

The geographical distance between nonresident parents and children in Norway

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The final authenticated version is available at:

Dommermuth L. (2018). The geographical distance between nonresident parents and children in Norway. *Population, Space and Place*.24(2):e2089.

<https://doi.org/10.1002/psp.2089>



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Title:

The Geographical Distance between Nonresident Parents and Children in Norway

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Keywords:

post-separation families, nonresident parents, union dissolution, geographical distance, multilevel analysis

Acknowledgements:

I'm grateful to Torbjørn Skardhamar, Kjetil Telle, and Kenneth Aarskaug Wiik for their valuable comments. The study is part of the research project 'Spatial and Temporal Dynamics' funded by the Research Council of Norway (Project no. 219129).

Abstract:

As union dissolution rates increase in most modern societies, a growing number of children are living in post-separation families. The geographical distance between parental households shapes the possibilities for contact between nonresident parents and children, but empirical studies are lacking. This study investigates the geographical distance between nonresident parents and children in Norway using a total population sample, including exact geographical coordinates for residency. Results show that most children are registered in the maternal household, indicating a strong social norm favoring motherhood after union dissolution. The majority of nonresident parents live within a 10 km radius of their child, but the average distance is greater for nonresident fathers than for nonresident mothers. Multilevel analysis show that the distance between the parental households decreases with regional level of urbanization. There is evidence that the distance between the two parental households is greater if the child was either relatively young or old at parents' union dissolution. Parents' income at this time is negatively correlated with distance. This underlines the long lasting impact of family characteristics at the time of parents' union dissolution on subsequent residential moves. Also different events after parents' union dissolution are associated with the geographical distance between nonresident parents and children. Time since the break-up, the formation of a new co-residential union and the birth of subsequent children are positively correlated with the distance between the two parental households. If children move from one parental household to the other, this is associated with longer distances, especially to nonresident mothers.

When van de Kaa (1987) lined out Europe's Second Demographic Transition, he not only detected a decline in fertility, but also increasing divorce rates and remarriages. The two latter developments contribute to more complex household patterns and fewer children living together with both parents. While almost 90 percent of all children in the U.S. lived with both parents in 1960, this is only true for less than 70 percent since the beginning of the 1990s (U.S. Census Bureau, 2015). Also in Norway, the context of the present study, about a quarter of all children do not live with both parents nowadays (Statistics Norway, 2015). The majority of them have experienced the dissolution of their parents' union. Studies from different countries have concluded that union dissolutions can have a major impact on the life course of children, including their psychological, physical, and socioeconomic well-being (Amato, 2000, 2010). Good coparenting practices and a high involvement of the nonresident parent seem to diminish the negative impact of parents' union dissolution on children's well-being (Viry, 2014). But the relation between the child and the nonresident parent is restricted by time and longer distances between them seem to lead to a decline in involvement and contact (Arránz-Becker, Lois, & Salzburger, 2015; Cheadle, Amato, & King, 2010; Skevik, 2006). Analyzing the geographical distance between nonresident parents and children thereby reveals an important aspect of post-separation families.

In this study, I explore the variation in geographical distance between nonresident parents and children in Norway. The parents under study previously lived together with their common child, but by the end of 2012 the child is registered in one parental household and the other parent is defined as the nonresident parent. In contrast to previous studies that have used rough measures of distances (Cheadle et al., 2010) or distinguished between administrative units without taking the distance itself into account (Gram-Hanssen & Bech-Danielsen, 2008; Kalil, Mogstad, Rege, & Votruba,

2011), this study calculates the exact Euclidian distance between the two parental households. I investigate to what extent this distance is associated with different characteristics of post-separation families. In multilevel analysis, level of urbanization in labor market regions is included to account for contextual characteristics.

BACKGROUND AND HYPOTHESES

After the parental break-up, at least one parent moves out of the former shared family home and the post-separation family has to find a new living arrangement. In this context, the question of child custody is an important issue. In most modern societies, both legal parents, including parents of adopted children and parents of the same sex, usually have judicial custody after a union dissolution, as this is seen to be in the child's best interest (Dethloff, 2015). In addition to judicial custody, which covers general responsibility for the child, there is what is referred to as physical custody, which is usually related to the actual living arrangements of the child. The concrete custody regulations vary by country. In the case of Norway, the parent who has physical custody can decide where in Norway she or he wants to live with the child. It is only if the separated parents agree on joint physical custody that they have to reach consensus before they can move with the child (Section 37 in the Norwegian Children Act). In cases of joint physical custody, the child often lives equally in both parental households, but this is not required and other agreements between the parents are also possible (Kitterød & Lyngstad, 2014). Based on survey data, it is estimated that the proportion of parents practicing shared residence in Norway increased from 10 percent in 2004 to 25 percent in 2012 (Kitterød & Lyngstad, 2014). Currently, custody agreements between parents are not captured in administrative registers, but there is an ongoing discussion if information on joint physical custody should be included in the population register (The

Norwegian Tax Administration, personal communication, July 20, 2016). Regardless of the specific custody agreement and registration of the child, there is a geographical distance between two parental households in post-separation families.

Geographical Distance and Contact between Nonresident Parents and Children

Earlier research mostly focused on the contact between nonresident parents – and in many cases only nonresident fathers – and children, while evidence concerning the geographical opportunity structure of post-separation families is scarce. If information about distances or travelling times between the parental households was included, results indicated a strong positive correlation between short distances and contact (Arránz-Becker et al., 2015; Cheadle et al., 2010; Skevik, 2006; Swiss & Le Bourdais, 2009).

Several results suggest that geographical distances shape the contact pattern between nonresident parents and children. Firstly, a study on parents with joint physical custody in Norway pointed out that the relocation of one of the parents is an important reason for terminating an agreement on shared residence (Skjørten, Barlindhaug, & Lidén, 2007). Secondly, based on data from the U.S., Cheadle et al. (2010) found that moving closer to the nonresident child allowed nonresident fathers to increase their level of contact with their child. Thirdly, results from a German study showed that controlling for residential agreements and other factors does not reduce the positive effect of short geographical distances on contact between nonresident fathers and children (Schier & Hubert, 2015). Fourthly, Viry (2014) concluded that the distance to nonresident fathers is itself an important factor for children's wellbeing in post-separation families.

The Geographical Opportunity Structure of Post-Separation Families

Characteristics of moves triggered by union dissolution.

The distance between nonresident parents and children arises when at least one parent moves out of the former shared family home. In research on moving behavior, moves after union dissolutions are defined as “induced moves” (Mulder & Malmberg, 2011) with three specific characteristics: they are urgent, financially restricted, and spatially restricted (Feijten & van Ham, 2007; 2013).

