NSW GOVERNMENT

11
Technical report

Pathways of Care Longitudinal Study: Outcomes of Children and Young People in Out-of-Home Care

The Adapted Kvebaek Family Sculpture Technique and Closeness Measures: Data User Guide

Pathways of Care Longitudinal Study: Outcomes of Children and Young People in Out-of-Home Care in NSW

Technical Report No. 11
The Adapted Kvebaek Family Sculpture Technique and Closeness Measures: Data User Guide

Published by
New South Wales Department of Communities and Justice (DCJ)
Family and Community Services Insights Analysis and Research
6 Parramatta Square, 10 Darcy Street
Parramatta NSW 2150
Phone + 61 2 9716 2222
May 2022

ISBN: 978-0-6482697-5-5

Recommended citation Taylor, A., & Cashmore, J. (2022). The Adapted Kvebaek Family Sculpture Technique and Closeness Measures: Data User Guide. Pathways of Care Longitudinal Study: Outcomes of Children and Young People in Out-of-Home Care. Technical Report Number 11. Sydney. NSW Department of Communities and Justice.

Disclaimer
DCJ funds and leads the Pathways of Care Longitudinal Study. The analyses reported in this publication are those of the authors and should not be attributed to any data custodians. The authors are grateful for the reviewers' comments.

About the information in this report
The Kvebaek Family Sculpture Technique https://kvebaeksculpting.com/ was adapted for the Pathways of Care Longitudinal Study by Professor Judy Cashmore, Dr Joanna Watson, Marina Paxman and Dr Diana Smart with the permission from Julie Thorsheim, KST ASSOCIATES dated 2 November 2011. We acknowledge David Kvebaek and KST ASSOCIATES for developing the theoretical basis and method under girding the Kvebaek instrument that informed the development of our research activity exploring relationships and closeness. All the analyses presented in this report are based on the Wave 1-4 unweighted data collected in face-to-face interviews with children, young people and caregivers.

Pathways of Care Longitudinal Study Clearinghouse
All study publications including research reports, technical reports and briefs can be found on the study webpage www.facs.nsw.gov.au/resources/research/pathways-of-care

Study design by Australian Institute of Family Studies, Professor Judy Cashmore, University of Sydney; Professor Paul Delfabbro, University of Adelaide; Professor Ilan Katz, University of NSW; Dr Fred Wulczyn, Chapin Hall Center for Children University of Chicago.

Study data collection by I-view Social Research.

Advisors Expert advice and support has been provided by the CREATE Foundation; Aboriginal Child, Family and Community Care State Secretariat (AbSec); My Forever Family NSW; and program areas.

Acknowledgements We wish to extend our thanks to all the children, young people and caregivers who participated in interviews; childcare teachers, school teachers and caseworkers who participated in on-line survey interviews; and the data custodians in the relevant NSW and Commonwealth government departments. Ms Sammy Verma grew up in care and played a key role in the production of the study video for children and stakeholders. Ms Billy Black also grew up in care and designed the study artwork. Ms Sammy Verma and Mr Samuel Eyeson-Annan both did the voiceover for the audio computer-assisted self-interview (ACASI) for the child/young person interview.

Ethics approval by The University of NSW Human Research Ethics Committee (HC10335, HC16542, H210985); Aboriginal Health and Medical Research Council of NSW Ethics Committee (766/10); NSW Department of Education and Communities State Education Research Approval Process (SERAP, 2012250); NSW Population & Health Services Research Ethics Committee (Ref: HREC/14/CIPHS/74 Cancer Institute NSW: 2014/12/570).

Contents

List of figures

List of tables

List of exhibits

Preface

The Pathways of Care Longitudinal Study (POCLS) is funded and managed by the New South Wales Department of Communities and Justice (DCJ). It is the first large-scale prospective longitudinal study of children and young people in out-of-home care (OOHC) in Australia. Information on safety, permanency and wellbeing is being collected from various sources. The child developmental domains of interest are physical health, socio-emotional wellbeing and cognitive/learning ability.
The overall aim of this study is to collect detailed information about the life course development of children who enter OOHC for the first time and the factors that influence their development. The POCLS objectives are to:

- Describe the characteristics, child protection history, development and wellbeing of children and young people at the time they enter OOHC for the first time.
- Describe the services, interventions and pathways for children and young people in OOHC, post restoration, post guardianship, post adoption and on leaving care at 18 years.
- Describe children's and young people's experiences while growing up in OOHC, post restoration, post guardianship, post adoption and on leaving care at 18 years.
- Understand the factors that influence the outcomes for children and young people who grow up in OOHC, are restored home, are on guardianship orders, are adopted or leave care at 18 years.
- Inform policy and practice to strengthen the OOHC service system in NSW to improve the outcomes for children and young people in OOHC.

The POCLS is the first study to link data on children's child protection backgrounds, OOHC placements, health, education and offending held by multiple government agencies; and match it to first-hand accounts from children, caregivers, caseworkers and teachers. The POCLS database will allow researchers to track children's trajectories and experiences from birth.

The population cohort is a census of all children and young people who entered OOHC for the first time in NSW over the 18 month period between May 2010 and October 2011 (n=4,126). A subset of those children and young people who went on to receive final Children's Court care and protection orders by 30 April 2013 (n=2,828) were eligible to participate in the study. For more information about the study please visit the study webpage www.facs.nsw.gov.au/resources/research/pathways-of-care.

The POCLS acknowledges and honours Aboriginal people as our First Peoples of NSW and is committed to working with DCJ's Transforming Aboriginal Outcomes, and Ngaramanala (Aboriginal Knowledge Program), to ensure that Aboriginal children, young people, families and communities are supported and empowered to improve their life outcomes. The POCLS data asset will be used to improve how services and

supports are designed and delivered in partnership with Aboriginal people and communities.

DCJ recognises the importance of Indigenous Data Sovereignty and Governance (IDS/G) of all data related to Aboriginal Australians. The NSW Data Strategy (April 2021) includes the principles of IDS/G and provides provisions in regard to:

- Ensuring that our approach to data projects assesses the privacy, security and ethical impacts across the data lifecycle.
- Ensuring the controls are proportionate to the risks and that we consider community expectations and IDS.
- Guaranteeing a culture of trust between data providers and recipients, including Aboriginal people, through consistent and safe data sharing practices and effective data governance and stewardship.

A whole of government response to IDS/G in NSW is being led by the Department of Premier and Cabinet, along with the Coalition of Aboriginal Peak Organisations, including a position on reporting disaggregated data. The POCLS will continue to collaborate with Aboriginal Peoples and will apply the policy principles once developed.

In the interim, POCLS publications contain data tables that provide direct comparisons between the POCLS Aboriginal and non-Aboriginal cohorts. Interpretation of the data should consider the factors associated with the over-representation of Aboriginal children in child protection and OOHC including the legacy of past policies of forced removal and the intergenerational effects of previous forced separations from family and culture. This erosion of community and familial capacity over time needs to be considered in any reform efforts as it continues to have a profoundly adverse effect on child development. The implications for policy and practice should highlight strengths, develop Aboriginal-led solutions and ensure that better outcomes are achieved for Aboriginal people.

1 Introduction to the measures on children's relationships

This report describes the Pathways of Care Longitudinal Study (POCLS) measures and approaches to the analysis of the relationships between children and young people[1]in out-of-home care (OOHC) and the people in the household in which they were living, and those between the children and the members of their birth family and other people they were not living with. In particular, it examines how *close* children felt to the people around them, using several different measures. It also outlines the association between those measures and the characteristics of the children and their circumstances. The data were collected as part of the POCLS Waves 1–4, over a 7–8 year period, from children aged 7–17 years old.

Adapted Kvebaek Family Sculpture Technique (KFST)

The Kvebaek Family Sculpture Technique (KFST) is a symbolic figure placement procedure used in family assessment and research (Cromwell, Fourier & Kvebaek, 1980).[2] The KFST was first developed for use in family therapy and clinical work. It has been used clinically and in research in relation to family law (Cashmore & Parkinson, 2016; Guttman & Rosenberg, 2003), and the impact of clinical and family therapy studies (Nøvik & Solem, 2003). It has also been used in several Australian studies of the perspectives and perceptions of family with children then in foster care and adults who had been in foster care (Gardner, 1996 and 2004).

The adaptation of this technique in the POCLS involved children and young people aged 7-17 years placing figures or figurines, representing household or family members, on a matrix board to indicate how close they felt to each of these people. The children were first asked to select figures to represent the people they were living with (hereafter Family 1) and then to select figures to represent the people who were otherwise important to them but with whom they were not living including members of the birth family (hereafter Family 2). This technique provides several measures that indicate:

- The people the child selects as being part of their household (those they are living with) i.e. Family 1

[1] The term 'children and young people' is used interchangeably with 'children' unless otherwise specified.
[2] The Kvebaek website is at https://kvebaeksculpting.com/ In an early study, Russell (1980) reported overall test-retest reliability of 0.66 for the KFST. Berry, Hurley, and Worthington (1990) also reported significant correlations between the KFST's scores of emotional proximity and those of Olsson's FACES III test.

- The people the child selects as being part of their family and other people who they select as being 'important and special' for them (but not living with) i.e. Family 2
- Children's reported or perceived closeness to household and family members and others, as measured by the distance between the child's own figure and the other figures
- The overall configuration and degree of cohesiveness of the group of people selected and the child's 'position' or 'placement' within or relative to that group.

In summary, the configuration of the figures on the adapted KFST matrix board is assumed to provide a visual representation of children's interpersonal landscape and relationships. The primary measure of closeness is the distance between the child and the other people on the matrix. The data collected with the adapted KFST activity are referred to as *Kvebaek distance* data.

Closeness ratings scale

In some waves, children were asked to use a four-point scale to rate their closeness to the people from Family 1 and Family 2. The response options were on the 4-point rating scale: 1 = 'Very close'; 2 = 'Fairly close'; 3 = 'A bit close' and 4 = 'Not close at all', as well as 'non-response' options, 8 = 'Don't know' and 9 = 'Pass'. This required children to do multiple ratings for closeness, one for each person from Family 1 and Family 2. In some cases, the closeness ratings were used as an alternative to the POCLS adapted KFST activity; in others, the two methods were used together to allow comparisons. The data obtained with rating scales are referred to as *closeness ratings*.

Additional information

Additional information on children's relationship with others was also collected in some waves:

- In Wave 1, children were asked to nominate the three people who were most important and special to them.
- In Wave 4, children were asked who they would like to have more and less contact with.

In summary, this technical report describes:

- The POCLS adapted KFST activity questions and interviewer instructions
- The relevant data in the POCLS datasets
- How the data can be prepared for graphing and analysis
- How the data can be analysed (a mixed model analysis is reported as an example, but is not intended to be comprehensive)
- Selected SPSS and R syntax are presented in the Appendices.

2. POCLS adapted Kvebaek Family Sculpture Technique (KFST) Activity

As outlined above, children aged 7 to 17 years were asked to indicate who they felt close to, and to what extent, using an activity adapted from the KFST (Cromwell, Fournier & Kvebaek, 1980). The descriptions of the technique are outlined by Vandvik and Eckblad (1993) and Berry, Hurley and Worthington (1990).

- Children first placed a representation of themselves (a wooden figure, as shown in Figure 1) on any of the 64 squares on an 8 x 8 board (Figure 1), referred to here as a *matrix* or *board*.
- They were then asked to place representations of the other people from Family 1 on the matrix so as to indicate how close the child felt to them (see Exhibit 2).
- They were then asked to repeat the activity (starting with the figure representing themselves in the same position as before), this time placing figures representing the people from Family 2.

Figure 1.Top left: A child engaged in the Adapted Kvebaek Family Sculpture Technique activity; Top right: Unvarnished figures used with older children; Bottom: Figures used in the activity, reflecting several cultural backgrounds

The questions and interviewer's instructions are shown in Exhibits 1 and 2.[3]

Exhibit 1. Question used to find out who the child was living with at the time of the interview

To start with, who are you living with now?

- Foster family
- Relative's family
- Kinship family (not a relative but a person/family who shares cultural, tribal and community connection)
- Other young people and workers (residential care)
- Flat-mates (independent living)
- Myself (only me in independent living)
- Other (specify)

Exhibit 2 below shows how interviewers asked the children to take part in the adapted KFST activity, first placing people they were living with on the Kvebaek matrix (Family 1), then 'people really important and special to you that you don't live with now' (Family 2).

[3] The full POCLS Child and Young Person Questionnaire is available on the webpage www.facs.nsw.gov.au/resources/research/pathways-of-care.

Exhibit 2. The instructions for interviewers administering the adapted KFST activity

[ACTIVITY PROP'S: 8X8 SQUARE GRID AND MIX OF FIGURINES.]

Let's start with this activity and you can tell me who you live with now…
Here (INTERVIEWER: POINT TO THEM) are different figures for you to use to show the people you're living with now. There are figures for the adults and some for the children. Let's have a go?

• Child agrees to complete
• Child refuses to complete (specify) [TEXT BOX]

Let's start with you – can you choose a figure that's you and put it on the side here?

Now, can you pick out figures for all the other people living here, put them on the side, and tell me who they are in relation to you, for example: your foster mother, your grandmother, your foster brother, your foster sister?

[**INTERVIEWER: THE AGES OF FAMILY MEMBERS OVER 18 YEARS DO NOT NEED TO BE COLLECTED. PLEASE SELECT 'OVER 18 YEARS' FOR THESE PERSONS. FOR NOMINATED PEOPLE WHO ARE NOT OVER 18 YEARS OF AGE, JUST ASK WHETHER THEY ARE OLDER THAN YOU, ABOUT THE SAME AGE, OR YOUNGER THAN YOU] PROGRAMMING: PRESENT ALL POSSIBLE 23 PEOPLE IN THE HOUSEHOLD AS ONE GRID, NUMBERED FROM 1 to 23. (NO QUESTION PRECEDING THIS THAT ASKED THE NUMBER OF PEOPLE IN THE HOUSEHOLD**).

Member of household now Relationship Age (<18 years)

Now can you put these other people on the board to show how important and special they feel to you? When you've finished let me know.

[***INTERVIEWER*: WHEN APPROPRIATE REFLECT ON THE ACTIVITY WITH THE CHILD "SO YOU ARE SHOWING ME THAT THIS PERSON IS MORE IMPORTANT AND SPECIAL TO YOU THAN THIS PERSON" (POINTING TO THE FIGURES). AFTER THIS PART OF THE ACTIVITY IS COMPLETE, ENTER THE RESULTS INTO THE COMPUTER CONFIRMING WITH John WHO EACH PERSON IS. E.G., THAT'S YOUR FRIEND? B8**.]

The children's responses were recorded as two sets of coordinates, indicating the squares on which the children placed the figures representing themselves and other people. The first set of coordinates relates to the people from Family 1 and the second set relates to people from Family 2. The children were allowed to place more than one figure on a square, and some did so.

The term 'Family 1' is sometimes used to refer to the household the child was living in at the time of the interview (foster or relative/kinship care) and 'Family 2' is sometimes used to refer to the child's birth family, and friends and others the child was not living with. These labels arose from the order in which the children carried out the two adapted Kvebaek tasks.

A point worth noting here is that the adapted Kvebaek distances and the closeness rating scales were originally seen as possible measures of 'felt security' on the part the of the children and young people in the study (Cashmore & Paxman, 2006). Although this conception is now not seen as appropriate, and is not used in this report, the term 'FELT' is preserved in the names of variables and is sometimes used when referring to distance and closeness measurements collectively.

3. The data

3.1 The variables containing data from adapted KFST activity

Table 1 shows the variables containing the coordinates of the figures placed on the Kvebaek matrix and information about the people represented by the figures, most importantly their relationship to the study child, but also their gender and age (noting that age range was only asked at Wave 1). The variables in the lower part of the table are derived from the original variables, and were the ones used when preparing the data for analysis.

Note that the distances between the child and the other figures placed on the Kvebaek matrix were calculated as described in Section 5 of this report; they are different from the ones given in the variables *f1_rdis2_cyp - f1_rdis23_cyp* in Table 1. Further information about the variables and data can be found in the Adapted Kvebaek Family Sculpture Technique data dictionary.

Table 1. Variables containing Kvebaek distance data and associated information in POCLS file 'INTV_felt_w1234_long.sav'[4]

Variables	
Original	
felt1a_lp02_01_cyp - felt1a_lp23_01_cyp	Relationship to child
felt1b_lp02_cyp - felt1b_lp23_cyp	Age of person*
felt1c_lp02_02_cyp - felt1c_lp023_02_cyp	Gender of person
felt1y_lp01_cyp - felt1y_lp23_cyp	Vertical position
felt1x_lp01_cyp - felt1x_lp23_cyp	Horizontal position
Derived	
f1_bat_y02_cyp - f1_bat_y23_cyp	Vertical position – letter
f1_bat_x02_cyp - f1_bat_x23_cyp	Horizontal position - letter
f1_rbat_y02_cyp - f1_rbat_y23_cyp	Vertical position - number
f1_rbat_x02_cyp - f1_rbat_x23_cyp	Horizontal position - number
f1_co_y02_cyp -f1_co_y23_cyp	Horizontal coordinate
f1_co_x02_cyp -f1_co_x23_cyp	Vertical coordinate
f1_rdis2_cyp - f1_rdis23_cyp	Distance from child

[4] This data file is 'long' which implies that it contains a record for each child for each wave in which they participated.

f1_rel_02_cyp - f1_rel_23_cyp	Relationship to child
f1_age_02_cyp - f1_age_23_cyp	Age of person*
f1_gen_02_cyp - f1_gen_23_cyp	Gender of person

Notes: The names of the variables for Family 2 were the same as those for Family 1 as shown above except that the names of the original variables started with *felt2* and the names of the derived variables started with *f2*. Also, there were 10 variables rather than 23.

* The age variables occur only in the Wave 1 data.

3.2 The number of children providing Kvebaek distance data

Table 2 shows the numbers of all children who took part in each wave of the POCLS: 1,285 children in Wave 1; 1,200 in Wave 2; 1,033 in Wave 3 and 962 in Wave 4. These numbers include all children, not just those who were eligible to take part in the adapted KFST activity.

Table 2 also shows the number of waves in which each child participated with 275 taking part in only one wave of the POCLS, 225 in two waves, 273 in three and 734 in all four waves. That is, there were 734 children for whom data were obtained in every one of the four waves. In the upper part of the table, the totals show the sums of the observations over waves, which is equal to the sum of the number of children multiplied by the number of waves in which they participated, e.g., 275*1 + 225*2 + 273*3 + 734*4 = 4,480. Furthermore, the number of children at each wave who were aged from 7 to 17 years is shown as this is the age range of those who were eligible to take part in the POCLS adapted KFST activity.

The second part of the table shows the number of children who provided Kvebaek distance data over the four waves, and the number of waves on which children provided such data. It also shows how many times in each wave four categories of people were put on the Kvebaek matrix:

1. relative/kin/foster mother and
2. relative/kin/foster father (board 1/ Family 1)
3. birth mother and
4. father (board 2/ Family 2).

Note that it was very unusual for any parent to have Kvebaek distance data for all four waves. For this to happen, a child would have to take part in all the waves, be in the required age range for each of the waves (7–17) and agree to undertake the activity each time.

Table 2. The numbers of all children, and those aged between 7 and 17 years, who participated in each wave of the POCLS, the number of waves in which each child participated (upper) and the number who provided Kvebaek distance data (lower)

	Wave				Number of waves in which children participated				
	1	2	3	4	1	2	3	4	Total
Total number of children in POCLS	1,285	1,200	1,033	962	275	225	273	734	4,480
Number of children aged 7-17 at wave	377	463	475	744	521	203	196	136	2,059
Number of children for whom the adapted KFST data were obtained									
Board (Family) 1	331	279	232	577	512	200	125	33	1,419
Relative/kin/foster mother	159	130	102	294	315	112	42	5	6,85
Relative/kin/foster father	131	110	84	218	250	77	33	10	543
Board (Family) 2	305	261	218	526	513	196	107	21	1,310
Birth mother	210	163	115	222	322	120	44	4	710
Birth father	145	130	91	176	258	83	34	4	542

Notes: The number of children who participated in at least one wave = 1,507. The number of children aged 7-17 years who participated in at least one Wave = 1,056. The number who provided Kvebaek distance data on at least one wave = 870 (Family 1) and 837 (Family 2). Sometimes birth parents were part of Family 1. The numbers of birth parents in the table are for those placed on the board in the context of Family 2.

Appendix 1 shows the combinations of waves in which each child provided Kvebaek distance data. For example, 15 children have the code 10101 for Family 1 which, ignoring the leading ‘1’, shows that they did not provide data at Wave 1 and 3, but did so in Waves 2 and 4.

'Other' relationships and 'no position' responses (the figure was not placed on the Kvebaek matrix) are not considered here.

3.3 The questionnaire variables containing data from the closeness rating scale and additional information about the child's relationship with others

Table 3 shows variables that provide information on closeness rating and children's relationship with others. These variables are related to or, in some cases, were alternatives to, the Kvebaek distance variables. Brief descriptions of the questions related to the variables are included in the table.

In Wave 1 children were asked who the three most important and special people were to them. They answered in terms of the people they had placed on the Kvebaek matrix, and could include members of both Family 1 and 2. A total of 169 children answered the question[5].

In Waves 2 to 4, children who chose not to complete the adapted KFST activity were asked closeness ratings for members of Family 1 and Family 2 in ACASI questions. The variables containing the ratings and the codes for the people to whom the closeness ratings applied are shown in Table 3.

In Wave 2 and 3, the adapted KFST activity was replaced by closeness ratings for all young people aged 12–17 years. This was based on feedback from some interviewers that the young people did not like the activity. The closeness rating questionnaire was administered with ACASI.

