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The Effects of Family Structure on the Educational Attainment of Siblings in Hungary

KOEN VAN EIJCK AND PAUL M. DE GRAAF

ABSTRACT In this article we examine the impact of family structure on educational attainment in Hungary. Using a data-set collected in 1983 with information on all siblings of 17146 primary respondents, the effects of family size, birth order, and spacing were investigated. Hypotheses on these effects were based on sibling resource-dilution theory, which was modified for the case of Hungary, where educational policy has weakened the effects of parents' material resources. In a country in which cultural resources are predominant, resource-dilution theory offers different predictions. As expected, family size had a substantial negative effect on schooling. This effect increased over birth cohorts. The effect of birth order was curvilinear: in larger families the oldest and youngest siblings attained the highest educational qualifications. Effects of spacing were significant, indicating that close spacing affects schooling positively. The results corroborate sibling resource-dilution theory

INTRODUCTION

This study focuses on the impact of family structure on educational attainment in Hungary, for cohorts born between 1928 and 1958. The effects of the socio-economic status of the family of origin on educational attainment are well documented for Hungary (Simkus and Andorka, 1982; Robert, 1991). The importance of parents' educational and occupational position has been established clearly, but the effects of family structure have not been investigated systematically. In this article, aspects of family structure, namely family size, birth order, and spacing, that is the age-intervals between subsequent siblings, were looked at.

In many studies, it has been shown that the size of the family in which children grow up affects their life chances significantly. Having many siblings is found to be detri-

mental to one's educational and, consequently, occupational opportunities. First, it will be shown that this effect also exists in Hungary, and this finding will be extended by looking at change over cohorts. Second, given a certain family size, theory argues that birth order affects educational attainment as well. For the case of Hungary we shall show that the effects of birth order are related strongly to family size. Third, spacing may also play a role. There are theoretical arguments that parents' resources are more difficult to transmit to children when they are closely spaced. Our results give no support to this hypothesis at all. On the contrary, it seems that in Hungary close spacing is beneficial to educational success.

The Hungarian data-set employed was collected in 1983; our sample consists of all respondents and their siblings aged 25 to 55. In total, we have information on family background and educational attainment of

all siblings from 17146 families. The size of the data-set allows powerful statistical analysis, and thus makes possible a contribution to the discussion regarding the validity of prevalent theories on the effects of family structure, especially on the effects of birth order and spacing.

Two lines of theorizing are present in the literature on the effects of family structure, that is sibling resource-dilution theory and confluence theory. We regard sibling resource-dilution theory as most promising for our purposes, because the confluence model has been falsified frequently and seems to have been immunized by its defenders (cf. Retherford and Sewell, 1991). However, we shall direct some comments at the confluence model as well, since a lot of research has been carried out in order to test its predictions, and it has had a major impact on theorizing about the consequences of family structure.

Sibling Resource-Dilution Theory

In order to understand the mechanisms by which socio-economic background and family structure affect educational opportunities, one needs to consider the processes and means by which status characteristics are passed on from one generation to the next. Parents' resources play a crucial role in educational careers, and the availability of these resources is highly associated with levels of parental education and occupation. Generally, the relevant resources are distinguished into material and cultural resources.

Material resources refer to the financial situation of a person's parents, and thus to the money they can spend on the educational careers of their children. The availability of material resources is often indicated by parents' occupational status or income level. It is plausible that material resources play a relatively important role when the cost of education is high. The financial cost of education can be both direct (fees, books, and other learning materials) or indirect in the form of opportunity costs, that is

the loss of potential income during school attendance.

Cultural resources refer to parents' educational levels, their linguistic skills, and their attitude towards dominant cultural values (Bourdieu, 1977; DiMaggio, 1982; De Graaf, 1986). Parents' cultural resources provide children with the appropriate abilities and attitudes for being successful in school thus giving them a 'scholastic lead' which seems to increase throughout the remainder of the educational career.

From a functionalist point of view, it might be expected that the effects of parents' cultural and material resources would decrease over time in industrialist nations (Treiman, 1970), because technological change has affected the need for qualified personnel, legislation has made education affordable for many, and ascription has become less important. Cultural reproduction theory, on the other hand, argues that in modern societies cultural resources keep more of their original importance because parents still look for ways to transfer their positions to their children, and can no longer rely on the power of their financial advantages. The distinction between material and cultural resources will become important when we discuss theoretical arguments on the distribution of parents' resources between siblings.

