pairfam

Panel Analysis of Intimate Relationships and Family Dynamics

The pairfam COVID-19 survey: Design and instruments

Release 1.1

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pairfam Technical Paper

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1 Context and aims of the pairfam COVID-19 survey

In early 2020, the worldwide COVID-19 pandemic led to a major lockdown of most shops, child care facilities, and schools in Germany. In order to prevent the further spread of the virus, personal contact was limited to members of one's own household, and a large share of employees was forced into home office or reduced hours. Child care became a primary task for (working) parents, who were advised to avoid grandparents' support due to higher health risks for the older generation. Similarly, homeschooling was enforced and was supposed to be supported by teachers. Only children whose parents held system-relevant jobs and were required to work outside the home could rely on emergency child care or schooling in institutional settings.

In order to meet the need for information about this exceptional circumstance and how it has affected both institutions as well as individual lives, a substantial number of online surveys was soon initiated. While these were able to shed some light on important aspects of the conditions caused by the COVID-19 pandemic and the subsequent lockdown measures, many had to rely on convenience samples and/or collected cross-sectional data of limited value for analyzing changes caused by the pandemic. In contrast, ongoing longitudinal surveys provide the opportunity to collect data on conditions before, during, and after the COVID-19 pandemic. These not only allow for (better) estimates of change, but also enable researchers to address predictors of differential reactions as well as long-term consequences.

The German Family Panel pairfam, running since 2008/2009 (Huinink et al., 2011), took advantage of its longitudinal design and included an additional, optional online survey covering the COVID-19 situation. As a study of family life in Germany, it is particularly well suited to capture the consequences of the COVID-19 pandemic in private lives and personal relationships. Furthermore, this additional survey builds on the rich information collected in previous waves on multiple life domains, including occupational situation or – for younger participants – educational status. The main aims of this additional survey were (1) to collect information about conditions during the lockdown based on a well-described, largely representative sample of four birth cohorts (born 1971-73, 1981-83, 1991-93, and 2001-03), (2) to allow for a longitudinal perspective of how personal lives have changed due to the COVID-19 restrictions by linking participants' reports prior to and during the pandemic, and (3) to allow for future analyses able to trace long-term changes in well-being and a variety of life domains to particular experiences during the crisis situation caused by the pandemic as assessed in the pairfam COVID-19 survey.

Given the heterogeneity of age groups as well as the various life stages covered in the pairfam panel, the pairfam COVID-19 survey addressed a broad range of issues relevant for adolescents, young adults, and adults in their late 30s and 40s, as well as single respondents, couples, and parents. The following topics were included:

- personal well-being and worries related to the COVID-19 crisis
- partnership quality and general family climate
- for separated families: children's contact and communication with non-residential parents, and/or anchor's contact to non-residential children
- child care and the division of housework
- parents' experiences in the parenting role
- children's media use and school learning

Special modules for younger respondents:

- depressiveness, coping with the current conditions, rule compliance
- media use, personal contact to friends, and school learning

The survey includes instruments introduced in previous waves of the panel study, such as concerning relationship quality or the division of household chores and child care, as well as new modules concerning topics that emerged as particularly relevant during the COVID-19 pandemic (e.g., media use and media-based communication or homeschooling). For these new questions, preference was given to indicators/questions used in other COVID-19 studies to allow for (international) comparisons.

The online survey was conducted by Kantar Public between May 19th and July 13th, 2020. This technical paper describes the access to and citation of the pairfam COVID-19 data (section 2 and section 3), the study design, sample and participation rate (section 4), the included instruments (section 5), the data editing procedures (section 6), as well as the recommended weighting procedures (section 7). The data from the COVID-19 survey are available to registered pairfam data users (see the pairfam data access website: https://www.pairfam.de/en/data/data-access/).

2 Access to the pairfam COVID-19 data

The COVID-19 data collected by the German Family Panel pairfam are accessible to the scientific community as scientific use file for scholarly analyses. The data are made available to registered pairfam data users only. To become a registered pairfam user, interested researchers should follow the instructions on the pairfam data access website (German resp. English version). The data are distributed by GESIS.

The internal distribution of the COVID-19 pairfam data to a third party is authorized only if the other person:

- works in the context of the research project or the same research institute specified in the application form, or
- is a student using the data for a thesis required by the degree program (B.A./M.A. thesis).

There is the obligation to complete the distribution form and to inform the pairfam user support about any internal distribution of the data by sending a copy of this document.

Apart from supervising B.A./M.A. theses, the pairfam COVID-19 data may be used for additional teaching purposes. Due to data privacy issues, however, students may then not receive the regular pairfam data. In addition, the identifier variable ID has to be deleted from the COVID-19 data before handing over the data to the students. Also, every student has to sign the internal distribution form which needs to be sent to the pairfam user support. If the COVID-19 data need to be combined with the regular pairfam data for teaching purposes, a 50% teaching version has to be used. For further information on this topic, please contact the user service at support@pairfam.de

The current release of the COVID-19 data includes the following files:

- the well-prepared and anonymized pairfam COVID-19 data sets (anchor and step-ups) in the standard data formats Stata and SPSS (with both English and German labels),
- the codebook (in English and German language),
- an overview of all variables in the data set,
- syntax files to generate scales,
- the methods report of the survey institute, and
- this technical paper.

3 Referencing the pairfam project and pairfam COVID-19 data

Receiving credit from data users is of vital interest to the pairfam project. Only with these references can we prove the scientific value of pairfam. Therefore, we kindly ask you to add proper citation to all your publications that are based on pairfam data. For the details on the rules of pairfam citation, please refer to the citation website.

The most important citation rule is that usage of general pairfam data should be acknowledged by citing both the reference paper (Huinink et al., 2011) and the dataset (currently Brüderl, Drobnič, et al., 2021). Publications using the pairfam COVID-19 data should additionally include the citation of the COVID-19 dataset as well as this technical paper:

Release 1.0:

Walper, Sabine, Barbara Sawatzki, Philipp Alt, Julia Reim, Claudia Schmiedeberg, Carolin Thönnissen, and Martin Wetzel (2020). The pairfam COVID-19 survey. GESIS Data Archive, Cologne. ZA5959 Data file Version 1.0.0, https://doi.org/10.4232/pairfam.5959.1.0.0

Walper, Sabine, Barbara Sawatzki, Philipp Alt, Julia Reim, Claudia Schmiedeberg, Carolin Thönnissen, and Martin Wetzel (2020). The pairfam COVID-19 survey: Design and instruments. Release Version. LMU Munich: pairfam Technical Paper 15.

… or Release 1.1:

Walper, Sabine, Barbara Sawatzki, Philipp Alt, Julia Reim, Claudia Schmiedeberg, Carolin Thönnissen, and Martin Wetzel (2021). The pairfam COVID-19 survey. GESIS Data Archive, Cologne. ZA5959 Data file Version 1.1.0, https://doi.org/10.4232/pairfam.5959.1.1.0

Walper, Sabine, Barbara Sawatzki, Philipp Alt, Julia Reim, Claudia Schmiedeberg, Carolin Thönnissen, and Martin Wetzel (2021). The pairfam COVID-19 survey: Design and instruments. Release 1.1. LMU Munich: pairfam Technical Paper 15.

4 Study design and field work

This section outlines the design and field results of the pairfam COVID-19 survey. For details see also the methods report of the survey institute (Brix, Wich, & Schneekloth, 2020) which is made available with the data release. For general information about the pairfam design, see (Brüderl, Schmiedeberg, et al., 2021) and the pairfam Data Manual (Brüderl, Garrett, et al., 2021). In case of further questions concerning the data, please contact the pairfam user service at support@pairfam.de.

4.1 Study design

The pairfam COVID-19 survey was targeted towards all respondents of the pairfam panel, i.e. respondents of the four birth cohorts 1971-73, 1981-83, 1991-93, and 2001-03, who were part of the gross sample of wave 12 and had not refused participation. These respondents were invited to participate in a web-based interview of approximately 15 minutes.

Each respondent was sent an invitation letter with a personalized link to the online survey. Upon entering the survey, respondents provided informed consent to data collection including linking data from the online survey with existing panel data (via the anchor identifier *id*).

Unlike the pairfam panel interviews, the COVID-19 survey did not build on data from previous waves in the form of preloads. Instead, the filtering procedure in the web-based questionnaire was based on a few screening questions concerning household composition, as opposed to pre-existing information on relationships, cohabitation, and the number and age of children. Accordingly, the routing of the questionnaire was rather simple.

