Title: Regional social cohesion and fertility rate: Municipality-level analysis in Finland

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Abstract

Declining fertility rates pose a challenge for population structures and socioeconomic sustainability in developed countries. While many studies find that received social support matters for childbearing on the individual level, and regional variation in fertility can be considerable, few studies have investigated how regional social factors relate to fertility rates. In the current study, we used data from 299 municipalities in Finland to examine how different measures of social cohesion were associated with fertility rates at the regional level. Data for social indicators were derived from a large national survey (n=100,750), fertility data were derived from population registries. We applied spatial autoregressive error models to account for spatial autocorrelation between neighboring municipalities. Regions with higher social support and more frequent social contacts had higher fertility rates, whereas higher social trust and civic engagement were associated with lower fertility rates. These associations were stronger for fertility rates among age groups 20-34. The results suggest that regional social cohesion may be relevant for people's decisions of having children.

Introduction

Decreasing fertility rates pose challenges for the sustainability of the population structure, as fewer children will lead to increasingly aging populations (Zeman et al., 2018) with higher old-age dependency ratios (OECD, 2021). These trends will have substantial social and economic consequences for the developed countries that experience very low fertility rates. Declining fertility may partly be related to people's declining preferences for having children or large families (Golovina et al., 2023), as well as to the discrepancy between ideal and realized family size (Beaujouan & Berghammer, 2019; Sobotka & Beaujouan, 2014). Thus, falling fertility rates are related to the factors that prevent people from having the number of children they deem ideal.

Despite the societal importance of fertility trends, the factors affecting the fertility decline in many developed Western societies in 2010's are still poorly understood. Worsening economic conditions due to the economic crisis in 2008 were suggested to trigger fertility declines, but in some parts of Europe, and especially in the Nordic countries, fertility trends were not related to the recession indicators (Comolli et al., 2021; Matysiak et al., 2021). Therefore, researchers have suggested that focus should be switched to other factors than economic conditions in studying variation in fertility in the Nordic countries (Comolli et al., 2021). As fertility rates vary at the regional level within a country (Campisi et al., 2023; Kulu, 2013; Kulu & Washbrook, 2014), exploring these differences in detail might provide clues about social factors associated with childbearing. Campisi et al. (2023) recently showed that regional social context (e.g., partnership dissolution and conservative attitudes), is relevant for understanding regional variation in fertility decline in the Nordic countries. Therefore, the regional level of analysis may provide a fruitful avenue to understanding declining fertility trends.

Previous research on social cohesion and fertility

Social cohesion is one potential mechanism contributing to regional differences in fertility. Social cohesion is defined as processes that foster a sense of belonging and fortify enduring relationships within a community (Chan et al., 2006). Different measures have been used to capture the essence of social cohesion. Trust can be defined as "willingness of an entity to became vulnerable to another entity" (Schilke et al., 2021), representing a central component in forming meaningful relationships with individuals and interacting with institutions (Schilke et al., 2021). Another way to assess social cohesion is to measure civic engagement, which refers to participating in activities aimed at community development and fostering social cohesion and bonding (Adler & Goggin, 2005). Civic engagement includes a wide range of activities, from volunteering to involvement in community activities, all of which contribute to cohesion and a sense of community. At the individual level, social cohesion is maintained through close social relationships. In

terms of social capital, relationships offer resources to individuals, including emotional, instrumental, and financial support, which, in turn, foster close relationships and cohesion. On the other hand, a lack of meaningful social relations, that is loneliness, can deteriorate social cohesion. All the mentioned factors may facilitate cohesion at different societal levels.

Earlier studies on the associations between social capital and fertility have mainly focused on individual social networks and received social support. Social cohesion has been linked to fertility intentions and number of children. For example, social support from family can increase intentions to have a second or third child (Balbo et al., 2012) and having a social network with a larger proportion of kin in it is associated to having more children (Mathews & Sear, 2013a, 2013b). Overall, availability of social support and networks are well-recognized factors for fertility at the individual level (Balbo et al., 2012; Rossier & Bernardi, 2009).

Regional-level estimates of social cohesion can also play a role in differing fertility rates. Family planning imposes a need for more space, but also the availability of services, e.g., child-care, is important (Rindfuss et al., 2010). Intentions of childbearing are a common reason for residential moves (Ermisch & Mulder, 2019), and can lead to spatial clustering of families (Bergsvik et al., 2023) and fertility (Bergsvik et al., 2023; Kulu, 2013; Meggiolaro, 2011). This clustering can follow housing prices and size of the apartments, but also reflect some regions being perceived more "child-friendly" due to higher social cohesion in them. A recent study from Norway showed that couples who lived in neighborhoods with a higher share of families with at least three children were more likely to have a third child compared to other couples, highlighting the role of social interaction among neighbors (Bergsvik, 2020). Of the different social cohesion indicators, only general trust has been studied in relation to fertility at regional level. Aassve and colleagues found that general trust is associated with higher fertility both in Italian provinces (Aassve et al., 2016) and in between-country comparisons (Aassve et al., 2021). These studies provide some evidence that social cohesion measured at regional level may be associated with fertility, but more detailed information about which aspects of social cohesion are especially important for fertility are not known.