However, at Wave 4 all 7–17 year olds were asked to complete the adapted KFST activity and if they refused, they were asked the related closeness rating questions using ACASI questions.

[5] Note that the question was discontinued at Wave 2, but eight answers were recorded. These remain in the dataset but are ignored in this analysis.

Table 3. Variables containing closeness and associated data in the data file 'INTV_felt_w1234_long.sav'

The three most special and important people (Wave 1)	
felt3_01_cyp - felt3_03_cyp	Of people on the Kvebaek matrix
Closeness as an alternative to Kvebaek distance data (Wave 2-4)	
felt1a_new2_01_cyp - felt1a_new2_23_cyp	Relationship* (Fam1)
felt2_new2_01_cyp – felt2_new2_23_cyp	Closeness† (Fam1)
felt3a_new2_01_cyp – felt3a_new2_10_cyp	Relationship* (Fam2)
felt4_new2_01_cyp – felt4_new2_10_cyp	Closeness† (Fam2)
Closeness to relate to Kvebaek distance data (Wave 2-3)	
	How important and special ** person 2-4 (Person 1 is the child)
	More and less contact with (Wave 4)
felt11c_new4_1_cyp - felt11c_new4_6_cyp	More contact ††
felt11d_new4_1_cyp - felt11d_new4_6_cyp	Less contact ††

* The relationship, e.g., foster mother, of the person to the child.

† Rating on four-point scale – *Very close, Fairly close, A bit close* and *Not close at all*.

** Ratings were for the first three people placed on the Kvebaek matrix. The scale was *Very close (very important & special), Fairly close, A bit close*, and *Not close at all (not important & special)*. Note the addition of *important* and *special* to the anchor categories.

†† *Who do you want to have more/less contact with?*

3.4 The number of children providing data on the closeness rating scale and additional information on relationships

The numbers of children for whom the closeness rating scale and associated data were obtained are shown in Table 4. For Family 1 a few participants (n=18) provided only closeness ratings over the four waves. The remaining 132 who did closeness ratings on one or more waves also did the adapted KFST activity on one or more other waves. A similar pattern occurred for data for Family 2.

In Waves 2 and 3, data were collected which would allow the calculation of the correlation of the distances between the figure representing the child and the other people placed on the Kvebaek matrix on the one hand, and closeness ratings of the same people on the other hand.

Table 4. Numbers of children who provided closeness ratings scale data and associated data in each wave, and the number of waves in which each child provided such data

	Wave					Number of waves with child providing data					Total
	1	2	3	4		1	2	3	4		
Number of children who nominated people who were 'most important and special' to them											
N	169					169					169
Number of children who provided ACASI closeness ratings in lieu of the Kvebaek distance data											
N Family 1		57	94	43		116	36	2			194
N Family 2		55	86	42		110	33	2			182
Number of children who provided closeness ratings as well as Kvebaek distance data											
N		51	106			123	17				157
Number of children who answered the ACASI questions about whom they would like to have more and less contact											
N more				298		298					298
N less				79		79					79

The labels for the categories of people placed on the Kvebaek matrix, or specified in closeness ratings, are shown in Table 5. Categories 1 to 22 made up the original code frame used for Wave 1. Other codes were added in subsequent waves because new relationships emerged (e.g., adoptive mother/father) or specified in the ‘Other’ category by the children and subsequently back coded.

It is worth noting that there are male and female codes (e.g., *16 My female cousin* and *17 My male cousin*, and *18 Female flatmate* and *19 Male flatmate*) for categories of people whose gender is not inherent in the category and also codes which do not specify gender (e.g., *36 My birth cousin* and *37 My flatmate*). Furthermore, the use of labels for the relationship between people varied over waves. For example, *16 Female cousin* and *17 Male cousin* occur only at Waves 1 and 2, while *36 Birth cousin* occurs only at Waves 3 and 4. For more information see Table 6, Appendix 3.

Table 5. The value labels showing children's' relationships with people they placed on the Kvebaek matrix

Value	Label	Value	Label
2	My foster mother	26	Female friend/age peer
3	My foster father	27	Male friend/age peer
4	My foster sister	28	Female friend/adult
5	My foster brother	29	Male friend/adult
6	My birth sister	30	Previous carer (Female)
7	My birth brother	31	Previous carer (Male)
8	My mother	32	My adoptive mother
9	My father	33	My adoptive father
10	My grandmother	34	My adoptive sister
11	My grandfather	35	My adoptive brother
12	My great grandmother	36	My birth cousin
13	My great grandfather	37	My flatmate
14	My aunty	38	My friend/age peer
15	My uncle	39	My birth siblings
16	My female cousin	40	My previous carer
17	My male cousin	41	My previous foster siblings
18	Female flatmate	42	My teacher
19	Male flatmate	43	My adopted great grandmother
20	Female friend	44	My adopted great grandfather
21	Male friend	45	My adopted aunty
22	Other	46	My adopted uncle
		47	My adopted cousin
		48	My friend/adult
		49	My adopted grandmother
		50	My adopted grandfather

4. Graphical representation of the people placed on the Kvebaek matrix

Before discussing how the distances derived from the POCLS adapted KFST activity were calculated, and the subsequent analyses, we'll consider how to look at the data descriptively, using graphs. The visual representations give the analyst an insight into the ways individual children distributed the figures on the Kvebaek matrix and potentially allow a case-study approach to comparing different groups of children, and different times, in terms of the relationships between children and others in their relative-kinship/foster and birth families.

For the purposes of demonstration, fictitious data are used and identifying information has been omitted. Figure 2 represents the positions of people placed on the Kvebaek matrix for the OOHC household (Family 1) over four waves. The fictional study child shown by the red circles in the four panels of Figure 2 is in foster care for Waves 1-3 and then moves into relative/kinship care by Wave 4.

In the first three waves, the child placed the foster mother and father on the Kvebaek matrix, along with birth and foster siblings and an aunt (Wave 2) (Figure 2). In Wave 4, there is an aunt and uncle, siblings and a cousin.

The four panels in Figure 3 show the members of a second fictional child's birth family, including mother, father, siblings and a great-grandmother with whom they were not living with (Family 2). The circles representing the child's family are physically close to the red circle representing the child on all four waves.

As can be seen, the graphs display a great deal of information, from the demographic data in the heading to the number and type of people placed on the Kvebaek matrix and their positions relative to the child and to each other. These graphs were produced with *lattice* (Sarkar, 2008) which is implemented in R (R Core Team, 2018). For more information on *lattice* including the *lattice* commands,[6] please refer to Appendix 4.

[6] My grateful thanks to Dr Ian Watson for his help with the graphs.

Figure 1. Graphs showing the people placed on the Kvebaek matrix over four waves by a child in the context of Family 1 (OOHC household) (fictitious data)

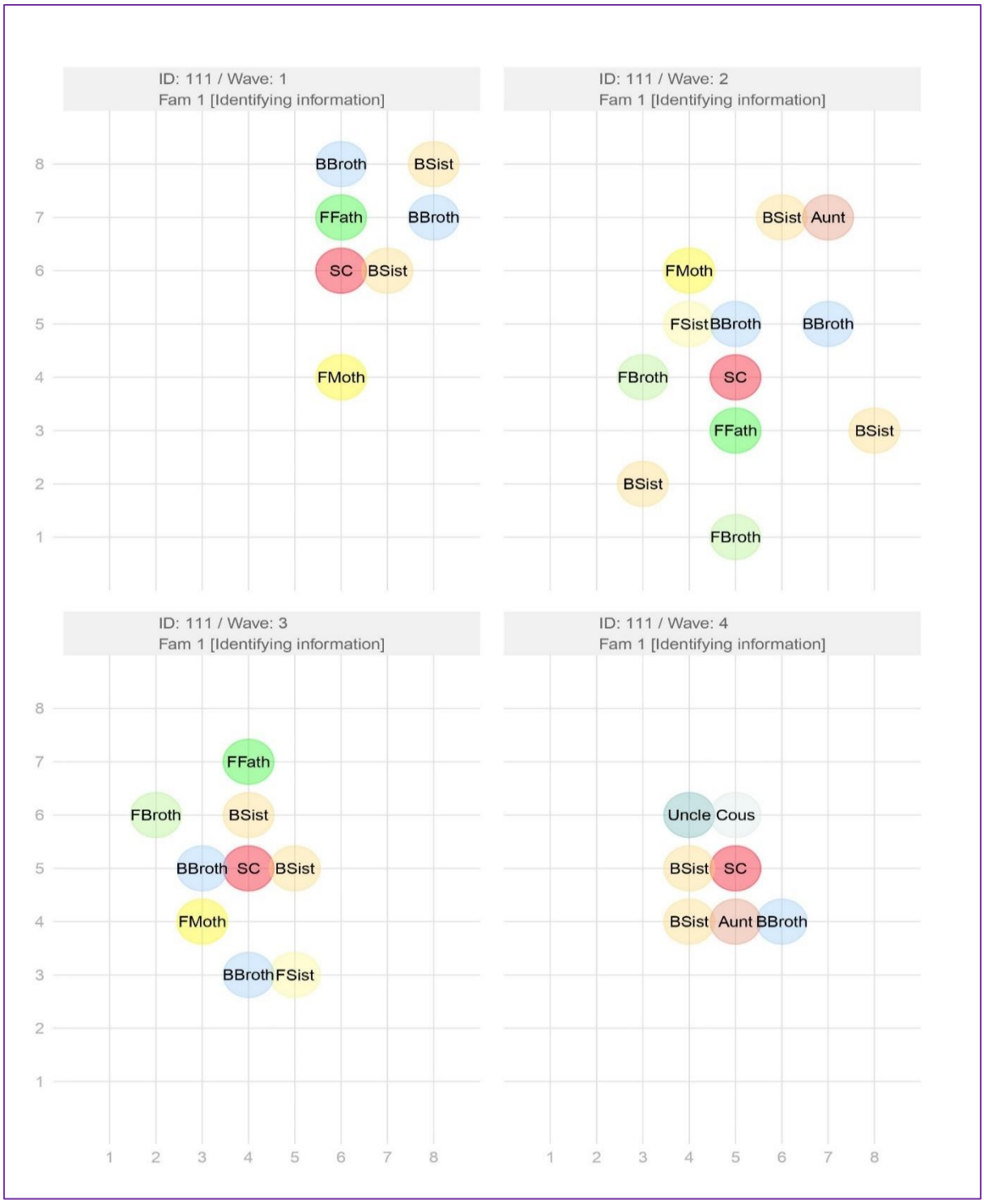
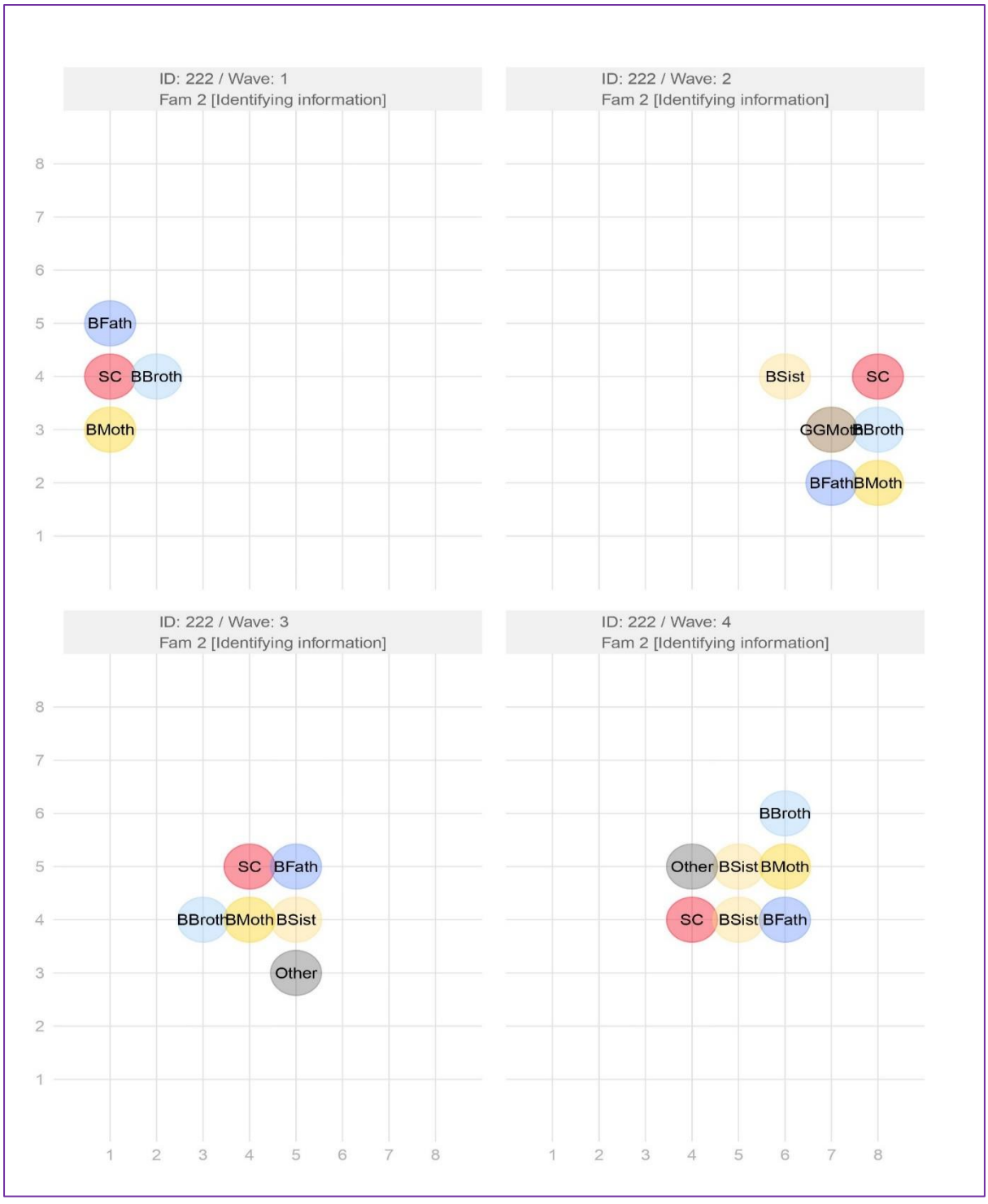


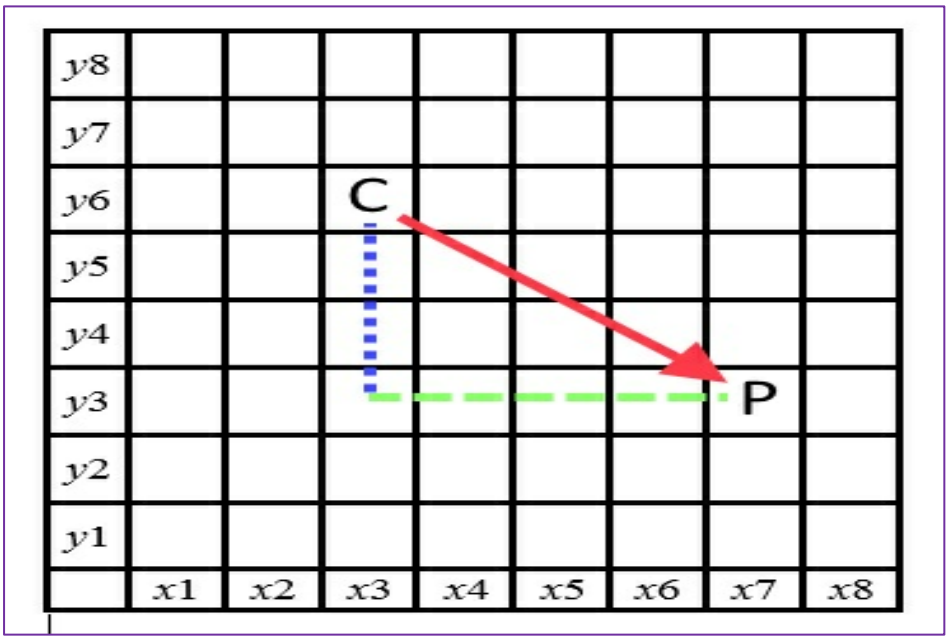
Figure 2. Graphs showing the people placed on the Kvebaek matrix over four waves by a child in the context of Family 2 (not living with) (fictitious data)



5. Calculating the Kvebaek distance: distance between the child and other people on the Kvebaek matrix

This section discusses different ways of calculating the Kvebaek distance i.e. the distance between the figure representing the child or young person, and those representing other people from Family 1 and Family 2. The distances can be calculated in a number of ways: *maximum distance*, *city block (or taxi cab) metric* and the *Euclidian distance.* The *maximum distance* is the maximum of the horizontal and vertical distances between the square occupied by the figure representing the child and the square occupied by a figure representing another person. In the example matrix given in Figure 4, the figure representing the child, marked *C*, is located in square (*x*3, *y*6) while the figure representing another person (*P*) is located in square (*x*7, *y*3). In terms of the horizontal axis, the distance between *C* and *P* is *x*7 – *x*3 = 4 (green dashed line), while the distance on the vertical axis is *y*6 – *y*3 = 3 (blue dotted line). According to the rule used for the KFST datasets, the distance between *C* and *P* would be recorded as 4 i.e. the maximum distance.

Figure 4. The Kvebaek matrix, showing distances between the figures representing the child (C) and that representing another person (P)



The *city block (or taxi cab) metric* calculates the distance between *C* and *P* as equal to the sum of the absolute differences between their coordinates, in this case (*x*7 – *x*3) + (*y*6 – *y*3) = 7. The other, *Euclidian distance*, which was used in the analyses reported here, is calculated as the diagonal distance between two sets of coordinates, which is equal to $\sqrt{((x7 - x3)^2 + (y6 - y3))^2} = \sqrt{(4^2 + 3^2)} = 5$. This distance is shown by the red

arrow in the figure. When two figures are in the same row or column (or both), the Euclidian distance is the same as the maximum of the horizontal and vertical distance; in other cases, the distances will differ.

Figures 5 and 6 show the relationship between the Euclidian distances and the maximum of the horizontal or vertical distances, and the city block distances respectively. The distances were calculated for all possible combinations of the location of the figure representing the child and the location of a figure representing another person. While the relationship between the distances is close in both cases, the Euclidian distance provides finer discrimination than either of the other measures. For example, a distance of seven on the maximum of the horizontal and vertical distance scale was associated with eight different distances on the Euclidian scale. The same sort of variation occurred, to a lesser extent, with the distances based on the city block metric.

Figure 5. The relationship between Euclidian distance (horizontal axis) and the maximum of the horizontal distance (vertical axis) for all possible distances between squares on the Kvebaek matrix.

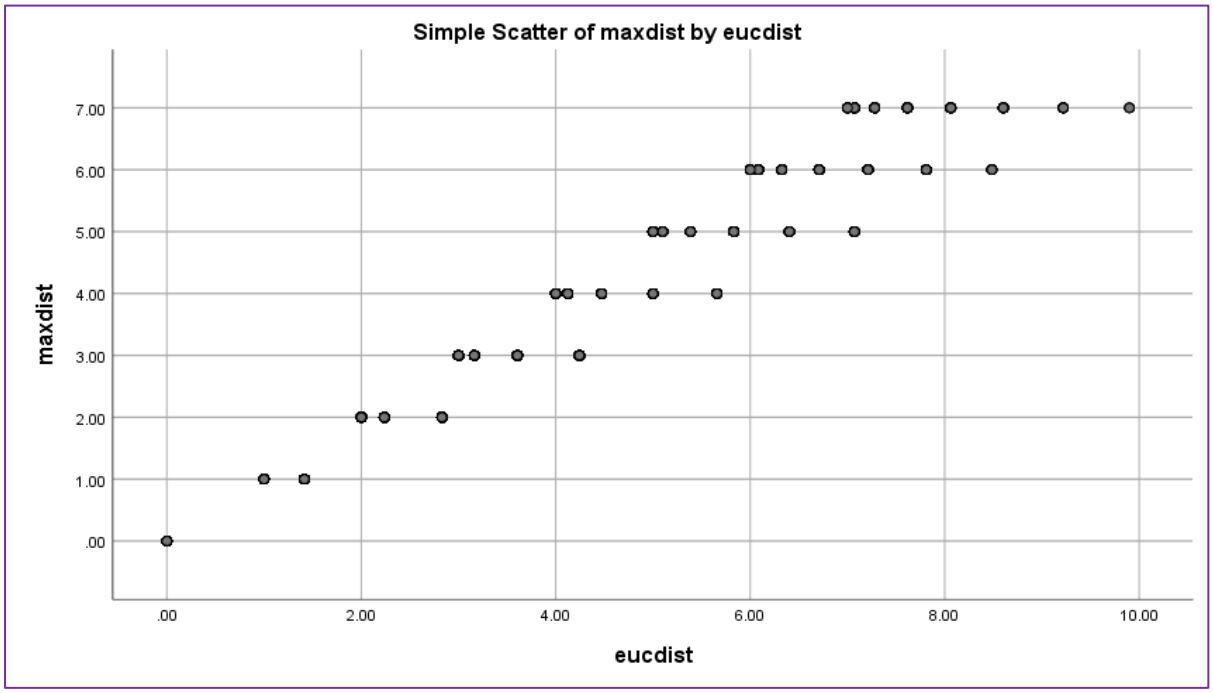
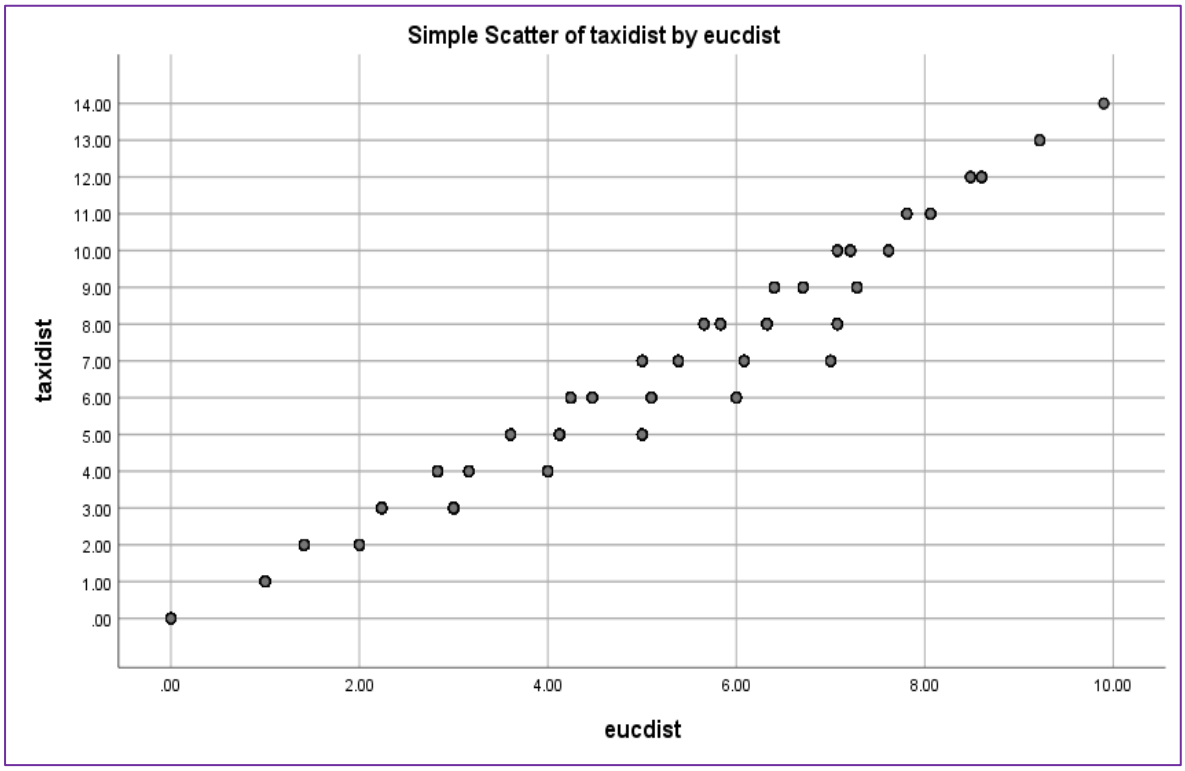


Figure 6. The relationship between Euclidian distance (horizontal axis) and the city block (taxi) distance (vertical axis) for all possible distances between squares on the Kvebaek matrix



Of course, these considerations do not carry much weight if the chosen method of calculating distance does not correspond reasonably closely with the way the children represent distance. The relationship between the distances and the ancillary data about the closeness of the child to the people in their lives considered later in this report may provide some reassurance on this matter.