The programming and field work was executed by the Kantar Public, the same survey institute that conducted the face-to-face panel interviews.

4.2 Field work and results

The field period spanned from May 19th to July 13th, 2020. The invitation letter was sent to all participating pairfam respondents at the beginning of the field period and a reminder was sent to those who had not yet answered the web survey on June 3rd, 2020. Field work ended on July 13th, 2020 without further notification.

Of the gross sample of 9,640 individuals who were contacted, a total of 3,182 participated in the pairfam COVID-19 survey. Of these, 22 cases were deleted due to incomplete interviews; 6 more cases were deleted as it was obvious their partner had completed the questionnaire based on

conflicting birth dates[1]. The overall response rate was 33.0%. Figure 1 shows the temporal development across the field period: the majority of the data (92.6%) was collected by mid-June.

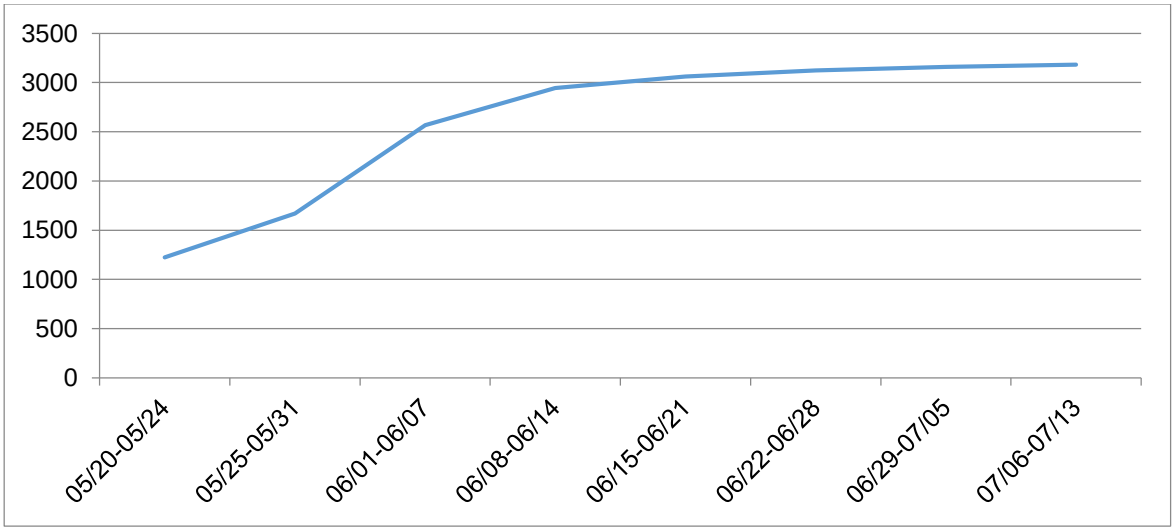


Figure 1: Number of interviews per week (cumulated over the field period)

Table 1 shows response rates and the sample composition of participants of the web survey as well as, for comparison, wave 11 participants[2]. More women than men participated in the COVID-19 survey than in the pairfam main study[3]. While we only find small differences for most socio-demographic characteristics between the main sample and the participants of the COVID-19 study, educational attainment seems to be a strong predictor for study participation. Similar effects have been found in other online COVID-19 surveys (Auspurg, 2020; Kohler, Kreuter, & Stuart, 2019). Further information can be found in the section 7 (Weighting).

[1] The latter were included in the number of respondents shown in Kantar's methods report.
[2] Wave 11 was the chosen baseline, as wave 12 was still in progress at the decision for a baseline.
[3] Some respondents self-classified as "diverse", a category that is not available in the panel study. In Kantar's methods report binary gender information from the panel data is used instead of respondents' reports in the online survey.

Table 1: Sample composition

	COVID-19 survey	pairfam panel
Sex (in %)		
Female	58.0	53.0
Male	42.0	47.0
Birth cohort (in %)		
1971-73	18.5	16.4
1981-83	29.1	28.2
1991-93	20.9	25.6
2001-03	27.1	25.0
Step-up sample (born 1995-2003)	4.3	4.9
Family status (in %)		
Single	34.4	38.2
Living apart together (LAT)	14.2	15.3
Cohabiting (married and unmarried)	50.1	45.9
Children in the household	35.1	34.9
Highest school degree (in %)		
Currently enrolled	25.4	22.0
Lower, Volks-/Haupt-schulabschluss	5.2	11.4
Intermediate, Realschulabschluss	21.4	25.3
Upper, allg. Hochschulreife	48.0	41.4
N	*3.154*	*9.918*

5 Instruments

This description of indicators corresponds to their order in the online survey. For the description of instruments repurposed from previous waves of the pairfam study, please refer to the pairfam Scales and Instruments Manual (Thönnissen, Wilhelm, Alt, Reim, & Walper, 2021).

5.1 Current situation, household composition, employment

To capture the household composition (items *cor1_*) and the existence of a current partnership (item *cor2*) during the pandemic, questions from the PACO ("Psychological Adjustment to the COVID-19 Pandemic") study by the DIPF (Schmidt et al., 2020) were adapted.

Questions assessing current lockdown ordinances in the participants' region (item *cor3*), currently closed schools (item *cor4*), day care facilities and nursery schools (item *cor5*) were developed by the pairfam team.

To gather information on the main respondent's (items *cor6_*) and their partner´s (items *cor7_*) current employment situation, questions were adapted from the SOEP-CoV study (Kühne, Kroh, Liebig, & Zinn, 2020)

For the assessment of changes in the main respondent's (items *cor8_*) and his/her partner's (items *cor9_*) employment situation due to the COVID-19 pandemic, questions were adapted from the study "Mannheimer Corona-Studie" (Blom et al., 2020) and the SOEP-CoV study (Kühne et al., 2020).

Questions regarding changes in household income (item *cor10*) were adapted from the SOEP-CoV study (Kühne et al., 2020).

5.2 Well-being, concerns

Most indicators concerning well-being were included in previous pairfam waves (except *concerns* and *loneliness*, see below). For further information, see Thönnissen, Wilhelm, Alt, Reim, and Walper (2020).

The *activity* (cor11i1, cor11i4, cor11i10) and *anger* (cor11i2, cor11i3) scales are based on the "Befindlichkeitsskalen" by Abele-Brehm and Brehm (1986), which differentiate four mood dimensions: activity, calmness, anger, and lethargy/depressiveness.

Activity [Aktivität]		
How have you been feeling, for the most part, during the past four weeks? *Wie haben Sie sich in den letzten vier Wochen überwiegend gefühlt?*		
− active and enterprising − *tatkräftig*	cor11i1	1: Not at all 5: Absolutely *1: Trifft überhaupt nicht zu* *5: Trifft voll und ganz zu*
− full of energy − *voller Energie*	cor11i4	
− active − *aktiv*	cor11i10	
Anger [Ärger]		
How have you been feeling, for the most part, during the past four weeks? *Wie haben Sie sich in den letzten vier Wochen überwiegend gefühlt?*		
− angry − *ärgerlich*	cor11i2	1: Not at all 5: Absolutely *1: Trifft überhaupt nicht zu* *5: Trifft voll und ganz zu*
− peeved − *sauer*	cor11i3	

The *anxiety* scale (items *cor11i8, cor11i9*) is based on the "Positive and Negative Affect Schedule" (PANAS; Watson, Clark, & Tellegen, 1988) and the "Computeradaptiver Test zur Erfassung von Angst" (A-CAT; Walter et al., 2005). The original PANAS consists of 20 items describing various feelings and emotions; the A-CAT focusses on 7 items that construct anxiety.

The *stress* scale (items *cor11i5, cor11i6, cor11i7*) is based on the "Perceived Stress Questionnaire" (Levenstein et al., 1993) and its German Version by Fliege, Rose, Arck, Levenstein, and Klapp (2001).

For an economic assessment and as a result of their reliable use in the standard pairfam panel questionnaire, short versions of both scales were used. For further information, see Thönnissen et al. (2020).

