163]
April		-0.006	[-0.267,0.255]
May		-0.134	[-0.431,0.164]
June/July		-0.160	[-0.435,0.115]
Year of birth interviewed person	1986 and later		
Before 1975		0.327	[-0.057,0.712]
1976-1980		0.398	[0.074,0.721]
1981-1985		0.231	[-0.143,0.604]
Gender of interviewed person	Female		
Male		-0.500	[-1.129,0.130]
Federal region	East (including Berlin)		
West		-0.498	[-1.378,0.382]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 100,000 inhabitants		0.220	[-1.707,2.148]
100,000 up to 500,000 inhabitants		-0.177	[-1.337,0.983]
500,000 or more inhabitants		0.157	[-0.931,1.246]
CASMIN of interviewed person	1a, 1b, 2b		
1c, 2a		0.381	[0.014,0.747]
2c		0.660	[0.275,1.045]
3ab		0.929	[0.531,1.327]
Employment status of interviewed person	Unemployed		
Employed		0.035	[-0.195,0.264]
Migration background of interviewed person	No		
Yes		-0.143	[-0.359,0.073]
Marital status of interviewed person	Single		
Married		0.231	[-1.418,1.880]
Divorced/widowed		0.164	[-1.567,1.895]
Number of persons in household	2		
3		0.234	[-0.279,0.746]
4+		0.188	[-0.497,0.874]
Number of children in household	1		
2		-0.003	[-0.448,0.441]
3		0.366	[-0.143,0.875]
4+		-0.430	[-1.072,0.213]
Number of cases	1,893		

Table 14: Results of the logistic regression model for panel participation before Wave 3.

Value	**Reference Category**	**Estimate**	**95%-*CI***
Birth month	February		
March		0.297	[-0.167,0.761]
April		0.472	[-0.130,1.074]
May		0.962	[0.332,1.592]
June/July		-0.428	[-1.182,0.326]
Year of birth interviewed person	1986 and later		
Before 1975		-0.049	[-0.645,0.548]
1976-1980		0.158	[-0.347,0.663]
1981-1985		0.357	[-0.157,0.871]
Gender of interviewed person	Female		
Male		-1.398	[-2.263,-0.533]
Federal region	East (including Berlin)		
West		0.101	[-0.479,0.682]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 100,000 inhabitants		0.489	[-0.487,1.465]
100,000 up to 500,000 inhabitants		-0.139	[-0.872,0.593]
500,000 or more inhabitants		-0.410	[-1.146,0.326]
CASMIN of interviewed person	1a, 1b, 2b		
1c, 2a		-0.024	[-0.559,0.510]
2c		0.280	[-0.315,0.875]
3ab		0.311	[-0.230,0.851]
Employment status of interviewed person	Unemployed		
Employed		2.263	[1.805,2.721]
Migration background of interviewed person	No		
Yes		-0.373	[-0.675,-0.070]
Marital status of interviewed person	Single		
Married		-0.064	[-0.493,0.365]
Divorced/widowed		-0.228	[-1.257,0.801]
Number of persons in household	2		
3		-0.614	[-1.525,0.298]
4+		-0.927	[-2.064,0.210]
Number of children in household	1		
2		0.782	[0.005,1.559]
3		0.466	[-0.430,1.362]
4+		0.655	[-0.439,1.749]
Number of cases	3,431		

Table 15: Results of the logistic regression model for Wave 3 participation (CATI of parents).

Value	**Reference Category**	**Estimate**	**95%-*CI***
Birth month	February		
March		-0.021	[-0.276,0.234]
April		0.137	[-0.215,0.489]
May		-0.089	[-0.397,0.219]
June/July		0.036	[-0.281,0.354]
Year of birth interviewed person	1986 and later		
Before 1975		0.678	[0.335,1.020]
1976-1980		0.196	[-0.116,0.508]
1981-1985		0.142	[-0.159,0.444]
Gender of interviewed person	Female		
Male		-1.299	[-2.004,-0.595]
Federal region	East (including Berlin)		
West		0.147	[-0.138,0.431]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 100,000 inhabitants		-0.337	[-0.823,0.149]
100,000 up to 500,000 inhabitants		-0.108	[-0.558,0.343]
500,000 or more inhabitants		-0.265	[-0.728,0.197]
CASMIN of interviewed person	1a, 1b, 2b		
1c, 2a		0.451	[0.109,0.794]
2c		0.727	[0.351,1.103]
3ab		0.783	[0.392,1.174]
Employment status of interviewed person	Unemployed		
Employed		2.426	[2.135,2.718]
Migration background of interviewed person	No		
Yes		-0.400	[-0.636,-0.164]
Marital status of interviewed person	Single		
Married		0.405	[0.181,0.629]
Divorced/widowed		-0.316	[-0.943,0.311]
Number of persons in household	2		
3		-0.398	[-0.944,0.147]
4+		0.181	[-0.502,0.864]
Number of children in household	1		
2		0.089	[-0.373,0.551]
3		0.037	[-0.501,0.575]
4+		0.108	[-0.599,0.815]
Number of cases	3,281		