An example of the syntax used to calculate the Euclidian differences, in this case for the Wave 1 Family 1 variables shown in Table 1, can be seen in Appendix 5. The mean distances between the figure representing the child and the other figures placed on the Kvebaek matrix by the child for Family 1 and Family 2 for each of Waves 1–4 can be seen in Tables 6 and 7. Figures 7 and 8 show the distances averaged over the waves. The table in Appendix 6 shows the mean distances by wave and the original relationship categories.

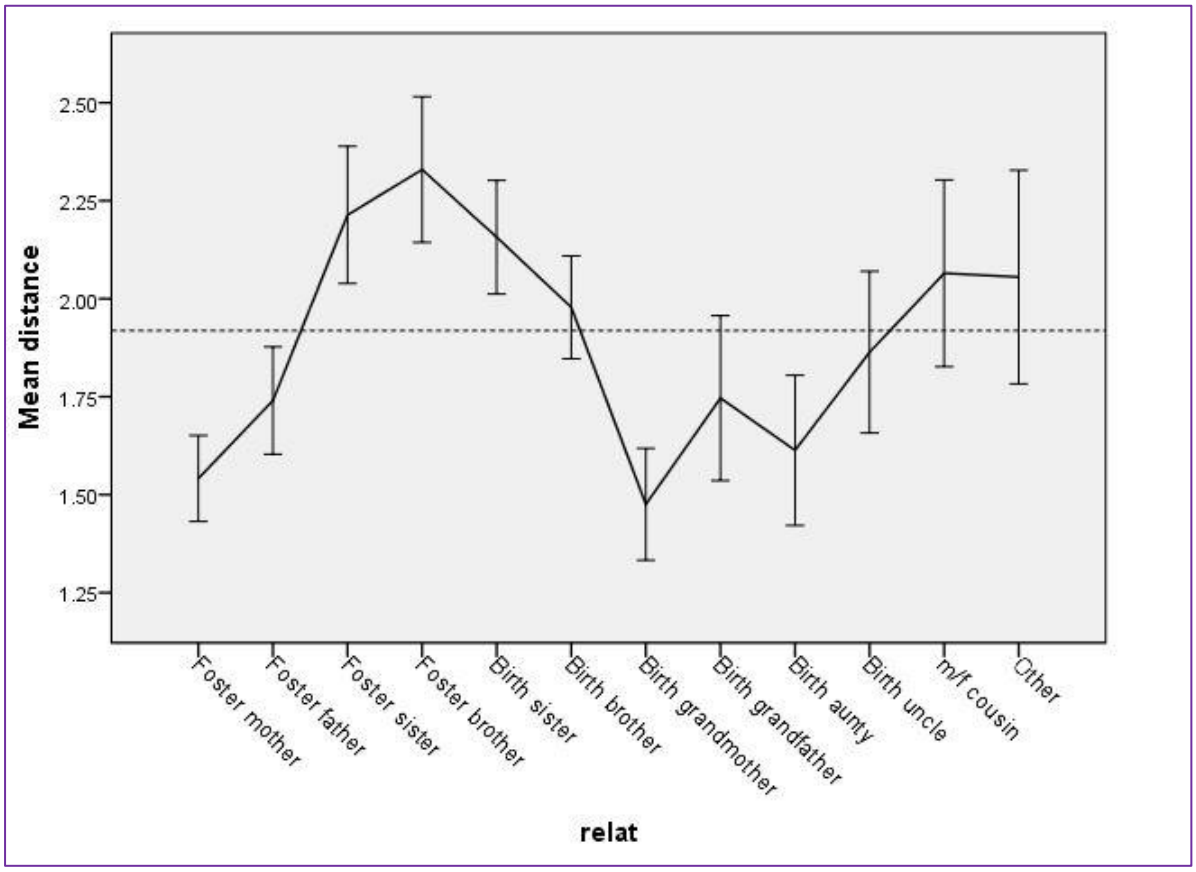
Table 6. Mean distances between child and others for each wave for Family 1

	wave Survey wave number											
	1			2			3			4		
	distance			distance			distance			distance		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
2 Foster mother	1.67	1.26	159	1.48	1.11	129	1.49	1.12	102	1.52	.98	294
3 Foster father	2.01	1.44	131	1.72	1.20	109	1.65	1.06	84	1.60	1.10	218
4 Foster sister	2.44	1.63	99	1.98	1.28	93	2.22	1.27	77	2.23	1.55	229
5 Foster brother	2.52	1.87	138	2.22	1.43	95	2.02	1.20	72	2.36	1.59	211
6 Birth sister	1.97	1.45	198	2.18	1.73	202	1.99	1.41	171	2.13	1.43	321
7 Birth brother	2.07	1.55	208	1.87	1.51	200	1.91	1.39	172	1.95	1.27	334
10 Birth grandmother	1.46	1.05	99	1.44	1.17	105	1.42	1.02	92	1.43	.87	196
11 Birth grandfather	1.85	1.23	64	1.77	1.53	70	1.46	.86	66	1.69	1.17	126
14 Birth aunty	1.56	.87	69	1.63	1.00	58	1.70	1.42	42	1.66	1.14	99
15 Birth uncle	1.99	1.09	57	1.89	1.33	69	1.86	1.18	40	1.82	1.00	89
16 m/f cousin	2.05	1.43	68	2.17	1.21	51	1.68	.84	34	2.17	1.40	105
60 Other	2.25	1.73	106	1.59	1.09	34	1.91	1.11	34	2.28	1.38	155

Table 7. Mean distances between child and others for each wave for Family 2

	wave Survey wave number											
	1			2			3			4		
	distance			distance			distance			distance		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
6 Birth sister	1.64	1.02	185	1.97	1.27	110	1.68	1.27	77	1.89	1.24	213
7 Birth brother	1.75	1.28	219	1.91	1.19	131	1.67	1.16	103	1.91	1.31	230
8 Birth mother	1.49	1.10	210	1.70	1.36	163	1.59	1.17	115	1.89	1.42	222
9 Birth father	1.61	1.15	145	1.91	1.54	130	1.79	1.36	91	1.94	1.27	176
10 Birth grandmother	1.88	1.06	94	1.63	1.13	79	1.87	.97	52	2.16	1.31	99
11 Birth grandfather	1.87	1.25	65	1.76	.87	51	2.16	1.62	34	2.59	1.50	66
14 Birth aunty	2.02	1.09	82	1.78	1.16	89	2.06	1.45	54	2.18	1.27	126
15 Birth uncle	2.27	1.16	70	1.84	1.06	53	2.23	1.38	33	2.17	1.21	92
16 m/f cousin	2.10	1.24	95	2.15	1.59	122	2.05	1.13	88	2.02	1.10	270
26 Friend	1.86	1.24	266	1.86	1.15	240	.	.	0	1.96	1.09	765
60 Other	2.09	1.24	94	2.28	1.11	105	2.82	1.74	202	2.41	1.69	345

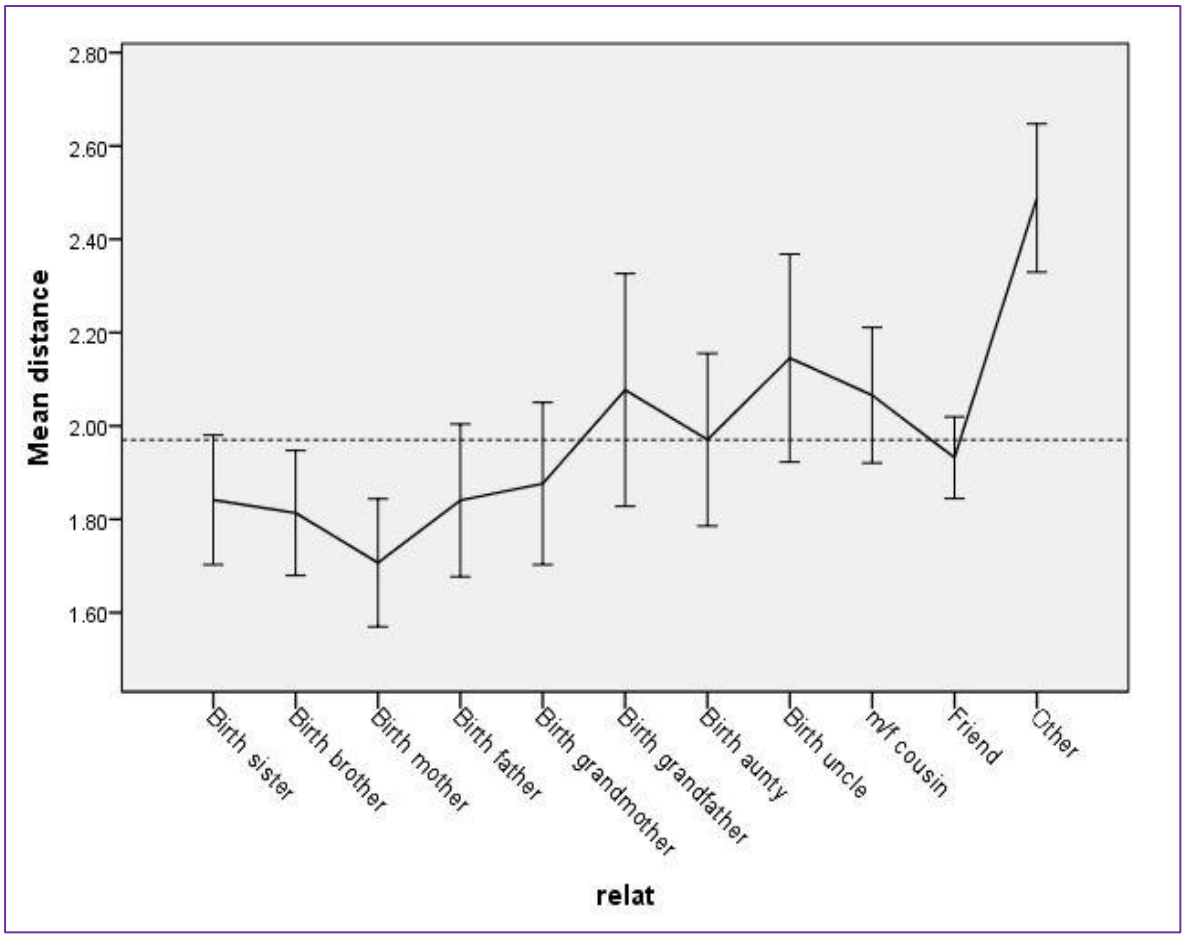
Figure 3. Distances between child and others for Family 1 averaged over Waves 1–4. The bars show approximate 95% confidence intervals. The x-axis label is short for relationship to the child



The dashed line in Figure 7 shows the overall mean for Family 1 across all relationships. For each relationship the average distance over the four waves is presented. This shows that, on average, the distances between the children and their foster mothers, foster fathers and the grandmother were the smallest. Greater distances occurred for foster siblings, cousins and ‘others’. As will be seen in Section 6, the distances between children and their foster siblings depended on the gender of the study children and that of their foster siblings.

The dashed line in Figure 8 shows the overall mean for Family 2 across all relationships. For each relationship the average distance over the four waves is presented. Apart from that for ‘others’, the mean distances varied less than those for Family 1. The mean distance was lowest for birth mothers, with slightly larger distances for birth fathers and siblings. The mean distances for birth aunties and friends were near the overall average while those for grandfathers, uncles and cousins were greater than the overall mean. The distance for the heterogeneous ‘others’ was clearly greater than those for all other people represented on the Kvebaek matrix.

Figure 4. Distances between child and others for Family 2 averaged over Waves 1–4. The x-axis label is short for relationship to the child



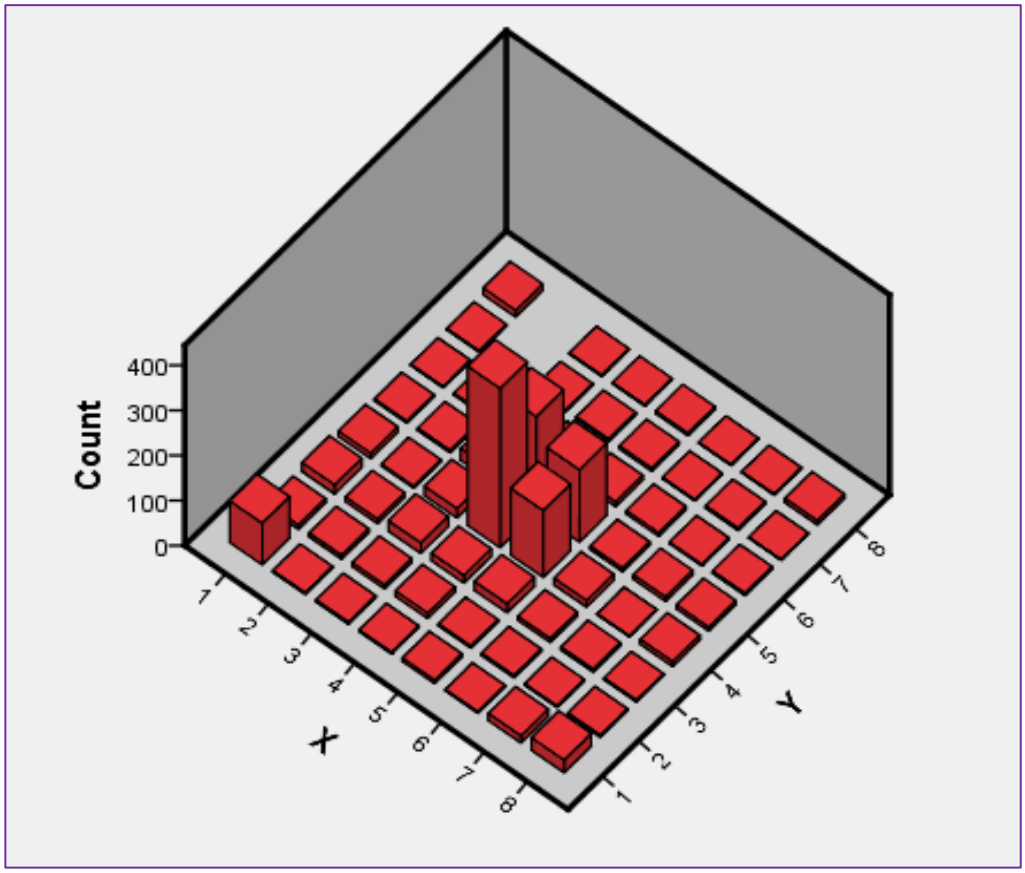
Note: Line rather than bar graphs have been used in this report because they show the differences in distances between people more clearly. The bars show approximate 95% confidence intervals.

5.1 The location of the figure representing the child on the Kvebaek matrix and its effect on distances

The child could place the figure representing themselves anywhere on the board but, within a wave, the same location was used for both Family 1 and Family 2. The children were free to use the same location over waves, but only 27.7% of those who carried out the adapted KFST activity on two or more waves used the same location for their figure at least once.

Over Waves 1–4, as Figure 9 shows, the children were most likely (61.6% of all instances) to locate the figure representing themselves in the middle four squares ((*x*4,*y*4), (*x*4,*y*5), (*x*5,*y*4) and (*x*5,*y*5)). The most frequent location was square (*x*4, *y4*), 40.4% of instances in the middle four squares and 24.9% overall.

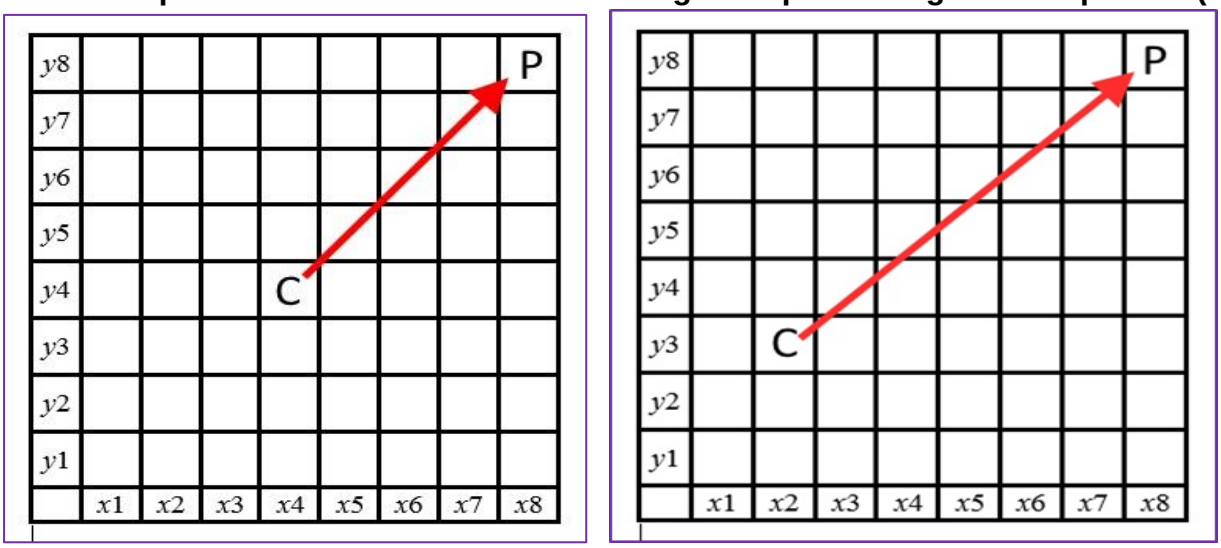
Figure 5. The locations of the figures representing the child over Waves 1–4



The location of the figure representing the child could potentially have a significant effect on the distances between that figure and those representing the other people placed on the Kvebaek matrix. Figure 10 shows that the greatest Euclidian distance for a child who places themselves somewhere in the centre (e.g., *x*4,*y*4) and another person would be $\sqrt{((x8 - x4)^2 + (y8 - y4)^2)} = 5.66$ (left graph). On the other hand, a child

who places themselves more towards the edge (e.g., *x2, y3*) could have a distance as great as $\sqrt{((x8 - x2)^2 + (y8 - y3)^2)} = 7.81$ (right graph).

Figure 6. The effect of the position of the figure representing the child (C) on the maximum possible Euclidian distance to a figure representing another person (P)



A point to remember is that, because the figure representing the child was in the same location for both families within a wave, there is no uncertainty when comparing distances within waves – for example, between the child and their foster mother and the child and their birth mother. However, if the figure representing a child is in a different location at different waves, there is some uncertainty when comparing any distances between waves. This is also the case when comparing children who have placed the figures representing themselves on different squares.

