

# Collecting Multi-Actor Family Network Data

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## Abstract

Although ‘the family’ is arguably the most fundamental of all social networks, surprisingly little data are available that enable researchers to study the full web of relationships between family members. Mapping family relationships from multiple – preferably ‘all’ – family members’ perspectives enables understanding relational dependencies, such as how parental divorce reverberates through the network. This article introduces a multi-actor family network survey method aimed at collecting ‘complete’ family network data. It discusses the design and implementation of the *Lifelines Family Ties* project. In this data collection project, a total of 160 children, parents, grandparents, aunts, uncles, and stepfamily members reported on their current and past well-being and their family relationships (contact, support, affection) with 524 family members, resulting in a dataset covering nearly 900 relationships. The article concludes by providing a preview of possible analysis techniques for future users of the *Lifelines Family Ties* dataset or other future multi-actor family network data.

## Keywords

family networks – multi-actor – parental divorce – retrospective data

- Related data set “Lifelines Family Ties”. These data are not publicly available and may be obtained from a third party. Researchers can apply to use the Lifelines data used in this study. More information about how to request Lifelines data and the conditions of use can be found on the website with URL [www.lifelines-biobank.com](http://www.lifelines-biobank.com)
- See the online materials: <https://wiki.lifelines.nl/doku.php?id=divq>

## 1. Introduction

The study of families as networks or systems used to be a vibrant field of research. In the first half of the 20th century, anthropologists explored kinship structures among various cultures and societies (e.g., Lévi-Strauss, 1969). In the latter half of the 20th century, the focus also shifted towards Western family networks, particularly the transformations in relationship structures resulting from parental divorce (e.g., Anspach, 1976; Duffy, 1982; Johnson, 1989; Spicer & Hampe, 1975). While interest in examining family relationships persists, especially in light of the ongoing changes in Western family life, they are not as frequently studied from a network perspective anymore.

Researchers studying contemporary family relationships typically use two types of data: personal family network data and multi-actor family data. In personal family network data, one family member reports about their relationships with and between significant family members (i.e., Widmer, 2016; Widmer et al., 2013). In multi-actor family data, a selected group of family members completes surveys reporting on various family relationships, often focusing on parent-child or sibling relationships. This data is often collected across multiple time points, enabling longitudinal analyses. However, researchers studying the broader system in which these family relationships are embedded, as well as considering the perspective from which they are reported, can benefit from family network data that encompass relational reports from and between multiple – ideally all – family members. Personal network data and multi-actor family data are not suitable for this purpose, nor were they collected to serve it. Therefore, this article introduces a multi-actor family network survey method with the aim of collecting ‘complete’ family network data.

This article introduces *Lifelines Family Ties* (de Bel, 2020; Stolk et al., 2008), a multi-actor family network data collection project. In this project, children, grandparents, aunts, uncles, and stepfamily members are invited to participate in the family network study through the parents. The primary goal of data collection was to examine changes in family networks following parental divorce, which occurred 5–10 years earlier (de Bel, 2020). Family members were asked to report on their current and past mutual family relationships (i.e., contact, support, affection) and their well-being. Ideally, families would be followed over time and capture the pre-divorce family network prospectively. This project was limited in time and budget, making such a prospective design infeasible. Families were recruited from an existing cohort study that roughly represents the general population of the Northern part of the Netherlands (Klijs et al., 2015). This approach provided us with a sample of both divorced and non-divorced families. Detailed information regarding ethical clearance and GDPR compliance is available in [Online Material A](#).

## 2. Methods

### 2.1. *Characteristics of the Cohort Study*

Lifelines is a multi-disciplinary prospective population-based cohort study examining in a unique three-generation design the health and health-related behaviours of 167,729 individuals living in the North of The Netherlands (Stolk et al., 2008). It employs a broad range of investigative procedures in assessing the biomedical, socio-demographic, behavioural, physical and psychological factors which contribute to the health and disease of the general population, with a special focus on multi-morbidity and complex genetics.

Lifelines initially recruited its participants through general practitioners, who invited patients aged between 25 and 50, resulting in ~81,500 participants. These participants were then asked to invite their family members, including parents, partner, children, and parents-in-law, leading to an additional ~64,500 participants and encompassing ~20,500 three-generation families. An additional ~21,500 self-registered individuals were included, many of whom were motivated by the complementary health information from the medical examinations (see Scholtens et al., 2015, for numbers). Lifelines was launched in 2016 and invites its participants every 5 years. It also maintains regularly updated register data, including information on marital status.