Not only do families differ according to their level of material and cultural resources, they also differ with regard to the number of siblings among whom these resources are to be divided. This observation makes it possible to formulate explanatory hypotheses on the association between family structure and educational attainment. These hypotheses originate from sibling resource-dilution theory (Anastasi, 1956; Blake, 1981; Powell and Steelman, 1990). Resource-dilution theory states that an increase in the number of siblings and a decrease in their spacing dilute the resources that parents can spend on each child. This dilution hinders the outcomes for every child, although for some children more than for others, depending on their gender, birth order, and the age-intervals between themselves and their siblings.

The Confluence Model

Another theoretical perspective with regard to the impact of family structure on socio-economic status is the confluence model, which was introduced by Zajonc and his associates in 1975 (Zajonc and Markus, 1975; Zajonc *et al.*, 1979). Zajonc and colleagues developed a mathematical model which is based on the mutual intellectual influences among children as they develop in the family context. A family's intellectual environment is considered as a function of the average of the weighted absolute intellectual levels (mental ages) of all members of the family. The larger the sibship, the more the intellectual environment suffers from the low mental ages of young children. That is why successive children are born in an increasingly inferior environment, which is a direct handicap to their own intellectual development. A similar process is suggested to explain the effects of spacing.

Zajonc and colleagues do not consider the interactions between parents and their children, nor any deliberate or necessary resource-investment strategies. The intellectual family climate, which does not even take into account parental IQ, is considered to be so important that the model can dispose of these other factors. Until now, it has seemed impossible to replicate the initial results obtained with the confluence model (Brackbill and Nichols, 1982; Galbraith, 1982; Steelman, 1985; Retherford and Sewell, 1991). Moreover, since the assumptions underlying the confluence model seem unrealistic, and since it claims to be applicable to intelligence only, which is something quite different from educational attainment, we will not go into it in any further detail.

Fortunately, sibling resource-dilution theory does account for the types of resources and socio-psychological processes that are obviously associated with schooling levels. Dilution theory is in fact the oldest approach to the explanation of family-structure effects (Heer, 1985). As discussed, many siblings might be more profound diluters of one another's resources than few widely spaced siblings. This is found to be true for several

types of resources that have been investigated, such as economic resources (Olneck and Bills, 1979; Taubman and Behrman, 1986), parental aspirations (Marjoribanks, 1988a; 1988b; 1989a; 1991) or parental support (Kidwell, 1981; Ihinger-Tallman, 1982).

The Case of Hungary

Resource-dilution theory has been developed and tested mainly in Western capitalist societies. In this article, we will extend this line of research to another type of society. Hungary, as a former socialist state, is an interesting case for this purpose. We will analyse data collected in 1983, when Hungary still had a socialist regime, although its rigidity was already weakening. Respondents were born between 1928 and 1958, so most of them, except the oldest and the youngest, spent their entire educational career under communist administration.

In socialist states, it is likely that the impact of material conditions on educational opportunity and mobility processes is smaller than in Western countries. Education has been made free of financial cost, so material aspects of family status should not play a direct role in determining educational opportunity. Indirect cost, or opportunity cost, cannot play a large role either, because a system of scholarships was established in order to support students of parents without sufficient financial resources (Szelényi and Aschaffenburg, 1993). The Hungarian case allows us to assess whether the hypothesized diluting effects of family structure hold in a society in which financial resources have been made less powerful by activist legislation. We must recognize, however, that the variation in material conditions has more effects on educational opportunity than just those caused by the direct and indirect cost of education itself. The size and quality of the parental home and different kinds of cultural assets may provide a helpful environment too.

One of the major goals of Hungarian educational policy has been to equalize social differences by taking away financial restrictions (Robert, 1991). The underlying assumption of this policy was that this would reduce the

impact of family background on educational careers. However, the effects communist leadership had in mind have not been identified unambiguously by sociological research. It seems that in Hungary, as in the former Czechoslovak Socialist Republic (Mateju (1990)), parents' financial resources do not play a substantial role in the intergenerational transmission of socio-economic status. However, this finding does not guarantee equalization.

Several studies have corroborated the cultural reproduction thesis for socialist societies (Mateju, 1990; Ganzeboom *et al.*, 1990). This thesis states that parents' cultural resources are the most effective aspects of family background in educational careers. Research suggests that cultural reproduction theory is even more valid in the state socialist society of Hungary than in the Western market economies for which it was originally developed. Financial resources are of negligible importance, but the impact of cultural resources, as indicated by parents' reading behaviour and cultural habits, compensates for this equalizing tendency. Despite the intentions of Hungarian policy, family background plays as large a role in Hungary as it does in Western societies (Peschar, 1990). Szélenyi and Aschaffenburg (1993) show that it is mainly the cultural component of family background, namely parental education, that is responsible to a considerable degree for social reproduction in Hungary.