Anxiety [Angst]		
How have you been feeling, for the most part, during the past four weeks? *Wie haben Sie sich in den letzten vier Wochen überwiegend gefühlt?*		
− anxious − *ängstlich*	cor11i8	1: Not at all 5: Absolutely *1: Trifft überhaupt nicht zu* *5: Trifft voll und ganz zu*
− nervous − *nervös*	cor11i9	

Stress [Stress]		
How did you predominantly feel in the last four weeks? *Wie haben Sie sich in den letzten vier Wochen überwiegend gefühlt?*		
− stressed − *gestresst*	cor11i5	1: Not at all 5: Absolutely *1: Trifft überhaupt nicht zu* *5: Trifft voll und ganz zu*
− overburdened − *überlastet*	cor11i6	
− under pressure − *unter Druck*	cor11i7	

The *loneliness* scale consists of two items. The first (item *cor11i11*, included in previous pairfam waves) was adapted from the "UCLA Loneliness Scale" by Russell, Peplau, and Cutrona (1980). The original 4-stage response format was expanded to the uniform 5-stage format. The second (item *cor11i12,* new to pairfam) was adapted from the study "Psychological Adjustment to the COVID-19 Pandemic" (PACO) by the DIPF (Schmidt et al., 2020).

Loneliness [Einsamkeit]		
How have you been feeling, for the most part, during the past four weeks? *Wie haben Sie sich in den letzten vier Wochen überwiegend gefühlt?*		
− alone − *allein*	cor11i11	1: Not at all 5: Absolutely *1: Trifft überhaupt nicht zu* *5: Trifft voll und ganz zu*
− lonely *[new to pairfam]* − *einsam*	cor11i12	

To assess COVID-19-related *concerns* during the pandemic, items *cor12_* were also adapted from the PACO study (Schmidt et al., 2020).

Concerns [Sorgen]		
How worried are you about the following areas in your life? *Wie ist es mit den folgenden Bereichen - machen Sie sich da Sorgen?*		
− Your personal finance situation − *Um Ihre eigene wirtschaftliche Situation*	cor12i1	1: Not worried 2: Somewhat worried 3: Very worried *1: Keine Sorgen* *2: Einige Sorgen* *3: Große Sorgen*
− Your health − *Um Ihre Gesundheit*	cor12i2	
− The health of your relatives − *Um die Gesundheit von Angehörigen*	cor12i3	
− [Respondents in education/vocational training]: Exams, graduation − *[Befragte in Ausbildung]: Um Prüfungen, um den Abschluss*	cor12i4	

5.3 Partnership quality and the division of household chores and care work

The module on partnership starts with questions addressing the frequency of personal (item *cor13*) and non-personal (item *cor15*) contact with the anchor's partner as well as changes in these types of contact due to the COVID-19 pandemic (items *cor14, cor16*).

Three scales that were part of the standard pairfam panel in previous waves were included to cover relationship quality: *intimacy* (items *cor17i1, cor17i6*), *admiration* (items *cor17i2, cor17i4*), and *conflict* (items *cor17i3, cor17i5*). These were originally adapted from the "Network of Relationships Inventory" (NRI; Furman & Buhrmester, 1985) and used in an abbreviated form. In contrast to the original version of the NRI, the questions in the pairfam version concern only the relationship with the partner and not with any other individuals with whom the anchor has a relationship.

Partnership satisfaction was registered as a central indicator of partnership quality (item *cor18*). This item was included from the German version of the "Relationship Assessment Scale" (RAS) by Sander and Böcker (1993) and is included in all waves of the pairfam panel. For further information, see Thönnissen et al. (2020).

Admiration [Wertschätzung]		
How often do the following things happen in your partnership? *Wie häufig kommen folgende Dinge in Ihrer Partnerschaft vor?*		
− How often does [name partner] express recognition for what you've one? − *Wie oft zeigt [Name Partner/in] Ihnen Anerkennung für das, was Sie tun?*	cor17i2	1: Never 5: Always *1: Nie* *5: Immer*
− How often does [name partner] show that he/she appreciates you? − *Wie oft zeigt Ihnen [Name Partner/in], dass er/sie Sie schätzt?*	cor17i4	
Conflict [Konflikt]		
How often do the following things happen in your partnership? *Wie häufig kommen folgende Dinge in Ihrer Partnerschaft vor?*		
− How often do you and [name partner] disagree and quarrel? − *Wie oft sind [Name Partner/in] und Sie unterschiedlicher Meinung und streiten sich?*	cor17i5	1: Never 5: Always *1: Nie* *5: Immer*
− How often are you and [name partner] annoyed at or angry with each other? − *Wie oft passiert es zwischen Ihnen und [Name Partner/in], dass Sie ärgerlich oder wütend aufeinander sind?*	cor17i3	

The *relative share of labor* scale derives from the "Negotiating the Life Course project" (McDonald, Jones, Mitchell, & Baxter, 2009) and was implemented to assess the division of labor between the partners in various areas of the household, including both chores and child care tasks (item *cor19*). In this scale, the original 13 areas of work (Baxter, 2002) are divided into five categories: housework (washing, cooking, cleaning), shopping, home and auto repairs, financial and administrative matters, and taking care of children (if at least one child is present in the household). This question was included in previous pairfam panel waves.

Relative share of labor [Relativer Arbeitsanteil]		
How do you and your partner currently organize tasks in the following areas? Please refer only to the portion of the work done by you and/or your partner. *Wie haben Sie und Ihre Partnerin / Ihr Partner sich derzeit die Arbeit in folgenden Bereichen zeitlich aufgeteilt? Beziehen Sie Ihre Angaben nur auf den Anteil der Arbeiten, die Sie und Ihre Partnerin / Ihr Partner erledigen.*		
− Housework (washing, cooking, cleaning) − *Hausarbeit (Waschen, Kochen, Putzen)*	cor19i1	This task is taken over by… 1: (Almost) completely my partner 2: For the most part my partner 3: Split about 50/50 4: For the most part me 5: (Almost) completely me *Das übernimmt…* *1: (Fast) vollständig mein/e Partner/in* *2: Überwiegend mein/e Partner/in* *3: Etwas halbe/halbe* *4: Überwiegend ich* *5: (Fast) vollständig ich*
− Shopping − *Einkaufen*	cor19i2	
− Working on the house, apartment, or car − *Reparaturen am Haus, in der Wohnung, am Auto*	cor19i3	
− Financial and administrative matters − *Finanzielle Angelegenheiten, Behördengänge*	cor19i4	
− [Respondents with children in the household:] Child care − [Befragte mit Kindern im Haushalt:] Kinderbetreuung	cor19i5	

5.4 **Family climate**

The following instrument addresses the family climate during the COVID-19 crisis and asks for a comparison to the time prior to the COVID-19 pandemic. The response format for all of these 5 items describes whether there was a change in family climate: value “1” describes an increase and value “3” a decrease in the dimensions, while value “2” stands for no change.

The items *cor20i1* and *cor20i14* assess positive aspects, while *cor20i2, cor20i3* and *cor20i5* focus on negative aspects of the respondent’s perception of family climate in everyday life during the pandemic. All items are adapted (with an abbreviated answer format) from the COVID-19 module implemented in the pairfam Child Questionnaire on short notice in wave 12 and developed by the pairfam team. They were posed to all respondents with parents, a partner, or children in the household.

Family climate [Familienklima]		
What is the atmosphere like at your home? Do the following apply more, the same, or less than before the crisis due to COVID-19? The atmosphere is … *Wie ist die Stimmung bei Ihnen zu Hause? Trifft Folgendes mehr, gleich oft oder weniger zu als im Vergleich zu der Zeit vor der Corona-Krise? Die Stimmung ist …*		
− ... happy, we are having fun together − *… fröhlich, wir haben Spaß miteinander*	cor20i1	1: More than before 2: The same as before 3: Less than before *1: Mehr als vorher* *2: Gleich wie vorher* *3: Weniger als vorher*
− ... anxious and worried − *… ängstlich und sorgenvoll*	cor20i2	
− ... stressful and irritated − *… stressig und genervt*	cor20i3	
− ... comfortable and relaxed − *… gemütlich und entspannt*	cor20i4	
− ... conflictual, heavy − *… Es gibt Streit oder "dicke Luft"*	cor20i5	

5.5 **Separated families**

The separation module consists of two parts: the first refers to children in the household who's other biological parent lives elsewhere, the second to respondents' biological children who live elsewhere. All questions in this module were developed by the pairfam team.

5.5.1 Children whose other biological parent lives elsewhere

This module begins with a filter question for respondents with at least one child, asking whether one of the respondent's children has a biological parent living outside the household (*cor22*). The following questions were posed to separated/divorced respondents with children in the household. If the respondent had more than one child from a previous relationship, these questions referred to the youngest child. Items are included to capture personal contact, i.e.

- how often the child's other biological parent saw this child in person during the lockdown period (item *cor23*),
- whether this was more often, less often, or as often as usual compared to the time before the COVID-19 pandemic (item *cor24*), and
- in case of changes, how this came about (items *cor25i1* to *cor25i4*).