2.2. *Selecting Families*

The number of available three-generation families varied greatly between families with divorced and non-divorced parents. There were 8,539 non-divorced two-parent families available, including 805 families with at least one participating grandparent in Lifelines. In contrast, there were only 358 families with divorced parents available, with only 103 of them having at least one participating grandparent in Lifelines. The available sample of families, whether with divorced or non-divorced parents, was categorized into six selection groups based on combinations of family members: at least one child (C), one parent (P), both parents (2P), one grandparent (GP), at least one grandparent on both sides (2GP), and all four grandparents (4GP) (see Table 1 below). Consequently, families with divorced parents were selected when there was at least one child aged 12 years or older (6–16 years at the time of divorce) and at least one parent (divorced 5–10 years ago) known in Lifelines. Families with non-divorced parents were selected when there was at least one child aged 12 years or older, and both parents (first partners/not married before) were known in Lifelines.

2.3. *Approaching Families and Their Response*

Between October 2017 and February 2019, all 358 divorced and 120 non-divorced parents received an informational email containing an informed consent (IC) form and a family contact form (see Table 1<sup>1</sup>). The mail was followed up by a telephone call after 2 weeks (see process in Figure 1). No invitations were sent in December and during July–August due to the holiday and vacation season.

Out of the 358 available divorced families who were approached, 44 contact persons responded positively (see Table 1). However, 20 of them did not provide the correct contact details for their family members or did not obtain

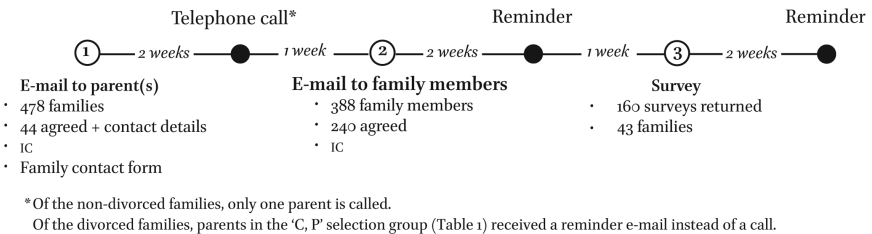


FIGURE 1    Flowchart of the data collection process

1 When starting to approach families, the selection groups were not as precisely disaggregated as in Table 1. This is why not all non-divorced families from the 'C, 2P, 2GP' selection group were approached and why 'C, 2P' families were invited instead of 'C, 2P, GP' families.

TABLE 1 Available and approached families

Divorced					
Selection group	Available families	Approached families	Parent(s) agreed	(Right) contact details provided	Primary response rate
C, P	226	226	19	7	0.03
C, 2P	29	29	4	4	0.14
C, P, GP	87	87	17	10	0.11
C, 2P, GP	15	15	4	3	0.20
C, 2P, 2GP	1	1	0		0.00
C, 2P, 4GP	0				
Total	358	358	44	24	0.07
Non-divorced					
Selection group	Available families	Approached families <sup>[a]</sup>	Parent(s) agreed	(Right) contact details provided	Primary response rate
C, 2P	7734	7	0	0	0.00
C, 2P, GP	725	34	7	7 <sup>[a]</sup>	0.21
C, 2P, 2GP	60	59	15	11	0.19
C, 2P, 4GP	20	20	3	2	0.10
Total	8539	120	25	20	0.17
Grand total	8897	478	69	44	0.09

<sup>[a]</sup> The family with whom it was agreed in advance to participate as an ego network is included in the primary response rate even though we could not approach the family members

permission from their family members to share their contact information. This resulted in 24 divorced families for which we could invite the family members, resulting in an overall primary response rate of 7%. The highest primary response rate (20%) was observed in the ‘C, 2P, GP’ selection group.

Among the 120 non-divorced families who were approached, 25 responded positively. However, five parents did not provide the correct contact details for

their family members or did not obtain permission from their family members to share their contact information. One family was retained as an ego network. Consequently, 20 non-divorced families remained, and the family members of 19 of these families could be invited. While the overall primary response rate of 17% is notably higher than the overall primary response rate of 7% for the divorced families, this difference is biased by the selection groups. Similar to the divorced families, the highest primary response rate of 21% was observed in the 'C, 2P, GP' selection group.