Present study

We combined large-scale survey data with demographic register data from Finland to examine how measures of social cohesion are related to fertility rates when aggregated at the level of municipalities. We conceptualized social cohesion as a) social networks; b) participation rates in activities; c) level of trust; d) level of loneliness. Assessing aggregated measures allows for investigating the spatial nature of fertility and social cohesion. We investigated whether the different measures of social cohesion are similarly associated

with fertility rates. We hypothesized that all indicators of higher social cohesion (i.e., social support, community involvement, trust, and a lack of loneliness) are associated with higher fertility rates. It is important to note that all measures are related to aggregated regional estimates and are not comparable to individual level estimates.

Methods

Sample

The Adult Health and Service survey (ATH) is a large Finnish survey conducted between 2012–2017, with the aim of following trends in wellbeing and health in different population- and age groups. The final sample consists of 100,750 participants who are 20 years or older from 309 different municipalities. Due to anonymization, data was unavailable for 10 municipalities, resulting in a final sample of 299 municipalities.

Fertility

Fertility rate was calculated as the number of births per 1,000 women aged between 15 and 49 in the municipality. The rate was calculated as an average from years 2018, 2019, and 2020, to allow a lag between the measures of social cohesion from ATH data and fertility. Additionally, we calculated fertility by age group (five-year intervals from 15 to 49, a total of 7 age groups), aiming to investigate whether social cohesion acts differently on fertility, depending on age.

Estimates of social cohesion

All variables were transformed so that minimum value is 0 for ease of interpretation.

Social networks were measured by assessing perceived social support and social interactions. Social support was measured with two questions: 1) “Who do you believe truly cares about you, whatever may happen?” and 2) “Who will provide practical help when you need it?” from individuals from following categories: spouse/partner, other next of kin, close friend, close colleague, close neighbor, another person close to you, and no one. Six dichotomous variables were based on each option, which were coded as 1 if the participant reported expecting social support from the mentioned person(s) and 0 otherwise. A sum score for social support was calculated by summing all the dichotomous variables measuring the expected emotional and instrumental support (range = 0–12). Additionally, we included separate variables for social support (emotional support + instrumental help) from partner, relatives, friends, and others (range =0-2) to investigate if the source of expected social support affects the results. Social interactions were measured by asking the participants how often they were in contact with people they were not cohabiting with, through phone, internet, or in face-to-face interaction, using a scale from 0 to 4 (0=never, 1= less than

once a month, 2= 1-3 times a month, 3=1-2 times a week, 4= almost daily). A sum score for social interactions (phone+email+face-to-face) was formed by summing the three scales (range = 0-12).

Social participation included measures about engaging in community activities. Community participation was assessed by asking participants to evaluate their attendance in group activities or organizations including sports clubs, culture associations or organisations, political or trade associations, organisations for the unemployed, organisations for older people (e.g. for pensioners or front veterans, other old-age care organisations), child, youth or family organisations, public health or patient organisations, mental health or substance abuse organisations, disability organisations (e.g. Finnish Association of People with Mobility Disabilities), organisations for care giving relatives (e.g. Association of Care Giving Relatives and Friends), informal hobby group, some other group/organization. The responses were rated on a scale from 0 to 4 (0 = never, 1= less than once a month, 2= 1-3 times a month, 3= 1-2 times a week, and 4= 3+ times a week). A Sum score of all the aforementioned activities was formed (range= 0-48). A separate measure for engagement in cultural events was measured by the frequency of participation in theater performances, concerts, museums, libraries, cinema, sports, and other cultural events. The responses were rated on a scale from 0 to 3 (0= no participation in the last 12 months, 1= a couple of times a year, 2= 1-3 times a month, 3= at least 1/wk). A sum score was calculated by summing all 8 variables (range= 0-24).

Trust was assessed with six items asking about trust in healthcare, social welfare, judiciary, police, municipal decision making, and people. The responses were rated on a scale from 0 (indicating no trust) to 4 (indicating complete trust). Two variables were formed for subsequent analyses: (1) a trust sum score, which encompassed all six items reflecting general trust (range of 0-24), and (2) a separate variable for trust in people (range of 0-4).

Lastly, level of loneliness was assessed by the question: “Do you ever feel lonely?”, with responses rated on a scale from 0 (never) to 4 (all the time).

Covariates

Covariates included regional estimates of population size (logarithm transformed), population density, proportion of residents born in and still living in the municipality, religion (a proportion of those affiliated to church, as religiousness is associated with childbearing behavior (Kolk & Saarela, 2023)), and a composite score of municipality-level socioeconomic status (a sum score of standardized regional tax income, education level, and inversed unemployment rate). Data for covariates was obtained from Statistics Finland population registries.