Because couples – or at least one party – want to put the decision to break up into effect as soon as possible, moves triggered by union dissolution are often urgent. As a result of this time pressure the first move after a union dissolution is often to temporary housing, followed by several subsequent moves (Gram-Hanssen & Bech-Danielsen, 2008), typically over short distances (Feijten & van Ham, 2007, 2013; Mulder & Malmberg, 2011). To take into account the urgency of the first move after a union dissolution, the first hypothesis assumes that there is *a positive correlation between the time since union dissolution and the geographical distance between the nonresident parent and the child (time hypothesis)*.

Moves after union dissolutions are usually financially restricted, as the individual resources of each partner are in most cases smaller than the shared resources of both former partners (De Jong & Graefe, 2008). Such moves therefore often involve a step down the housing ladder (Feijten & van Ham, 2013; Mulder, 2013; South, Crowder, & Trent, 1998). Financial resources also play an important role when former partners decide over the earlier shared family home. According to Mulder and Wagner (2010), one or both former partners will move after union dissolution if the monetary and nonmonetary costs of moving are lower than costs of staying. For those moving out, their financial resources shape their possibilities on the housing market. Measuring the distance between nonresident parents and children, two Swedish studies found that

distances were shorter among parents with higher income (Statistics Sweden, 2015; Stjernström & Strömgren, 2012). While these findings are based on income after parent's separation, Cooke, Mulder, and Thomas (2016) point out the relevance of resources before a divorce, as women with low relative income were more likely to make longer distance moves than their ex-partners. Based on these previous results, it can be expected that *nonresident parents with greater financial resources will have better opportunities to choose their place of residence and therefor live closer to their child than nonresident parents with small financial resources (income hypothesis)*.

The third characteristic of moves triggered by union dissolutions is their spatial restriction (Feijten & van Ham, 2007, 2013). For nonresident parents, the contact with their children seems to play an important role in this context. Results from a study of divorced couples in the U.S. show that divorced parents are less likely to move to another state than ex-partners without children (Cooke et al., 2016). Further, nonresident parents in Denmark stated that finding new permanent housing near their children was an important milestone (Gram-Hanssen & Bech-Danielsen, 2008). If only one parent moves out, the former shared family home may serve as the reference point in the search for a new house. In this case, the parent who moves out is familiar with the neighborhood and the local housing market. If both parents move out, it might be more difficult to find two new parental homes situated relatively close to each other.

Interestingly, no previous study has investigated the relevance of the former shared family home to the distance between nonresident parents and their children. The third hypothesis states that *the distance between dissolved parental households is shorter if only the nonresident parent moved out of the former shared family home compared to post-separation families where the resident parent and the child or all family members moved out (family home hypothesis)*.

Ties to the social network and labor market region are other factors that increase the spatial restriction of moves after union dissolutions, while structural aspects of the local housing market may shape the impact of such factors. Urban areas offer a variety of housing opportunities and provide better opportunities for adjustment moves within the same municipality as rural areas (Nivalainen, 2004). In line with this, Feijten and van Ham (2007) found that moving distances are shorter in a densely populated area. Therefore, the fourth hypothesis states that *there is a negative association between regional degree of urbanization and distance between nonresident parents and children (urbanization hypothesis)*. The impact of such contextual measures on living arrangements of post-separation families has to my knowledge not been examined in detail so far.

Family characteristics and geographical distance after union dissolution.

Most children live or are registered in the maternal household if the parents do not live together (Arránz Becker et al., 2015; Feijten & van Ham, 2013; Kitterød & Lyngstad, 2014; Mulder & Wagner, 2010). This so-called gendered household pattern is also dominant in countries with a strong focus on gender equality, even though the proportion of children registered in the paternal household has increased from 8 percent in 1975 to 21 percent in 2013 in Sweden (Statistics Sweden, 2015). Studies including nonresident mothers as well as nonresident fathers found that, on average, absent fathers live further away from their children than absent mothers (Statistics Sweden, 2015; Stjernström & Strömgren, 2012).

The age of the child seems to be another important factor that can alter the distance between a child and the nonresident parent. Cheadle et al. (2010) used child's age at union dissolution as an indicator and expected that, the longer a father and a child lived

together before the parental break-up (i.e., the older the child was at the parents' union dissolution), the stronger would their emotional bonds be. In line with this, their results suggested that nonresident fathers were more likely to have minimal contact with their child, if the child was relatively young at the time of the parents' union dissolution.

Conversely, other authors have argued that nonresident parents try to keep the distance especially short for the youngest children, because infants have a greater need for care and support through face-to-face contact than grade school children or teenagers (Viry, 2014).

However, the impact of child's age on the distance to the nonresident parent may vary with the time since the parents' union dissolution. The authors of the report from Statistics Sweden tried to disentangle the two factors from each other. They created a subsample that only included dissolved unions where the child was not older than seven years when the parents broke up (Statistics Sweden, 2015). According to these results, the likelihood of living near the absent parent decreased if the child was older when the parents' union was dissolved, which contradicts the findings of Stjernström and Strömberg (2012). More research seems to be necessary to investigate how child's age is related to the distance between nonresident parents and children. Based on the existing, rather mixed evidence, it is hypothesized that *the distance to the nonresident parent increases with child's age at the parents' union dissolution (child's age hypothesis)*.

The distance between the child and the nonresident parent may also be affected by the union and family status of both parents. Some ex-couples broke up because one of them found a new partner (Mulder & Wagner, 2010), and a new relationship can also be a motive for a subsequent move at a later stage. Results from Sweden show that the distance between children and absent parents increased if one or both parents were

remarried (Stjernström & Strömgren, 2012) or had a child with another parent (Statistics Sweden, 2015; Stjernström & Strömgren, 2012). Both events indicate a change in the family status, and it can be assumed that *repartnering and subsequent childbirths are associated with an increase in the distance between the nonresident parent and the child (new family hypothesis)*. Interestingly, previous studies in this field have so far only included remarriages and not subsequent cohabitations, even though cohabitations are widespread in many countries and especially in Nordic societies (Noack, Bernhardt, & Wiik, 2014).