#### 2.4. *Approaching Family Members*

Once parents returned the participation forms along with the contact details of their family members, family members could be invited. In cases where these family members were not already participants in the Lifelines study, it was explained that they would not become part of the cohort study, but only participate in this study.

A total of 204 family members, including parents, in 24 divorced families were approached (see Table 2 below). 150 family members returned the IC form and 140 did so with a positive reply. A total of 184 family members, again including the parents, in 20 non-divorced families were approached. 109 family members returned the IC and 100 were positive. No families dropped out at this stage because there was always at least one invited family member other than a parent who agreed to participate.

#### 2.5. *Filling out the Survey*

The family members who provided consent were sent a link to their family survey. The first question concerned an identification question ("Who are you from this list of family members?"), resulting in a personalized survey. Depending on the respondent's family role, they were addressed differently, with children addressed less formally than adults. The content of the questions varied based on divorce status and family role. For children under 18, whose parents had granted permission for their participation, an additional question about their consent was included to ensure their voluntary involvement. Children and extended family members from divorced families were presented with supplementary questions concerning their experiences during the divorce. Parents were provided with additional inquiries about their current and former partner relationships. Stepfamily members were excluded from questions regarding the period before the parental divorce. The survey solicited both current and retrospective reports on family relationships (e.g., contact, support, affection) and well-being (the survey and codebook are available in [Online Material B](#)). The median response time for completing the survey was 37.72 minutes.

TABLE 2      Approached and participating family members

Selection group	IC's sent to family members	IC's returned (of which positive)	Surveys returned	Divorced		Achieved multi-actor diagram <sup>[a]</sup>					
				Mean secondary response rate (s.d.)	Number of family networks (of which multi-actor)	1F	1G	2-1G	2G	2-2G	3G
C, P	52	37 (35)	27	0.50 (0.26)	7 (6)	1			3	3	
C, 2P	39	28 (25)	19	0.54 (0.34)	4 (4)				2	2	
C, P, GP	75	58 (55)	33	0.45 (0.24)	10 (9)	1	2		4	1	1
C, 2P, GP	38	27 (25)	21	0.56 (0.22)	3 (3)			1	1	1	1
Total	204	150 (140)	100	0.49 (0.25)	24 (22)	2	2	1	9	7	2
Non-divorced											
Selection group	IC's sent to family members	IC's returned (of which positive)	Surveys returned	Non-divorced		Achieved multi-actor diagram <sup>[a]</sup>					
				Mean secondary response rate (s.d.)	Number of family networks (of which multi-actor)	1F	1G	2-1G	2G	2-2G	3G
C, 2P, GP	65 <sup>[b]</sup>	35 (32)	15	0.26 (0.16)	7 (5)	2	2	1	2		
C, 2P, 2GP	100	55 (49)	34	0.32 (0.23)	10 (6)	4	1		3		2
C, 2P, 4GP	19	19 (19)	11	0.62 (0.36)	2 (2)				1	1	1
Total	184	109 (100)	60	0.34 (0.24)	19 (13)	6	3	1	2	4	3
Grand total	388	259 (240)	160	0.42 (0.25)	43 (35)	8	5	2	11	11	2

<sup>[a]</sup> 1F = one family member, 1G = one generation, 2G = two generations, 3G = three generations, '2-' prefix = information from paternal and maternal side  
<sup>[b]</sup> The family with whom it was agreed in advance to participate as an ego network is not included in the secondary response rate, but is included in the multi-actor diagram

Among divorced families, 100 family members from 24 families completed the survey (see Table 2). Out of these, 75 were Lifelines participants. Of the 100 family members who initiated the survey, 91 successfully completed it. To assess the secondary response rates, the number of returned surveys was divided by the number of ICs sent to family members within each family. The selection group 'C, 2P, GP' had the highest average secondary response rate. Among the 24 family networks, 22 are multi-actor. The most common types are the '2G' multi-actor diagram (see Table 2), indicating participation from two generations, and '2-2G', which signifies that participating family members come from both parents' sides.