In order to assess the possible effect of the location of the figure representing the child on the distances obtained in the study, the Euclidian distance between each square and every other square was obtained, and the mean of the distances was calculated for each square of the Kvebaek matrix. Given the symmetry of the Kvebaek matrix, this mean distance was the same for more than one square. Each cell of Figure 11 shows the mean Euclidian distance from that cell to all other cells (upper figure in each cell) and the largest of the Euclidian distances from that cell to all other cells (lower figure in each cell). The cells with the same mean distance to the other cells have the same colour. There is a close curvilinear relationship between the mean and maximum Euclidian distances ($R^2 = .98$; the R^2 for the linear relationship = .97).

Figure 7. The mean of all possible Euclidian distances (upper number in each cell) and the maximum possible Euclidian distance (lower number) between each cell and every other cell on the Kvebaek matrix. Squares of the same colour have the same mean possible difference.

8	5.6 9.9	5 9.2	4.6 8.6	4.4 8.1	4.4 8.1	4.6 8.6	5 9.2	5.6 9.9
7	5 9.2	4.4 8.5	4 7.8	3.8 7.2	3.8 7.2	4 7.8	4.4 8.5	5 9.2
6	4.6 8.6	4 7.8	3.6 7.1	3.4 6.4	3.4 6.4	3.6 7.1	4 7.8	4.6 8.6
5	4.4 8.1	3.8 7.2	3.4 6.4	3.1 5.7	3.1 5.7	3.4 6.4	3.8 7.2	4.4 8.1
4	4.4 8.1	3.8 7.2	3.4 6.4	3.1 5.7	3.1 5.7	3.4 6.4	3.8 7.2	4.4 8.1
3	4.6 8.6	4 7.8	3.6 7.1	3.4 6.4	3.4 6.4	3.6 7.1	4 7.8	4.6 8.6
2	5 9.2	4.4 8.5	4 7.8	3.8 7.2	3.8 7.2	4 7.8	4.4 8.5	5 9.2
1	5.6 9.9	5 9.2	4.6 8.6	4.4 8.1	4.4 8.1	4.6 8.6	5 9.2	5.6 9.9
	1	2	3	4	5	6	7	8

The mean of all possible distances from the square containing the figure representing the study child to every square on the Kvebaek matrix was used in subsequent analyses. For a given square (e.g., *x*4, *y*4), this was calculated by the brute-force method of looping through all 8 x 8 = 64 squares in the matrix, calculating the Euclidian distance from the given square in each case. The mean of these distances was used as the value of *the_mean of all possible distances* for that matrix for that child in the analyses reported in Section 6. The distance between a figures positioned on the same square as the figure representing the child (i.e., zero) was not included in the mean, on the supposition that this could not happen; as it turned out, it could and did, but this makes no difference to the usefulness of the variable.

The Pearson correlation between (a) the mean of the *actual* distances between the figure representing each child and the figures representing the other people placed on the board by the child, and (b) the mean *possible* distance given the location of the child's figure on the board, calculated separately for each wave and Families 1 and 2, varied between 0.11 and 0.48. The correlations were stronger for Family 2 (0.22 to 0.48) than Family 1 (0.11 to 0.33).

A mixed model analysis was carried out to see if there were differences between different groups of children in terms of the position of the figures representing themselves on the Kvebaek matrix, as measured by all possible distances. There were no statistically significant differences between males and females, type of placement (foster care, relative/kinship care, and residential care), or Aboriginality. However, the mean possible distance tended to be smaller for older children (F (3, 2014) = 6.3, p < .001) and for those in later waves (F (3, 2174) = 15.2, p < .001). Each of the variables mentioned were tested with the others held constant.

Given the results described above, the measure of mean possible distance was included in analyses of the relationship between the Kvebaek distances and other variables. One reason for this was to account for variability among the distances which would potentially make the comparisons of interest more sensitive, and another was to increase the validity of comparisons between distances which could be affected by the location of the figure representing the child.

5.2 Preparing the data for investigations of the correlates of distance

The main aim of analyses of the adapted KFST data is to compute the distances on the board between the figures representing the child and those representing other people, and to assess the associations between the distances and other variables such as the wave at which the activity was done, and characteristics of the children themselves and their situations before, and at the time, they carried out the activity. In order to carry out the analyses, additional data about the children, their circumstances and their caregivers were drawn from another file '*intv_cypc_w1234_long.sav*'[7].

For the purposes of analysis, the distance and closeness data were further stacked (see Appendix 2 for a description of stacking) so that there was a record for every person that each child put on the matrix for each family at each wave. For example, if a participant put five people on the board (including themselves) for Family 1 at each wave, and seven people on the board for Family 2 at each wave (including themselves), and participated in three out of the four waves, she would have (5 + 7)*3 records in the dataset. Of course, children varied in terms of how many people they put on the matrix at each wave and for each family, and how many waves they took part in. The average number of people placed on the matrix for each family and at each wave is shown in

[7] The file 'intv_cypc_w1234_long.sav' is also in 'long' format like the Kvebaek data file 'intv_felt_w1234_long.sav'.

Table 8. Significantly more figures were placed on the board for Family 2 than for Family 1 (F (1, 2021) = 63.3, p < .001).
As might be expected, the distribution of distances was positively skewed (1.9 for Family 1 and 1.6 for Family 2). While a log transformation reduced the skewness to close to zero, the results obtained with the original data were very similar to those obtained with the transformed data, so it was decided to present the outcomes obtained with the untransformed data. The regression coefficients can therefore be interpreted in terms of squares on the Kvebaek matrix. Other researchers may make different decisions about transformations and/or the distributional models used in analyses.

Table 8. The mean number of people placed on the Kvebaek matrix (including the child) for each family at wave

Family	Wave	Mean	N	SB
1	1	5.34	331	1.98
	2	5.42	378	1.94
	3	5.30	232	1.82
	4	5.25	577	1.86
	Total	5.32	1418	1.90
2	1	6.04	305	2.52
	2	5.97	259	2.59
	3	5.62	217	2.43
	4	6.05	526	2.59
	Total	5.96	1307	2.55
Total	1	5.65	536	2.28
	2	5.69	537	2.29
	3	5.45	449	2.14
	4	5.63	1103	2.27
	Total	5.62	2725	2.26

6. Analyses of the correlates of Kvebaek distance

The distances between the figures representing the children and each of the other figures placed on the board were analysed with mixed or multilevel regression models (see, for example, Snijders & Bosker, 2012). These models took account of the correlations among the distances for each participant by means of random variation around the intercept. Initial models contained random effects for districts, households and the children themselves[8]. The multiple observations for each child were structured in terms of the fixed effects of wave, the relationships of the people represented on the Kvebaek matrix and other variables.

In the analyses, Kvebaek *distance* was the dependent variable (DV) and the independent variables (IVs) were as follows (note that some numbers refer to single variables while others refer to groups of related variables):

Table 9. Variables included in the mixed model analyses

	Independent variables	Variable name in the POCLS data set	Description
1	Wave	*wave*	
2	OOHC placement type	*plctype*_interview/ *PL_ADMIN_CHILD_PLACE*	Foster care, relative or kinship care
3	Total time in OOHC	Ideally, one would have used time in present placement (*PRESENTPLACEMENTINMONTHS*/ *PL_ADMIN_PLACEMENT_N*) but both of these variables had a lot of missing data, as did *PL_ADMIN_PL_STARTDATE*. Therefore *months_in_OOHC_at_interview** was used.	This time dates from when the child was first taken into out of home care. At Wave 1, the mean months in OOHC was 19.6 (sd 5.4) with a minimum of 10.1 and a maximum of 38.6.
4	Whether the child changed households over the four waves	*HH_change_w1_4* – same *HH w1-4*; changed HH at least once; Unknown.	The last category occurred because of waves in which the child did not participate, so it was not known whether they changed households

[8] For more information on the challenges of the hierarchical structure of the POCLS data, the analytical approach to deal with it and the relevant syntax can be found in the Appendix 7 .

	Independent variables	Variable name in the POCLS data set	Description
5	Age of the child	*child_age_group_years*	
6	Gender of the child	*StudyChild_Gender*/*KD_ADMIN_STUDYCHILD_SEX*	
7	Whether the child was Aboriginal	*STUDYCHILD_ABORIGINALITY* /*KD_ADMIN_STUDYCHILD_ATSI*	
8	Whether the child was from a CALD (culturally and linguistically diverse) background	*STUDYCHILD_CALD* /*KD_ADMIN_STUDYCHILD_CALD*	As some children identified as CALD were also from an Aboriginal background and some were not, the interaction of this variable with the Aboriginality variable was included in models.
9	Carer 1's culture	*carer1_culture*/*CD_CRR_CARER_CULT*	Aboriginal, CALD, Other Australian/culture unspecified
10	Type of relationship	*relat*	The categories varied depending on the household, as described below and shown in Tables 12 and 13
11	The number of people placed on the board	*n_on_board_inc_SC*	Placed by the participant for a given family
12	The mean distance of all squares on the Kvebaek matrix	*mean_of_all_possible_distances*	From the square on which the figure representing the child was placed
13	The carer's report of	**how settled the child is-** *child3*/*IN_CRR_SETTLE_NOW* **how the child is going** *child7*/*IN_CRR_CARER1_GOING*	Very well, fairly well, not very well
14	Carer 1's relationship with the child	child8/ *IN_CRR_CARER1_RELN*	Very close, fairly close, not very close
15	How often adults looking after you	**help you if you have a problem-** *pl5_01_cyp*/*RC_CYP_ADULT_HELP* **listen to you-** *pl5_02_cyp*/*RC_CYP_ADULT_LISTEN* **do things with you which are just for fun-** *pl5_04_cyp*/*RC_CYP_ADULT_FUN* **spend time just talking to you-** *pl5_05_cyp*/*RC_CYP_ADULT_TALK*	Always, often, sometimes, rarely, never
16	Parenting practices (carer 1)	**warm parenting** - *awarm*/*RC_CRR_CARER_WARMSCORE* **hostile parenting-**	Centred at its mean

	Independent variables	Variable name in the POCLS data set	Description
		ahost/ RC_CRR_CARER_HOSTSCORE	
17	Child's contact with mother, father, sibling	*fam1_01/FC_CRR_CONT_MOTH* *fam1_02/FC_CRR_CONT_FATH* *fam1_03/FC_CRR_CONT_SIB*	Yes/no
18	Child has a good relationship with birth mother, birth father, siblings	*fam8_01/ FC_CRR_RELN_MOTHER* *fam8_02/FC_CRR_RELN_FATHER* *fam8_03/FC_CRR_RELN_SIBLING*	Yes/no
19	Carer's feeling about the child's contact with their birth family	*fam9, FC_CRR_ACCFAM*	Positive, slightly positive, neutral, slightly negative, negative
20	How well child's needs are being met with maintaining family relationships	*fam12*, *FC_CRR_ACCFAM_RELN*	Very well, fairly well, not very well, not very well at all

Note: The lowercase variable names are those used in the original datasets (those available at the beginning of the study) or belong to variables which were created during the analysis; the variable names consisting entirely of uppercase letters are those used in the datasets currently available in SURE (Secure Unified Research Environment - *https://www.saxinstitute.org.au/our-work/sure/*).
The random factors were SC (*pocls_id*), nested under household, which was nested under district. Maximum likelihood was used in fitting all models.
* This variable showed the difference in months between the date at which the SC first entered out-of-home-care (PL_ADMIN_FIRST_ENTRYDATE) and the date of the interview (IV_ADMIN_INT_DATE).

Because the numbers of cases in each relationship category varied considerably for the two 'Families', the people represented on the board and the corresponding distances for each 'Family' were analysed separately. The relationship categories for Family 1 (OOHC) are shown in Table 10 and those for Family 2 (birth family and others) in Table 11.

Initial analyses of the distances for the members of Family 1 and Family 2 used all the categories in Table 10 and Table 11 respectively. 'Distances' here always refer to the Euclidian distance between the child's location and the location of another figure on the Kvebaek matrix, for example, birth mother or sibling. Later analyses compared distances for mothers (foster/kin-family mothers compared with birth mothers) and fathers (foster/kin-family fathers compared with birth fathers). There were also comparisons of distances between the child and birth siblings with whom the child was living in foster or relative/kinship care, and birth siblings with whom the child was not living.

Table 10. The number in each relationship category for the figures placed on the Family 1 Kvebaek matrix

Relationship	Placement Type		Total
	Foster Care	Rel/Kin care	
2 Foster mother	587	58	645
3 Foster father	466	50	516
4 Foster sister	434	34	468
5 Foster brother	460	27	487
6 Birth sister	319	427	746
7 Birth brother	316	474	790
10 Birth grandmother	7	365	372
11 Birth grandfather	7	233	240
14 Birth aunty	7	216	223
15 Birth uncle	1	206	207
16 m/f cousin	12	200	212
22 other	129	55	184
Total	2745	2345	

Table 11. The number in each relationship category for the figures placed on the Family 2 Kvebaek matrix

Relationship	Placement Type		Total
	Foster Care	Rel/Kin care	
6 Birth sister	266	221	487
7 Birth brother	360	228	588
8 Birth mother	282	318	600
9 Birth father	204	252	456
10 Birth grandmother	162	117	279
11 Birth grandfather	99	88	187
14 Birth aunty	87	193	280
15 Birth uncle	52	138	190
16 m/f cousin	109	372	481
22 other	539	123	662
26 Friend	632	454	1082
Total	2792	2504	5296

Potentially, if the relationship was treated as a repeated measures factor, the analysis could have allowed for variations in the correlations of the residuals for the different levels of the within-subject factor. However, because there was often more than one person in a given relationship category for a participant (e.g., more than one sibling) this was not possible. In effect, this meant that the homogeneity of the variances of the treatment-level differences was assumed, probably unjustifiably. This is a matter which other researchers may explore.

For the purposes of the analyses, the data for children and young people who were in residential care were omitted. The number of children in residential care who provided Kvebaek data for Family 1 ranged from 1 (Waves 2 and 3) through 10 (Wave 4) to 21 (Wave 1). These numbers were too small to include in the analyses reported here, and it was not appropriate to include them in either the foster or relative/kinship care groups. Initial analyses for both families included all the variables listed in Table 9, but some were dropped before further analyses were conducted (See Appendix 8).

6.1 Family 1(relative/ kinship or foster family in OOHC)

The output for the model for Family 1 is shown in Table 12. All variables were fitted together. Perhaps the most interesting result at the early stage of analysis was that the random variation was significant at all three levels, although at the district level would probably have little effect on the fixed effects. Nevertheless, all three random variables were retained in the analyses reported here. The variance between households and children was more than 10 times as great as that between districts and both need to be incorporated in further models. The residual, which shows the within-child variation in distances, was comparatively large; surprisingly, it did not increase markedly (by 4.3%) when *relat*, the variable which would be expected to drive a lot of the variation, was omitted from the model. This is of a piece with the small effect sizes found in this analysis.

The tests of fixed effects showed that wave and *relat* (relationship of the person represented on the matrix to the child) were statistically significant along with age of the child and the measure showing the mean of all possible distances from the squares on which the children placed the figures representing themselves. Also significant were two measures of the relationship between the child and the carer, and the carer's yes/no assessment of whether the child had a good relationship with his or her father.

These effects will be described in more detail but, as can be seen from the R^2 values for the overall model and for individual variables, the associations between the distances and the variables in the model were weak. There is clearly a great deal of variability in the individual distances for each child which is not accounted for by these rather general variables, as shown by the size of the residual (unexplained within-child variance) which is much larger than the other sources of variation.

Table 12. The coefficients for the mixed model of distances for Family 1

Variable	Coeff (se)	*P*	%R^2
Wave*			.24
[Wave 1]			
Wave 2	-.141 (.107)	.189	
Wave 3	-.197 (.194)	..309	
Wave 4	-.042 (.325)	.898	
Placement type			
[Foster care]			
Relative/kinship care	-.033 (.082)	.687	
Months in OOHC at interview	-.000 (.005)	.940	
Household change w1_4			
[Did not change HH]			
Changed HH	.052 (.088)	.554	
Not known	-.132 (.091)	.146	
			Age of child at interview** .53
[6–8 years]			
9–11 years	-.186 (.050)	<.0005	
12–17 years	-.261 (.079)	.001	
Sex of child			
[Female]			
Male	-.052 (.061)	.399	
Aboriginality of child			
[non-Aboriginal]			
Aboriginal	-.124 (.077)	.110	
CALD background of child			
[not CALD]			
CALD	.116 (.112)	.298	
Carer 1's culture			
[Aboriginal]			
CALD	-.184 (.134)	.172	
Other Australian	-.114 (.089)	.200	
Relationship to child**			

Variable	Coeff (se)	*P*	%R^2
			3.0
[Foster mother]			
Foster sister	.630 (.072)	<.001	
Foster father	.220 (.078)	.002	
Foster brother	.747 (.077)	<.001	
Birth sister	.537 (.073)	<.001	
Birth brother	.364 (.073)	<.001	
Birth grandmother	-.117 (.094)	.215	
Birth grandfather	.175 (.106)	.100	
Birth aunty	.137 (.109)	.207	
Birth uncle	.319 (.111)	.004	
m/f cousin	.572 (.114)	<.001	
Other	.508 (.109)	<.001	
Number on_board	.018 (.017)	.275	
Mean of all possible distances**	.274 (.030)	.000	2.2
Carer helps if child has a problem*			.38
[Always]			
Often	.264 (.067)	<.001	
Sometimes	.059 (.079)	.453	
Rarely/Never	.080 (.158)	.613	
NA/refused	.110 (.186)	.555	
		Carer does things with child for fun**	1.3
[Always]			
Often	-.140 (.062)	.023	
Sometimes	.060 (.064)	.349	
Rarely/Never	.486 (.096)	<.001	
NA/refused	.046 (.182)	.799	
Warm parenting	-.025 (.010)	.013	
Hostile parenting	.016 (.006)	.013	
Child's contact with (y/n):			
Mother	-.030 (.066)	.651	
Father	-.055 (.063)	.385	
Sibs	-.007 (.059)	.911	
Child has good relationship with father*	.193 (.069)	.005	1.5

Variable	Coeff (se)	*P*	%R^2
Carer's feeling about:			
Child's contact with birth family			
[Positive]			
Slightly positive	.024 (.074)	.747	
Neutral	-.016 (.080)	.847	
Slightly negative/negative	.028 (.079)	.720	
Child's need for family relationships met			
[Very well]			
Fairly well	-.036 (.055)	.512	
Not very well	-.038 (.086)	.659	
Not at all well	.019 (.123)	.875	
Constant	.695 (.286)		
Random effects parameters (variance)			
District		.028 (99% CI .004 - .182)	
Household		.188 (.102 - .345)	
Study child		.238 (.154 - .369)	
Residual		1.264 (1.194 – 1.340)	

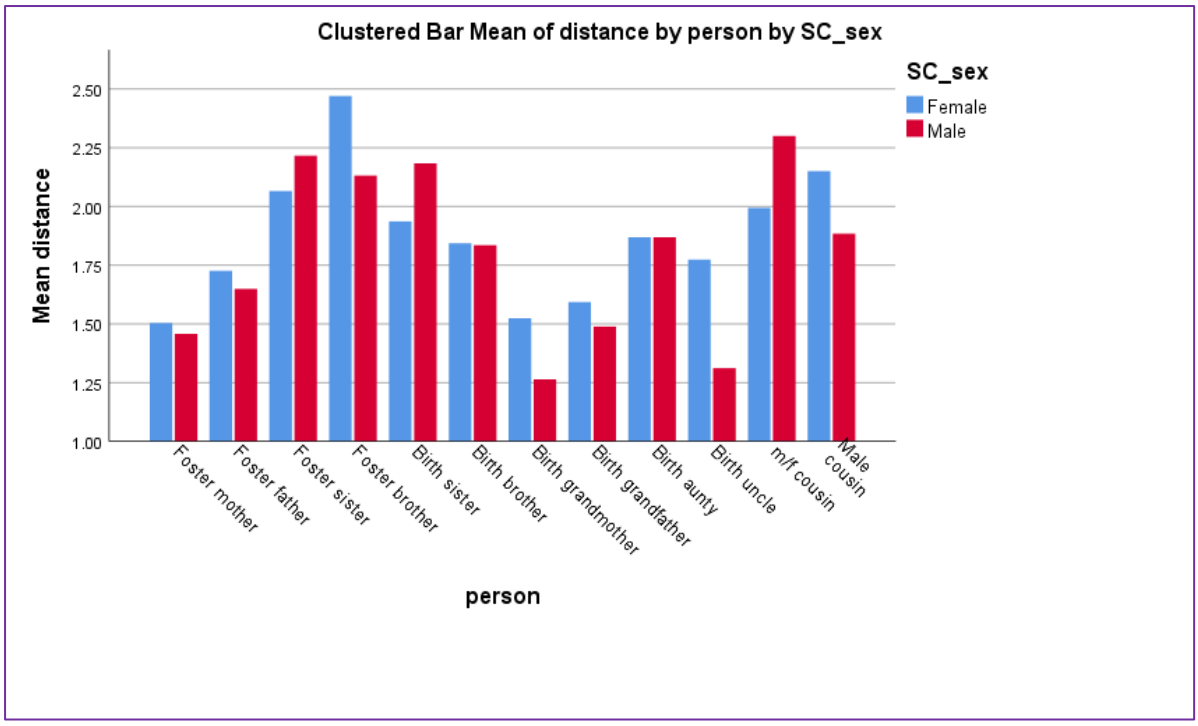
* $p < .01$ ** $p < .001$, %R^2 = 10.9, N_{obs} = 4626, N_{SCs} = 679 Note: Dummy (0,1) or indicator variables were used to represent categorical variables, The categories in square brackets are the reference categories with which each of the other categories were compared in terms of the predicted values of distance.