Statistical analyses

We used multilevel regression with post-stratification (MRP) to obtain representative estimates for social cohesion for municipalities from the individual-level data (Kastellec et al., 2019). We first estimated the indicators of social cohesion with multilevel regression using four age groups (20-34, 35-49, 50-65, 65+) and sex (male/female), and municipality. The obtained estimates for municipalities (i.e., estimates for 4 age groups x 2 sexes for each municipality) were weighted according to the population structure of each individual municipality. This allows for more accurate predictions, especially for smaller municipalities. The weighted estimates were then aggregated to estimate municipality-level variables. To aid the interpretation of the coefficients, measures of social cohesion were standardized by extracting the 10^{th} percentile values from the 90^{th} percentile values so that 1 unit difference in the standardized variable reflects the difference between low (10^{th} percentile) and high (90^{th} percentile) values.

We then examined whether the municipality-level social cohesion was associated with municipal fertility rates. Data from 299 municipalities was analyzed using spatial autoregressive models to account for the spatial nature of fertility. As the estimates for each individual municipality are influenced by the estimates from the neighboring municipalities (e.g., larger municipalities have more educated people, impacting neighboring municipalities), spatial autoregression takes into account the non-random distribution of the response variable (fertility). Each estimate of social cohesion was fitted separately using two models. Model 1 was adjusted for demographic factors: the mean age of the municipality, the logarithm of the population, and population density. Model 2 was additionally adjusted for the composite score of socioeconomic status, the proportion of residents born in and still living in the municipality, and the proportion of people affiliated with the Evangelical Lutheran church (the predominant religion in Finland). Age-specific associations were analyzed by using the aforementioned models and age-group specific fertility categories as outcomes. All statistical analyses were conducted in R version 4.3.1 (R Core Team, 2023) using packages “arm” for MRP and "spatialreg” (Bivand et al., 2013), “geofi” (*Geofi - Access Finnish Geospatial Data*, 2019/2023), and “Sotkanet” (Lahti et al., 2013/2022) for spatial regression analyses.

Results

Descriptive statistics are presented in Table 1. Figure 1 shows the clustering of high and low fertility rates in Finland, illustrated with the Getis–Ord hotspot analysis. High values are given for municipalities that have high net fertility rates and that have neighboring municipalities with high fertility rates.

Results of regression models are presented in Table 2. In model 1, Social support and social interactions were associated with higher regional fertility, and these associations remained after adjusting for Model 2

covariates. Cultural activities were negatively associated with fertility in both models. General trust was not associated with fertility in either model, while higher trust in people was associated with lower regional fertility in both models. No association was observed between loneliness and fertility.

Results for age-specific fertility are presented in Figure2 and in Table 3. In age-group analyses, three indicators of social cohesion (i.e., social support, social interactions, and engagement in cultural activities) were robustly associated with fertility. These associations were stronger for the ages between 20-34 and diminished thereafter. Support from partner, close ones and others were most strongly associated with fertility around the 25-29-year-old group, with the associations becoming less pronounced in older age groups. The importance of social support from friends on fertility reached its peak later, around the 30-34-year and 35-39-year age categories.

Discussion

We studied how different indicators of social cohesion were associated with fertility rates across 299 Finnish municipalities. Of the different social cohesion indicators, higher level of social support and more frequent social interactions were associated with higher fertility rates, whereas higher trust in people and more frequent civic engagement were related to lower fertility rates, even after adjusting for sociodemographic covariates. When we analyzed age-specific associations, social support and social interactions were consistently associated with age-specific fertility rates, particularly among the 20-34-year age group.

The associations of social support and social interactions with higher regional fertility rates support the hypothesis that more active social networks can promote childbearing. Parenthood is a highly social endeavor, and the availability of practical and emotional support from others can alleviate the burden of parenthood, thus making childbearing less burdensome. Though our study was done at the regional-level, and may not be comparable with research conducted at the individual-level (Sedgwick, 2015), our results align with earlier research focusing on fertility and social support and social interactions (Balbo et al., 2012; Rossier & Bernardi, 2009). Previous studies carried out at the individual level have shown that social support can fasten the transition to having more children (Balbo, 2012) and is associated with higher completed fertility (White & Bernardi, 2008). It is also possible that the measures of social support and interactions are indicators of more family-friendly living environments more generally (e.g., considered safe, providing more activities and services for families with children, etc.), and this could explain why these regions have higher fertility rates.

We observed no major differences between sources of social support. Earlier studies have reported that childcare support often comes from kin, whereas emotional support comes from multiple sources (Balbo & Mills, 2011). The mechanism by which social support and fertility are connected may not be specific to kin, but rather the expectation of available support more generally could act as a cue to encourage childbearing (Harknett et al., 2014). Social support from a partner was the only source of support that was not associated with fertility, which may seem counterintuitive. It may be that the way support was measured (range 0-2) was too crude, and did not adequately catch the variation in the support (e.g., frequency or quality).