Another resemblance between Hungary and Western countries concerns the development of educational participation. In Hungary the process has been very similar to what happened in the West; the educational system expanded rapidly after World War II (Robert, 1991), differences in schooling levels between men and women virtually disappeared, and the expansion rate was hardly influenced by changes in educational policy (Szélenyi and Aschaffenburg, 1993).

In this article, our focus will be on the effects of family structure on educational attainment. We will test hypotheses derived from resource-dilution theory. In the following sections we will elaborate on the finding that,

in Hungary, the most effective resources are cultural resources.

RESOURCE DILUTION THEORY IN HUNGARY

Hypotheses with Respect to Family Size

The basic hypothesis with regard to family size is that an individual child will benefit less from the available resources when family size is larger. The size of a family is negatively associated with the educational and, consequently, occupational attainments of its offspring (e.g. Blau and Duncan, 1967; Lindert, 1977; Featherman and Hauser, 1978; Mercy and Steelman, 1982; Blake, 1989).

Large family size is related to low parental socio-economic status (SES), but it is important to consider these factors separately. This is necessary, because it is plausible that the effects of SES and family size are not independent. They are thought to interact, because they both denote certain restraints on the availability of resources. According to dilution theory, resources are less effective as family size increases, because this causes them to be diluted. The validity of this argument depends on the type of resources that are most important in educational careers. The argument seems to be more valid if material resources have larger effects than cultural resources, because in general material resources can only be expended once.

It should be recognized that family size is not only effective through the dilution of known resources. After controlling for known family background factors, family size will still appear to have a direct effect on educational attainment, because it is related to unmeasured family factors (such as educational aspirations), and thus represents unknown educational resources as well.

If modernization and political change have enhanced meritocratic selection procedures in educational careers, and if, as a consequence, the effects of all parental resources have decreased, the relevance of family size should become smaller over cohorts. On the other hand, the proportion of large families decreases over cohorts, and possibly the remaining large

families can be characterized by an increasingly unfavourable educational climate, which is not captured by the usual indicators of family background. Then it can be argued that the modernization process has benefited children from larger families less than those from small families (Kidwell, 1981; Blake, 1985), which might increase the relevance of family size. We will return to this issue in our discussion on trends in the impact of family background.

It is not easy to evaluate both arguments, and maybe they just compensate for each other, but it is likely that in Hungary the second argument is stronger than the first. Robert (1991) shows that in Hungary the effects of parents' socio-economic resources on educational attainment are constant over birth cohorts, so it seems that there has been no trend towards meritocracy. In the same period, there has been a general increase in affluence, resulting from the shift from an agricultural towards an industrial economy. Therefore, taken together, the consequences of a stable level of meritocracy and rising affluence may result in increasing family size effects because of growing cultural differences between small and large families. If members from small families have gained more from educational expansion and modernization in general, the cultural difference between those from large and those from small families will have increased.

Hypotheses with Respect to Birth Order

If it were true that parents' resources are divided equally between all children within a family, the amount of resources available for each sibling could be computed simply by dividing the total amount of resources by the number of siblings. Yet, it is plausible that resources are not distributed uniformly within families. Resource-dilution theory can be used to predict a potential impact of birth order on educational attainment.

Variation in schooling between siblings could be explained if it were related to some systematic pattern of resource allocation within families. Lindert (1977) uses results from a time-input analysis to argue that the

impact of ordinal position can be attributed to systematic differences in time spent on siblings by their parents. Oppenheimer (1974) shows that the peak in a family's income does not necessarily parallel the peak in the financial needs of the family, which is caused by the number and ages of children. This is especially true for low- and medium- SES families, where, as a consequence, financial resources are divided unevenly among the offspring. Blake (1989) concentrates on the distribution of socio-cultural resources among children within families. She states that one's place in the sibship may make one 'favored or disfavored regarding financial resources and encouragement to continue through high school or on to college' (Blake, 1989: 160). Blake's empirical research shows significant effects of birth order on educational attainment of children from relatively large families, where being in an early middle position (third- or fourth-born) is most disadvantageous. Similar results are obtained by Marjoribanks (1989a).