Table 16: Results of the logistic regression model for participation in Waves 1, 2 and 3 (CATI of parents).

Value	**Reference Category**	**Estimate**	**95%-*CI***
Birth month	February		
March		0.058	[-0.195,0.311]
April		0.170	[-0.091,0.430]
May		0.069	[-0.170,0.309]
June/July		0.014	[-0.289,0.316]
Year of birth interviewed person	1986 and later		
Before 1975		0.617	[0.327,0.908]
1976-1980		0.347	[0.077,0.618]
1981-1985		0.284	[-0.001,0.569]
Gender of interviewed person	Female		
Male		-1.167	[-1.795,-0.540]
Federal region	East (including Berlin)		
West		0.310	[-0.073,0.692]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 100,000 inhabitants		-0.155	[-0.662,0.352]
100,000 up to 500,000 inhabitants		0.024	[-0.495,0.543]
500,000 or more inhabitants		0.038	[-0.464,0.540]
CASMIN of interviewed person	1a, 1b, 2b		
1c, 2a		0.531	[0.202,0.860]
2c		0.784	[0.481,1.086]
3ab		1.019	[0.676,1.361]
Employment status of interviewed person	Unemployed		
Employed		1.821	[1.574,2.068]
Migration background of interviewed person	No		
Yes		-0.398	[-0.614,-0.183]
Marital status of interviewed person	Single		
Married		0.288	[0.062,0.514]
Divorced/widowed		-0.359	[-0.949,0.231]
Number of persons in household	2		
3		-0.266	[-0.774,0.242]
4+		0.125	[-0.448,0.699]
Number of children in household	1		
2		0.082	[-0.308,0.472]
3		0.051	[-0.352,0.453]
4+		0.188	[-0.448,0.824]
Number of cases	3,431		

Table 17: Results of the logistic regression model for Wave 1 and 2 participation in direct measurements (of children).

Value	**Reference Category**	**Estimate**	**95%-*CI***
Birth month	February		
March		0.091	[-0.119,0.301]
April		-0.014	[-0.230,0.201]
May		-0.091	[-0.288,0.107]
June/July		-0.126	[-0.375,0.122]
Year of birth interviewed person	1986 and later		
Before 1975		0.458	[0.131,0.786]
1976-1980		0.369	[0.111,0.626]
1981-1985		0.315	[0.040,0.590]
Gender of interviewed person	Female		
Male		-0.483	[-0.959,-0.008]
Federal region	East (including Berlin)		
West		-0.324	[-1.173,0.524]
BIK categories	Less than 50,000 inhabitants		
50,000 up to 100,000 inhabitants		0.254	[-1.520,2.028]
100,000 up to 500,000 inhabitants		-0.135	[-1.198,0.927]
500,000 or more inhabitants		0.207	[-0.774,1.189]
CASMIN of interviewed person	1a, 1b, 2b		
1c, 2a		0.437	[0.116,0.759]
2c		0.644	[0.355,0.934]
3ab		0.912	[0.556,1.268]
Employment status of interviewed person	Unemployed		
Employed		-0.075	[-0.270,0.121]
Migration background of interviewed person	No		
Yes		-0.320	[-0.507,-0.134]
Marital status of interviewed person	Single		
Married		0.522	[-0.867,1.912]
Divorced/widowed		0.546	[-0.997,2.089]
Number of persons in household	2		
3		0.507	[0.178,0.837]
4+		0.360	[-0.107,0.826]
Number of children in household	1		
2		0.008	[-0.359,0.376]
3		0.172	[-0.185,0.528]
4+		-0.133	[-0.685,0.420]
Number of cases	3,431		