Somewhat surprisingly, higher social trust and community participation had a weak negative association with fertility rates. This is in contrast with earlier studies on regional-level fertility and trust, that have observed a positive association between trust and fertility (Aassve et al., 2016, 2021). The discrepancy may stem from different sample or from different methodology or reflect true country variations. Aassve et. al. (2016) compared European countries, and trust may be linked to fertility in between-countries comparisons. In a more comparable study to the one presented here, Aassve and colleagues examined how trust affects fertility in Italian provinces (Aassve et al., 2021). It is unclear why higher regional social trust would be associated with lower fertility; furthermore the correlation between social trust and social support was -.22, suggesting that these measures capture different phenomena. Our measure of trust included questions about trust towards various social institutions (e.g., healthcare, police, social welfare etc.), and this might reflect different psychosocial dispositions compared to the measures of social support and interaction, which are measures of social activity. Also loneliness was not related to fertility on a regional-level, contrary to another recent Finnish study which investigated the absence of loneliness on fertility ideals and intentions (Artamonova et al., submitted). It may be that loneliness matters only on an individual level for those of prime childbearing age, but the general regional social fabric does not affect childbearing decisions.

In age-group specific analyses, we observed that the associations between social support and fertility rate were the strongest in ages 20-34 (Table 3). The stronger associations for younger age groups could be driven by social support decreasing the uncertainty in the life situation e.g., young people are more often in precarious financial situation, and social cohesion could lessen their perceived uncertainty. Perceived uncertain life situation is reported as the strongest factor behind the decision to postpone or not to have children in Finland (Savelieva et al., 2023). Therefore, available social support may be especially relevant for people's faster transition to parenthood. Previous studies have shown that social support from grandparents was related to increased fertility intentions (Tanskanen & Rotkirch, 2014) and social trust was related to higher fertility especially among 25-34-year-old people (Aassve et al., 2021). For older age

groups, the effects of social support and social trust on fertility may be weaker because they have already established careers and secure incomes, therefore some other mechanisms may be in play.

Limitations

Our results should be considered with some caveats. Firstly, our study is cross-sectional. Although there was a 3-year lag between social cohesion estimates and regional fertility, we cannot establish causation. It is possible that higher fertility leads to higher social cohesion trough community activities and shared life-situation e.g., meeting people in daycare, schools, through children's hobbies. Secondly, as mentioned earlier, we used aggregated measures, which should not be interpreted to be comparable to studies using individual-level data.

Conclusions

This study examined the associations between different components of social cohesion and fertility. Given the high importance of fertility to regional vitality, understanding the processes that lead to decreasing fertility rates is crucial for understanding depopulation. In our analyses, social cohesion at municipality-level was associated with higher regional fertility rates and these associations were stronger for younger age groups but attenuated in older age groups. Further exploration of the causes behind regional differences in social support and fertility can offer new insights for regional policy making. Our results suggest that not all measures of social cohesion are equally important for regional fertility, and that social cohesion related to close ties and social support may be particularly significant.

Table 1. Descriptive statistics of social cohesion indicators and covariates of 299 municipalities in Finland.

	Mean	SD	Range
Social cohesion			
Social support	3.99	0.16	0-12
Partner	1.38	0.05	0-2
Next of kin	1.32	0.05	0-2
Friend	0.7	0.07	0-2
Someone else	0.11	0.01	0-6
Social interactions	3.04	0.09	0-12
Loneliness	1.18	0.03	0-4
General trust	15.03	0.36	0-24
Trust in people	2.61	0.03	0-4
Civic engagement	8.76	0.27	0-48
Cultural activities	11.75	0.39	0-24
Covariates			
Population (log)	8.82	1.26	-
Population density	2.53	1.48	-
Socioeconomic status	0	2.24	-
Proportion of people residing in their region of birth	51.41	12.08	-
Affiliated to Lutheran church	82.07	5.67	-

Table 2. Spatial regression coefficients and confidence intervals from spatial regression analysis between different social cohesion markers and fertility

	Model1		Model2	
Social cohesion	**B**	CI	B	CI
Social support	**8.49**	(4.27,12.71)	**12.48**	(7.47,17.48)
Partner	1.33	(-1.37,4.03)	1.46	(-1.7,4.62)
Next of kin	**5.9**	(1.95,9.84)	**5.96**	(1.97,9.96)
Friend	**9.5**	(5.33,13.66)	**11.12**	(6.84,15.4)
Other	**6.1**	(2.97,9.23)	**6.32**	(3.11,9.53)
Loneliness	0.95	(-1.74,3.63)	1.24	(-1.49,3.97)
General trust	-0.74	(-3.54,2.06)	-1.06	(-3.96,1.85)
Trust in people	**-3.77**	(-6.42,-1.11)	**-3.65**	(-6.36,-0.95)
Civic engagement	**-2.52**	(-5.02,-0.03)	**-3.02**	(-5.56,-0.47)
Cultural activities	-1.42	(-5.14,2.29)	-1.51	(-5.29,2.26)
Social interactions	**8.5**	(4.14,12.85)	**11.64**	(7.18,16.11)