The association between distance and wave was slightly U-shaped, with the mean being higher for Wave 1 and Wave 4 than for Waves 2 and 3. The overall effect was significant (χ^2 (3) = 12.0, p = .0075) but none of the pairwise comparisons was significant. (All multiple comparisons reported here are Bonferroni-adjusted to maintain an alpha of .01 for individual effects, which could have single or multiple degrees of freedom).

Distances were smaller for older children (χ^2 (2) = 16.3, $p < .001$); the difference between the 6–8 year group and each of the other groups (9–11 and 12–17 year-olds) was significant. This effect occurred with wave and time in OOHC held constant (along with all the other variables in the model).

As would be expected, distances differed for the different people that the child placed on the Kvebaek matrix (χ^2 (11) = 204.9, $p < .001$). The mean distances are shown for males and females in Figure 12 as the pattern differed slightly for male and female children (χ^2 (11) = 33.3, $p < .001$ for the interaction).

Figure 8. Mean distances between child and other members of Family 1, by child's gender



The smallest distances were for foster mother, birth grandmother and grandfather and, for boys, birth uncle. Foster sisters and brothers were placed further away from the child, less so for same-sex siblings. Birth siblings (those who were in the OOHC family, foster or relative/kinship care) were placed slightly closer to the child on the matrix. Foster fathers were placed slightly further away than foster mothers, and birth grandfathers. The results in Figure 12 provide evidence that the Kvebaek activity is sensitive to the way relationships are seen by children and that they engaged with the activity.

Two variables included in the model asked the study child "*how often adults looking after you*" … *help you if you have a problem* … *do things with you that are just for fun*. Approximately 62% and 45% of children respectively answered *always*. In each case around 10% did not answer, or were not asked, the question and for the purposes of the analysis, these were included in a separate category. The association with distance was different for the two questions. For *help you if you have a problem* the mean distance was 1.78 for the *always*, *sometimes* and the combined *rarely/never* categories, but over 2 for the *often* and *NA/refused* categories. A similar issue arose with *do things with you that are just for fun*: the distance for the children who said *often* was smaller than that for children who said *always*.

These items may be tapping subtleties, or it may be that responses were contaminated by the use of the word *often* in the question as well as in one of the response categories.

Carers were asked whether or not children had a good relationship with individual members of their birth family. The item concerning the father survived the initial selection process and gave the unexpected result that having a good relationship with him was associated with a greater mean distance in Family 1 (see Table 12). This was in contrast to the finding that good relationships with mothers or siblings (other than those with whom the child was living) were associated (non-significantly) with smaller distances. The association between greater mean distance and the child having a good relationship with their birth father was consistent over waves.

The mean of all possible distances takes account of where on the Kvebaek matrix the children placed the figure representing themselves. Those who placed the figure near the edge of the matrix had more scope for greater distances, and this was reflected in the significant positive coefficient (Table 12). In the analyses the position of the figure representing the child was seen as an extraneous variable which should be held constant when assessing the associations of other variables with distance. This approach could be unjustifed and possibly misleading if children put their figures towards the edge of the matrix in preparation for putting greater distance between their figures and those representing one or more other people in the household. It is worth mentioning two associations which were marginally significant – both at $p = .013$. Higher warm parenting scores were associated with smaller mean distances and a higher hostile parenting scores were associated with greater mean distances (Table 12).

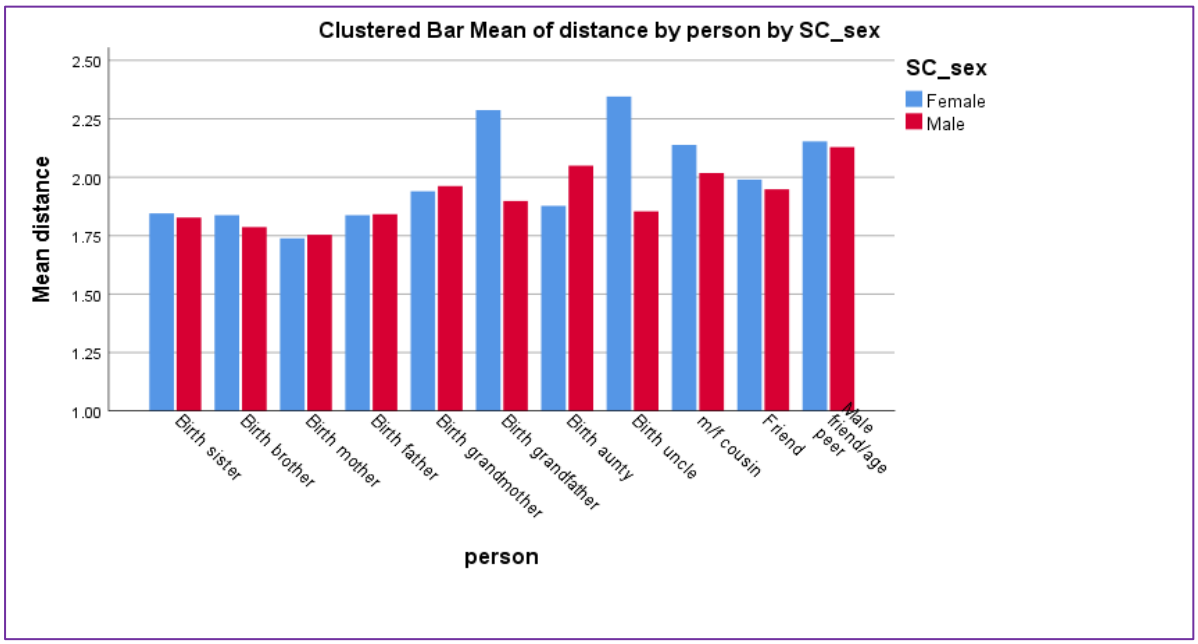
Finally, before considering the results for Family 2, the birth family, the variables which were not found to be significantly associated with distance for Family 1 should be mentioned: placement type, time in OOHC, whether the child changed households, their gender and their and their carer's Aboriginality. Of course, failure to reject the null hypothesis of no assocation does not mean there is none, especially when there is so much extraneous noise, as indicated by the variance components shown in Table 14. A reduction in such noise by the inclusion of further explanatory variables would make for more sensitive tests of the other variables in the model.

6.2 Family 2 (birth family and other special people not in the OOHC household)

The results of the analysis of the distance data based on where children positioned members of their birth family (Family 2) on the Kvebaek matrix are shown in Table 13. As can be seen from the coefficients in the table, the mean distances were larger for later waves. The association was not significant, however, in part because of the relatively large standard errors for the indicator variables, which suggest strong variability among children. The decrease in mean distance with age was significant ($\chi^2(2) = 63.4$, $p < .001$) and more marked than that found for Family 1.

As in Family 1, there was an association between distance and the relationship to the child of the people placed on the matrix (χ^2 (10) = 68.7, p < .001). Figure 13 shows the mean distances. For the members of the child's nuclear family, the distances are uniform (with a slight dip for the mother) and there is little difference in the distances for male and female children. The distances were slightly higher for grandmothers, but again there is little difference between male and female children. For grandfathers and uncles, however, the distances implied by female children are greater than those for male children.

Figure 9. Mean distances between the child and other members of Family 2, by child's gender



Despite the differences between female and male children noted above, the interaction between relationship and the gender of the child was not significant (χ^2 (10) = 15.9, p = .10). It should be pointed out that, at least on a given wave, a member of a child's birth family could not be placed on both the Family 1 and Family 2 matrix. It may be that a child had one or more siblings living in OOHC and one or more other siblings living with her or his birth family. The same could apply to grandparents and aunts and uncles.

There was a small but significant positive association between the number of people placed on the Kvebaek matrix and average distance. This was probably due to the larger number of people placed on the matrix for Family 2. There was a stronger association between distance and how far from the centre the children placed the figure representing themselves, similar to that found for Family 1.

The mean distances for the *very well*, *fairly well* and combined *not very well* and *not at all well* categories of an item asking carers how settled the child was decreased from *very well* to *not very well/not at all well* (see the coefficients in Table 13). This may

seem paradoxical, but the ratings by the carers were in the context of the OOHC household, while the distances were for the children's birth families. It seems unlikely that the distance measure and the carers' ratings are sensitive enough to reflect a situation where the child's closeness to their birth families contributes to their not 'settling down' in OOHC (or vice-versa) but the association may be worth further investigation. The association was not consistent over waves and was affected by the adjustment for the other variables in the model.

The overall significance for the item showing how often the carer was reported (by the child) to help when the child had a problem in the OOHC household is almost entirely due to the large mean distance for children for whom the item was not applicable or who refused to answer, so this result is not pursued further.

The significant positive coefficient for the child's contact with siblings with whom they were not living in OOHC (see Table 13) indicates that distances are greater in the birth family when such contact occurs. The results of further investigation showed that the distances depended on the gender of the child and also on the birth family member. It may be that female children placed themselves at a greater distance from birth brothers living at home if they had contact with siblings. The item did not differentiate between contact with male and female siblings and whether or not they lived at home.

As with the results for Family 1, placement type, time in OOHC, whether the child changed households, their gender and their and their carer's Aboriginality were not significantly associated with distance. The comments made with respect to this finding for Family 1 apply equally here.

The analyses reported so far have produced interesting and possibly useful results, despite the very small effect sizes. In the next section analyses focus on distances for individual members of households.

Table 13. The coefficients for the mixed model of distances for Family 2

Variable	Coeff (se)	*p*	*%R^2*
Wave			
[Wave 1]			
Wave 2	.161 (.096)	.093	
Wave 3	.339 (.178)	.057	
Wave 4	.654 (.295)	.026	
Placement type			
[Foster care]			
Relative/kinship care	.104 (.063)	.097	
Months in OOHC at interview	-.008 (.005)	.073	

Variable	Coeff (se)	*p*	*%R²*
Household change w1_4			
[Did not change HH]			
Changed HH	-.040 (.079)	.616	
Not known	-.003 (.083)	.970	
Age of child at interview**			1.6
[6–-8 years]			
9–11 years	-.332 (.047)	<.001	
12–17 years	-.502 (.076)	<.001	
Child's gender			
[Female]			
Male	-.027 (.060)	.650	
Child's Aboriginality			
[non-Aboriginal]			
Aboriginal	-.021 (.068)	.760	
CALD background of child			
[not CALD]			
CALD	-.065 (.100)	.512	
Carer 1's culture			
[Aboriginal]			
CALD	-.080 (.121)	.508	
Other Australian	-.092 (.083)	.267	
Relationship to child**			2.1
[Birth sister]			
Birth brother	.030 (.069)	.668	
Birth mother	-.077 (.069)	.268	
Birth father	.009 (.073)	.899	
Birth grandmother	.100 (.086)	.245	
Birth grandfather	.286 (.098)	.003	
Birth aunty	.138 (.088)	.117	
Birth uncle	.323 (.100)	.001	
m/f cousin	.232 (.081)	.004	
Friend	.147 (.067)	.028	
Male friend/age peer	.395 (.076)	<.001	

Variable	Coeff (se)	*p*	*%R²*
Number on board*	.031 (.009)	.001	.3
Mean of all possible distances**	.394 (.028)	<.001	8.1
How settled child is*			.1
[Very well]			
Fairly well	-.177 (.061)	.004	
Not very well/Not at all well	-.390 (.139)	.005	
Carer helps if child has a problem**			1.5
[Always]			
Often	-.125 (.063)	.046	
Sometimes	-.144 (.073)	.048	
Rarely/Never	-.122 (.138)	.376	
NA/refused	.371 (.092)	<.001	
Warm parenting	-.017 (.010)	0.068	
Hostile parenting	.011 (.006)	0.084	
Child's contact with (y/n):			
Mother	.054 (.064)	0.393	
Father	.049 (.052)	0.345	
Sibs*	.189 (.056)	0.001	.4
Carer's feeling about:			
Cchild's contact with birth family			
[Positive]			
Slightly positive	.066 (.068)	0.332	
Neutral	.024 (.078)	0.760	
Slightly negative/negative	.008 (.073)	0.913	
Child's need for family relationships met			
[Very well]			
Fairly well	.064 (.050)	0.200	
Not very well	.072 (.084)	0.392	
Not at all well	.113 (.112)	0.313	
Constant	.396 (.219)		
Random effects parameters (variance)			
District		0	
Household		.039 (.002 - .881)	

Variable	Coeff (se)	*p*	*%R²*
Child		.362 (.245 - .534)	
Residual		1.050 (.991 – 1.113)	

* $p < .01$ ** $p < .001$, $\%R^2 = 15.1$, $N_{obs} = 4952$, $N_{SCs} = 663$ Note: Dummy (0, 1) or indicator variables were used to represent categorical variables. The categories in square brackets are the reference categories with which each of the other categories were compared in terms of the predicted values of distance.

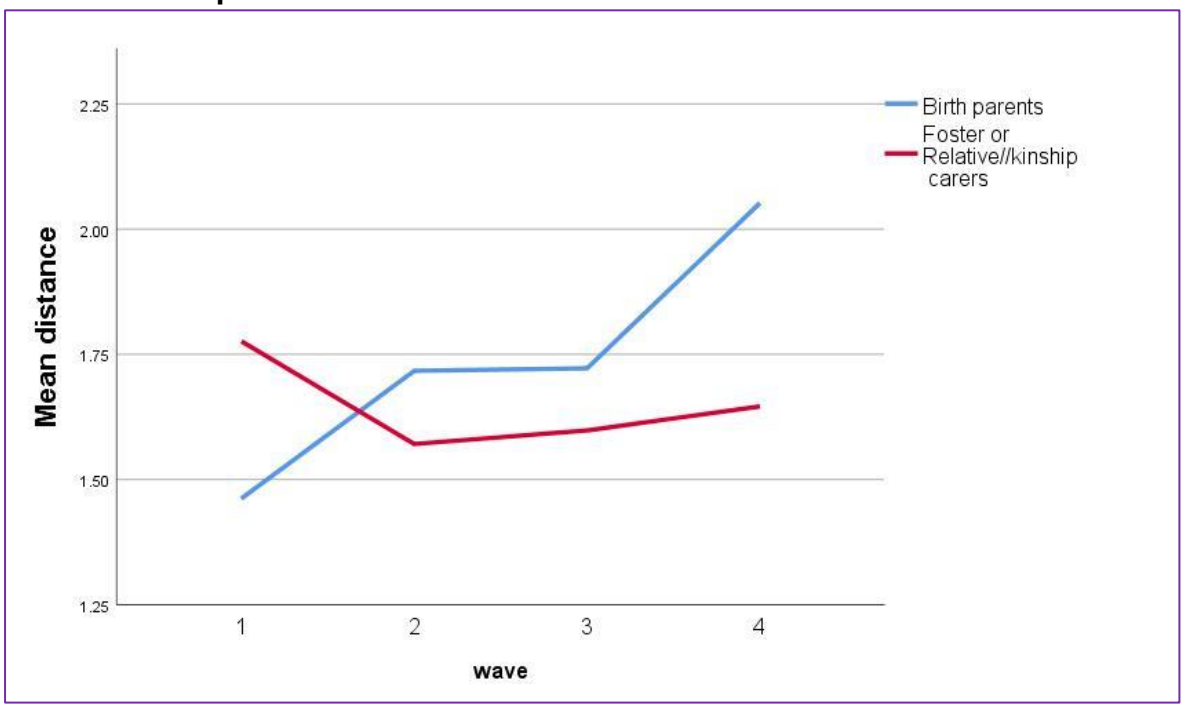
6.3 Distances from birth parents and relative/kinship or foster carers over waves

A question of interest is how Kvebaek distances between children and their birth parents and foster or relative/kinship carers respectively change over time. The analysis described here brought together Family 1 and Family 2 distances for mothers and fathers, classified as foster or birth parents, and examined changes over waves. Using all available cases, there were 2,019 observations from 597 children.

The three-way interaction between the gender of the parent or carer, whether the distance was for a birth parent or a foster or relative/kinship carer and wave was not significant (χ^2 (2) =.71, p = .87) but that between wave and whether parents were birth or kinship/foster carers was (χ^2 (3) = 29.8, $p < .001$ – tested in the absence of the higher-order term). The means are plotted in Figure 14. As might be expected from the graph, the interaction contrasts comparing birth and kinship/foster carers between Wave 1 and Waves 2 and 4 respectively were significant, and that for Wave 1 versus 3 marginally so. The main driver of the effect is the crossover between Waves 1 and 2.

A supplementary analysis based on children who were in the same household on all four waves (but did not necessarily provide Kvebaek data on all waves; N_{obs} = 990, N_{SC} = 288) also produced a significant interaction, with the same crossover between Wave 1 and Wave 2, but the line for birth parents was flatter and that for foster/kinship carers showed a downward trend which continued after Wave 2. As always, great care is needed when interpreting these kinds of results in such complex settings – complex both in terms of the situations we are trying to understand and the data we have at our disposal. As with earlier analyses, only a small amount of variance (10%) was accounted for. Note that the variables described here were added to the full models described earlier.

Figure 10. The mean Kvebaek distances for birth parents and foster/or relative/kinship carers over waves



6.4 Distances from siblings in birth and relative/kinship or foster families over waves

Over the four waves, approximately 26% of children put one or more siblings on the Family 1 Kvebaek matrix (i.e. they were living with them) and one or more other siblings on the Family 2 matrix (i.e. they were siblings with whom they were not living). Over half (57%) put one or more siblings on the Family 1 matrix and none on the Family 2 matrix and 18% put one or more siblings on the Family 2 matrix and none on the Family 1 matrix.

A final analysis examined the distances between children and their birth siblings in the context of their foster/kinship care families and their birth families. The gender of the siblings and of the children was included, along with wave. The four-way interaction was tested first, then the three-way and two-way interactions. None of the interactions was significant. The mean distance between the child and male siblings was slightly smaller than that between the child and female siblings, but this was not significant (b =-113, z = 2.1, p = .035).

These results are reassuring, in that the distance between children, as measured by the Kvebaek distance, did not differ for siblings with whom they lived, nor change over waves.

6.5 Summary

The analyses of distances derived from the adapted KFST activity indicate that they are sensitive to variations in the children's relationship to the members of their families at both the group and individual level. Some of the associations are initially counter-intuitive and may suggest avenues for further investigation. On the other hand, a great deal of variability in the distances is not accounted for by the variables which were included in the models.

The next section describes the results for the other measure of closeness, using a rating scale, which was used as an alternative for older children who did not want to perform the adapted Kvebaek activity, and also to validate the distance measure by asking a small number of children to carry out both the activity and answer the interview questions.

7. Children's ratings of their closeness to others

As described above, children were asked to carry out the adapted Kvebaek task, in which they placed figures representing themselves on an 8 x 8 matrix and then placed other figures of their choice on the matrix to give a physical representation of their closeness to each of the people on the board. The distance between each of these people and the child could then be calculated.

Some children, mainly older children, were unwilling to do this task, and its administration was sometimes felt to be onerous in the context of the whole interview. As a result, the use of closeness ratings which did not involve the matrix were considered and, with older children, used, as an alternative.

7.1 Equivalence of Kvebaek distances and closeness ratings

In Waves 2 and 3 children aged 7–11 who had completed the adapted Kvebaek activity were asked to rate the closeness of the first three Family 1 persons (excluding themselves) they had placed on the Kvebaek matrix.

The equivalence of the Kvebaek and ratings methods could be assessed by seeing whether (a) the closeness ratings became larger (i.e. less close) from the first to the third person and (b) there was a correlation between closeness ratings and distance on the Kvebaek matrix between the figure representing the child and the figures representing other people.

Over both waves, the number of children who answered the three questions (first to third person) was 157 (51 Wave 2, 106 Wave 3), 152 (49, 103) and 135 (41, 94) respectively. Over the two waves, the number of different children who provided ratings was 140. Seventeen children provided data on both waves.

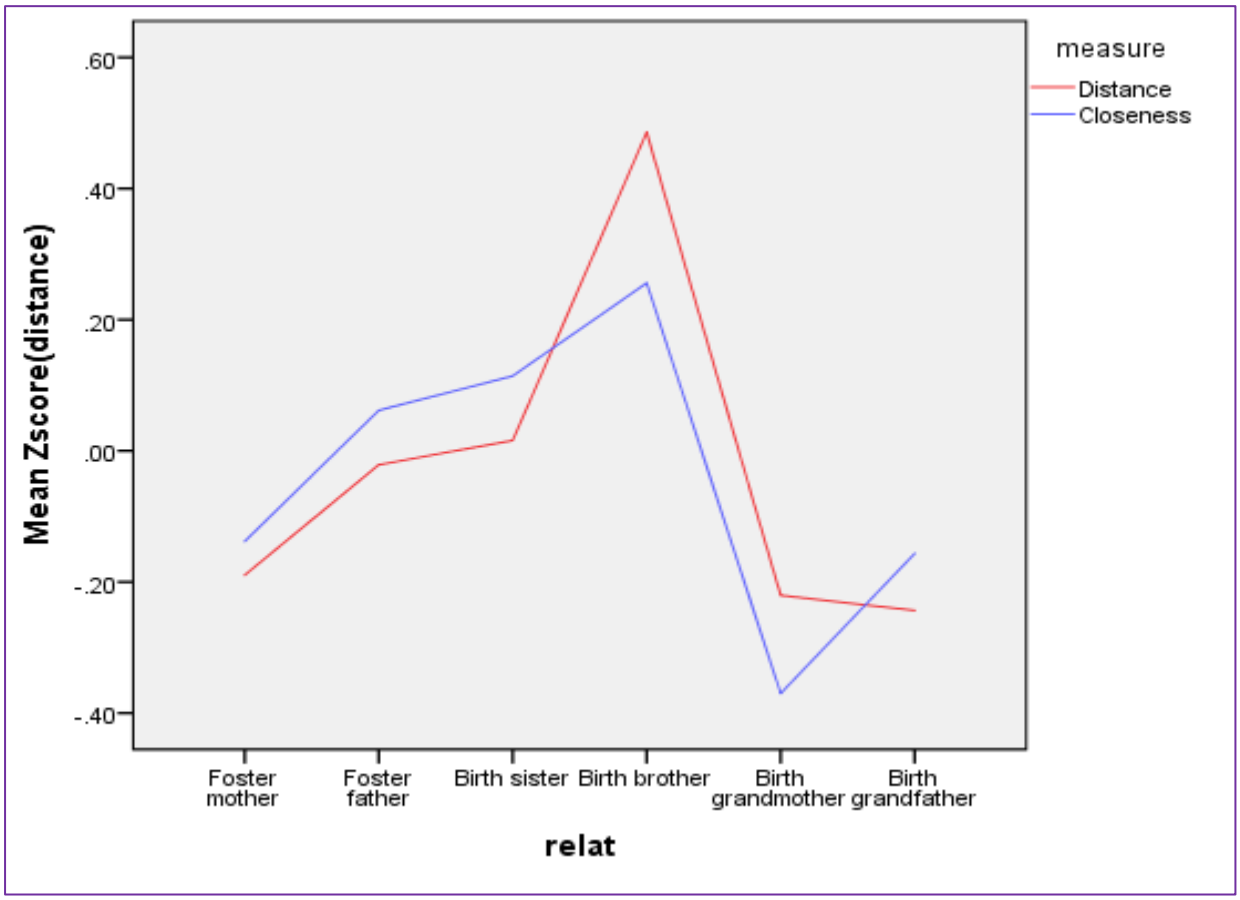
As expected, the mean closeness ratings increased (indicating less closeness) from the first to the third person placed on the board (1.22 [SD .51], 1.41 [.69] and 1.56 [.85] respectively). This pattern also occurred for the corresponding distances on the Kvebaek matrix for these children (1.41 [1.00], 1.59 [1.17] and 1.93 [1.30]).