In non-divorced families, 60 family members from 19 family networks completed the questionnaire (see Table 2). One family, despite initially responding positively to the IC, eventually dropped out due to non-response from all family members. Out of the 42 respondents asked, 31 mentioned being Lifelines participants. Of the 60 family members who began the survey, 55 finished it. The overall mean secondary response rate was 34% (S.D. = 24%), which is notably lower than the secondary response rate observed in divorced families (49%; S.D. = 25%). The highest response rate was observed in the 'C, 2P, 4GP' selection group. Among the 19 family networks, 13 are multi-actor. Notably, the number of ego networks ('1F', see Table 2 above), where only one family member completed the survey, is higher compared to divorced families. Similar to divorced families, the multi-actor diagrams '2G', which denotes participation from family members spanning two generations, and '2-2G', indicating participation from family members on both parents' sides, are the most common types. However, the multi-actor diagram '2-3G', signifying participation from family members across three generations on both parents' sides, is still relatively rare but notably more prevalent among non-divorced families.

It is worth noting that the collected dataset is not entirely free from selection bias, as evidenced by the lower primary response rates among divorced families and the varying response rates among selection groups. The lower secondary response rate among non-divorced families also underscores the sensitivity of the topic of family relationships, which probably led to the inclusion of both divorced and non-divorced families with less problematic family relationships. Additionally, our decision to approach divorced families at least 5 years after the divorce likely means that the families or participating family members have had time to adapt to the divorce process. As a result, we anticipate that both groups include families with relatively stabilized relationships. In



families with only a few participating family members, this characteristic may be limited to a small group centred around the primary family member. While acknowledging the need for caution regarding potential bias for future users of the *Lifelines Family Ties* dataset, it is essential to recognize that similar biases exist in other multi-actor datasets (see [Online Material C](#)) and may well be considered inherent in the process of collecting multiple reports from different family members.

### 3. Data

- *Lifelines Family Ties* deposited at Lifelines Biobank – DOI:[www.lifelines-biobank.com](http://www.lifelines-biobank.com)
- **Online materials**
  - Ethical clearance and GDPR compliance – URL:[https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online\\_material\\_a.pdf](https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online_material_a.pdf)
  - Codebook (EN) and questionnaire (NL) – URL:[https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online\\_material\\_b.pdf](https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online_material_b.pdf)
  - Comparison of response rates other multi-actor datasets – URL:[https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online\\_material\\_c\\_def.pdf](https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online_material_c_def.pdf)
  - Scales – URL:[https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online\\_material\\_d.pdf](https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online_material_d.pdf)
  - Participating vs. available families – URL:[https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online\\_material\\_e\\_def.pdf](https://wiki-lifelines.web.rug.nl/lib/exe/fetch.php?media=online_material_e_def.pdf)
- **Temporal coverage:** Autumn 2017-Spring 2019 (data collection)

160 family members, from 24 divorced and 19 non-divorced families, reported on their well-being and current and past mutual family relationships (i.e., contact, support, affection) with 524 family members (number of family members mentioned in the survey), covering almost 900 relationships. 35 families of these 43 families were ‘multi-actor’, meaning that more than one family member in a family reported about his/her relationships. Survey completion was high with an average completion rate of 95.5%. For the 14 family members who did not reach the end of the survey, the average survey completion was 49% (ranging from 17% to 92%). Although the ideal of collecting ‘complete’ multi-actor family network data was only partially achieved, some multi-actor diagrams in *Lifelines Family Ties* are ‘more complete’ than in other multi-actor family datasets (see [Online Material C](#) for details).

3.1. *Characteristics of the Participating Families*

Table 3 presents the characteristics of the participating families in *Lifelines Family Ties*. The networks of divorced families contain on average one member less than non-divorced families (11.8 vs. 12.6) mostly due to a difference in reported paternal extended family members (grandparents: 0.8 vs. 1.3 and aunts/uncles 2.0 vs. 2.4).