Research comparing cohabitation and marriage found a higher level of commitment among married couples (Wiik, Bernhardt, & Noack, 2009). Whether the union type before the separation is related to the geographical distance between parents in post-separation families has, to my knowledge, not been investigated so far. We also do not know whether the sex of the child is correlated with the geographical distance to the nonresident parent. Research on parent-child contact in post-separation families has found that nonresident fathers have more contact with sons than with daughters (Manning & Smock, 1999). Likewise, the number of common children may play a role. Furthermore, it should be taken into account that an agreement on a child's residence can change and that a child may move from one parental household to the other (Skjørten et al., 2007). The reasons for such a move can vary greatly. An older child may express a wish to live with the other parent or changes in the life situation of one parent may lead to such a change in the living arrangement. We lack evidence, however, about whether a child's move to the other parental household is correlated with the distance to the nonresident parent.

Measuring geographical distances.

The geographical distance between the separated parental households should be measured as exactly as possible. Distinguishing between whether a person moved to or lives in a different parish, municipality, or region – as for example Gram-Hanssen and Bech-Danielsen (2008) or Kalil et al. (2011) do – paints an imprecise and perhaps even misleading picture, as it fails to differentiate between whether or not these administrative units are relatively close to each other. A study (Stjernström & Strömngren, 2012) and a research report (Statistics Sweden, 2015) from Sweden applied exact measures of geographical distance between absent parents and children. They concluded that most absent parents lived relatively close to their child: 75 percent lived within a 50 km radius of their child (Stjernström & Strömngren, 2012), and descriptive findings indicated that the median distance between the absent parent and the child decreased from 14.7 km in 1975 to 5.5 km in 2013 (Statistics Sweden, 2015). Based on a small Swiss sample of separated mothers living in Geneva, Viry (2014) found that about 80 percent of nonresident fathers lived within a 50 km radius of their child.

DATA AND METHODS

The analyses presented here were based on administrative register data from Norway covering all residents in the country. The individual-level registers include a unique identification number for each person, making it possible to merge information from different registers and to identify family relations. In a first step, all women with at least one child younger than 18 years old at the end of 2012 were selected from the population register ($N=654,186$). From the “Ground parcel, address and building register” (GAB), the exact dwelling number for each mother, child and father was added. For about six percent of the children, the father could not be definitely identified in the register and an additional three percent were excluded due to other missing or

improper values (e.g., one of the parents or the child had emigrated or died, exact addresses or geographical coordinates were missing). In the next step, this dataset was reduced to post-separation families, defined as follows: The parents were registered under the same address when the (youngest) common child was born, but they were not living together at the end of 2012, while the child had to be registered at the same address as one of the parents at the end of 2012. In some cases, intact families have moved to another address but the parents did not report this move at the same time, and intact families may thereby be counted as having been dissolved. Parents who were again registered as living at a common address at the end of 2013 ($n=1,612$) were therefore excluded from the sample.

The final sample consists of 111,031 post-separation families in Norway at the end of 2012. The parent who is not registered in the same household as the child is defined as the nonresident parent and, based on exact geographical coordinates for each address derived from the GAB-register, the exact Euclidian distance between the nonresident parent and the (youngest) child at the end of 2012 was calculated. Depending on which parental household the child is registered in, the variable reflects the distance between a nonresident father and a child ($n=91,517$) or a nonresident mother and a child ($n=19,514$).

As lined out above, I assume that the moving behavior of parents after a union dissolution and the arising geographical distance between the nonresident parent and the child is shaped by characteristics of the involved family members as well as the structure of the housing market. A multilevel strategy is an appropriate approach to address this issue (Snijders & Bosker, 2012). On the contextual level (level 2), the post-separation families are nested in labor market regions, based on the address of the former shared family home. Using commuting, labor market and trade data, Bhuller

(2009) defined 46 geographically connected labor market regions for Norway. In addition, I treated the four biggest cities in Norway (Oslo, Bergen, Trondheim and Stavanger) as independent regions and thereby ended up with 50 labor market regions. An index of urbanization was applied as a regional-level variable to capture main characteristics of the housing market in each labor market region. In 2007, 78% of all residents in Norway lived in an urban settlement (Statistics Norway, 2016), which is defined as a hub of buildings with at least 200 persons and when the distance between the buildings does not exceed 50 meters (Statistics Norway, 2014). Based on municipality data from 2007 (Statistics Norway, 2016), I calculated the proportion of the population living in urban settlements in each labor market region and defined four levels of urbanization: (i) low urbanization (< 60% of the population lives in urban settlements), (ii) moderate urbanization (60-79% live in urban settlements), (iii) high urbanization (80-89 % live in urban settlements) and (iv) very high urbanization ($\geq 90\%$ live in urban settlements).

According to this definition, 11 of the 50 regions have a high or very high urbanization rate, whereas about 60% of the post-separation families are nested in one of these 11 regions (see Table 1). In additional multilevel-models, other regional-level variables were tested (including size of the region, number of residents, population density, housing transactions and prices), but the described index of urbanization fitted best to the data. As a robustness check, a municipality fixed effects OLS model was tested (results available on request). For the variables on the family level, these models provided similar results as the multilevel models presented here.

[Table 1.]

Different variables on the family level (level 1) were developed to test the corresponding hypotheses and to control for other possibly relevant characteristics (see Table 1). If a post-separation family had several common children, the characteristics of the youngest common child were used to construct the dependent and several independent variables.

Firstly, the year of the parents' union dissolution was identified and the age of the (youngest) common child at the end of this year was included to test the *child's age hypothesis*. By definition, the family had to live together in the year when the child was born. Furthermore, the child had to be younger than 18 at the end of 2012. Therefore child's age at parents' union dissolution varies from 1 to 17 years, and a variable with seven age categories was constructed for the multilevel models (see Table 1). The time from the parents' break-up until the end of 2012 varies from 0 years (if they moved apart in 2012) to 16 years (if they dissolved the union in 1996). The median time since parents' union dissolution is six years in the case of nonresident fathers and four years in the case of nonresident mothers (see Table 1). Certainly, contact opportunities between nonresident parents and children are important at any point after parent's union dissolution. With the here chosen approach, I provide insight in the geographical opportunity structure of all types of post-separation families, including those separated several years ago. However, the variation in child's age at separation decreases systematically with shorter time since parents' union dissolution. Therefore, including the time since the parental break-up and child's age in the same model may lead to biased results. The main models focus on the impact of child's age at parents' union dissolution, whereas time since the parental break-up is excluded. In additional analyses, controlling either for time since separation or focusing on union dissolutions

within certain time frames, the relationship between these aspects was investigated further.

To test the *family home hypothesis*, parents who still live at the same address as before the union dissolution were identified in the dataset. If a mother or father still lived in the former family home, the address of the (youngest) common child was also taken into account. This made it possible to establish whether the resident parent stayed together with the child in the former family home or whether only the nonresident parent still lived there at the end of 2012.