These findings are in accordance with theoretical expectations that parents spend more resources on first- and last-borns, since children in these positions have fewer siblings directly competing for the same resources. Children who are first-borns enjoy a period in which they are the only child of the family, and perhaps also periods where they are only competing with one or two siblings, and therefore they receive a relatively large proportion of the available resources during their early life. This provides them with a head start. Since the material resources necessary for education hardly play any role in this phase of a person's life, the advantage lies in the available cultural resources. In addition, children who are among the youngest in large families usually find their older siblings leaving the parental home or finishing education by the time they are adolescents, which means that the number of siblings who call on parental resources diminishes, leaving a greater share for the youngest children of the family. Thus, they benefit from resources which become available when the number of siblings living with their parents has decreased. This advantage is believed to result mainly

from the relaxation of the strain on parents' material resources. With regard to Hungary, however, this argument loses strength. A possible increase in parental encouragement and attention due to the fact that older siblings leave the parental home may still have a positive impact on younger children, although we agree that the importance of cultural resources diminishes as children grow older. Both older and younger siblings spend some time in a family that is smaller than the total number of siblings indicates. If the advantageous position of young siblings in large families is principally caused by the availability of extra material resources, the relative educational attainments of these siblings will be less exceptional in Hungary than in Western societies. Since middle-borns have neither of the advantages that can be attributed to oldest and youngest siblings, they can be expected to receive the smallest proportion of resources. Therefore the hypothesis, confirmed by Blake (1989) and Marjoribanks (1989a), is that the educational attainments of successive siblings in large families show a U-shaped curve. In small families the trend is expected to be more or less linearly downwards, because here older siblings do not leave the parental home long before their younger siblings have completed their educational careers. That is why, in small families, younger siblings' attainments are not expected to be better than those of middle-borns.

The empirical assessment of birth-order effects has caused much methodological confusion during recent decades, and even today it is a controversial topic (Adams, 1972; Schooler, 1972; Cicirelli, 1978; Ernst and Angst, 1983; Hauser and Sewell, 1985). The major reason for this confusion lies in the fact that previous studies have often been conducted in ways that are bound to lead to ambiguous results. The most important errors were sampling bias and the attribution of effects of family size or socio-economic background to birth order because of inadequate controls for background variables. Appropriate methodology, although no more sophisticated than multiple regression analysis, but with the appropriate controls, was seldom applied. Even Ernst and

Angst (1983), in their otherwise excellent review of birth-order research, seriously limit the scope of their own empirical research, in which they find no effect of birth order on educational attainment. They do not include controls for parental education and they fail to make a clear distinction between birth order and family size. Although their review shows that very few proper studies have been done on birth order, Ernst and Angst themselves, after having convincingly displayed all the pitfalls of birth-order research, do not fully circumvent these pitfalls either.

For a thorough and methodologically sound examination of the effects of birth order, we refer to a study conducted by Hauser and Sewell (1985). In their analysis, birth order is incorporated into standard attainment models as a set of dummy variables expressing a sibling's position relative to the level of schooling of the first-born of a given family size. Using data from the Wisconsin Longitudinal Study of Social and Psychological Factors in Aspirations and Achievement (Sewell and Hauser, 1980), and controlling for cohort effects (educational expansion within families) and socio-economic background, Hauser and Sewell find no significant or systematic effects of birth order on schooling.

Unfortunately, the Wisconsin Longitudinal Study contains some flaws with respect to the data on siblings. A major difficulty arises from the fact that this sibling data-set was based on primary respondents who were selected on the basis of an educational criterion, i.e. high school graduation. Moreover, the primary respondents were all high school seniors in 1957, hence stemming from the beginning of the baby-boom. The result was that respondents tended to be concentrated in low birth orders. The explicit overall impact of these sample characteristics is hard to assess (Blake, 1989: 167-74), but they certainly make it worthwhile to try to improve on Hauser and Sewell's study by using the same methodology on a less bias-prone sample. While this study by Hauser and Sewell (1985) has been criticized by Blake (1989) for possible sampling bias, her own study, which did find birth-order effects, has been criticized by Hauser (1989) for being

based on cross-sections instead of actual sibships. Both critics have a point, so the claim that the subject is sufficiently dealt with is unjustified.

If Hauser and Sewell's observation is correct for the United States, which is not unlikely, this still does not imply that birth-order effects will not be found in any country. As mentioned before, under the Hungarian regime educational opportunities and parental resources were allocated differently than in Western countries, so generalization of American results to Eastern Europe is unwarranted, especially when they referred to the situation a few decades ago. We feel that the repudiation of the impact of birth order is premature, since there has been too little research on the subject with sufficient methodological consideration and results have been confined to Western societies.

In the present study, Hauser and Sewell's analytical design for the estimation of birth-order effects will be used, because we see it as the most rigorous way to find out if real birth-order effects exist and if they are in line with dilution theory. Since our data are not biased by a selection of respondents based on age or any educational criterion, we expect a consistent pattern to emerge, showing that parents allocate their resources systematically according to strategies that do not guarantee maximum equality among siblings (Blake, 1989; Marjoribanks, 1989a; 1989b).