Note. Values are regression coefficients from spatial regression analysis fitted separately for each predictor variable presented as the difference between low (10^{th} percentile) and high (90^{th} percentile) values, meaning that 1 unit difference in the standardized score reflects the difference between low (10^{th}) and high (90^{th} percentile) values. Model 1 was adjusted for population and population density, and Model 2 was additionally adjusted for a composite score of socioeconomic status, a portion of people living in the municipality where they were born in, and a proportion of people belonging to the Lutheran church.

Table3. Spatial regression coefficients between measures of social cohesion and fertility by age-group.

	age 15-19		age 20-24		age 25-29		age 30-34		age 35-39		age 40-44		age 45-49	
	B	CI	B	CI	B	CI	B	CI	B	CI	B	CI	B	CI
Social support	-0,18	(-1.06,0.69)	**10,12**	(4.4,15.84)	**11,16**	(5.01,17.32)	**9,08**	(4.54,13.63)	**7,65**	(4.3,10.99)	**3,44**	(1.7,5.17)	**0,66**	(0.21,1.11)
Partner	0,13	(-0.5,0.75)	**4,6**	(0.68,8.53)	**7,18**	(3.01,11.35)	2,82	(-0.38,6.01)	1,76	(-0.66,4.19)	0,44	(-0.78,1.65)	0,12	(-0.22,0.45)
Close ones	0,18	(-0.58,0.94)	3,11	(-1.82,8.04)	2,56	(-2.74,7.86)	1,79	(-2.2,5.77)	**4,37**	(1.42,7.32)	**2,19**	(0.7,3.69)	**0,55**	(0.16,0.95)
Friends	-0,1	(-0.96,0.76)	5,43	(-0.15,11.01)	3,32	(-2.69,9.34)	**7,81**	(3.38,12.23)	**7,9**	(4.66,11.15)	**3,23**	(1.56,4.91)	**0,63**	(0.19,1.07)
Someone else	-0,06	(-0.67,0.56)	**5,93**	(1.93,9.93)	3,99	(-0.33,8.31)	**5,07**	(1.87,8.27)	**2,55**	(0.13,4.96)	**1,7**	(0.47,2.92)	0,16	(-0.16,0.49)
Social interactions	0,02	(-0.81,0.86)	**5,83**	(0.33,11.34)	**6,00**	(0.09,11.91)	**7,43**	(3.07,11.78)	**8,55**	(5.42,11.69)	**3,33**	(1.69,4.97)	**0,66**	(0.23,1.09)
Loneliness	0,28	(-0.24,0.79)	-0,82	(-4.06,2.42)	-2,52	(-6,0.96)	0,94	(-1.69,3.57)	1,27	(-0.73,3.27)	0,79	(-0.21,1.79)	0,06	(-0.21,0.34)
Trust Generalized	0,23	(-0.33,0.79)	-1,21	(-4.83,2.42)	0,12	(-3.77,4.02)	-0,88	(-3.8,2.05)	-0,95	(-3.15,1.26)	-0,2	(-1.31,0.91)	0,00	(-0.29,0.3)
Trust people	0,02	(-0.51,0.56)	-1,48	(-4.85,1.88)	-0,57	(-4.2,3.06)	-0,87	(-3.6,1.86)	**-2,08**	(-4.14,-0.03)	-0,82	(-1.86,0.21)	0,05	(-0.23,0.33)
Community groups	-0,05	(-0.61,0.51)	-2,7	(-6.15,0.75)	-1,56	(-5.3,2.17)	0,33	(-2.49,3.15)	-1,81	(-3.94,0.33)	-0,79	(-1.85,0.28)	0,02	(-0.27,0.31)
Friend groups	0,02	(-0.49,0.53)	-0,24	(-3.4,2.92)	-1,18	(-4.59,2.22)	0,05	(-2.53,2.62)	0,27	(-1.69,2.23)	0,02	(-0.96,1)	0,06	(-0.21,0.33)
Cultural activities	0,22	(-0.53,0.97)	0,07	(-4.7,4.84)	-6,28	(-11.36,-1.2)	-1,91	(-5.77,1.94)	0,44	(-2.49,3.36)	0,15	(-1.32,1.62)	0,05	(-0.35,0.45)

Note. Values are regression coefficients from spatial regression analysis fitted separately for each predictor variable presented as the difference between low (10th percentile) and high (90th percentile) values. Results are from the fully adjusted model including regional estimates of population, population density, a composite score of socioeconomic status, a portion of people living in the same region where they were born in, and a portion of people belonging to the Lutheran church.