Two sets of dummy-variables were constructed to test the *new family hypothesis*.

Firstly, parents who were living together with a new partner (cohabitation or marriage) at the end of 2012 were coded as repartnered (versus no new partner). Secondly, childbirths with a new parent were identified (versus no subsequent births).

To test the *income hypothesis*, parents' income in the year of the separation was derived from the tax and income register. It includes the sum of wages and salaries, property income and transfers and is adjusted by consumer price index. One might argue that the current income of the nonresident parent is more relevant for the distance to the nonresident child, as the nonresident parent may have the opportunity to move closer. Therefore, the household income of the nonresident parent in 2012 is included as an independent variable in additional models. Income quartiles were constructed for both income measures and the lowest income quartile serves as the reference category in the models.

In addition, four other background variables were constructed and included in the analyses. Firstly, a dummy variable measures whether the child has moved from one to the other parental household after the parents' union dissolution. Secondly, I controlled for whether the parents were cohabitants or spouses before they moved apart from each

other. Finally, the sex of the (youngest) common child and the number of common children were included as additional controls at the family level.

Analytical strategy

I apply multilevel linear regression models as the data are hierarchically structured (individuals nested in 50 regions). The literature gives varying rules of thumb for the necessary number of units on the contextual level, but Bryan and Jenkins (2016) pointed out that at least 25 groups should be applied in linear models. The first step in a multilevel analysis is to run a so-called empty model, where the individuals are only nested within the regions. Compared with the empty model, the explanatory power of level-2 variables can be evaluated in a next step (random intercept model with macro explanatory variables). Next, level-1 variables are added to the model. In the model selection process I tested whether the impact of these variables varies across groups (i.e., varying or fixed slopes) or is moderated by the group level-variable (i.e. interactions between degree of urbanization and level-1 variables).

The distances moved after a union dissolution and the distances between nonresident parents and children are often rather short (Stjernström & Strömgen, 2012). However, some people still move relatively far after a union dissolution and, in Norway, the longest straight line distance from south to north is more than 1700 km on the mainland. This implies that the dependent variable measuring the distance between nonresident parents and their child is not normally distributed, but right-skewed (see Figure 1). Therefore, the natural logarithm of the distance (in km) was used as the dependent variable in the multilevel models.

Nonresident mothers might represent a distinctive group of mothers in post-separation families. Furthermore, some of the independent variables may have a different influence

on the distance measured among nonresident fathers and nonresident mothers, which may be undetected in a common model. Separated models were therefore performed for nonresident mothers and nonresident fathers.

RESULTS

Most children are registered in the maternal household after the parents' union dissolution. Among post-separation families in Norway, over 82 percent of the (youngest) children were registered in the maternal household at the end of 2012, whereas 17.6 percent were registered in the paternal household (see Table 1). This is in line with earlier findings, underlining a gendered household pattern among post-separation families (Arránz Becker et al., 2015, Kitterød & Lyngstad, 2014). Furthermore, the descriptive findings in Table 1 show that the median distance between children and nonresident fathers is greater (5.4 km) than in the case of nonresident mothers (3.5 km).

[Figure 1]

This difference between nonresident fathers and mothers is also visible in Figure 1, where the distance between children and their nonresident parents is divided into seven categories. More than 12 percent of the nonresident mothers live within a radius of 500 meters of their child, whereas the same is true for 9.4 percent of the nonresident fathers. A linear geographical distance of 500 meters is equivalent to approximately a 10-minute walk between two addresses. Many other nonresident parents also live relatively near their child. Taken together, 70 percent of the nonresident mothers and 62 percent of the nonresident fathers live within a 10-km radius of their child. If the radius is expanded to

50 km, about 88 percent of all nonresident mothers and more than 83 percent of all nonresident fathers are included. These descriptive results are in line with the two Swedish studies, which found very similar distributions for the distance between children and absent parents in Sweden (Statistics Sweden, 2015; Stjernström & Strömberg, 2012). The observed difference in the distance to the child between nonresident fathers and nonresident mothers is highly significant in multilevel models comparing both groups of parents (results available on request).

Results from the first set of multilevel models, the so-called empty model, indicate that the geographical distance between nonresident parents and children varies significantly across labor market regions (see Model 1, in Table A1 and Table A2 in the online appendix). The level-1 variance (i.e., the variation among families within regions) is substantially larger than the level-2 variance, which is similar among nonresident mothers and nonresident fathers. Based on the error variances, the intra-class correlation (ICC) can be calculated (Snijders & Bosker, 2012). The ICC is 0.03 for both groups of nonresident parents, implying that about 3% of the outcome measure is due to variations between regions. As even a small ICC can cause a large Type I error in model estimation and as the level-2 variance is clearly significant, the results of the empty models underline that a multilevel approach is the appropriate analytical strategy.

In a second step, the measure for urbanization was added to the models as the macro explanatory variable (see Model 2 in Table A1 and A2 in the online appendix). The model fit improves significantly and based on Snijders and Bosker's method (SB), the proportion of explained between-group variation can be calculated (Snijders & Bosker, 2012). According to the SB-method, the urbanization index explains about 44% (nonresident fathers) and 69% (nonresident mothers) of the variation in distance among regions. The negative beta-coefficient for urbanization indicates that the distance

between the nonresident parent and the child decreases with a higher level of urbanization.

In a third step, level-1 variables were included as independent variables. In the model selection process, the slopes of the level-1 variables were allowed to vary and different cross-level interactions were tested. This led to a main model for each group of nonresident parents (see Table 2). For nonresident mothers, effects of all level-1 variables are treated as fixed (i.e., no random slopes), while for nonresident fathers a random slope is specified for the variable family home and fathers' income.

The model fit improves significantly when level-1 variables are included. Based on SBs'-method, the proportion of explained level-1 variance is 17% among nonresident mothers and 14% among nonresident fathers. The beta-coefficient for urbanization remains stable and highly significant in the main models displayed in Table 2 (-0.29 among nonresident mothers and -0.25 among nonresident fathers), which confirms the *urbanization-hypothesis*.