Hypotheses with Respect to Spacing

The third topic we address with regard to family structure is spacing. Spacing refers to the age-intervals between subsequent siblings. Wide spacing indicates large age-differences between siblings, and close spacing indicates small age-differences. Dilution theory offers predictions in this area as well. In the case of wide spacing, parents can spread the investment of their resources over time. This reasoning is probably most applicable to their material resources, which are more easily depleted when all investments have to be made within a short period of time. When parents can disperse their investments over a longer time, each child will be granted a

greater share of the available means. Again, since we are investigating a socialist state, the role of material resources is rather limited, so this argument does not lead to specific predictions in the Hungarian case.

When we consider cultural resources in relation to spacing, again dilution theory cannot give a conclusive answer. Cultural resources, such as linguistic skills or cultural sophistication, can in principle be utilized without quantitative limitations, whereas material resources can often only be spent once. Cultural resources can be spent on several siblings at the same time, e.g. when showing them the proper use of language and cultural values in general, when reading to them, or when engaging in outdoor cultural activities. This may be even more effective when children are closer in age. Besides, siblings close in age might stimulate one another more than widely spaced siblings, because they can be considered as peers.¹ If these arguments are valid, close spacing can be seen as less of a disadvantage. The presence of many siblings has certainly proved to be detrimental, but, given their presence, spacing may become a secondary feature, because short age-intervals have both advantages and disadvantages.

The extent to which the impact of spacing on the investments of cultural versus material resources may compensate for each other is still undecided. Empirical results on spacing have often yielded no effect at all (Schooler, 1972; Cicirelli, 1978; Steelman, 1985). However, if anything, results suggest that wide spacing is beneficial for children's life-chances (Galbraith, 1982), and again the reasons for this have typically been thought to be associated with economic resources.² These results refer to the United States, where financial resources do indeed seem to affect educational attainment. For Hungary, where cultural resources are of primary importance, we expect close spacing to be beneficial.

HYPOTHESES

All our hypotheses refer to the Hungarian case:

- (1) Educational attainment will be negatively related to family size, even after controlling for SES and cohort.
- (2) Educational attainment will be negatively related to birth order in small families. In larger families, the relationship between birth order and educational attainment will be curvilinear, indicating that first- and last-borns do better than middle-borns. This pattern will persist after controls for SES and cohort are added.
- (3) Educational attainment will be positively related to density of spacing.
- (4) Children from small families will have benefited more from educational expansion than children from large families. As a consequence, the negative effect of family size will increase over cohorts.

DATA

The data to be analysed in this article are from the Social Mobility and Life History Survey, 1983 (Harcza and Kulcsar, 1983). This survey is carried out every ten years and usually includes information on siblings, parents, and grandparents of the respondents. Data were collected during face-to-face interviews using standardized questionnaires. The sample was a stratified probability household sample. Within each household the interview was carried out with all members born before 1969 (that is aged 14 or older). The total number of primary respondents was 32301. Primary respondents reported on their educational attainment, year of birth and gender, and provided the same information on all of their living siblings. Handling respondents and siblings as separate cases, we created a comprehensive data-set on 95408 individuals.

Our dependent variable of interest is educational attainment, and to avoid confounding cohort and age effects we selected only those persons (primary respondents as well as siblings) aged 25 or older; after age 25, formal highest educational attainment is quite stable. This age selection induced the loss of 14110 cases in the analysis. Because of the household design of the data collection some respondents were siblings. Therefore, some individuals show up

more than once in the comprehensive data-set, once as primary respondent, and a second time as sibling of a brother or sister who was also a primary respondent. In that case, when he had multiple information on the same sibship, we only used the information provided by the oldest sibling. This resulted in the elimination of 858 cases. The upper limit for age was set at 55, primarily because respondents were asked to report only on living siblings. Leaving out the older persons limited the sample by 25905 persons, leaving us with a final sample of 54535 respondents and siblings.³ All these individuals have equal weights in the coming analyses, although we recognize that we are dealing with dependent observations, which might cause standard errors to be underestimated.⁴

The structure of our data is such that respondents have given information both on themselves and on their siblings. We have computed some additional diagnostic controls to assess whether this design has biased our results. First, we have tested whether being a respondent has any effect on reported educational attainment. Second, we have checked whether respondent status has any impact on the effects of cohort and birth order, by including interaction terms for these variables. Because no significant effects were found, we have not included the variable for respondent status in our analyses.⁵

For each family size (expressed as number of children), the number of respondents is reported in Table 1. The last category ($N=8+$) also includes children from families with more than eight siblings, although we only have information on the eight oldest siblings in each family. In order to demonstrate the decrease in average family size in Hungary, we have divided the sample into three birth cohorts.⁶ The decline in average sib-size is most distinct between the youngest cohort on the one hand and the two older cohorts on the other. To illustrate, consider that in the youngest cohort, 53.2 per cent of respondents and siblings come from families with three children or less, whereas in the older cohorts these numbers are 39.8 and 36.4 per cent, respectively.