Fig1. Map of fertility rates in Finland in 2018-2020

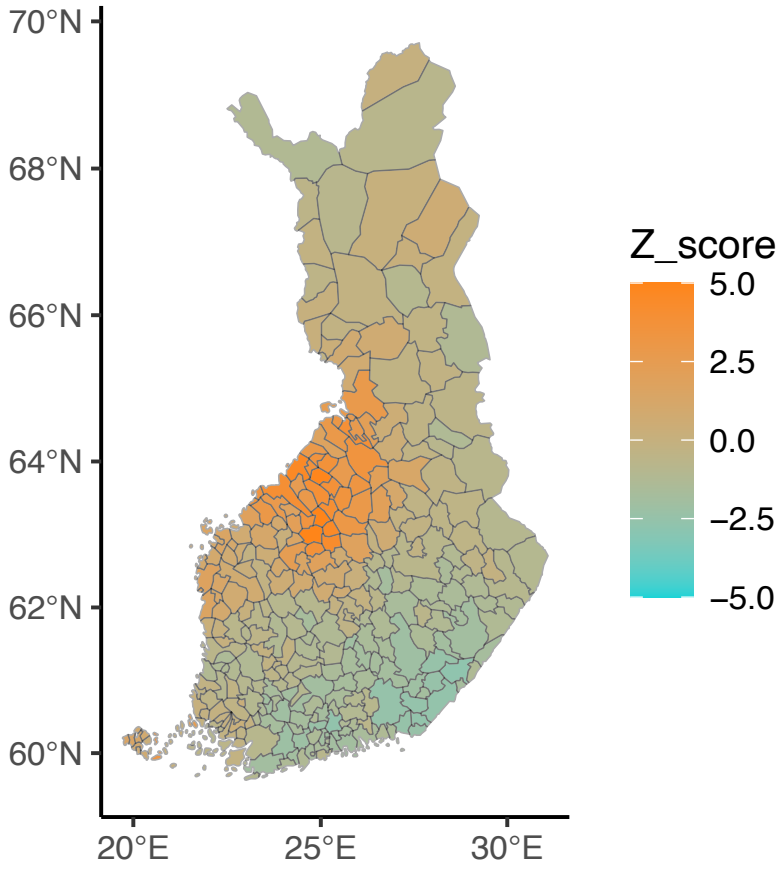
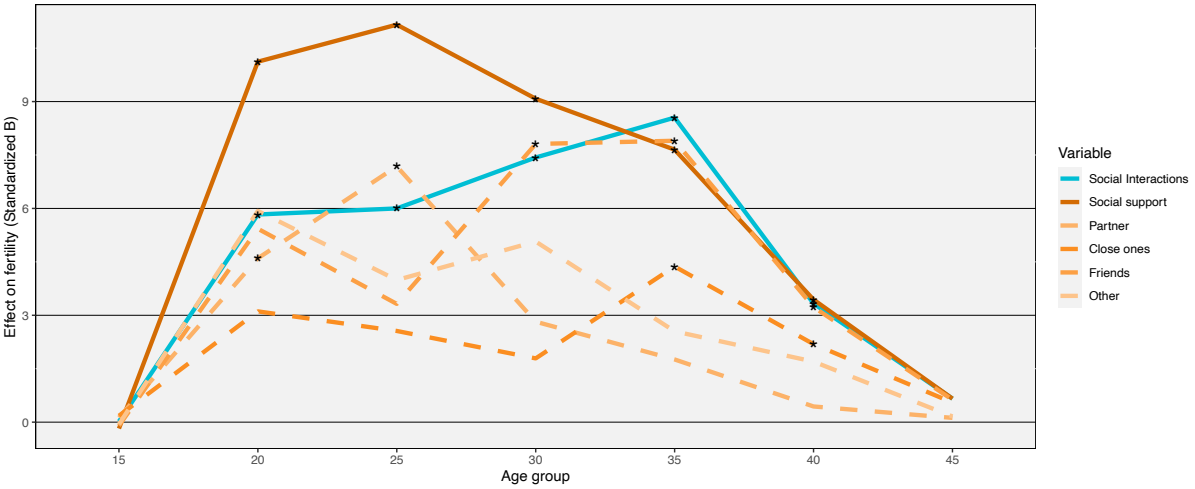


Figure 1. Clustering of high (orange) and low (teal) fertility rates in Finland 2017-2019. The values are z-scores of a Getis–Ord hotspot analysis that gives higher values to municipalities that have high net fertility and that have neighboring municipalities with high net fertility rates. Municipalities with missing values (n=10) were imputed to the figure with the mean of all municipalities for ease of interpretation.