[Table 2]

Next, the results for the level-1 variables are presented. The *child's age hypothesis* is not confirmed by the results of the multilevel models, as the association between distance and child's age at parents' union dissolution is not linear. Descriptive findings show that the median distance is longest among the youngest children and decreases thereafter, but increases slightly again among older children (see Figure A1 in the online appendix). This development is confirmed by the results of the multilevel models, in which children aged 5 to 6 years at parents' break-up serve as the reference category (see Table 2). Among nonresident mothers, both younger and older children at parents'

union dissolution have a significantly longer distance to their nonresident mother than children in the reference group. The pattern is somewhat different among nonresident fathers. The distance to a nonresident father is shortest, if the child was 7-8 years old at the parental break-up. As among nonresident mothers, children in the two youngest and the oldest age group live significantly further away from their nonresident father than those in the reference group. While the distance between nonresident mothers and children is longest if the child was comparatively old at parent's union dissolution, this is opposite among nonresident fathers with the longest distance to children that were 1-2 years old ($b = 0.32$). Test of pair-wise differences in LS-means indicate that the categories 7-8, 9-10 and 11-12 years differ not significantly from each other.

Time since separation may affect the impact of child's age on the distance to the nonresident parent. As a robustness check, first time since separation was included as an independent variable to the models (see Model 3 in Table A1 and A2 in the online appendix) and second, the sample was reduced to families that either separated within the last four years (see Model 4 in Table A1 and A2 in the online appendix) or at least five years ago (see Model 5 in Table A1 and A2 in the online appendix). Both approaches confirm the non-linear association between child's age at parents' union dissolution and distance. Among nonresident fathers, longer distances to children in the oldest age group are more pronounced in these models.

Time since separation itself has a positive linear impact on distance between nonresident parents and children. Descriptive results show that the median distance between children and nonresident parents increases by years since separation (see Figure A1 in the online appendix). Under control of the other independent variables, time since separation has a significant positive impact on distance to the child among nonresident fathers (see Model 3 in Table A2 in the online appendix). Among

nonresident mothers the pattern is less pronounced. Compared to those who separated within the last two years, also those who separated 3-5 and 6-8 years ago live further away from each other, but the increase in distance is not significant (see Model 3 in Table A1 in the online appendix). However, nonresident mothers that moved apart more than eight years ago live significantly further away from their nonresident child than those in the reference group. Taken together, these results confirm the *time hypothesis*. Next, the *family home hypothesis* is tested. The hypothesis assumes that the distance between a nonresident parent and a child is shortest if only the nonresident parent moves out. This case resembles the reference category in the multilevel-models, compared with post-separation families where the resident parent or where both parents move out. In line with the hypothesis, the results show that the distance between nonresident parents and children is longest if all family members moved out of the former family home (see Table 2). The corresponding coefficients are significant and comparatively high ($b = 0.39$ among nonresident mothers and 0.60 among nonresident fathers). In contrast to the hypothesis, I find that the distance between the child and the nonresident parent is shortest if the nonresident father ($b = -0.30$) or the nonresident mother ($b = -0.46$) stayed alone in the former family home.

Further, the results of the multilevel-models support the *new family hypothesis*. The findings indicate that entering a new relationship or having a child with a different parent is associated with an increase in the distance between the nonresident parent and the child. In both groups of nonresident parents, the beta-coefficients of the dummy variables measuring a new relationship are stronger than those measuring an additional childbirth with another parent (see Table 2). It seems likely that repartnering often goes hand in hand with a subsequent move and increasing distances to the nonresident child,

while a subsequent birth is less often linked to another move or eventually only to an adjustment move.

Parents' income in the year of the union dissolution is negatively correlated with the distance between the nonresident parent and the child in 2012. Compared to those in the lowest income quartile, distances are significantly shorter among those in higher income quartiles. The coefficients indicate a stronger impact of the income of the nonresident parent, but also the income of the resident parent seems to play a significant role (see Table 2). According to tests of pair-wise differences in LS-means, the differences between the income quartiles are significant. In line with the *income hypothesis*, these results indicate that economic resources shape the possibilities on the housing market and allow parents with higher income to live closer to each other after a union dissolution than those with lower income. Parents' economic situation may change in the years after the union dissolution, due to job changes or if one establishes a new co-residential relationship. In additional models, I controlled for the household income of the nonresident parent in 2012 (results available on request). Results from these models are in line with those from the main models in Table 2, as a low household income of the nonresident parent in 2012 is correlated with longer distances to the child. However, including parent's income in the year of the separation provides a better model fit and only nonresident parents in the lowest household income quartile in 2012 differ significantly from the other household income quartiles. This indicates that the income in the year of the separation has a long-lasting impact on the geographical opportunity structure of post-separation families. Also if the sample is restricted to union dissolutions that occurred more than four years ago, parents' income in the year of the separation is negatively correlated with distance (see Model 5 in Table A1 and A2 in the online appendix).

Next, the models control for a child's move between the parental household (see Table 2). Among nonresident fathers, the impact of a child's move from the father to the mother seems to be comparatively low ($b = 0.08$). However, if children moved from the mother to the father, they seem to live substantially further away from their nonresident mother than children that always lived in the paternal household. With $b = 0.69$, the corresponding coefficient has one of the highest values in the model for nonresident mothers. Furthermore, including a cross-level interaction in the model (results available on request) shows that the positive impact of such a move on the distance to the nonresident mother is especially strong in more rural regions compared to higher urbanized regions.

In addition, the models control for the number of common children (see Table 2). Here, the results are almost the same among nonresident mothers and nonresident fathers.

Compared to parents with two common children, the distance between nonresident parents and children is longest if they have only one common child. In the case of three or more common children, however, ex-partners also tend to live further apart than post-separation families with two common children. The gender of the (youngest) child is not significantly associated with the distance to nonresident mothers, but nonresident fathers seem to live further away from their daughters than their sons. However, this difference is not significant if time since separation is included or if the analyses are restricted to union dissolutions within the last four years (see Model 3 and 4 in Table A2 in the online appendix), which suggests that this gender difference is relatively weak, but increases with time since parents' union dissolution. According to the results of the main models (Table 2), the distance from a child to a nonresident parent is expected to be significantly higher if the parents were married and not cohabitants before the break-up. Results of an additional model including a cross-level interaction

indicate that among nonresident fathers the impact of parents' union type varies by urbanization and the difference between originally married and cohabiting parents is especially strong in less urbanized regions (results available on request).

DISCUSSION

About eight out of ten children in post-separation families are registered in the maternal household in Norway. This strong gendered household pattern of post-separation families is in itself remarkable and deserves more attention. In intact families, the vast majority of Norwegian fathers play an active part in the upbringing of their offspring. Stimulating fathers to take more responsibility as caregivers for their children is defined as a general aim of family policy in Norway and fathers' position after a union dissolution has been strengthened (Kitterød & Lyngstad, 2014). Despite this strong focus on gender equality and father involvement in Norway, the results presented here indicate a strong social norm favoring motherhood after union dissolutions, according to which the maternal household should be the base for the child when parents move apart from each other. With regard to the geographical distance between a child and the nonresident parent, this gendered pattern is prolonged in the sense that nonresident mothers on average live closer to a child than nonresident fathers.