Next, focusing media-based forms of contact, further questions assess

- how often the other biological parent had contact to the child during the lockdown via telephone, text, video calls, etc., while (item *cor26*)
- whether this was more often, less often, or as often as usual compared to the time before the COVID-19 pandemic (item *cor27*), and

- the respondent's satisfaction with this overall care situation regarding the respective child (item *cor28*).

5.5.2 Nonresidential biological children from former relationships

The second part of this module is structured in the same way: the same questions were included, but in reference to the respondent's own contact to his/her biological children living elsewhere. This section begins with a filter question for all respondents, asking whether the respondent has biological children from previous relationships that live elsewhere with the other biological parent (*cor29*). All subsequent questions were posed to all respondents with non-resident children due to separation/divorce. If the respondent has more than one nonresident child from a previous relationship, these questions refer to the youngest child.

5.6 Child care and parenting role

Ten items are included to assess respondents' child care arrangements during the lockdown due to the COVID-19 pandemic. The items *cor21i1* to *cor21i10* were adapted from the "Corona-Alltag" survey by the "Wissenschaftszentrum Berlin für Sozialforschung" (WZB; Bünning, Hipp, & Munnes, 2020). These items were posed to respondents with at least one child in the household.

Child care [Kinderbetreuung]		
How did you organize child care while day care facilities and schools were closed? Please mark all options that apply. *Wie hatten Sie die Kinderbetreuung organisiert, während Kitas und Schulen geschlossen waren? Bitte kreuzen Sie alles an, was zutrifft.*		
− My child(ren) doesn't/don't require close supervision. − *Meine Kinder benötigen keine enge Betreuung.*	cor21i1	0: Not mentioned 1: Mentioned *0: Nicht genannt* *1: Genannt*
− I supervised them at home without working. − *Ich habe sie zu Hause betreut ohne zu arbeiten.*	cor21i2	
− I supervised them at home while working from home. − *Ich habe sie betreut, während ich von zu Hause aus arbeitete.*	cor21i3	
− My partner supervised them at home without working. − *Mein/e Partner/in hat sie zu Hause betreut ohne zu arbeiten.*	cor21i4	
− My partner supervised them at home while working from home. − *Mein/e Partner/in hat sie betreut, während er/sie von zu Hause aus arbeitete.*	cor21i5	
− The child/ren attended an emergency day care facility. − *Die Kinder besuchten eine Notfallbetreuung.*	cor21i6	
− Relatives, friends, or neighbors supervised my child(ren). − *Verwandte, Freunde oder Nachbarn betreuten die Kinder.*	cor21i7	

− The child(ren) was/were alone at home. − *Die Kinder waren alleine zu Hause.*	cor21i8	
− [Respondents with “separation children”] My child(ren)'s other biological parent(s) supervised them. − *[Befragte mit Trennungskindern] Der andere Elternteil betreute sie.*	cor21i9	
− Other − *Anderes*	cor21i10	

Respondents with children in the household were also posed questions regarding their experiences in the parenting role during the crisis. These four items were included from the original pairfam panel survey (see Thönnissen et al., 2020): *cor36i1* and *cor36i2* are part of pairfam’s *parental self-efficacy/competence* scale (originally 4 items), while *cor36i3* and *cor36i4* stem from the *unspecific strain* scale (originally 3 items; adapted from the Socio-Economic Panel (SOEP, 2007)), capturing respondents’ feelings of exhaustion and general distress due to parenting.

Parenting role [Elternrolle]		
To what extent do the following statements apply to you? *Wie sehr treffen folgende Aussagen auf Sie zu?*		
− I can meet the needs of my child/children very well. − *Ich kann den Bedürfnissen meines Kindes / meiner Kinder sehr gut gerecht werden.*	cor36i1	1: Not at all 5: Absolutely *1: Trifft überhaupt nicht zu* *5: Trifft voll und ganz zu*
− I feel helpless concerning parenting. − *Ich fühle mich hilflos in der Erziehung meines Kindes / meiner Kinder.*	cor36i2	
− My life with the child/children is exhausting. − *Mein Leben mit dem Kind / den Kindern ist anstrengend.*	cor36i3	
− I am often at the end of my rope. − *Ich bin oft am Ende meiner Kräfte.*	cor36i4	

5.7 **Children in the household: Media consumption and schooling**

In order to gain information about children’s media consumption while schools and day care facilities were closed, parents were asked how much time per day their children spent in front of a screen (item *cor37*). For parents with more than two children, these questions were posed only for the youngest and oldest of their children. Respondents were also asked to compare their children’s media consumption to the time before the crisis due to COVID-19 (item *cor38*). These items were adapted from the “Corona-Alltag” questionnaire by the “Wissenschaftszentrum Berlin für Sozialforschung” (WZB; Bünning et al., 2020).

Furthermore, questions about school and homeschooling during the lockdown were included for respondents with school children in the household. In cases with multiple school children in the household, the questions refer to the youngest school child. This module begins with a question concerning the youngest child's grade (item *cor39*) and continues to describe the schooling situation, i.e. whether the child received class materials from the school during the lockdown (*cor40*) and the use of devices for studying at home (items *cor41, cor42*). It also assesses the support that the child received while studying from home (item *cor44*) and the overall experience with homeschooling (items *cor45, cor46*). The items *cor40, cor41, cor43, cor44* and *cor45* were adapted from a survey conducted by the University of Magdeburg (Porsch & Porsch, 2020) regarding homeschooling during the COVID-19 pandemic. The remaining items were developed by the pairfam team.

School assignments [Schulaufgaben]		
Who supported your child with these assignments, including via e-mail, telephone, or video call? Please mark all options that apply. *Wer hat Ihr Kind bei der Bearbeitung der Aufgaben, z. B. auch per E-Mail, Telefon oder Videoanruf unterstützt? Bitte kreuzen Sie alles an, was zutrifft.*		
− My child completed the assignments independently. − *Mein Kind hat die Aufgaben selbständig bearbeitet.*	cor44i1	0: Not mentioned 1. Mentioned *0: Nicht genannt* *1: Genannt*
− I did. − Ich	cor44i2	
− [Respondents with a partner] My partner − *[Befragte mit Partner] Meine Partnerin / mein Partner*	cor44i3	
− [Respondents with "separation children"] My child's other biological parent − *[Befragte mit Trennungskindern] Der andere Elternteil*	cor44i4	
− Siblings − *Geschwister*	cor44i5	
− Schoolmates − *Mitschüler/innen*	cor44i6	
− Others − *Andere Personen*	cor44i7	

Experience with homeschooling [Erfahrung mit Home Schooling]		
What was your experience with that task? *Wie ging es Ihnen bei dieser Aufgabe?*		
− I felt exhausted and overwhelmed. − *Ich habe mich durch die Aufgabe erschöpft und überlastet gefühlt.*	cor45i1	1: Not at all 5: Absolutely *1: Trifft überhaupt nicht zu* *5: Trifft voll und ganz zu*
− I enjoyed supporting my child(ren) in learning new content. − *Es hat mir Freude gemacht mit meinem Kind/meinen Kindern neue Lerninhalte zu erarbeiten.*	cor45i2	
− From your perspective: How well did your child manage studying from home? − *Nach Ihrer Beobachtung: Wie gut ist Ihr Kind mit dem Lernen zu Hause zurechtgekommen?*	cor46	1: Not well at all 5: Absolutely *1: Sehr schlecht* *5: Sehr gut*

5.8 Module for respondents up to 25 years

To better understand young people's experiences during the lockdown, a module for respondents up to and including the age of 25 years (i.e., respondents born 1995 or later) was included.

5.8.1 Well-being and coping

This module begins with an assessment of depressiveness during the lockdown based on the scale used in the original pairfam panel survey. Whereas the original wording refers to the present, the item wording in the pairfam COVID-19 survey refer to the past, more specifically to the lockdown due to the COVID-19 pandemic. To assess depressiveness as a trait variable, the 10 items from the "State-Trait Depression Scales" (STDS Form Y-2; Spaderna, Schmukle, & Krohne, 2002) were used. The *depressiveness* scale consists of five items assessing negative mood in general (dysthymia items: *per2i1, per2i3, per2i4, per2i5, per2i6*) and five items assessing positive mood in general (euthymia items: *per2i2, per2i7, per2i8, per2i9, per2i10*). For more information regarding this scale, see the pairfam Scales Manual (Thönnissen et al., 2020).