The association between Kvebaek distance and closeness ratings was assessed in a mixed model with distance as the dependent variable and the closeness rating as the independent variable. Both were standardised, and wave and the order in which figures were placed on the Kvebaek matrix were also included. The standardised regression coefficient for closeness was .333, SE .05, $p < .0005$.

This result does not indicate a close correspondence between the two measures at an individual level. At a higher level of aggregation, however, there is a greater case for equivalence, as shown by the means of the standardised versions of distance and

closeness for the six people most frequently put first, second or third on the Kvebaek matrix (at least 40 observations each) shown in Figure 15. There is still some inconsistency, however, as shown by the results for birth grandparents.

Figure 11. Mean closeness ratings and distances for people most frequently put on the Kvebaek matrix on Waves 2 and 3



It is worth noting that, with four categories, the closeness rating scale is subject to some quantisation error, which would affect individual ratings. This will be discussed below.

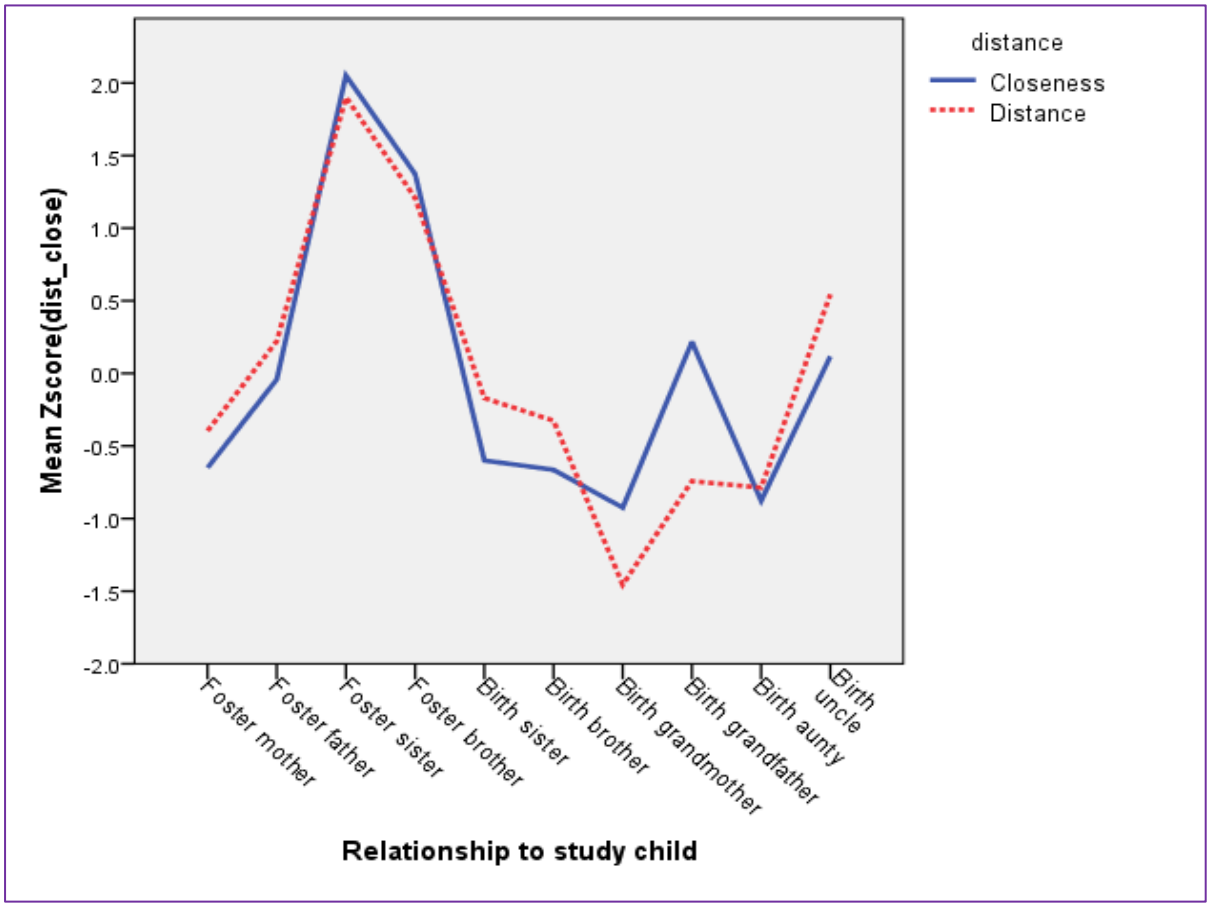
7.2 Further distances and closeness ratings

In Waves 2 to 4, children aged 12 to 17 who did not complete the adapted KFST activity were asked to rate their closeness to people they nominated, using the scale described above (but with *very important & special to me* and *not important or special to me* removed from the first and fourth category labels respectively). They did this for Family 1 and Family 2.

Fifty-seven and 54 children provided data for Family 1 and Family 2 respectively at Wave 2; the corresponding figures for Wave 3 were 94 and 86 and at Wave 4, 43 and 42. Altogether there were 1,896 observations (number of children times the number of people whose closeness they rated).

While it was not possible to compare distances and closeness ratings individually, the average distances and ratings for relationship categories were calculated. Standardised versions of the variables for Family 1 and Family 2 are shown in Figures 16 and 17 respectively. The distances were obtained from Waves 1 to 4 for children who were in the same age range (12–17 years) as the children who provided closeness ratings.

Figure 12. Mean distance and closeness ratings for Family 1, Waves 2- 4



The two profiles for Family 1 are very similar, with some exceptions. The greatest discrepancy between distance and closeness measures occurred for grandfathers. There were relatively few grandfathers with closeness ratings for Family 1 (31) and there was a rating of 4 (*Not close at all*), which was quite rare. The closeness rating scale is to some extent prone to quantisation error, where a move from one of the four categories to the neighbouring category is equivalent to a change of 1.4 standard deviations.

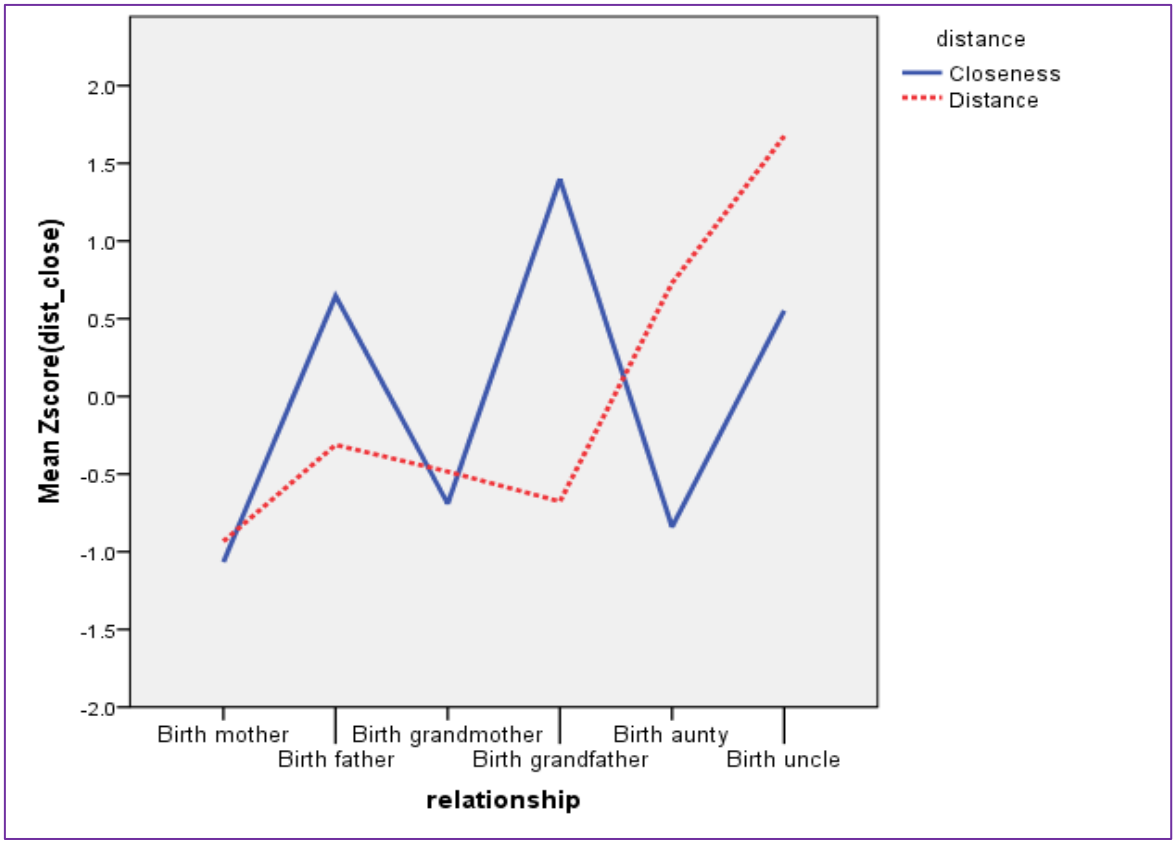
The number of observations on which the points in the graph are based ranged from 31 to 118 for closeness and 16 to 62 for distance.

The results for Family 2 (plotted on the same x-axis as those for Family 1 in Figure 16) show more discrepancies between the distance and closeness ratings. For fathers and grandfathers, the closeness ratings are higher than the distance measure, while for

aunts and uncles the reverse is the case. Bear in mind that numerically higher closeness ratings indicate less closeness (towards the 4 = 'Not at all close' end of the scale), just as greater distances indicate that the child placed the figure representing the person (aunt, for example) further away from the figure representing themselves on the adapted Kvebaek matrix.

The number of observations on which the points in the graph are based ranged from 40 to 124 for closeness and 18 to 100 for distance.

Figure 13. Mean distance and closeness ratings for Family 2, Waves 2–4



7.3 The relationship of closeness ratings and Kvebaek distances with other variables

The association between the distances derived from the adapted KFST activity and other variables measured in the POCLS were examined in an earlier section of this report. In this section, we look at the association between closeness ratings and some of the variables which measure relationships between children and members of their foster or relative/kinship families (Family 1) and other indices of their welfare in that setting.

Because of the relatively small numbers of observations, the analyses were based on bivariate correlations (Spearman rank correlations) and no adjustments were made for other variables. For comparative purposes Kvebaek distance measures were included in these basic analyses along with the closeness measures. For people who were placed on the Kvebaek matrix only once in a given wave in the context of a family (such as foster mother in Family 1 or birth mother in Family 2) there was a single data point for each child in each wave for either Family 1 or Family 2. Roles for which there were multiple people placed on the board, such as foster sisters and brothers in Family 1 and birth brothers and sisters in Family 1 or 2, were represented in a given wave by the mean of the closeness ratings or Kvebaek distances for that role for that wave.

As well as individual measures (e.g. that showing the child's ratings of their closeness to their foster mother or Kvebaek distance between the figure representing the child and that representing their foster mother), the results below were also based on average distances over more than one person, e.g. both foster parents, or all foster siblings.

The data for both closeness and distance were for children aged 12–17 years and from Waves 2 to 4. The correlations between the Kvebaek distances and the responses to the three measures shown in Table 14 (the carer's relationship with the child, whether the child felt part of the family and whether the child was happy living in the foster/kinship household)[9] were mostly positive, as would be expected (the scales were such that the lower values were more favourable, as was the closeness ratings scale and, it has been assumed, the distance values).

[9] Carer 1's relationship with study child: 1 = ‘very close’, 2 = ‘quite close’, 3 = ‘not very close’.
Help you feel part of the family?: 1 = ‘always’, 2 = ‘often’, 3 = ‘sometimes’, 4 = ‘rarely’.
Are you happy living here? 1= ‘very happy’, 2 = ‘happy’, 3 = ‘unhappy’, 4 = ‘very unhappy’.

Table 14. Spearman correlations of Kvebaek distance and closeness measures with the responses to selected questions

Person	Distance/ Closeness	Carer 1's relationship with study child	Child – Help you feel part of the family	Child – are you happy living here
Foster mother	Distance	.42 (*n* = 57)	.48 (47)	.15 (45)
	Closeness	.33 (83)	.42 (83)	.36 (83)
Foster father	Distance	.21 (42)	.30 (34)	.15 (34)
	Closeness	.27 (59)	.53 (59)	.25 (59)
Mean of foster parents	Distance	.40 (62)	.50 (51)	.23 (49)
	Closeness	.37 (84)	.50 (84)	.36 (84)
Mean of foster siblings	Distance	.17 (43)	.32 (38)	.31 (36)
	Closeness	-.04 (60)	.09 (59)	.26 (60)

Notes: Kvebaek distance and closeness measures were obtained for children in foster care or kinship/family care and in the context of Family 1. The correlations are for children aged 12–17 years.

The most consistent correlations occurred between both Kvebaek distance and closeness ratings and the child's rating of the extent to which they felt they were part of the family and with one exception, the values fell between .30 and .50 (medium to large effect sizes, according to Cohen's (1992) guidelines). The correlations of Kvebaek distance and closeness ratings with the other two variables were less consistent and tended to be lower, ranging between .15 and .42. Again, the exception was for the means of the foster siblings' Kvebaek distances and closeness ratings. As was shown in the earlier analyses in this and earlier sections, the Kvebaek distance between the child and the foster siblings depended on both their gender and that of the child, so it is not surprising that the associations are not clear. The small numbers of cases meant that further investigation was not possible in this case.

The measures represented in Table 15 were treated as continuous, so Pearson rather than Spearman rank correlations were used.

Table 15. Pearson correlations of distance and closeness measures with parenting and CBCL[10] scale scores

Person	Distance/ Closeness	Warm parenting	Hostile parenting	CBCL internalising T-score	CBCL externalising T-score	CBCL total T-score
Foster mother	Distance	-.28 (*n* = 57)	.10 (56)	.12 (57)	.19 (57)	.18 (57)
	Closeness	-.46 (82)	.10 (83)	.24 (83)	.28 (83)	.25 (83)
Foster father	Distance	-.05 (42)	.17 (41)	.09 (42)	.13 (42)	.15 (42)
	Closeness	-.38 (58)	.32 (59)	.37 (59)	.26 (59)	.30 (59)
Mean of foster parents	Distance	-.24 (62)	.12 (61)	.06 (62)	.14 (62)	.13 (62)
	Closeness	-.49 (83)	.25 (84)	.33 (84)	.30 (84)	.31 (60)
Mean of foster siblings	Distance	.07 (43)	.04 (43)	.05 (43)	.02 (43)	.05 (43)
	Closeness	-.10 (59)	.10 (60)	.29 (60)	.30 (60)	.31 (60)

Notes: Kvebaek distance and closeness measures were obtained for children in foster care and in the context of Family 1. The correlations for both closeness and distance are for children aged 12–17 years.

The mostly negative correlations with the warm parenting scale were highest for the child's ratings of their closeness to their foster parents, ranging from -.38 (foster father) to –.49 (foster parents). The correlations involving distance were not so high (.07 to –.28).

The correlations involving the hostile parenting scale and the three CBCL scales were all positive, as would be expected, but were generally small (between 'low and 'medium'). Although none was high, the correlations for the ratings involving closeness tended to be greater than those for distance.

[10] Children's socio-emotional development outcomes is measured using the Child Behaviour Checklist (CBCL). In the POCLS, the CBCL was completed by the cares of children aged 3 to 17 years from wave 1. The CBCL measures Child Problem Behaviours and yields two principal composite indices: 'Internalising' and 'Externalising'. The CBCL Total Problems Score is the sum of all items including 'Internalising', 'Externalising' and 'Other' problems. CBCL scores can be presented in a raw score format; as standardised t-scores or by classifying children as falling into 'clinical', 'borderline' and 'normal' ranges.

7.4 The three most important and special people to the child

In Wave 1, children who had undertaken the adapted KFST activity were asked to nominate the three people who were the most special and important to them from among the people that they had placed on either the Family 1 or Family 2 Kvebaek matrices. As shown in Table 3, 169 children nominated at least one person. Table 16 shows the number of times each person was chosen.

Birth mothers, who were chosen by 34.7% of children (19.3% of all responses), and grandmothers, who were chosen by 25.1% of children (14% of all responses) were most likely to be nominated. Foster mothers, male and female siblings and foster fathers were chosen by 13% to 15% of children.

Table 16. The people nominated by children as the most important and special to them

People	Responses		Percent of cases
	N	Percent	
Foster mother	26	8.6	15.6
Foster father	15	5.0	9.0
Foster sister	4	1.3	2.4
Foster brother	7	2.3	4.2
Birth sister	25	8.3	15.0
Birth brother	25	8.3	15.0
Birth mother	58	19.3	34.7
Birth father	22	7.3	13.2
Birth grandmother	42	14.0	25.1
Birth grandfather	15	5.0	9.0
Birth great grandmother	1	0.3	0.6
Birth aunty	8	2.7	4.8
Birth uncle	7	2.3	4.2
Female cousin	5	1.7	3.0
Male Cousin	3	1.0	1.8
Female Friend	17	5.6	10.2
Male Friend	10	3.3	6.0
other	11	3.7	6.6
Total	301	100.0%	180.2%

8. Who does the child want to have more or less contact with?

In Wave 4, children were asked in the ACASI questions whether they would like to have more and, in separate questions, less contact, with each of six possibilities: birth mother, birth father, birth brothers and sisters, grandparents, other relatives, such as aunties, uncles and cousins, and someone else. The variables are shown in Table 4.

Yes/no answers were obtained from 24% of 6–8 year-olds, 46% of 9–11 year-olds and 35% of 12–17 year-olds on the 'more contact' items, a total of 298 out of the 962 children who took part in Wave 4. The corresponding figures for the 'less contact' items were 10%, 8% and 6%, a total of 79. The results are shown in Figures 18 (more contact) and 19 (less).

Only one child said they would like both more and less contact with the same person. Looking to possible practical implications of these results, they were examined to see if there was any relationship with type of placement (foster or relative/kinship care), gender, Aboriginality, CALD, age, and whether the child had contact with their mother, father, siblings, grandparents, aunts and uncles and cousins. Given the relatively small numbers of observations and the number of tests, the following results should be treated with caution.