Next, the results of the analyses suggest that the independent variables mostly have a similar impact among nonresident mothers and nonresident fathers. This result is an important finding itself, as the situation of post-separation families with nonresident mothers is not well enough investigated. One interesting difference between the two groups is related to children moving between the parental households. Moving from the maternal to the paternal household leads to a longer increase in distance than moving from the father to the mother. This may be due to the circumstance that more fathers

than mothers stayed in the former shared family home. Some children may want to move back home or to their old neighborhood, which in many cases means moving from the mother to the father. This may be especially the case when the mother makes a subsequent move further away. It is therefore related to longer distances.

The impact of child's age at parents' union dissolution also differs to some extent between nonresident mothers and nonresident fathers. The association between child's age and distance is non-linear and overall the differences by child's age are more pronounced among nonresident mothers. While nonresident fathers live especially further away from children with whom they only lived a few years together, the opposite is true among nonresident mothers, which have longer distances to children that were 11 years or older at parent's union dissolution. These differences might be related to gender-specific parent-child bonds that vary with child's age. Future research including parenting norms in post-separation families may provide further insight here. Strong local ties may be one possible explanation for the relative short distances if the child was 5 to 8 years at parents' union dissolution. Children in Norway start primary school at the age of six and usually remain at the same school until the age of 13.

Parents might be more reluctant to move a long distance at this time, since it may mean the child having to change schools and losing another part of his or her social network in the middle of the parents' break-up. The finding that distances between children and nonresident parents increase if the child was comparatively old at parents' union dissolution is not visible in earlier comparable studies.

The *time hypothesis* is supported by the results, as the longer it was since the parents moved apart, the greater was the geographical distance between them. This is most likely driven by subsequent moves over time. In line with this, I find that repartnering and having a child with a different parent is associated with an increase in the distance

between nonresident parents and children. Interestingly, changes in the family situation of both parents play a significant role here. From the perspective of a nonresident parent, it may be perceived as unfavorable, but at the same time meaningful, that the distance to the child increases when he or she moves together with a new partner or family. But nonresident parents seem to have to pay the same price of longer distances without similar benefits in cases where the resident parent establishes a new family relation and moves further away with the child. This is reflected in an ongoing political debate, in which the Minister of Children and Equality proposes to define shared physical custody as the main option for post-separation families and to extend the obligation to notify the other parent if one wants to move with the child (NRK, 2016). A union dissolution usually involves a reduction in household income (Amato, 2010; De Jong & Graefe, 2008) and increases the likelihood of moving to a poorer neighborhood (South et al., 1998). In addition, previous studies on contact frequency between nonresident fathers and children (Skevik, 2006; Swiss & Le Bourdais, 2009) suggest a positive impact of income on contact. The latter findings might be driven by income differences in the geographical distance between nonresident parents and children. The results presented here support the *income hypothesis*, as income is negatively associated with distance between nonresident parents and children. This means that nonresident fathers and mothers with a lower income in the year of the break-up are less likely to find housing near their child than nonresident parents with higher incomes, which reduces their contact opportunities with their children. For children in financially disadvantaged families, the spatial proximity and contact with the nonresident parent may be especially important. Further, the results presented here indicate that parents' income around the break-up has a long lasting impact on the

geographical opportunity structure of post-separation families as it seems to excel the association between distance and the current household income of nonresident parents. In the multilevel analyses, the post-separation families were nested in 50 labor market regions and an index of urbanization was applied as a regional-level variable. The results show that distances between the separated parental households decrease with increasing level of urbanization, as the housing market in urban regions offers more opportunities to live nearby each other. Future comparable research may investigate if regional context and urbanization has a similar impact on the geographical opportunity structure of post-separation families in countries with other patterns of population density. Further, the general finding that many ex-partners with common children live relatively close to each other also several years after they moved apart from each other indicates that their residential mobility is restricted for many years. Given the increasing number of post-separation families, this aspect deserves more attention in studies on moving intentions and behavior. Based on longitudinal data, one could examine changes in the distance over time and under control of other intervening events.

While previous results suggest that geographical distances shape the contact pattern between nonresident parents and children (Cheadle et al., 2010; Schier & Hubert, 2015; Skjørten et al., 2007; Viry, 2014), so far little research has been conducted on this distance itself. Therefore the current study focused on the geographical distance between nonresident mothers or fathers and their children and showed that different attributes of post-separation families are associated with this spatial measure. The results presented underline the importance of including both nonresident mothers and nonresident fathers in analyses of post-separation families. This knowledge may help to improve the situation of post-separation families, for example the unfavorable situation of nonresident parents with low income. Furthermore, the analytical approach has

shown that the regional context has an impact on the geographical opportunity structure of post-separation families. To which degree the influence of geographical distance on contact patterns varies by context, is so far not evaluated. A distance of 5 km may have a different impact on the relation between nonresident parents and children in cities compared to rural areas. Future research on contact patterns in post-separation families should therefore consider the here presented findings and take measures of geographical distances and context into account.

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Table 1. Descriptive statistics of family-level and region-level characteristics

<i>Post-separation family characteristics (level 1)</i>	Nonresident mothers	Nonresident fathers
Median distance to child (km)	3.5	5.4
Child's age at parents' union dissolution		
1–2 years	19.3%	32.1%
3–4 years	24.3%	26.7%
5–6 years	18.7%	16.6%
7–8 years	12.8%	10.1%
9–10 years	10.3%	6.5%
11–12 years	7.0%	4.1%
13–17 years	7.7%	4.0%
Connection to former family home		
Resident parent stayed	46.6%	20.4%
Nonresident parent stayed	5.9%	20.2%
Both parents and child moved out	47.6%	59.3%
Family status after parents' union dissolution		
Mother lives with new partner (ref. = no)	23.2%	24.6%
Mother, child with other parent (ref. =no)	15.3%	17.1%
Father lives with new partner (ref. = no)	20.6%	26.8%
Father, child with other parent (ref. = no)	14.9%	20.7%
Annual income at separation (NOK) *		
25 th percentile	278,000	337,000
Median	365,000	441,000
75 th percentile	454,000	583,000
Child moved to other parent (ref. = no)	33.8%	8.2%
(Youngest) child is a girl (ref. = boy)	44.2%	50.3%
Number of common children		
One child	39.1%	43.0%
Two children	43.3%	40.5%
Three or more children	17.6%	16.4%
Parents were married before union dissolution (ref. = cohabiters)	57.5%	48.9%
Median time since parents' union dissolution	4 years	6 years
% of all post-separation families	17.6%	82.4%
<i>N</i>	19,514	91,517
<i>Regional characteristic (level 2)</i>	by regions (<i>n</i> =50)	by families (<i>n</i> =111,031)
Level of urbanization		
Low urbanization	38%	18.8%
Moderate urbanization	40%	21.7%
High urbanization	14%	39.7%
Very high urbanization	8%	19.8%

* Adjusted by consumer price index; income quartiles are calculated based on income of all mothers and fathers, regardless if they are nonresident or resident parents after the separation.