Depressiveness [Depressivität]		
The following statements can be used to describe yourself. Please read each statement and mark which of the four answer possibilities best describes how you felt during the lockdown. *Im Folgenden finden Sie eine Reihe von Feststellungen, mit denen man sich selbst beschreiben kann. Bitte lesen Sie jede Feststellung durch und wählen Sie aus den vier Antworten diejenige aus, die angibt, wie Sie sich zur Zeit der Kontaktbeschränkungen gefühlt haben.*		
− My mood was melancholic. − *Meine Stimmung war schwermütig.*	cor47i1	1: Almost never 2: Sometimes 3: Often 4: Almost always *1: Fast nie* *2: Manchmal* *3: Oft* *4: Fast immer*
− I felt happy. (R) − *Ich war glücklich. (R)*	cor47i2	
− I felt depressed. − *Ich war deprimiert.*	cor47i3	
− I felt sad. − *Ich war traurig.*	cor47i4	
− I was in desperation. − *Ich war verzweifelt.*	cor47i5	
− My mood was gloomy. − *Ich war in gedrückter Stimmung.*	cor47i6	
− I felt good. (R) − *Ich fühlte mich gut. (R)*	cor47i7	
− I felt secure. (R) − *Ich fühlte mich sicher. (R)*	cor47i8	
− I felt calm and composed. (R) − *Ich war ruhig und gelassen. (R)*	cor47i9	
− I enjoyed life. (R) − *Das Leben machte mir Spaß. (R)*	cor47i10	

The next section focuses on young people's coping behavior during the lockdown. The instrument *cor48_* is based on the "Ways of Coping Checklist" (WCCL) derived from Lazarus' transactional model of stress (Aldwin, Folkman, Schaefer, Coyne, & Lazarus, 1980; Folkman & Lazarus, 1980). In the original model, the items refer to either behavioral or intrapsychic coping behaviors and differentiate between problem and emotion-centered functionality. The coping scale used in the pairfam COVID-19 survey is based on a shortened, modified version of the German adaptation of the WCCL, the "Skala zur Erfassung des Bewältigungverhaltens" (SEBV; Ferring & Filipp, 1989).

Coping [Bewältigung]		
Think about the time during the lockdown. Which of the following statements apply to you? *Denken Sie an die Zeit während der Kontaktbeschränkungen. Welche der folgenden Aussagen treffen auf Sie zu?*		
− I did everything to somehow entertain myself. − *Ich habe alles Mögliche getan, nur um mich zu beschäftigen.*	cor48i1	1: Not at all 5: Absolutely *1: Trifft überhaupt nicht zu* *5: Trifft voll und ganz zu*
− I tried to make myself happy with food, drinks, smoking, etc. − *Ich habe versucht, es mir durch Essen, Trinken, Rauchen oder Ähnliches besser gehen zu lassen.*	cor48i2	
− I imagined that other people were having a much harder time. − *Ich habe mir vorgestellt, dass es anderen viel schlechter geht.*	cor48i3	
− I spoke to someone to learn more about the situation. − *Ich habe mit jemandem geredet, um mehr über die Situation zu erfahren.*	cor48i4	
− I followed expert opinions. − *Ich habe die Meinungen von Experten verfolgt.*	cor48i5	
− I did something new that I would have otherwise never done. − *Ich habe etwas ganz Neues gemacht, was ich unter anderen Umständen sonst nie getan hätte.*	cor48i6	

5.8.2 Compliance to rules

Item *cor49* addresses the compliance to formal or informal rules established by the government to reduce the spread of the SARS-CoV2 virus that causes COVID-19 in the German population during the state of lockdown. This question is based on a survey conducted by the University of Koblenz-Landau that assesses life during the COVID-19 pandemic from a psychological perspective (Pressestelle Campus Landau, 2020).

Compliance [Regelkonformität]		
How often did you do the following things? *Wie oft haben Sie die folgenden Dinge getan?*		
− I met up with people outside of my household, even when it was not necessary. − *Ich habe mich mit anderen Personen außerhalb meines Haushalts getroffen, ohne dass es nötig gewesen wäre.*	cor49i1	1: Never 5: Very often *1: Überhaupt nicht* *5: Sehr oft*
− I visited or was visited by older relatives or friends (> 65). − *Ich habe ältere Verwandte oder Freunde (> 65 Jahre) besucht oder von diesen Besuch bekommen.*	cor49i2	
− I was not particularly vigilant about maintaining 1-2 meters between myself and people outside of my household. − *Ich habe nicht besonders darauf geachtet, 1-2 m Abstand zu Personen außerhalb meines Haushalts zu halten.*	cor49i3	

5.8.3 Media consumption, personal contacts

Respondents up to the age of 25 years were asked about their media consumption and personal contacts during the lockdown, i.e.

- how much time they spent in front of a screen (e.g., TV) (*cor50*),
- whether this happened more or less often than before the crisis (*cor51*),
- how often they saw their friends in person (*cor52*), and
- how much they missed their friends (*cor53*).

The items *cor50* and *cor51* were implemented parallel to *cor37* and *cor38* for respondents with school children, that are based on the "Corona-Alltag" questionnaire by the "Wissenschaftszentrum Berlin für Sozialforschung" (WZB; Bünning et al., 2020). The remaining questions were developed by the pairfam team.

5.8.4 School

The items *cor54* to *cor58* were implemented parallel to the school-related questions for respondents with school children in the household (see items *cor39* to *cor46*) based on a survey by the University of Magdeburg (Porsch & Porsch, 2020) concerning homeschooling during the COVID-19 pandemic. These questions were posed to young respondents attending school to gather insights into the differences between learning at school and studying from home during the lockdown.

5.9 Overall evaluation

The last module includes questions concerning the respondent's overall experience during the pandemic. These items assess how respondents are personally affected (items *cor59i1, cor59i4*) and respondent with parents, a partner, or children in the household are additionally asked about their experience as a family (items *cor59i2, cor59i3*). All items in this section were developed by the pairfam team. The final questions in this module concern coping strategies of the youngest (item *cor61i1*) and oldest (item *cor61i2*) child in the household. The wording of these items derives from the study "Kindsein in Zeiten von Corona" conducted by the German Youth Institute (Langmeyer, Guglhör-Rudan, Naab, Urlen, & Winklhofer, 2020).

The survey ends with an open question about the first thing respondents would like to do once the COVID-19 pandemic is over.

Experience with the pandemic [Erfahrung mit der Pandemie]		
In sum: What has been your experience during the COVID-19 pandemic? *Zum Schluss: Wie haben Sie die Corona-Pandemie bisher erlebt?*		
− This period has strongly affected me personally in a negative way. − *Die Zeit hat mich persönlich stark belastet.*	cor59i1	1: Not at all 5: Absolutely *1: Trifft überhaupt nicht zu* *5: Trifft voll und ganz zu*
− [Respondents with parents, a partner, or children in the household] This period has strongly affected us as a family in a negative way. − *[Befragte mit Eltern, Partner oder Kindern im Haushalt] Die Zeit hat uns als Familie stark belastet.*	cor59i2	
− [Respondents with parents, a partner, or children in the household] This period has strengthened our bond. − *[Befragte mit Eltern, Partner oder Kindern im Haushalt] Die Zeit hat unseren Zusammenhalt in der Familie gestärkt.*	cor59i3	
− I can see the positive side of this period as well. − *Ich kann dieser Zeit auch gute Seiten abgewinnen.*	cor59i4	

6 Data editing

This section describes the editing of the data collected with the pairfam COVID-19 survey. Data processing was completed with SPSS. Two data sets are provided: One covering the anchor respondents of the pairfam study and another covering step-up cases, who are former participants of the child interview who have reached the eligible age of 15 and now continue to take part in the main anchor survey.

Please note that the pairfam COVID-19 survey officially serves as the follow-up observation of wave 11, as the selection of the gross sample for the COVID-19 survey was completed during the fieldwork period for wave 12. This affects the merging process of the resulting data sets with the standard pairfam data. To avoid issues with temporary drop-out cases (“Aussetzer”), using wave 11 as a reference wave for both wave 12 and the COVID-19 survey is recommended.

6.1 Variable and value labels

Each variable in the data sets was assigned a label containing a short description of the variable and its question number in the CAWI program. The values of all variables are labeled according to the CAWI questionnaire.

6.2 Missing values

The following missing values codes were defined and applied to all variables in the COVID-19 data sets. Table 2 lists the missing values codes and respective value labels.