TABLE 1 *Number of cases by family size, separately for persons aged 25-34, persons aged 35-44, and persons aged 45-55, including percentages and cumulative percentages*

size	25-34-year-olds			35-44-year-olds			45-55-year-olds		
	N	%	cum.	N	%	cum.	N	%	cum.
1	944	5.4	5.4	820	4.6	4.6	935	4.8	4.8
2	4486	25.8	31.2	2921	16.5	21.1	2687	13.8	18.6
3	3815	21.9	53.2	3310	18.7	39.8	3464	17.8	36.4
4	2740	15.8	68.9	2879	16.3	56.1	3378	17.4	53.8
5	1932	11.1	80.1	2461	13.9	70.0	2943	15.1	68.9
6	1270	7.3	87.4	1878	10.6	80.6	2291	11.8	80.7
7	898	5.2	92.5	1426	8.1	88.6	1681	8.6	89.4
8+	1298	7.5	100.0	2010	11.4	100.0	2068	10.6	100.0
TOTAL	17 383	100.0		17 705	100.0		19 447	100.0	

Source: Social Mobility and Life History Survey, 1983.

In this study we will investigate the impact of family structure on the highest level of education. For this purpose, we will employ OLS regression estimates. An alternative way to examine this topic is suggested by Mare (1981). Mare proposes a decomposition of the association between social background and educational attainment. Using logistic regression, he investigates the probabilities of moving on to a higher level of education at a number of essential grade-progression points, given that the preceding schooling level has been completed. Many scholars since Mare have used this transition approach; some have used it to study Hungary (Simkus and Andorka, 1982; Robert, 1991). This seems to have led to a declining appreciation of the use of linear regression for the examination of educational opportunities *per se*. Despite this growing scepticism, linear effects obtained by OLS estimates remain valuable and legitimate statistics for studying inequality of educational opportunity (Mare, 1993). The transition approach must be used if one is interested in a detailed analysis of educational careers. We will not apply the transition approach to our research problem, because we have not formulated specific hypotheses with regard to the age dependency of the effects of family structure. We consider highest level of educational attainment as a variable which summarizes the cumulative advantages provided by socio-economic background and family structure.⁷

Since years of schooling is not regarded as a good proxy for educational achievement in Hungary (Andorka and Harcsa, 1992), we will examine completed level of education rather than years of education. Respondents' and siblings' educational attainment was coded into eight categories:

- (1) not completed elementary school;
- (2) completed eight classes;
- (3) elementary school plus apprenticeship;
- (4) incomplete secondary schooling;
- (5) secondary school diploma;
- (6) secondary schooling plus apprenticeship;
- (7) incomplete higher education;
- (8) university or college.

For father's and mother's levels of education, the category 'not attended school' (0) was added. Father's occupational status was scored on the International Socio-Economic Index scale (ISEI; Ganzeboom *et al.*, 1992). Gender was coded 0 (male) and 1 (female). Cohort was expressed in single years, where 1928, the birth-year of the oldest people included, was set to zero.

EFFECTS OF FAMILY STRUCTURE

Family Size and Birth Order

Before we start with the regression analysis we first present a graph with the mean educational attainments for all birth orders in sibship sizes

1 to 8 in order to see if any pattern emerges. Figure 1 shows the bivariate relationship between birth order and educational attainment within sibships from 1 to 8; the only control variable is gender. Each single curve, which is shaped by the average scores of the successive birth-order positions depicted along the X-axis, represents a family size. First, we observe a clearly negative effect of family size on educational attainment. The only exception to this monotonic relationship is for singletons, who do worse than children from two-child families. This finding corresponds with results from studies in Western societies, and is probably to be attributed to the observation that broken families are more likely to have only one child. Second, we see that the effect of birth order is negative in two-child families, but with increasing family size the positions of the later-borns get better and exceed those of

first-borns more and more as family size increases. The birth-order effects in families of four or more are curvilinear, showing that second-borns attain the lowest average schooling levels.