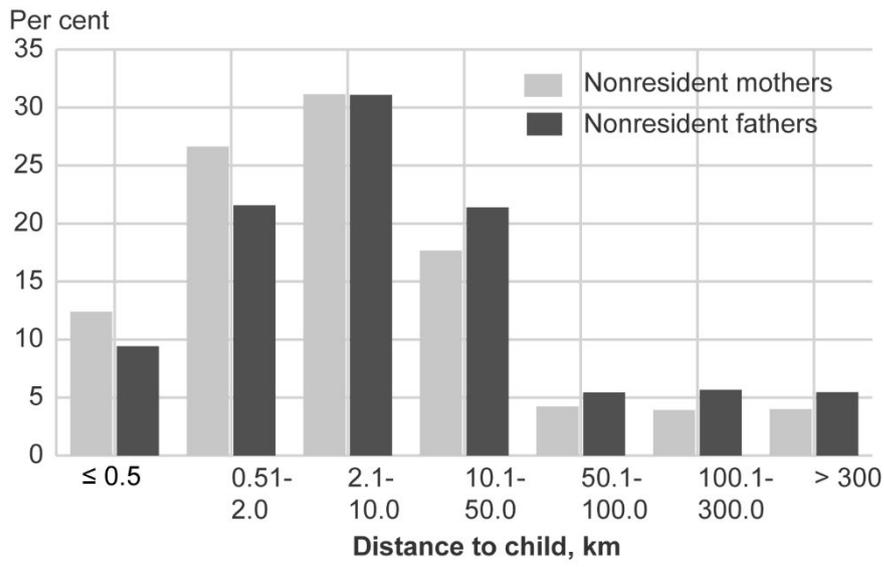
Table 2. Multilevel model predicting distance between nonresident parents and child

	Nonresident mothers		Nonresident fathers	
	B	SE	b	SE
Intercept	1.63***	0.08	2.00***	0.05
<i>Family characteristics (level 1)</i>				
Child's age at dissolution (ref. 5-6 years)				
1-2 years	0.25***	0.04	0.32***	0.02
3-4 years	0.13**	0.04	0.12***	0.02
7-8 years	0.17**	0.05	-0.08**	0.03
9-10 years	0.24***	0.05	-0.05	0.03
11-12 years	0.36***	0.06	-0.06	0.04
13-17 years	0.63***	0.06	0.17***	0.04
Family home (ref. resident parent stayed)				
Nonresident parent lives in family home	-0.46***	0.06	-0.30***	0.03
All moved out	0.39***	0.03	0.60***	0.04
Family status after union dissolution				
Mother lives with new partner (ref. no)	0.28***	0.03	0.25***	0.02
Mother, child with other parent (ref. no)	0.03	0.04	0.08**	0.02
Father lives with new partner (ref. no)	0.23***	0.04	0.29***	0.02
Father, child with other parent (ref. no)	0.16**	0.04	0.20***	0.02
Mother's income at separation (ref. 1 st q.)				
2 nd quartile	-0.29***	0.04	-0.12***	0.02
3 rd quartile	-0.56***	0.04	-0.22***	0.02
4 th quartile	-0.80***	0.04	-0.35***	0.02
Father's income at separation (ref. 1 st q.)				
2 nd quartile	-0.18***	0.04	-0.36***	0.03
3 rd quartile	-0.32***	0.04	-0.49***	0.03
4 th quartile	-0.40***	0.04	-0.59***	0.03
Child moved to other parent (ref. no)	0.69***	0.03	0.08**	0.02
Child is a girl (ref. boy)	0.03	0.03	0.04**	0.01
Common children (ref. two children)				
One child	0.28***	0.03	0.22***	0.01
Three or more children	0.21***	0.04	0.14***	0.02
Parents were married (ref. cohabiters)	0.13***	0.03	0.17***	0.01
<i>Regional characteristics (level 2)</i>				
Level of urbanization	-0.29***	0.04	-0.25***	0.03
<i>Error variance</i>				
Level 1 (Residual)	3.30***	0.03	3.07***	0.02
Level 2 (Intercept)	0.04**	0.01	0.01*	0.01
Family home			0.01***	0.01
Father's income at separation			0.01***	0.01
<i>Model Fit</i>				
AIC	78825.0		379925.8	
BIC	78828.8		379933.4	
N	19514		91517	

Note: * $p < .05$. ** $p < .01$. *** $p < .0001$

Values bases on SAS Proc Mixed, Estimation Method = REML.

Figure 1. Distance between nonresident parents and children



APPENDIX

Table A1. Multilevel model predicting distance between nonresident mother and child

	Model 1		Model 2		Model 3		Model 4 ¹		Model 5 ²	
	b	SE	b	SE	b	SE	b	SE	b	SE
Intercept	1.71***	0.06	2.01***	0.05	1.56***	0.08	1.38***	0.09	1.79***	0.11
<i>Family characteristics (level 1)</i>										
Child's age at dissolution (ref. 5-6 years)										
1-2 years					0.20***	0.05	0.38***	0.06	0.18**	0.06
3-4 years					0.10*	0.04	0.21***	0.06	0.08	0.06
7-8 years					0.20***	0.05	0.09	0.06	0.28**	0.07
9-10 years					0.30***	0.05	0.21**	0.06	0.36**	0.08
11-12 years					0.42***	0.06	0.32***	0.07	0.77***	0.13
13-17 years					0.67***	0.06	0.70***	0.06		
Family home (ref. resident parent stayed)										
Nonresident parent lives in family home					-0.46***	0.06	-0.28**	0.07	-0.66***	0.10
All moved out					0.37***	0.03	0.33***	0.04	0.42***	0.05
Family status after union dissolution										
Mother lives with new partner (ref. no)					0.25***	0.04	0.37***	0.05	0.21***	0.05
Mother, child with other parent (ref. no)					-0.01	0.04	0.14	0.08	0.00	0.05
Father lives with new partner (ref. no)					0.20***	0.04	0.17**	0.06	0.23***	0.05
Father, child with other parent (ref. no)					0.11*	0.04	0.11	0.08	0.16**	0.05
Mother's income at separation (ref. 1 st q.)										
2 nd quartile					-0.28***	0.04	-0.27***	0.05	-0.30***	0.05
3 rd quartile					-0.54***	0.04	-0.50***	0.05	-0.60***	0.06
4 th quartile					-0.77***	0.04	-0.76***	0.05	-0.79***	0.06
Father's income at separation (ref. 1 st q.)										
2 nd quartile					-0.16***	0.04	-0.13*	0.06	-0.21**	0.06
3 rd quartile					-0.28***	0.04	-0.26***	0.06	-0.36***	0.06
4 th quartile					-0.36***	0.04	-0.38***	0.06	-0.37***	0.06