Table 2: Missing codes in the data sets anchor_covid-19 and stepup_anchor_covid-19

Value	Label
-1	Don’t know
-2	No answer
-3	Does not apply
-4	Filter error / Incorrect entry

The missing values “-1 Don’t know” and “-2 No answer” were assigned if the respondent could not or did not answer a question. These codes are the only missing values also documented in the codebook. The value “-3 Does not apply” was assigned if a respondent had not been asked the corresponding question (i.e., the respondent was filtered over the question).

6.3 Value checks

For each variable, it was assessed whether the actual value range corresponded to the range of possible values listed in the questionnaire. Values out of range were identified as incorrect entries and recoded to “-4 Filter error / Incorrect entry”.

6.4 Filter checks

Filters for each variable as documented in the CAWI questionnaire were also checked. In the case of filter errors (i.e., a question asked by mistake or not asked by mistake) the missing value “-4 Filter error / Incorrect entry” was assigned.

6.5 Consistency checks

Various checks were conducted to identify logically impossible or empirically implausible combinations of values on two or more variables. In some cases, it was not possible to resolve the inconsistency, for example with regard to the main respondent‘s gender and date of birth. Consequently, the provided values were left unedited. Instead, two generated variables (*inconsist_sex* and *inconsist_dob)* indicate inconsistencies between information from the main survey and the COVID-19 survey. Table 3 describes these tag variables in detail.

Table 3: Tag variables in the COVID-19 data sets

Variable	Label	Values	Value labels	Description
inconsist_sex	Inconsistency sex respondent between COVID-19 and pairfam survey	0 1	No inconsistency Inconsistency	Respondent’s sex in COVID-19 survey not respondent’s sex in pairfam survey
inconsist_dob	Inconsistency date of birth (month, year) respondent between COVID-19 and pairfam survey	0 1 2 3	No inconsistency Inconsistency: month Inconsistency: year Inconsistency: month & year	Respondent’s date of birth in COVID-19 survey not respondent’s date of birth in pairfam survey

6.6 Coding open answers

Open answers to the items *cor8i11o* and *cor9i11o*, which contain information further qualifying the residual category of the given answer list, were first compared to the answer list. If possible, open

answers were recoded into existing categories and the original answer was coded “0 Not mentioned”. All remaining open answers were coded to a single value (“1 Mentioned”), indicating that an open answer has been provided. The actual string values were deleted due to data protection laws. For the same reason, all open answers to item *cor62o* were coded “1 Mentioned” and deleted from the data sets.

6.7 Generated variables and scales

In order to facilitate data analysis, the COVID-19 data sets for anchors and step-ups respectively includes several generated variables that are of interest for various analyses. Table 4 lists all generated variables.

Table 4: List of generated variables included in the COVID-19 data sets

Construct	Variable name
Birth cohort	cohort
Sample indicators	sample, demodiff
Interview date: day, month, year, week number	intd, intm, inty, intwn
Interview duration	intdur
Interview device	intdev
Generated identifier sex	sex_gen
Generated identifier date of birth	dobm_gen, doby_gen

In contrast to these generated variables, scales variables are not included in the delivered data set. However, syntax files (*scales_covid-19*, both in Stata and SPSS) are included as part of the scientific use file.

6.8 English-language data

An English version of the data sets was produced to enable non-German speakers to work with the COVID-19 data. All variable labels and value labels were translated according to the English version of the COVID-19 questionnaire.

7 Weighting

7.1 General overview

In preparation for the pairfam COVID-19 survey, the pairfam team in collaboration with GESIS Team on Survey Statistics[4] made substantial modifications to the weighting procedure used for the pairfam data.

These changes affect both the design weight (*dweight*), which corrects disproportionate sampling across cohorts (including the DemoDiff and the wave 11 refreshment sample) and the combination of multiple selection "frames", as well as the nonresponse weight (*cdweight*), which corrects for survey nonresponse (including longitudinal panel drop-out). We provide only standardized weights which are centered on characteristics of the sample size of the current observation (e.g., survey wave) *t*. Moreover, step-up respondents are not part of the random sample selection process, and therefore are not weighted in the data.

The wave 11 refreshment sample was also allocated a design weight. Therefore, in addition to the pairfam base design weights (*dweight*) and the combined design weights of the pairfam base and DemoDiff samples (*d1weight*), two new design weights are now provided: one allows for analyses of the full data set (*d2weight*; a combination of the pairfam base, DemoDiff, and the wave 11 refreshment sample), while the other is a design weight for the refreshment sample only (*d3weight*).

As a result of the modified nonresponse approach, a new calibration weight for each of the above-mentioned study populations is provided. These calibration weights provide factors for each subpopulation to adjust the observed data to characteristics of the general population. This step has three advantages: First, it ensures that the weighted data more closely represent the population of interest in central characteristics and size. Second, selective nonresponse can be managed by assigning observations with characteristics of higher selectivity a higher analysis weight, tackling both cross-sectional survey participation bias and longitudinal panel attrition bias for the following waves. Third, a correction of cohort-specific nonresponse aiming to represent the cohort sizes of the population can be integrated.

With release 12.0, new weights are also available for the pairfam anchor data of all waves. For more information on weighting in pairfam, please see the pairfam Data Manual (Brüderl, Garrett, et al., 2021) and the Technical Paper 17 (Wetzel, Schumann, & Schmiedeberg, 2021).

[4] In particular, we would like to thank Dr. Bruch, Dr. Felderer, and Dr. Sand of GESIS for their consulting and concrete support in implementing the new weighting strategy. For all remaining issues the pairfam team is fully responsible.

7.2 **Design weights**

The modified design weights have been defined to achieve the following:

1. Correct for different inclusion probabilities of the cohorts, i.e. under- or overrepresentation in the gross sample as compared to the population
2. Integrate the DemoDiff sample into the pairfam sample by addressing the shares of respondents living in Eastern and Western Germany
3. Address the issues arising from drawing a refreshment sample with a different sample population

Figure 2 illustrates these challenges by presenting gross sample and population sizes. Although population sizes for each cohort vary only slightly, the youngest cohort was targeted as a considerably smaller gross sample due to the fact that response rates were expected to be higher than in the older cohorts. In an unweighted analysis, the youngest cohort would be under-represented (1). DemoDiff, the East German subsample of pairfam, surveyed a random sample of individuals living in Eastern Germany. As this population was already adequately represented in the random sample of the pairfam base, unweighted analyses with a combination of these two data sets would result in an over-representation of Eastern German residents (2). In the wave 11 refreshment sample, no new cases were drawn for the oldest cohort (1970-73), but rather a new, younger cohort (2000-03) was integrated into the sample. If, for instance, an unweighted analysis of the COVID-19 survey would be pursued over all cohorts (see paragraph “Best implementation of weights”), the oldest cohort would be underrepresented.

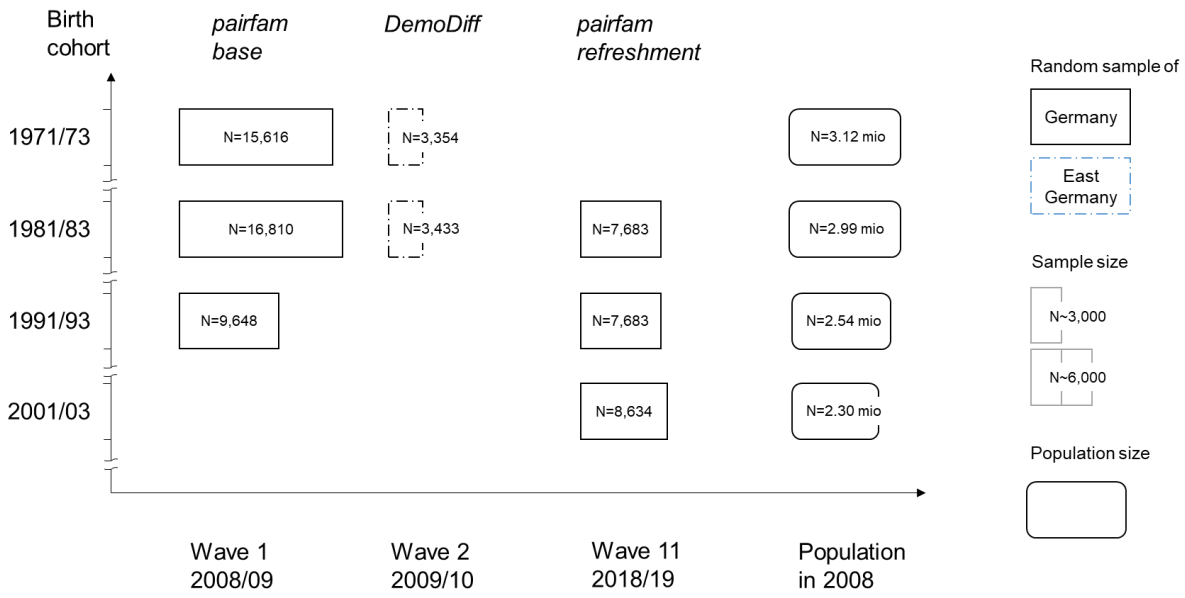


Figure 2: Gross pairfam samples relative to population size

Accordingly, when including all subsamples into one data set, inclusion probabilities must be addressed. This challenge has been tackled numerous times in “dual frame” surveys (Brick, Cervantes, Lee, & Norman, 2011; Lohr & Rao, 2000; Sand, 2018). Adapted to the COVID-19 survey, three different frames can be identified:

- F1) pairfam base frame: Representative of the German population of three age cohorts (1971-73, 1981-83, 1991-93).
- F2) DemoDiff frame: Representative of the population living in the Eastern Germany in two age cohorts (1971-73, 1981-83).
- F3) pairfam refreshment frame: Representative of the German population of three age cohorts (1981-83, 1991-93, 2001-03).

To combine these three frames, a composite estimator (Brick et al., 2011; Lohr & Rao, 2000; Sand, 2018) was used which combines the weights of two samples in the ratio of their respective net sample sizes.

As the analysis sample depends on the research question at hand, pairfam provides four design weights representing different (combinations of) frames:

1) *dweight:* Initial pairfam design weights adjusting only the pairfam base gross sample to the German population in the three initial cohorts
2) *d1weight:* Combined pairfam base sample and DemoDiff sample design weights adjusting both samples to the German population in the three initial cohorts[5]
3) *d2weight:* Combined pairfam base/DemoDiff/refreshment design weights adjusting all gross subsamples to the German population for all four cohorts
4) *d3weight:* Refreshment sample design weights adjusting the wave 11 refreshment gross sample to the German population in three cohorts

We standardized design and calibrated design weights stepwise for each cohort *i* (and at each observation *t*) as follows leading to a mean of all $\bar{w}_t = 1$ and a sum of all weights of the sample size ($\sum w = N_{T,NS}$).

$$w_i = \frac{N_{i,P} N_{T,NS}}{N_{i,GS} \sum_{j=1}^{3} \left(\frac{N_{j,P} N_{j,NS}}{N_{j,GS}} \right)}$$

with $N_{i,P}$ the size of cohort i in the population, $N_{T,P}$ the total size of all cohorts in the population, $N_{i,GS}$ the size of cohort i in the gross sample, $N_{T,GS}$ the total size of all cohorts in

[5] Note that DemoDiff contributes information for only two cohorts.

the gross sample, $N_{i,NS}$ the size of cohort i in the net sample (of their first appearance), and $N_{T,NS}$ the total size of all cohorts in the net sample.

7.3 **Calibrated design weights**

Each of the calibration weights aims to adjust the data to the target population and simultaneously control for baseline survey participation and panel attrition bias. To achieve this, an iterative proportional fitting (IPF) approach was used applying the *ipfranking* package (Kolenikov, 2019) for *Stata* to successively identify higher or lower weights until an optimal adjustment to the reference data (Mikrozensus 2019) was achieved.[6]

The following reference characteristics from the Mikrozensus 2019 were used:

- Gender: male, female
- Federal state (Bundesland): 14 categories[7]
- Education level: no or primary education (Hauptschule), lower secondary (Realschule), higher secondary (Abitur), still in education[8]
- Migration background: none vs. first generation or second generation
- Settlement structure: 8 categories[9]
- Family status: single, married, widowed/divorce[*]
- Child(ren) living in household: none, one, two and more[*]

The information stems from the latest available source which is either the address register maintained by the field institute Kantar public (gender, federal state, settlement structure) or from the latest available scientific use file, here wave 11 (for a limited number of temporary drop outs wave 10; education, migration background, family status and number of children). Weights were constructed with a cohort-sensitive approach considering the respective design weights, which resulted in four different calibration weights based on four analytical samples and their respective design weights:

[6] The replication file can be provided by support@pairfam.de.
[7] Germany has 16 federal states. To avoid small case numbers in cells, Saarland has been combined with Rheinland-Pfalz, and Bremen with Hamburg.
[8] The selection bias by education seems to be particularly strong. To better understand this association with the weights, we included subsection 7.4 on “Limitations of weighting: Educational selection bias”.
[9] The original “753er systematic” of the BIK has 10-categories. To avoid small case numbers in cells, “<2.000” and “2.000 to <5.000”, as well as “50.000 to <100.000” rural and urban were collapsed to a joined category.
[*] Due to the distribution of this variable, it has not been considered for the youngest cohort 4 (2001-03).

1) *cdweight:* Calibrated design weight adjusting the pairfam base sample to central characteristics of the German population in the three initial cohorts

2) *cd1weight:* Calibrated design weight adjusting the combined pairfam base and DemoDiff sample to central characteristics of the German population in the three initial cohorts[10]

3) *cd2weight:* Calibrated design weight adjusting the combined pairfam base/DemoDiff/refreshment sample to central characteristics of the German population in all four cohorts

4) *cd3weight:* Calibrated design weight adjusting the pairfam wave 11 refreshment sample to central characteristics of the German population in three cohorts

Note that for all calibration weights, pairfam provides ready-to-use combinations of calibration and design weights, as using the respective design weights is a precondition of applying calibration weights. Accordingly, users do not need to combine these further. Additionally, all calibration weights were standardized on the sample size leading to a mean of all $\bar{w}$ = 1 and a sum of all weights = sample size ($\sum w = N_{T,NS}$; see also design weights).

7.4 Limitations of weighting: Educational selection bias

The pairfam samples are biased towards higher education when compared to the Mikrozensus 2019 (see Figure 3). This effect has been found in other German COVID-19 surveys as well (Auspurg, 2020), and might be attributable to an intersection of the novelty of the COVID-19 situation and the chosen mode (web survey), as this effect is more pronounced for that subsample than in the standard face-to-face pairfam interviews. For an overview of potential problems, see (Post, Class, & Kohler, 2021).

The younger cohorts in particular show skewed educational distributions, both with an over-representation of the currently enrolled (in particular cohort 4: 2001-03) and with a significant over-representation of graduates of higher secondary education (in particular cohort 1: 1991-93). This leads to an under-representation of respondents with lower educational attainment.

[10] Note that DemoDiff contributes information for only two cohorts.