- Older children were more likely to indicate that they would like more contact with other relatives, such as aunts, uncles and cousins: 6–8 years 18.1%, 9–11 38.2%, 12–17 46.4%, χ^2 (2, N = 298) = 15.1, p = .001)
- Children who had contact with their father were more likely to indicate that they would like more contact with him: no contact 39.6%, contact 64.3% χ^2 (1, N = 298) = 17.8, p < .001, OR = 2.7 – ORs are calculated with the larger odds in the numerator
- Children who had contact with siblings were more likely to indicate that they would like more contact with their siblings: no contact 33.9%, contact 66.7% χ^2 (1, N = 298) = 30.2, p < .001, OR = 3.9
- Children who did <u>not</u> have contact with their paternal aunts and uncles were more likely to indicate that they would like more contact with siblings: no contact 59.1%, contact 39.7% χ^2 (1, N = 298) = 8.3, p = .004, OR = 2.2

Figure 14. The percentage of children who answered 'yes' to questions about whether they would like to have more contact with specified people. n = 298

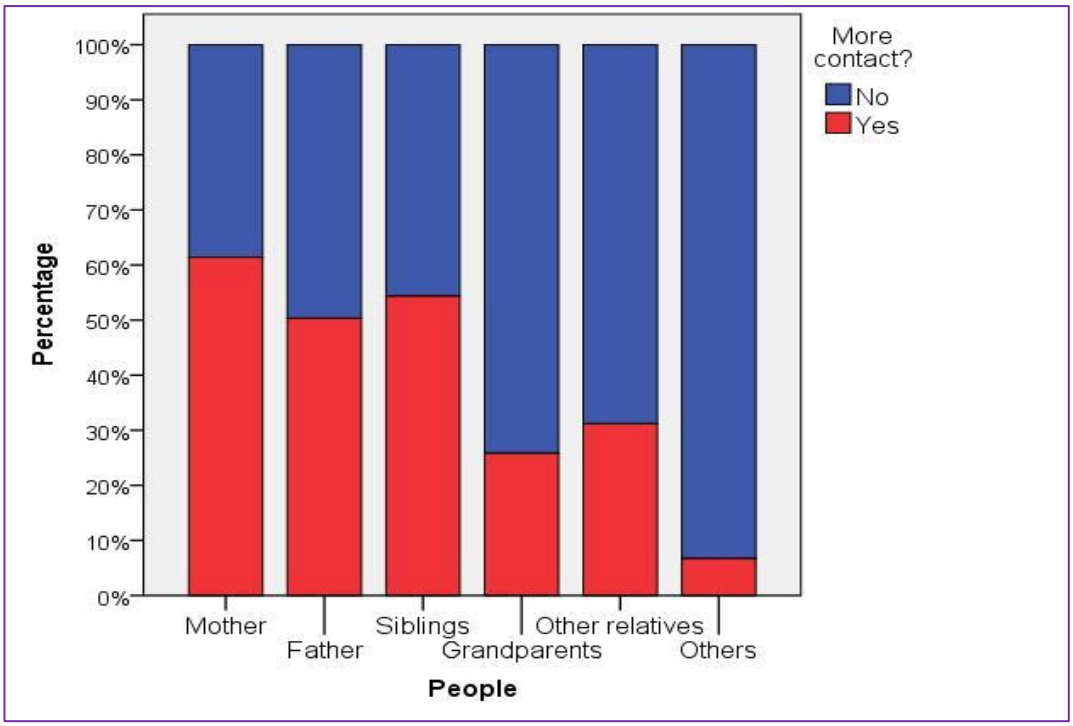
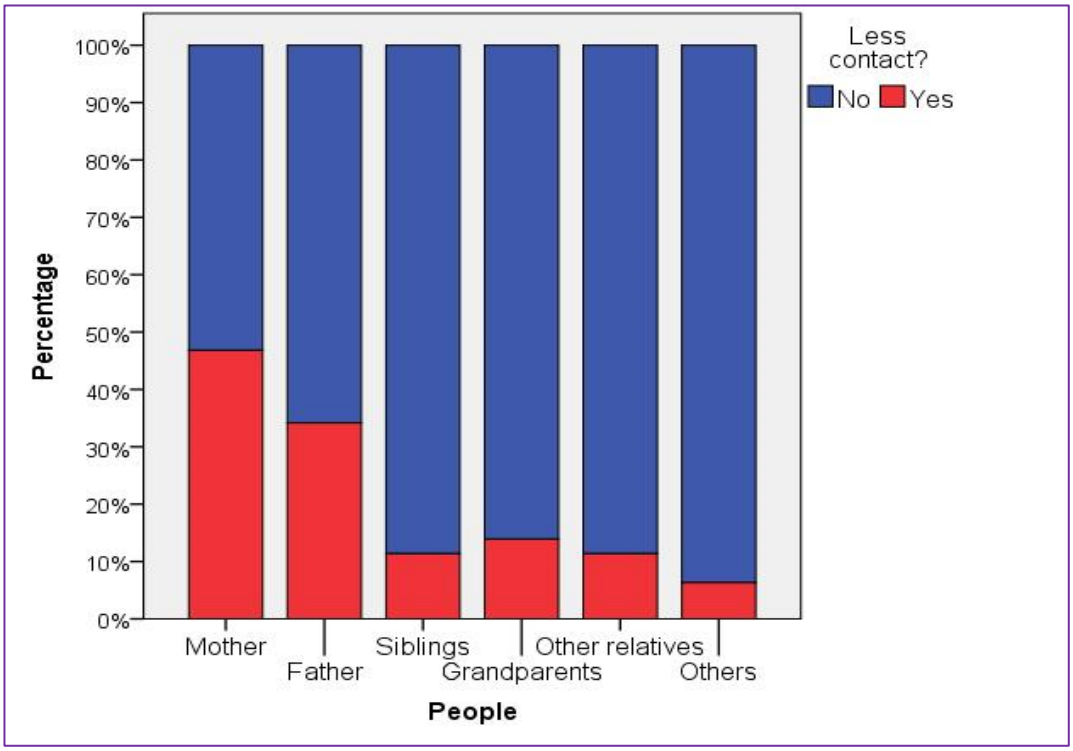


Figure 15. The percentage of children who answered 'yes' to questions about whether they would like to have *less contact* with specified people. *n* = 79



9. Final points

The analyses reported here indicate that distances based on the POCLS adapted KFST activity are sensitive to at least some of the intricacies of human relationships in relative/kinship and foster families, and birth families, as well as having associations with higher-level and more general factors. The modulation of the distance measure by the gender of the children and that of the person placed on the matrix was well-illustrated.

It was sobering that so little of the variability of the distance measures was accounted for in multi-variable models, interesting and sometimes revealing as the results of the analyses were. It is possible that none of the other variables included in the survey, plentiful though they are, would account for much more of the variance. As has been demonstrated, or alluded to, the distances provide a potentially rich basis for further, perhaps more fine-grained, study of the dynamics of the interpersonal settings of children in OOHC. There is a potential for obtaining illuminating results from the close examination of the positioning of figures on the Kvebaek matrix, and the changes in positioning over waves. Analyses based on techniques specifically designed for studying distances may also provide additional insights.

The results of the limited analyses of the closeness rating scale data suggest that the direct approach may have advantages for some purposes, possibly in terms of the strength of their relationship with other variables, such as the CBCL. It is interesting that, as far as can be told from these data, the association between distance and closeness ratings was not strong at the level of individual children but showed the same sorts of patterns e.g., over categories of people. Given the small distances and high closeness for some people, lower-level associations may be reduced by the restricted ranges.

Finally, some methodological points which were mentioned earlier in the report. Around a quarter of the children had changed households at least once over the four waves, giving rise to possible biases due to multiple membership (Chung & Beretvas, 1992). However, efforts to assess the impact of ignoring this feature were thwarted by the smallness of the household clusters, which led to intractable models. As the effects of changing household in OOHC are of great interest, this topic has already been studied elsewhere and will be the subject of further work in the future.

Questions of missing data have not been canvassed here. Given that not all children provided data at all four waves (not to mention that they or the carers did not answer all questions on waves in which they participated) there is room, and probably a need, to consider this topic more carefully. Here, reliance has been placed on stacked data, in which the presence of missing values does not lead to the elimination of whole cases, and on the properties of maximum likelihood estimation in that setting. Over the course of the mixed model analyses, some unsystematic experimentation was carried out with

more restricted samples than that used here (e.g., those containing only cases with no missing data over waves on the variables under examination). The aim was to see whether outcomes were stable, and also whether the analyses were more sensitive (more likely to show significant associations) without the variation introduced, for example, by changes in household. This could be eliminated by using only data from children who were in the same household over all four waves. The answers were that the results were consistent over different samples, and that there was no noticeable difference in the variability of residuals and the sensitivity of tests.

Although sampling weights were available to apply in the analysis, they were not used here. Firstly, they would not necessarily be suitable for the sub-sample of children who did the adapted KFST activity. Secondly, unless the variables used in calculating the weights are strongly associated with the variables in the analysis, they will make little difference, at the cost of introducing error, especially if the weights are at all large. Finally, most of the analyses reported here contained a number of demographic and what might be called structural variables (such as type of placement) which, if they are part of the weighting, or closely associated with variables which were, make the use of weights unnecessary other than for the presentation of full-sample descriptive statistics.

10. References

Berry, J.T., Hurley, J.H., & Worthington, E.L. Jnr. (1990). Empirical validity of the Kvebaek Family Sculpture Technique. *The American Journal of Family Therapy*, *18*, 19–31.

Cashmore, J., Parkinson, P. (2016). Children's 'wishes and feelings' in relocation disputes. *Child and Family Law Quarterly*, *28*(2), 151-174.

Chung, H., & Beretvas, S.N. (2012). The impact of ignoring multiple membership data structures in multilevel models. *British Journal of Mathematical and Statistical Psychology*, *65*, 185–200.

Cohen, J. A (1992). Power primer. *Psychological Bulletin*, *112*, 155–159.

Cromwell, R., Fournier, D., & Kvebaek, D. (1980). *The Kvebaek Family Sculpture Technique: A diagnostic and research tool in family therapy*. Jonesboro, Tennessee:
Pilgrimage.

Gardner, H. (1996). The concept of family: Perceptions of children in family foster care. *Child Welfare, LXXV* (2), 161–182.

Gardner, H. (2004). Perceptions of family: complexities introduced by foster care. Part 1: Childhood perspectives. *Journal of Family Studies, 10*, 170–187.

Gehring, T. M., & Marti, D. (1993). The architecture of family structures: Toward a spatial concept for measuring cohesion and hierarchy. *Family Process, 32*, 135–139.

Guttmann, J. & Rosenberg, M. (2003) Emotional intimacy and children's adjustment: A comparison between single-parent divorced and intact families. *Educational Psychology, 23*(4), 457–472. DOI: 10.1080/01443410303213

IBM Corp. Released 2015. *IBM SPSS Statistics for Windows*, Version 23.0. Armonk, New York: IBM Corp.

Nøvik, T.S. & Solem, M-B. (2003). Family distance matters. *Clinical Child Psychology and Psychiatry, 8* (2), 1359–1045.

Olson, D.H., Portner, J., & Lavee, Y. (1985). *Family adaptability and cohesion evaluation scale* (FACES III). St. Paul: University of Minnesota.

R Core Team (2019). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/ .

Russell, C.D. (1980). A methodological study of family cohesion and adaptability. *Journal of Marital and Family Therapy, 6*, 459–469.

Sarkar, Deepayan (2008). *Lattice: Multivariate Data Visualization with R*. Springer, New York. ISBN 978-0-387-75968-5

Shafer, J.L., & Graham, J.W. (2002). Missing data: our view of the state of the art. *Psychological Methods*, *7*, 147–177.

Solem, M.B., & Nøvik, T.S. (1995). Informants' experience with the Kvebaek Family Sculpture Technique: A comparison between a clinical and an epidemiological sample. *Nordic Journal of Psychiatry, 49*, 439–445.

Shafer, J.L., & Graham, J.W. (2002). Missing data: our view of the state of the art. *Psychological Methods*, *7*, 147–177.

Snijders, T.A.B, & Bosker, R.J. (2012). *Multilevel Analysis* 2nd Edition. Sage Publications.

Statacorp (2011). *Stata: Release 12*. Statistical Software. College Station, TX: Statacorp LP.

Vandvik, I.H., & Eckblad, G.F. (1993). FACES III and the Kvebaek Family Sculpture Technique as measures of cohesion and closeness. *Family Processes*, *32*, 221–233.

Appendix 1: The combinations of waves on which children provided Kvebaek distance data

wave_comb * family Crosstabulation

Count

		family		
		1	2	Total
wave_comb	10001	332	320	652
	10010	23	28	51
	10011	68	67	135
	10100	23	31	54
	10101	15	17	32
	10110	16	22	38
	10111	62	47	109
	11000	134	134	268
	11001	31	21	52
	11010	1	2	3
	11011	2	4	6

Based on children in foster or relative/kinship care who provided Kvebaek data for the Family 1 and Family 2 matrices

Ignore the initial '1' – it's there to stop SPSS dropping the leading zeroes. The remaining four digits represent Waves 1 to 4 respectively. The first of the four digits is '1' if a child provided Kvebaek data on Wave 1 and '0' if they did not. The second of the four digits is '1' if a child provided Kvebaek data on Wave 2 and '0' if they did not, and so on.

For example, 10110 represents children who provided Kvebaek data at Waves 2 and 3 but not at Waves 1 and 4. 11111 represents children who provided Kvebaek data on all four waves.

Appendix 2: Stacking the data

Each FELT data file contained one record for each child or young person (abbreviated as CYP). As described earlier, the files consisted of variables (among others) which showed the coordinates of the figures placed on the matrix by the child (including that representing her- or himself) and information about the people represented by the figures, such as their relationship to the child and, in Wave 1, their gender and age. The data in the original files were in *wide* format, in that there were as many variables showing the *x* and *y* locations (for example) as there were figures placed on the matrix. Another way of storing the data is in *long* or *stacked* form. In a stacked dataset, information which is stored in different variables on a single record or line in the wide dataset is stored on different records.
Table A2.1 below represents a wide FELT dataset with four records, one for each child.

Table A2.1. An example of a wide dataset containing FELT information for four children. The variables are described in the text.

id	Cx	Cy	P1x	P1y	dist1	P2x	P2y	dist2	P3x	P3y	dist3
001	4	5	4	6	1.00	3	3	2.24	7	6	3.16
002	1	1	3	4	3.61	2	3	2.24			
003	5	4	1	3	4.12	4	4	1.00	1	7	5.00
004	3	4	3	4	0.00	5	4	2.00	8	8	6.40

The columns labelled *Cx* and *Cy* are variables containing the *x* and *y* coordinates of the figures representing the children. Columns *P1x*, *P1y*, *P2x*, *P2x* and *P3x* and *P3y* contain the coordinates of the other figures placed on the matrix by the children.

Columns *dist1*, *dist2* and *dist3* show the Euclidian distance between each figure and that representing the child. Note that, in this example, child 002 only placed two figures on the matrix (other than the one representing them self) while child 001, 003 and 004 placed three figures on the matrix (other than the one representing them self).

The long dataset derived from the above data is shown below. For each child, there is now one record for each of the figures they placed on the matrix (other than that representing the child). Therefore for child 002 there are two rows while for child 001, 003 and 004 there are three rows. Note also that the values of variables which are always the same for a child (*id*, *cx* and *cy*) are duplicated over the records for that child.

Table A2.2. The wide dataset shown in Table A2.1 restructured into a long dataset.

id	cx	cy	seq	px	py	dist
001	4	5	1	4	6	1.00
001	4	5	2	3	3	2.24
001	4	5	3	7	6	3.16
002	1	1	1	3	4	3.61
002	1	1	2	2	3	2.24
003	5	4	1	1	3	4.12
003	5	4	2	4	4	1.00
003	5	4	3	1	7	5.00
004	3	4	1	3	4	.00
004	3	4	2	5	4	2.00
004	3	4	3	8	8	6.40

The variable *seq* (short for sequence) has been added to the data, and shows the order of variables in the original wide dataset. This is important in the present case, because we would like to know the order in which figures were placed on the matrix by the child. The restructuring of a dataset from wide to long can be achieved with the SPSS *varstocases* command. Syntax which could be used for this purpose with the above data is shown below.

```
varstocases make px from p1x p2x p3x/
  make py from p1y p2y p3y/
  make dist from d1 d2 d3/
  index=seq (3)/
  keep=id cx cy.
```

There are various reasons for stacking data. One is that it is often easier to produce graphs from multiple records than from multiple variables. This use of stacking is illustrated in section 5.2, which describes the production of plots which show how individual children placed the figures on the matrix.

Another reason for stacking data is to allow the use of procedures, such as *mixed* in SPSS, which readily handle data for which there are multiple observations for each subject (giving rise to lack of independence of observations), but in which the number of observations per subject varies. Analyses of data in which each subject has the same number of repeated observations is readily carried out with wide datasets using standard ANOVA procedures. When the number of observations differs over subjects, either because of missing data or because subjects determine the number of observations, as in the present case, stacked data are preferred. This is mainly because the loss of one observation does not lead to the loss of all the data for a subject, as would often be the case with a wide dataset. Furthermore, procedures using maximum likelihood estimation which work with data in stacked format, such as SPSS *mixed*, produce less biased estimates of effects than conventional ANOVA

procedures. The analysis of the relationship between the FELT distances and other variables of interest, described in section 7 of this report, is based on stacked data and utilises the Stata *xtmixed* procedure.

Appendix 3: Relationship category

Table 6. The numbers in each relationship category placed on adapted KFST activity

Count

		wave Survey wave number				
		1	2	3	4	Total
relat	1 Study child	636	537	449	1103	2725
	2 Foster mother	159	129	102	294	684
	3 Foster father	131	109	84	218	542
	4 Foster sister	99	93	77	229	498
	5 Foster brother	138	95	72	211	516
	6 Birth sister	383	312	248	534	1477
	7 Birth brother	427	331	275	564	1597
	8 Birth mother	212	163	115	231	721
	9 Birth father	147	132	93	185	557
	10 Birth grandmother	193	184	144	295	816
	11 Birth grandfather	129	121	100	192	542
	12 Birth great grandmother	15	11	16	34	76
	13 Birth great grandfather	5	4	6	10	25
	14 Birth aunty	151	147	96	225	619
	15 Birth uncle	127	122	73	181	503
	16 Female cousin	79	84	0	0	163
	17 Male cousin	84	89	0	0	173
	18 Female flatmate	7	0	0	0	7
	19 Male flatmate	7	0	0	0	7
	20 Female friend	12	1	0	0	13
	21 Male friend	7	7	0	0	14
	22 Other	200	139	236	500	1075
	26 Female friend/age peer	107	110	0	0	217
	27 Male friend/age peer	97	82	0	0	179
	28 Female friend/adult	38	25	0	0	63
	29 Male friend/adult	24	23	0	0	47
	30 Previous carer (female)	0	2	0	1	3
	31 Previous carer (male)	0	1	0	0	1
	32 Adoptive mother	0	0	0	11	11
	33 Adoptive father	0	0	0	9	9
	34 Adoptive sister	0	0	0	5	5
	35 Adoptive brother	0	0	0	5	5
	36 Birth cousin	0	0	122	375	497
	38 Friend/age peer	0	0	0	546	546
	39 Birth siblings	0	0	140	0	140
	41 Previous foster siblings	0	0	0	3	3
	45 Adopted aunty	0	0	0	5	5
	46 Adopted uncle	0	0	0	4	4
	47 Adopted cousin	0	0	0	3	3
	48 Friend/adult	0	0	0	230	230
	49 Adopted grandmother	0	0	0	3	3
	50 Adopted grandfather	0	0	0	4	4
Total		3614	3053	2448	6210	15325

Appendix 4: Graphical representation of the people on the Kvebaek matrix

The graphs presented in Figures 2 and 3 were produced with *lattice*, which is implemented in R. One of the attributes which led to the use of this R package was that assignments of colours to different categories of people remained constant over graphs despite the fact that the presence or absence of categories varied over graphs. Other programs assign attributes such as colour separately for each graph in a series
The data used with *lattice* were in long form[11] (stacked) so initially there was one record for each person placed on the matrix by each child in each wave for each family. In a few cases (226, 1.5%) children put more than one person of the same relationship (e.g., birth sister, or foster brother) on the same square. These records were aggregated so that only one instance was represented graphically at that point on the matrix. More often (1,517, 10.1%), children put up to six different categories of person on the same square. In order to avoid the complete overlap of the symbols representing different types of people, the coordinates of the different points were 'jittered' by adding or subtracting a constant to/from the x- and/or y-coordinates. The direction of the jitter was determined by the number of people which had to be accommodated on a given square. The SPSS commands used to apply the jitter are shown in following section. Please note that the fictitious data shown in Figures 2 and 3 in the report no jitter was necessary.