Child moved to other parent (ref. no)	0.61***	0.03	0.50***	0.05	0.74***	0.04				
Child is a girl (ref. boy)	0.04	0.03	0.04	0.03	0.03	0.04				
Common children (ref. two children)										
One child	0.30***	0.03	0.30***	0.04	0.28***	0.05				
Three or more children	0.20***	0.04	0.23***	0.05	0.16**	0.06				
Parents were married (ref. cohabiters)	0.11**	0.03	0.11**	0.04	0.13**	0.05				
Years since separation (ref. 0-2 years)										
3-5 years	0.01	0.04								
6-8 years	0.05	0.04								
9-11 years	0.26***	0.05								
12-16 years	0.52***	0.06								
<i>Regional characteristics (level 2)</i>										
Level of urbanization		-0.33***	0.03	-0.28***	0.04	-0.23***	0.03	-0.33***	0.05	
<i>Error variance</i>										
Level 1 (Residual)	3.87***	0.04	3.88***	0.04	3.28***	0.03	2.75***	0.04	3.82**	0.06
Level 2 (Intercept)	0.14***	0.03	0.04**	0.01	0.04**	0.01	0.01*	0.01	0.08**	0.03
<i>Model Fit</i>										
AIC	81928.4		81884.6		78739.8		38004.9		40532.1	
BIC	81932.2		81888.4		78743.6		38008.7		40535.9	
N	19514		19514		19514		9848		9666	

Note: * $p < .05$. ** $p < .01$. *** $p < .0001$

¹ Model 4 includes only post-separation families that separated within the last four years.

² Model 5 includes only post-separation families that separated more than four years ago.

Values bases on SAS Proc Mixed, Estimation Method = REML.

Table A2. Multilevel model predicting distance between nonresident father and child

	Model 1		Model 2		Model 3		Model 4 ¹		Model 5 ²	
	b	SE	b	SE	b	SE	b	SE	b	SE
Intercept	2.09***	0.05	2.33***	0.06	1.85***	0.05	1.80***	0.06	2.14***	0.07
<i>Family characteristics (level 1)</i>										
Child's age at dissolution (ref. 5-6 years)										
1-2 years					0.30***	0.02	0.39***	0.03	0.31***	0.03
3-4 years					0.09***	0.02	0.13***	0.03	0.11***	0.03
7-8 years					-0.06*	0.03	-0.07*	0.04	-0.07*	0.03
9-10 years					0.00	0.03	0.01	0.04	-0.01	0.04
11-12 years					0.00	0.04	0.04	0.04	-0.06	0.07
13-17 years					0.28***	0.04	0.30***	0.04		
Family home (ref. resident parent stayed)										
Nonresident parent lives in family home					-0.29***	0.03	-0.32**	0.03	-0.30***	0.04
All moved out					0.56***	0.04	0.43***	0.03	0.64***	0.04
Family status after union dissolution										
Mother lives with new partner (ref. no)					0.21***	0.02	0.26***	0.03	0.22***	0.02
Mother, child with other parent (ref. no)					0.02	0.02	0.16**	0.04	0.03	0.02
Father lives with new partner (ref. no)					0.25***	0.02	0.32**	0.03	0.24***	0.02
Father, child with other parent (ref. no)					0.13***	0.02	0.22	0.04	0.15***	0.02
Mother's income at separation (ref. 1 st q.)										
2 nd quartile					-0.11***	0.02	-0.05	0.03	-0.16***	0.02
3 rd quartile					-0.20***	0.02	-0.16***	0.03	-0.25***	0.02
4 th quartile					-0.32***	0.02	-0.34***	0.03	-0.29***	0.03
Father's income at separation (ref. 1 st q.)										
2 nd quartile					-0.35***	0.03	-0.34***	0.04	-0.36***	0.04
3 rd quartile					-0.45***	0.03	-0.44***	0.04	-0.47***	0.04
4 th quartile					-0.54***	0.03	-0.53***	0.04	-0.57***	0.04
Child moved to other parent (ref. no)					0.06*	0.02	0.13**	0.04	0.02	0.03
Child is a girl (ref. boy)					0.04	0.01	0.02	0.02	0.05**	0.02

Common children (ref. two children)										
One child					0.24***	0.02	0.28***	0.02	0.20***	0.02
Three or more children					0.13***	0.02	0.16***	0.03	0.11***	0.03
Parents were married (ref. cohabiters)										
					0.14***	0.01	0.12**	0.02	0.18***	0.02
Years since separation (ref. 0-2 years)										
3-5 years					0.14***	0.02				
6-8 years					0.20***	0.02				
9-11 years					0.29***	0.02				
12-16 years					0.45***	0.02				
<i>Regional characteristics (level 2)</i>										
Level of urbanization					-0.26***	0.04	-0.25***	0.04	-0.24***	0.02
<i>Error variance</i>										
Level 1 (Residual)	4.18***	0.02	4.18***	0.02	3.69***	0.02	3.38***	0.02	3.92***	0.02
Level 2 (Intercept)	0.13***	0.03	0.07***	0.02	0.01*	0.01	0.01	0.01	0.03*	0.02
Family home					0.01***	0.00	0.01***	0.00	0.01**	0.01
Father's income at separation					0.01**	0.00	0.01*	0.00	0.01**	0.01
<i>Model Fit</i>										
AIC	390799.8		390776.26		379599.2		156201.8		223344.1	
BIC	390803.6		390780.0		379606.8		156217.4		223351.7	
N	91517		91517		91517		38466		53051	

Note: * $p < .05$. ** $p < .01$. *** $p < .0001$

¹ Model 4 includes only post-separation families that separated within the last four years.

² Model 5 includes only post-separation families that separated more than four years ago.

Values bases on SAS Proc Mixed, Estimation Method = REML.

Figure A1. Median distance between nonresident parents and children, by time since and by child's age at the union dissolution