TABLE 3      Characteristics of the families in *Lifelines Family Ties*

	Divorced families (N = 24, n = 284 <sup>[a]</sup> )				Non-divorced families (N = 19, n = 240 <sup>[a]</sup> )			
	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
<i>Family average</i>								
Network size	11.8	3.8	6	22	12.6	3.3	9	21
Number of children	2.2	0.8	1	4	2.4	0.9	1	5
Number of parents	2.0	0.0	2	2	2.0	0.0	2	2
Number of paternal grandparents	0.8	0.8	0	2	1.3	0.9	0	2
Number of paternal aunts/uncles	2.0	1.4	0	6	2.4	1.6	0	6
Number of maternal grandparents	1.4	0.8	0	2	1.5	0.5	1	2
Number of maternal aunts/uncles	3.0	3.5	0	17	3.0	2.2	0	7
Number of step and other family members	0.5	0.9	0	4				
<i>Parental average</i>								
Relationship duration	4.6	1.0	3	6	5.9	1.1	4	7
Year of divorce	2009	2.3	2005	2013				
Year of birth parents	1966	3.1	1961	1973	1967	5.0	1959	1976
Parental education	2.7	0.4	2	3	2.5	0.5	2	3
Parental conflict	2.0	0.5	1.0	2.8	1.3	0.3	1.0	1.8

<sup>[a]</sup> number of family members about whom is being reported

The parental averages in Table 3 are the mean of both parents' reports when available and the single parental report otherwise. Relationship duration (scale in [Online Material D](#)), was longer among non-divorced parents than among divorced parents. Divorced parents are on average one year older and higher educated than non-divorced parents. Parental conflict (scale in [Online Material D](#)) is higher among divorced parents than among non-divorced parents.

### 3.2. *Representativeness of the Larger Population*

Using data from the Lifelines database, we matched fathers and mothers from the participating families in *Lifelines Family Ties* with fathers and mothers in the available families from the Lifelines selection sample (as shown in Table 1). We then compared their basic demographic characteristics (see Tables 4a and 4b in [Online Material E](#)). It was observed that participating parents in *Lifelines Family Ties* have slightly fewer children and siblings compared to parents from the selection sample. Additionally, mothers in *Lifelines Family Ties* are more likely to be employed than mothers in the selection sample. For non-divorced parents in *Lifelines Family Ties*, there are slight differences in that they tend to be slightly younger, have higher levels of education, and live in more urbanized areas (scale in [Online Material D](#)) compared to non-divorced parents in the available sample. In other words, although there are some notable differences between parents in *Lifelines Family Ties* and the available parents in the larger Lifelines sample, these differences are small and not considered critical.

## 4. Research Potential

The *Lifelines Family Ties* data can be accessed via Lifelines. Since the larger Lifelines project involves the collection of sensitive personal medical data, this information is relatively easy to trace back to individuals. Therefore, Lifelines has chosen to make all its data, including the *Lifelines Family Ties* dataset, only accessible in a secure workspace. Researchers can apply to gain access to this workspace. More information about how to request Lifelines data and the conditions of use can be found on their website.<sup>2</sup> Another option for working with the *Lifelines Family Ties* dataset is to collaborate with the authors. Lastly, the dataset may be accessed for free for a maximum of three months for replication purposes only, under conditions set by Lifelines.<sup>3</sup>

<sup>2</sup> [www.lifelines.nl/researcher/how-to-apply](http://www.lifelines.nl/researcher/how-to-apply)

<sup>3</sup> By contacting [data@lifelines.nl](mailto:data@lifelines.nl).

This dataset presents an opportunity to explore a wide range of research questions, with a primary focus on family relationships. First, researchers can analyze the data as personal network data. Personal network studies often aim to explain individual outcomes by examining the characteristics of the network. A first article analyzing these data serves as an illustration of the numerous possibilities. It examines how multi-functional family ties, ties that serve multiple needs simultaneously, are associated with family members' well-being (e.g., de Bel, 2023). The data were analyzed by adopting a multi-level repeated measures model, i.e., considering the two time points and the nested structure of family members in families. Other possibilities would be to study how other relational dimensions, such as contact or strong bonds, or specific relational structures, such as triads (e.g., de Bel et al., 2021; de Bel & Widmer, 2024), are associated with family members' well-being.

Second, although the family social network data are not complete, that is, they do not contain the reports by all family members, social network analysis can be employed to investigate the structure and changes of these networks. This can be achieved by employing methods that allow missing observations or by imputing the missing data. In cases where complete network data is available, both family members provide reports about their mutual relationship. If one of these reports is missing, it can be substituted with the other available report. Generally, symmetrized social networks may be used for the analysis.

Third, parents were not only asked – like all other family members – to report on the relationships *with* their family members, they were also asked to share their perspectives on the relationships between their family members. This additional layer of data may be of interest to researchers who are interested in cognitive social structures (Brands, 2013; Krackhardt, 1987) and wish to explore differences between self-reported and perceptual network data.

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