Hauser and Sewell (1985) pointed to the fact that in the United States educational expansion has been present within as well as between families and that this explains the educational lead of later-borns. We test this hypothesis for the case of Hungary by regressing educational attainment on birth order, gender, cohort, and the interaction of cohort and gender, separately for each family size.⁸ The results are presented in Table 2 and Figure 2. To improve the clarity of our presentation, we will discuss the cohort effects in more detail in a separate section later on in this article. For now we will only mention cohort as a control variable.

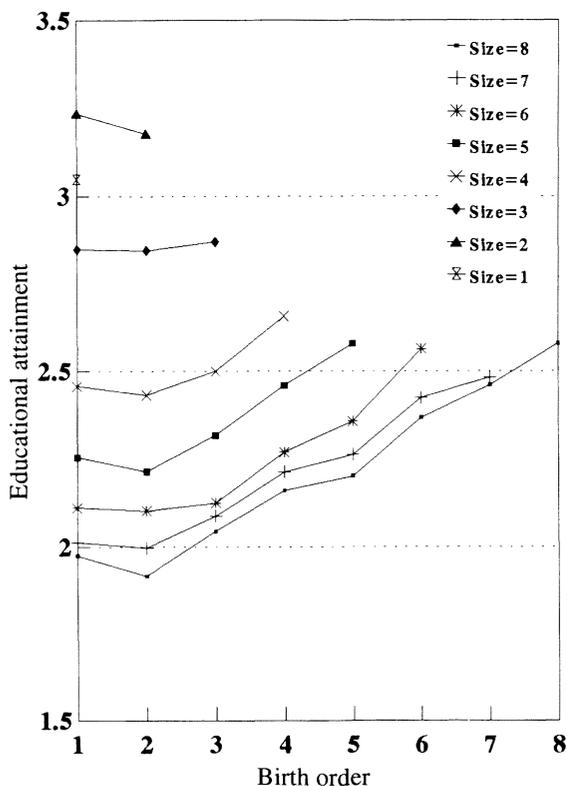


FIGURE 1 Education by family size and birth order, controlled for sex [Source: *Social Mobility and Life History Survey, 1983*]

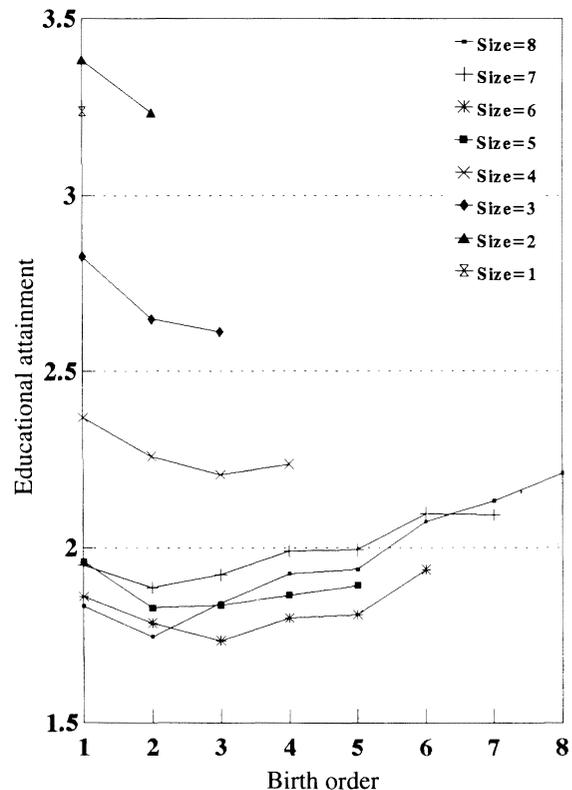


FIGURE 2 Education by family size and birth order, controlled for sex, cohort, and the interaction term of sex with cohort [Source: *Social Mobility and Life History Survey, 1983*]

TABLE 2 *The effects of birth order (BO) (panel A), controlled for birth cohort, sex, and the interaction term of sex and birth cohort (panel B), separately for family sizes 1 to 8*