Figure 2. Associations between age-specific fertility, social support and social interactions



References

Artamonova, A., Berg, V., Hägglund, A.E & Rotkirch, A. (submitted) Social resources are related to higher fertility intentions in contemporary Finland

Aassve, A., Billari, F. C., & Pessin, L. (2016). Trust and Fertility Dynamics. *Social Forces*, *95*(2), 663–692. https://doi.org/10.1093/sf/sow080

Aassve, A., Le Moglie, M., & Mencarini, L. (2021). Trust and fertility in uncertain times. *Population Studies*, *75*(1), 19–36. https://doi.org/10.1080/00324728.2020.1742927

Adler, R. P., & Goggin, J. (2005). What Do We Mean By "Civic Engagement"? *Journal of Transformative Education*, *3*(3), 236–253. https://doi.org/10.1177/1541344605276792

Balbo, N. (2012). The influence of the family network on the realisation of fertility intentions. *Vienna Yearbook of Population Research*, *9*, 179–206. https://doi.org/10.1553/populationyearbook2011s179

Balbo, N., Billari, F. C., & Mills, M. (2012). Fertility in Advanced Societies: A Review of Research. *European Journal of Population = Revue Européenne de Démographie*, *29*(1), 1–38. https://doi.org/10.1007/s10680-012-9277-y

Balbo, N., & Mills, M. (2011). The effects of social capital and social pressure on the intention to have a second or third child in France, Germany, and Bulgaria, 2004—05. *Population Studies*, *65*(3), 335–351.

Beaujouan, E., & Berghammer, C. (2019). The Gap Between Lifetime Fertility Intentions and Completed Fertility in Europe and the United States: A Cohort Approach. *Population Research and Policy Review*, *38*(4), 507–535. https://doi.org/10.1007/s11113-019-09516-3

Bergsvik, J. (2020). Linking Neighbors' Fertility: Third Births in Norwegian Neighborhoods. *Comparative Population Studies*, *45*. https://doi.org/10.12765/CPoS-2020-21

Bergsvik, J., Cools, S., & Hart, R. K. (2023). Explaining Residential Clustering of Large Families. *European Journal of Population*, *39*(1), 13. https://doi.org/10.1007/s10680-023-09655-6

Bivand, R., Hauke, J., & Kossowski, T. (2013). Computing the Jacobian in Gaussian Spatial Autoregressive Models: An Illustrated Comparison of Available Methods. *Geographical Analysis*, *45*(2), 150–179. https://doi.org/10.1111/gean.12008

Campisi, N., Kulu, H., Mikolai, J., Klüsener, S., & Myrskylä, M. (2023). A Spatial Perspective on the Unexpected Nordic Fertility Decline: The Relevance of Economic and Social Contexts. *Applied Spatial Analysis and Policy*, *16*(1), 1–31. https://doi.org/10.1007/s12061-022-09467-x

Chan, J., To, H.-P., & Chan, E. (2006). Reconsidering Social Cohesion: Developing a Definition and Analytical Framework for Empirical Research. *Social Indicators Research*, *75*(2), 273–302. https://doi.org/10.1007/s11205-005-2118-1

Comolli, C. L., Neyer, G., Andersson, G., Dommermuth, L., Fallesen, P., Jalovaara, M., Jónsson, A. K., Kolk, M., & Lappegård, T. (2021). Beyond the Economic Gaze: Childbearing During and After Recessions in the Nordic Countries. *European Journal of Population*, *37*(2), 473–520. https://doi.org/10.1007/s10680-020-09570-0

Ermisch, J., & Mulder, C. H. (2019). Migration Versus Immobility, and Ties to Parents. *European Journal of Population*, *35*(3), 587–608. https://doi.org/10.1007/s10680-018-9494-0

geofi—Access Finnish Geospatial Data. (2023). [R]. rOpenGov. https://github.com/rOpenGov/geofi (Original work published 2019)

Golovina, K., Nitsche, N., Berg, V., Miettinen, A., Rotkirch, A., & Jokela, M. (2023). Birth cohort changes in fertility ideals: Evidence from repeated cross-sectional surveys in Finland. *European Sociological Review*, jcad048. https://doi.org/10.1093/esr/jcad048

Harknett, K., Billari, F. C., & Medalia, C. (2014). Do Family Support Environments Influence Fertility? Evidence from 20 European Countries. *European Journal of Population*, *30*(1), 1–33. https://doi.org/10.1007/s10680-013-9308-3

Kastellec, J. P., Lax, J. R., & Phillips, J. (2019). Estimating State Public Opinion With Multi-Level Regression and Poststratification using R. *Working Paper*. https://jkastellec.scholar.princeton.edu/publications/mrp_primer

Kolk, M., & Saarela, J. (2023). *Religion and fertility – A longitudinal register study examining differences by sex, parity, partner's religion, and religious conversion in Finland*. Stockholm Research Reports in Demography. https://doi.org/10.17045/sthlmuni.22220659.v1