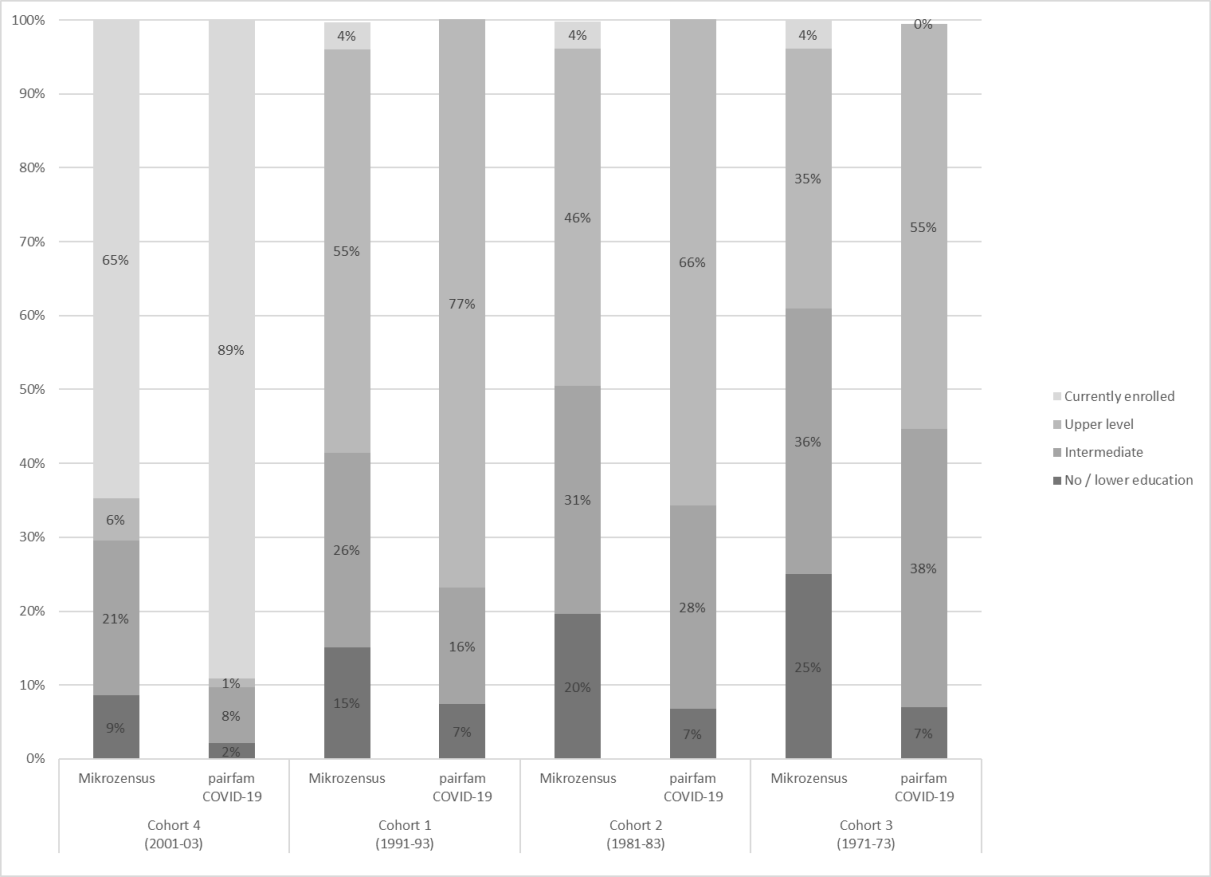
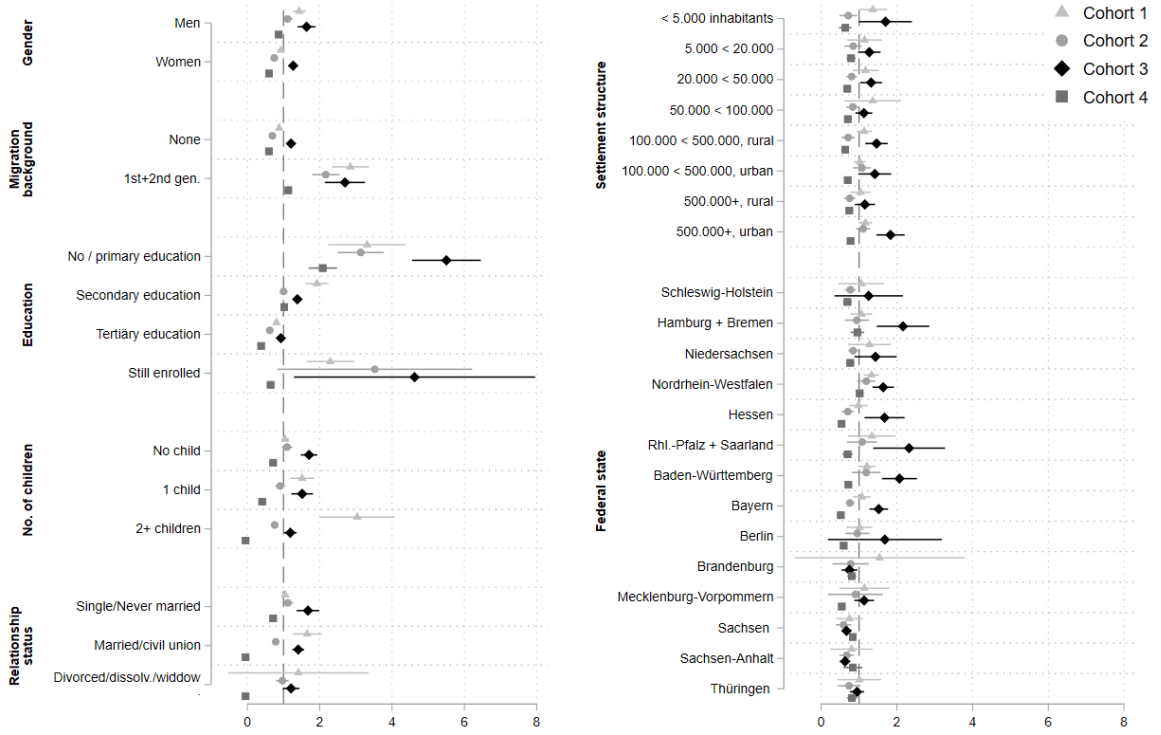


Figure 3: Comparison of educational distribution: Mikrozensus and (unweighted) pairfam COVID-19 survey

The weighting procedure attempts to correct this selection bias by calibrating the observed cases to the Mikrozensus distribution using a 4-step education variable (see section 7.3). The size of the weights varies considerably over education and cohort. Figure 4 shows means (and standard deviations) of the cd2weight variable (full sample) for all calibration characteristics. Due to the standardization, the grand mean over all cohorts is 1.[11] However, cohort 3 has a mean weight of 1.42 (as it received no refreshment sample in wave 11) and cohort 4 has a mean of 0.71 (mostly due to the large refreshment sample). For education, very large weights can be found for the older cohorts with low education and who are currently enrolled. Accordingly, we recommend to combine educational variables into larger categories (e.g., Abitur yes/no) and avoid strong interpretations of educational effects as they might be based on only a small number of cases. In some particular situations, trimming might be an appropriate measure (Potter & Zheng, 2015). In general, we recommend running all models without weights and with calibrated design weights to evaluate the effect of weighting on the results.

[11] For instance, men in the cohorts 1 and 3 tend to be underrepresented in the study and therefore received a weight slightly above 1 indicating that each answer of them will be slightly larger weighted – while women (of cohorts 1, 2, and 4) are overrepresented and received weights < 1.



Note: In cohort 4, no. of children and relationship status was not part of the weighting procedure (see also sec. 7.3). This is indicated with values smaller than 0 in the categories with too small cell numbers.

Figure 4: Mean (and standard deviations) of weights for included reference characteristics

7.5 Best implementation of weights

For most analyses with pairfam COVID-19 data, using weighted data is recommended. If the COVID-19 survey including all subsamples (pairfam base sample, DemoDiff, pairfam wave 11 refreshment) is of interest, using calibrated design weights is highly recommended to control for various selection risks (i.e., by cohort, East/West, and base/refreshment) and cumulated selective participation over the previous pairfam waves. The following commands are recommended for weighting data with Stata using the survey-commands:

. svyset [pweight=cd2weight]

. svy: tabulate sex cohort

. svy, subpop (if cohort==1): tabulate sex cohort

The applied design weight (c*d2weight*) is applicable for the use of the full data set. For subsample analyses (e.g., refreshment sample only), please use the other calibrated design weights c*dweight*, c*d1weight*, and c*d3weight,* respectively.

Please keep in mind that as the pairfam study observes distinct birth cohorts which could differ significantly in behavior/characteristics, estimating point estimates (e.g., mean levels) over multiple

cohorts might not be an adequate approach for most research questions. Often, presenting cohort-specific results might be a more informative choice. In both cases, weights are appropriate.

For integrated analyses over multiple cohorts, calibration weights are necessary because they correct for the unequal response rates within and over cohorts. Nonresponse bias is more often than not a problem. Accordingly, we recommend the use of the calibration weights. Because design weights are a precondition for using calibration weights, pairfam provides already combined calibrated design weights. The design weight corrects only for differential selection probabilities (and not for nonresponse). Nevertheless, design weights are provided in particular for advanced users who may want to model a nonresponse correction themselves.

If only particular subpopulations of the pairfam study are of interest (e.g., cohort 1991-93, residents of Eastern Germany, men, parents), weights are still appropriate. Finally, due to the educational selection bias, we recommend estimating all models without weights and with calibration weights separately to evaluate the effect of weighting on the results. Please keep in mind that the design weights do not control for unequal cohort sizes neither in the net sample nor in the population (whereas calibration weights do).

8 Changes between Release 1.0 and Release 1.1

Variables affected	Description of changes
d2weight	Correction of the nominator in the standardization
cdweight, cd1weight, cd2weight, cd3weight	In order to harmonize the weighting procedure with the pairfam study, several minor changes have been applied: • Settlement structure indicator (BIK) has been simplified from a 10-step to an 8-step indicator. • Federal states: Bremen and Hamburg have been combined to one group as well as Rheinland-Pfalz and Saarland to one. • Education has now been included as a 4-step indicator (previously dichotomized) and is now also applied for the youngest cohort 4.

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