R lattice commands to produce the graphs of the Kvebaek matrices in Section

```
library(data.table)
library(lattice)
lattice.options(default.args=list(as.table=TRUE))
#trellis.par.get()

setwd ("g:\\pocls-usydney\\")

matrix_data <- read.csv(file="for R graphs-family1-w1234.csv", header=TRUE, sep=",",
    fileEncoding="UTF-8-BOM")

names(matrix_data)
md.dt <- data.table(matrix_data)
names(md.dt)

table(md.dt$relat)
```

[11] Long or stacked data are described in Appendix 2.

```
md.dt[,relationship:= factor(relat,
levels=c(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,26,27,28,29,30,
     31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50),

labels=c("SC","FMoth","FFath","FSist","FBroth","BSist","BBroth","BMoth","BFath","GMot
h","GFath","GGMoth","

GGFath","Aunt","Uncle","FCous","MCous","FFlat","MFlat","FFrnd","MFrnd","Other","FFr
ndP","MFrndP","FFrndA","MFrndA",

         "FCarer","MCarer","AMoth","AFath","ASist","ABroth","Cous","Fltmte","FrndPr","Si
bs","PrvCare","PrvFSib",
"Tchr",

         "AGGMoth","AGGfath","AAunt","AUncle","ACous","FrndAd","AGrMoth","AGrFath
"))]
table(md.dt$relationship)
table(md.dt$wave)

setkey(md.dt, id_num, wave)
md.dt[, person := as.character(interaction(id_num, wave))]
class(md.dt$person)
md.dt$person <- sapply(md.dt$person, function(x) paste0("ID: ", x))
md.dt$person <- sapply(md.dt$person, function(x) sub(".", " / Wave: ", x, fixed=TRUE))
md.dt

md.dt[, heading :=
         descrip_lab<-paste0("\n",descrip_lab)]

md.dt$heading
md.dt[, person := paste0(person, heading)]
md.dt$person

kolors <-
c("#fd071d","#fffb06","#2df92f","#fdfa90","#b4f48d","#ffdd80","#a0d0fc","#ffd411","#679
2ff","#e8c440","#5b84e4","#936638","#3b5b9c","#e7967d","#78beba","#febeb0","#99eb
eb","#feab13","#ab611b","#cf39fb","#0cfcf9","#696969",
"#e48efb",

"#a6fefc","#852da5","#076867","#fbafb1","#cd5245","#fe34af","#00daa8","#fe83bb","#2
dfbc2","#dce9ee","#f58b04",
"#ededef",
```

```
"#f9e5fc","#ff6a4f","#e7fbda","#32200c","#b0307c","#0f6a51","#faf804","#07caff","#b4b
9da","#c4c4c3","#dd3499",
"#1da57e")

custom.settings <-   list(
        superpose.symbol =list(
                col=kolors, fill=kolors, pch=19, alpha=0.4, cex=2),
        par = list(
                ylab.text=list(col="grey70", cex=1),
                xlab.text=list(col="grey70", cex=1)),
        strip.border = list(col = NA),
        layout.widths = list(right.padding = 2),
        layout.heights = list(top.padding = 2, strip=2.5),
        strip.background = list(col = "grey95"),
        axis.line = list(col = NA),
        axis.text= list(col="grey70", cex=.8)
)

xseq <- 1:8
yseq <- 1:8
myscales <- list(x=list(at=xseq, lim=c(0,9)),
                                y=list(at=yseq, lim=c(0,9)),
                                alternating = 1)
p5 <- xyplot(y ~ x | person,
                groups=relationship, cex=5, type=c("p"),
                data=md.dt,
                xlab=NULL, ylab=NULL,
                scale=myscales,
                between = list(x = 1, y = 1),
                par.settings = custom.settings,
                par.strip.text=list(col="grey40", cex=.8),
                axis = function(side, line.col, ...){
              if (side %in% c("left", "bottom")){
                axis.default(side = side, line.col = "grey90", ...)
              }
                },
                layout=c(2,2),
                key = list(columns = 6, space = "bottom",
                        padding.text = 3, border = "grey70",
               between.columns=1, rep=FALSE,
                        points = list(col = kolors, alpha = 0.4, pch = 19, cex = 1),
                        text = list(levels(md.dt$relationship), cex = .5, col="grey40") ),
                panel = function(x, y, subscripts, groups, ...) {
```

```
                        panel.abline(h=xseq, v=yseq, col="grey90")
                        panel.superpose(x, y, subscripts, groups, ... )
                        panel.text(x=x, y=y, adj=c(NA, NA),
                                col="black", cex=.6,
                                labels=groups[subscripts])
                }
)

# cex=.6 above controls the size of the text in the blobs

p5

# length(kolors)

pdf("Family 1 w1234.pdf", h=11, w=8)
print(p5)
dev.off()
```

SPSS Syntax to apply jitter

Used to add jitter to points which represent *different* categories of person on the same square of the Kvebaek matrix. Multiple instances of the *same* category of person on the same square were aggregated for the purposes of plotting.

```
** Aggregate the file which doesn't have multiple records for the same category of person on the same square.
aggregate outfile=* mode=addvariables overwrite=yes/
  break=wave family pocls_id x y/
  n_on_same_square=n.
sort cases by wave family pocls_id n_on_same_square relat.

* Now add a seq number to each observation so the jitter values can be added.

compute seq_mult_on_square = seq_mult_on_square + 1.
do if ($casenum ne 1).
 if (pocls_id ne lag(pocls_id) or x ne lag(x) or y ne lag(y))seq_mult_on_square = 1.
end if.
leave seq_mult_on_square.
execute.
formats seq_mult_on_square (f2).
freq seq_mult_on_square.

* Now the jitter.
compute offset = .25.

do if (n_on_same_square eq 1).
```

```
  compute new_x=x.
  compute new_y=y.
else if (n_on_same_square eq 2).
   do if (seq_mult_on_square eq 1).
      compute new_x=x-offset.
      compute new_y=y.
   else if (seq_mult_on_square eq 2).
      compute new_x=x+offset.
      compute new_y=y.
    end if.
else if (n_on_same_square eq 3).
   do if (seq_mult_on_square eq 1).
      compute new_x=x-offset.
      compute new_y=y+offset.
   else if (seq_mult_on_square eq 2).
      compute new_x=x+offset.
      compute new_y=y+offset.
   else if (seq_mult_on_square eq 3).
      compute new_x=x.
      compute new_y=y-offset.
    end if.
else if (n_on_same_square eq 4).
   do if (seq_mult_on_square eq 1).
      compute new_x=x-offset.
      compute new_y=y+offset.
   else if (seq_mult_on_square eq 2).
      compute new_x=x+offset.
      compute new_y=y+offset.
   else if (seq_mult_on_square eq 3).
      compute new_x=x-offset.
      compute new_y=y-offset.
   else if (seq_mult_on_square eq 4).
      compute new_x=x+offset.
      compute new_y=y-offset.
    end if.
else if (n_on_same_square eq 5).
   do if (seq_mult_on_square eq 1).
      compute new_x=x.
      compute new_y=y+offset.
   else if (seq_mult_on_square eq 2).
      compute new_x=x-offset.
      compute new_y=y.
   else if (seq_mult_on_square eq 3).
      compute new_x=x.
```

```
      compute new_y=y.
   else if (seq_mult_on_square eq 4).
      compute new_x=x+offset.
      compute new_y=y.
   else if (seq_mult_on_square eq 5).
      compute new_x=x.
      compute new_y=y-offset.
    end if.
else if (n_on_same_square eq 6).
   do if (seq_mult_on_square eq 1).
      compute new_x=x-offset.
      compute new_y=y+offset.
   else if (seq_mult_on_square eq 2).
      compute new_x=x.
      compute new_y=y+offset.
   else if (seq_mult_on_square eq 3).
      compute new_x=x+offset.
      compute new_y=y+offset.
   else if (seq_mult_on_square eq 4).
      compute new_x=x-offset.
      compute new_y=y-offset.
   else if (seq_mult_on_square eq 5).
      compute new_x=x.
      compute new_y=y-offset.
   else if (seq_mult_on_square eq 6).
      compute new_x=x+offset.
      compute new_y=y-offset.
    end if.
end if.
execute.
```

Appendix 5: Calculating Euclidian distances

An example of calculating Euclidian distances from the coordinates of figures on the Kvebaek matrix

```
do repeat y=f1_rbat_y01_cyp f1_rbat_y02_cyp f1_rbat_y03_cyp f1_rbat_y04_cyp
f1_rbat_y05_cyp
   f1_rbat_y06_cyp f1_rbat_y07_cyp f1_rbat_y08_cyp f1_rbat_y09_cyp f1_rbat_y10_cyp
   f1_rbat_y11_cyp f1_rbat_y12_cyp/
   x=f1_rbat_x01_cyp f1_rbat_x02_cyp f1_rbat_x03_cyp f1_rbat_x04_cyp f1_rbat_x05_cyp
   f1_rbat_x06_cyp f1_rbat_x07_cyp f1_rbat_x08_cyp f1_rbat_x09_cyp f1_rbat_x10_cyp
   f1_rbat_x11_cyp f1_rbat_x12_cyp/
   d=distf1_1 to distf1_12.
compute d=sqrt((y - f1_rbat_y01_cyp)**2 + (x - f1_rbat_x01_cyp)**2).
end repeat.
```

Appendix 6: Kvebaek distances

Mean Kvebaek distances by wave and original relationship categories for Family 1 (first table) and Family 2 (second table).

	wave											
	1			2			3			4		
	distance			distance			distance			distance		
relation	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
1 Study child	.00	.00	331	.00	.00	279	.00	.00	232	.00	.00	577
2 Foster mother	1.67	1.26	159	1.48	1.11	130	1.49	1.12	102	1.52	.98	294
3 Foster father	2.01	1.44	131	1.72	1.20	110	1.65	1.06	84	1.60	1.10	218
4 Foster sister	2.44	1.63	99	1.98	1.28	94	2.22	1.27	77	2.23	1.55	229
5 Foster brother	2.52	1.87	138	2.22	1.43	95	2.02	1.20	72	2.36	1.59	212
6 Birth sister	1.97	1.45	198	2.18	1.73	202	1.99	1.41	171	2.13	1.43	321
7 Birth brother	2.07	1.55	209	1.87	1.51	200	1.91	1.39	172	1.95	1.27	334
8 Birth mother	1.00	.00	2	.	.	0	.	.	0	1.92	1.10	9
9 Birth father	3.81	2.23	2	2.24	.00	2	1.21	.29	2	2.44	2.08	9
10 Birth grandmother	1.46	1.05	99	1.44	1.17	106	1.42	1.02	92	1.43	.87	196
11 Birth grandfather	1.85	1.23	64	1.77	1.53	71	1.46	.86	66	1.69	1.17	126
12 Birth great grandmother	2.19	1.23	8	2.69	1.92	5	1.44	.77	7	2.40	1.78	12
13 Birth great grandfather	2.24	.	1	.	.	0	2.30	1.84	2	1.41	.00	4
14 Birth aunty	1.56	.87	69	1.63	1.00	58	1.70	1.42	42	1.66	1.14	99
15 Birth uncle	1.99	1.09	57	1.89	1.33	69	1.86	1.18	40	1.82	1.00	89
16 Female cousin	2.01	1.48	35	2.07	1.04	28	.	.	0	.	.	0
17 Male cousin	2.09	1.40	33	2.28	1.39	24	.	.	0	.	.	0
18 Female flatmate	3.52	2.14	7	.	.	0	.	.	0	.	.	0
19 Male flatmate	3.25	1.64	7	.	.	0	.	.	0	.	.	0
20 Female friend	1.81	1.19	12	3.16	.	1	.	.	0	.	.	0

	wave											
	1			2			3			4		
	distance			distance			distance			distance		
relation	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
21 Male friend	2.70	2.08	7	1.76	.63	7	.	.	0	.	.	0
22 Other	2.25	1.73	107	1.59	1.09	34	1.91	1.11	34	2.28	1.38	155
26 Female friend/age peer	.	.	0	.	.	0	.	.	0	.	.	0
27 Male friend/age peer	.	.	0	.	.	0	.	.	0	.	.	0
28 Female friend/adult	.	.	0	.	.	0	.	.	0	.	.	0
29 Male friend/adult	.	.	0	.	.	0	.	.	0	.	.	0
30 Previous carer (female)	.	.	0	.	.	0	.	.	0	.	.	0
31 Previous carer (male)	.	.	0	.	.	0	.	.	0	.	.	0
32 Adoptive mother	.	.	0	.	.	0	.	.	0	1.39	.77	11
33 Adoptive father	.	.	0	.	.	0	.	.	0	.93	.38	9
34 Adoptive sister	.	.	0	.	.	0	.	.	0	2.80	2.17	5
35 Adoptive brother	.	.	0	.	.	0	.	.	0	1.57	.83	5
36 Birth cousin	.	.	0	.	.	0	1.68	.84	34	2.17	1.40	105
37 Flatmate	.	.	0	.	.	0	.	.	0	.	.	0
38 Friend/age peer	.	.	0	.	.	0	.	.	0	1.97	1.39	11
39 Birth siblings	.	.	0	.	.	0	.	.	0	.	.	0
40 Previous carer	.	.	0	.	.	0	.	.	0	.	.	0
41 Previous foster siblings	.	.	0	.	.	0	.	.	0	.	.	0
42 Teacher	.	.	0	.	.	0	.	.	0	.	.	0
43 Adopted great grandmother	.	.	0	.	.	0	.	.	0	.	.	0
44 Adopted great grandfather	.	.	0	.	.	0	.	.	0	.	.	0
45 Adopted aunty	.	.	0	.	.	0	.	.	0	.	.	0
46 Adopted uncle	.	.	0	.	.	0	.	.	0	.	.	0
47 Adopted cousin	.	.	0	.	.	0	.	.	0	.	.	0

relation	wave											
	1			2			3			4		
	distance			distance			distance			distance		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
48 Friend/adult	.	.	0	.	.	0	.	.	0	.	.	0
49 Adopted grandmother	.	.	0	.	.	0	.	.	0	.	.	0
50 Adopted grandfather	.	.	0	.	.	0	.	.	0	.	.	0

relation	wave											
	1			2			3			4		
	distance			distance			distance			distance		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
1 Study child	.00	.00	305	.00	.00	261	.00	.00	218	.00	.00	526
2 Foster mother	.	.	0	.	.	0	.	.	0	.	.	0
3 Foster father	.	.	0	.	.	0	.	.	0	.	.	0
4 Foster sister	.	.	0	.	.	0	.	.	0	.	.	0
5 Foster brother	.	.	0	.	.	0	.	.	0	.	.	0
6 Birth sister	1.64	1.02	185	1.97	1.27	110	1.68	1.27	77	1.89	1.24	213
7 Birth brother	1.75	1.28	219	1.91	1.19	131	1.67	1.16	103	1.91	1.31	230
8 Birth mother	1.49	1.10	210	1.70	1.36	163	1.59	1.17	115	1.89	1.42	222
9 Birth father	1.61	1.15	145	1.91	1.54	130	1.79	1.36	91	1.94	1.27	176
10 Birth grandmother	1.88	1.06	94	1.63	1.13	80	1.87	.97	53	2.16	1.31	99
11 Birth grandfather	1.87	1.25	65	1.76	.87	52	2.16	1.62	34	2.59	1.50	66
12 Birth great grandmother	2.58	1.31	7	1.71	1.38	6	2.26	2.01	9	2.36	1.83	22
13 Birth great grandfather	1.96	.75	4	1.64	1.03	4	1.87	.82	4	2.14	1.15	6

	wave											
	1			2			3			4		
	distance			distance			distance			distance		
relation	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
14 Birth aunty	2.02	1.09	82	1.78	1.16	90	2.06	1.45	54	2.18	1.27	126
15 Birth uncle	2.27	1.16	70	1.84	1.06	54	2.23	1.38	33	2.17	1.21	92
16 Female cousin	2.33	1.54	44	2.18	1.74	58	.	.	0	.	.	0
17 Male cousin	1.89	.87	51	2.12	1.47	66	.	.	0	.	.	0
18 Female flatmate	.	.	0	.	.	0	.	.	0	.	.	0
19 Male flatmate	.	.	0	.	.	0	.	.	0	.	.	0
20 Female friend	1.80	1.23	145	.	.	0	.	.	0	.	.	0
21 Male friend	1.94	1.25	121	.	.	0	.	.	0	.	.	0
22 Other	2.09	1.24	94	2.28	1.11	106	2.82	1.74	203	2.41	1.69	345
26 Female friend/age peer	.	.	0	1.82	1.08	110	.	.	0	.	.	0
27 Male friend/age peer	.	.	0	1.82	1.13	83	.	.	0	.	.	0
28 Female friend/adult	.	.	0	2.06	1.43	26	.	.	0	.	.	0
29 Male friend/adult	.	.	0	1.92	1.24	23	.	.	0	.	.	0
30 Previous carer (female)	.	.	0	1.00	.00	2	.	.	0	1.41	.	1
31 Previous carer (male)	.	.	0	1.00	.	1	.	.	0	.	.	0
32 Adoptive mother	.	.	0	.	.	0	.	.	0	.	.	0
33 Adoptive father	.	.	0	.	.	0	.	.	0	.	.	0
34 Adoptive sister	.	.	0	.	.	0	.	.	0	.	.	0
35 Adoptive brother	.	.	0	.	.	0	.	.	0	.	.	0
36 Birth cousin	.	.	0	.	.	0	2.05	1.13	91	2.02	1.10	270

relation	wave											
	1			2			3			4		
	distance			distance			distance			distance		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
37 Flatmate	.	.	0	.	.	0	.	.	0	.	.	0
38 Friend/age peer	.	.	0	.	.	0	.	.	0	1.89	1.06	535
39 Birth siblings	.	.	0	.	.	0	1.95	.99	140	.	.	0
40 Previous carer	.	.	0	.	.	0	.	.	0	.	.	0
41 Previous foster siblings	.	.	0	.	.	0	.	.	0	1.33	.58	3
42 Teacher	.	.	0	.	.	0	.	.	0	.	.	0
43 Adopted great grandmother	.	.	0	.	.	0	.	.	0	.	.	0
44 Adopted great grandfather	.	.	0	.	.	0	.	.	0	.	.	0
45 Adopted aunty	.	.	0	.	.	0	.	.	0	2.74	1.47	5
46 Adopted uncle	.	.	0	.	.	0	.	.	0	3.34	2.54	4
47 Adopted cousin	.	.	0	.	.	0	.	.	0	.67	1.15	3
48 Friend/adult	.	.	0	.	.	0	.	.	0	2.13	1.15	230
49 Adopted grandmother	.	.	0	.	.	0	.	.	0	5.05	1.92	3
50 Adopted grandfather	.	.	0	.	.	0	.	.	0	3.85	2.75	4

Appendix 7: The hierarchical structure of the data

The longitudinal data collected in the POCLS form a hierarchical structure: in its simplest form, the observations made on the children at each wave are at the lowest level and the children themselves are at the second level. A more complex structure exists if the households to which the children belong are seen as a third level, and the administrative districts in which the households are located make up a fourth level, assuming that there is sometimes more than one child living in a given household. At the other extreme, the multiple observations of distance at each wave make up another level.

Considering only children in foster or relative/kinship care, and those who provided Kvebaek data, around 76% of households in each wave contained only one child, while around 19% contained two children and the remaining households contained three or more (up to six) children. While the responses of children living in the same household are likely to be correlated, meaning that the assumption of the independence of observations could be violated, the preponderance of households with only one child, and the relatively small size of the largest 'clusters', mean the results of analyses may not be much affected, but this will be assessed in multilevel models.

An issue which arises with multilevel analyses, especially of longitudinal data, is that of multiple membership of clusters or groups at a hierarchical level. Again considering only children in foster or relative/kinship care, and only for the waves in which they contributed Kvebaek data, 9 (1.4%) were included in two different districts over the first three waves, and 314 (25.7%) lived in two or more different households (Table 10). Ignoring multiple membership may lead to incorrect estimates of parameters and variances (Chung & Beretvas, 2012). It may be, however, that the extent of multiple membership in the POCLS, at least over the first four waves, is not sufficient to give rise to significant bias; this will need to be investigated.

Table 10. The number of households in which children who provided Kvebaek data lived during waves 1–4.

number_of_HHs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 One household	907	74.3	74.3	74.3
	2 Two households	281	23.0	23.0	97.3
	3 Three or more households	33	2.7	2.7	100.0
	Total	1221	100.0	100.0	

In preparation for analyses which approached (or attempted to avoid) the problem by assigning children to one district or household, three variables were created for each of these variables. The syntax is shown below. The aggregate procedure was used to create variables which showed the first and last districts and households a child appeared in over the four waves. A more tortuous procedure was used to create variables which showed the district and household which the child was most likely to be in over the three waves. Of course, the majority of children were in the same district or household at each time point, or only contributed data for one wave.

SPSS syntax to create most frequent households and districts for analyses

```
* Create first and last districts and households.

sort cases by pocls_id wave.
aggregate out=* mode=addvariables/
  break=pocls_id/
  first_district first_hh=first(s_district hhid)/
  last_district last_hh=last(s_district hhid).

formats first_district last_district (f2) first_hh last_hh (f4).

* In order to get most frequent district and household uses casestovars and adds
unstacked data to main file for calculation.
* Probably could do it on stacked data but I (AT) took the easy way out.

dataset name intv.

cd 'g:\pocls-usydney'.
save outfile='dist_hh'/
  keep=pocls_id wave s_district hhid.
get file='dist_hh'.
dataset name dist_hh.

dataset activate dist_hh.
sort cases by pocls_id wave.
```

```
casestovars id=pocls_id/
  index=wave.

dataset activate intv.
sort cases by pocls_id wave.

match files file=intv/in=int/
  table=dist_hh/in=dh/
  by pocls_id/map.
execute.

* [Activate newly-merged dataset].

* Create most frequent district.
compute #nwaves=3.
vector #n(3).
vector x=S_DISTRICT.1 to S_DISTRICT.3.
loop #i=1 to #nwaves.
compute #n(#i)=0.
+ loop #j=1 to #nwaves.
do if (~sysmis(x(#i)) and ~sysmis(x(#j))).
 if (x(#i) eq x(#j))#n(#i) = #n(#i) + 1.
end if.
+ end loop.
end loop.

compute most_frequent_district = x(1).
loop #i=2 to #nwaves.
if (#n(#i) > #n(1))most_frequent_district = x(#i).
end loop.
execute.

formats most_frequent_district (f2).
freq most_frequent_district.
* Create most frequent household.

compute #nwaves=3.
vector #n(3).
vector x= hhid.1 to hhid.3.
loop #i=1 to #nwaves.
compute #n(#i)=0.
+ loop #j=1 to #nwaves.
do if (~sysmis(x(#i)) and ~sysmis(x(#j))).
 if (x(#i) eq x(#j))#n(#i) = #n(#i) + 1.
```

```
end if.
+ end loop.
end loop.

compute most_frequent_hh = x(1).
loop #i=2 to 3.
if (#n(#i) > #n(1))most_frequent_hh = x(#i).
end loop.
execute.

formats most_frequent_hh (f4).
freq most_frequent_hh.

** Attach INTV data to FELT data - all records.

dataset name FELT.
sort cases by pocls_id wave sequence.

dataset name intv.
sort cases by pocls_id wave.

match files file=felt/
  table=intv/
  by pocls_id wave/
  map.
execute.

crosstabs wave by plctype_interview
```

Appendix 8: Preliminary reduction of the independent variables from the model

Initial analyses for both families included all the variables listed in Table 11, but some were dropped before further analyses were conducted.
The variables in groups 12 (*child*3, 7 and 8), 13 (*pl5_01_cyp*, *pl5_02_cyp*, *pl5_04_cyp* and *pl5_05_cyp*) and 16 (*fam8_01- fam8_03*) in Table 11 were tested jointly as sets at the nominal *alpha* of .01. If a set was not significant, all variables were dropped. If the set was significant, individual variables were retained if they were significant at the same level.
For Family 1, all group 12 variables (*child*3, 7 and 8) were dropped, along with *pl5_02_c*

NSW GOVERNMENT