Kulu, H. (2013). Why Do Fertility Levels Vary between Urban and Rural Areas? *Regional Studies*, *47*(6), 895–912. https://doi.org/10.1080/00343404.2011.581276

Kulu, H., & Washbrook, E. (2014). Residential context, migration and fertility in a modern urban society. *Advances in Life Course Research*, *21*, 168–182. https://doi.org/10.1016/j.alcr.2014.01.001

Lahti, L., Happonen, E., Lehtomäki, J., Parkkinen, J., Lehtomaki, J., Saaristo, V., & Kantanen, P. (2022). *sotkanet: Sotkanet Open Data Access and Analysis* (0.9.79) [R]. https://github.com/rOpenGov/sotkanet (Original work published 2013)

Mathews, P., & Sear, R. (2013a). Does the kin orientation of a British womans social network influence her entry into motherhood? *Demographic Research*, *28*, 313–340. https://doi.org/10.4054/DemRes.2013.28.11

Mathews, P., & Sear, R. (2013b). Family and Fertility: Kin Influence on the Progression to a Second Birth in the British Household Panel Study. *PLoS ONE*, *8*(3), e56941. https://doi.org/10.1371/journal.pone.0056941

Matysiak, A., Sobotka, T., & Vignoli, D. (2021). The Great Recession and Fertility in Europe: A Sub-national Analysis. *European Journal of Population*, *37*(1), 29–64. https://doi.org/10.1007/s10680-020-09556-y

Meggiolaro, S. (2011). Do Neighbourhoods Have an Influence on Reproductive Intentions? Empirical Evidence from Milan. *Regional Studies*, *45*(6), 791–807. https://doi.org/10.1080/00343401003713399

OECD. (2021). *Old-age dependency ratio*. Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/social-issues-migration-health/old-age-dependency-ratio/indicator/english_e0255c98-en

R Core Team. (2023). *R: A language and environment for statistical computing.* https://www.R-project.org/.

Rindfuss, R. R., Guilkey, D. K., Morgan, S. P., & KRavdal, Ø. (2010). Child-Care Availability and Fertility in Norway. *Population and Development Review*, *36*(4), 725–748.

Rossier, C., & Bernardi, L. (2009). Social Interaction Effects on Fertility: Intentions and Behaviors: Les effets des interactions sociales sur la fécondité: intentions et comportements. *European Journal of Population / Revue Européenne de Démographie*, *25*(4), 467–485. https://doi.org/10.1007/s10680-009-9203-0

Savelieva, K., Jokela, M., & Rotkirch, A. (2023). Reasons to Postpone Childbearing during Fertility Decline in Finland. *Marriage & Family Review*, *59*(3), 253–276. https://doi.org/10.1080/01494929.2022.2083283

Savelieva, K., Nitsche, N., Berg, V., Miettinen, A., Rotkirch, A., & Jokela, M. (2021). *Birth cohort changes in fertility ideals: Evidence from repeated cross-sectional surveys in Finland*. SocArXiv. https://doi.org/10.31235/osf.io/7vtqm

Schilke, O., Reimann, M., & Cook, K. S. (2021). Trust in Social Relations. *Annual Review of Sociology*, *47*(1), 239–259. https://doi.org/10.1146/annurev-soc-082120-082850

Sedgwick, P. (2015). Understanding the ecological fallacy. *BMJ*, *351*, h4773. https://doi.org/10.1136/bmj.h4773

Sobotka, T., & Beaujouan, É. (2014). Two Is Best? The Persistence of a Two-Child Family Ideal in Europe. *Population and Development Review*, *40*(3), 391–419. https://doi.org/10.1111/j.1728-4457.2014.00691.x

Sobotka, Tomáš, Matysiak, Anna, & Brzozowska, Zuzanna. (2019). *Policy responses to low fertility: How effective are they?* https://www.unfpa.org/sites/default/files/pub-pdf/Policy_responses_low_fertility_UNFPA_WP_Final_corrections_7Feb2020_CLEAN.pdf

Tanskanen, A. O., & Rotkirch, A. (2014). The impact of grandparental investment on mothers' fertility intentions in four European countries. *Demographic Research*, *31*, 1–26.

United Nations Department of Economic and Social Affairs, Population Division. (2021). *World Population Policies 2021: Policies related to fertility*.

White, R. G., & Bernardi, L. (2008). *Close kin influences on fertility behavior* (WP-2008-024; 0 ed., p. WP-2008-024). Max Planck Institute for Demographic Research. https://doi.org/10.4054/MPIDR-WP-2008-024

Zeman, K., Beaujouan, É., Brzozowska, Z., & Sobotka, T. (2018). Cohort fertility decline in low fertility countries: Decomposition using parity progression ratios. *Demographic Research*, *38*, 651–690. https://doi.org/10.4054/DemRes.2018.38.25