Panel A	Size	BO2	BO3	BO4	BO5	BO6	BO7	BO8
	2	-.186** (.041)						
	3	-.235** (.046)	-.268** (.046)					
	4	-.132* (.055)	-.179** (.054)	-.122* (.053)				
	5	-.174** (.064)	-.221** (.063)	-.156* (.062)	-.105 (.062)			
	6	-.132 (.078)	-.186* (.077)	-.076 (.076)	-.114 (.075)	.010 (.075)		
	7	-.080 (.097)	-.100 (.095)	.036 (.093)	.012 (.092)	.105 (.092)	.139 (.093)	
	8	-.126 (.084)	-.021 (.082)	.038 (.081)	.072 (.081)	.204* (.081)	.262** (.082)	.365** (.083)
Panel B	Size	Cohort	Female	Female* cohort	Constant	R ²		
	1	.045** (.006)	-.917** (.163)	.049** (.009)	3.076	.092		
	2	.047** (.003)	-.799** (.088)	.037** (.005)	3.116	.087		
	3	.033** (.003)	-.780** (.076)	.037** (.004)	3.058	.067		
	4	.017** (.003)	-.934** (.071)	.042** (.004)	2.903	.055		
	5	.019** (.003)	-.618** (.071)	.026** (.004)	2.655	.042		
	6	.018** (.004)	-.575** (.077)	.022** (.005)	2.465	.040		
	7	.003 (.004)	-.565** (.089)	.022** (.006)	2.454	.024		
	8	.002 (.003)	-.344** (.076)	.011* (.005)	2.280	.022		

*significant, $p < .05$; **significant, $p < .01$.

Note: Results represent only one regression for each family size.

Source: Social Mobility and Life History Survey, 1983.

The results are in line with American findings, but do not completely replicate these for the Hungarian case. When the historical trend towards prolonged education is removed, all birth-order slopes are bent slightly downward. The hypothesized U-shaped pattern becomes even more pronounced. The hypothesis that first- and last-borns do better than middle-borns seems to find a stronger empirical basis after increasing attainments over cohorts have been controlled for. The

effects of birth order within the rows of Panel A from Table 2 demonstrate that, in families of two or three siblings, the trend in schooling levels is downward as one moves from first- to last-borns. In families of four to eight siblings, the graph is curvilinear, indicating that first- and last-borns do better than those born in between. In families with three to seven children, those born third have the lowest average educational attainment, whereas in sibships of eight or more the second-born child

does the worst. Running down the columns of panel *A* in Table 2, we see that the effects of each birth order are in general more positive for larger families. With larger family size, the curvilinearity of the effect of birth order becomes more pronounced.

Further controls for father's educational and occupational level and mother's educational level (Table 3 and Figure 3) do not alter this pattern substantively. The similarity of Figures 2 and 3 implies that the correlation between family size and achievement is not caused by a spurious relation due to the association of family size with parental SES. If this had been the case, we would have observed a decreasing distance between the lines for the different family sizes in Figure 3. Apparently, also in Hungary, family size has an effect on children's schooling levels that is independent of the impact of socio-economic family back-ground.

Both Table 2 and Table 3 demonstrate that women attain lower educational levels than men, which is as expected. Later on we will see that this gap between the sexes is closing rapidly.

When we compare the impact of birth order before and after controlling for family background, a slight tendency towards larger coefficients can be observed. Panel *A* from Table 3 gives the relevant effects; the result of adding controls for family background is that some significance is lost in the early birth orders, where coefficients are mostly negative, and some significance is gained in the higher birth orders, where most coefficients are positive. The overall pattern remains the same: birth order does not lose its relevance or significance after family background has been included in the model.

The fact that all effects of birth order shift in a positive direction means that first-borns are doing relatively worse than later-borns when family background is controlled for. This may be due to intra-generational parental mobility. Occupational status and income tend to increase during parental careers, and because first-borns are born in the earlier phase of their parents' careers, for them parental SES is on average lower than for their later-born siblings.

Controlling for parental SES will lead to matching schooling levels of early-borns to parental status characteristics that are on average higher than they actually were, due to parents' intra-generational mobility.⁹ Early-borns will seem to have lower educational levels than expected on the basis of background characteristics, and later-borns will seem to have higher levels when compared with their older siblings. Controlling for family background does not have the same effect for all siblings within a family. In fact we are attributing equal family background indicators to persons for whom there may have been actual differences in family SES (cf. Mare and Tzeng, 1989). Although this bias is not very large, it must be noted, because it can weaken birth-order effects for early-borns.

We checked the legitimacy of the use of OLS regression by estimating logistic regression equations for each educational transition separately. We do not present the results here due to lack of space.¹⁰ The parameters on birth order, as computed with logistic regression, are similar to those presented in Tables 2 and 3, but, very interestingly, only as far as the transitions during the early school career (until age 16) are concerned. This is in accordance with the findings of Mare and others (Shavit and Blossfeld, 1993), demonstrating that parental resources affect selection processes primarily during the early school career. None the less, these early selections turn out to be decisive, since they largely determine the outcome with regard to the highest educational level attained.

Spacing

In order to examine the hypotheses on spacing, we modelled the competition a child experiences from its siblings. We constructed a scale (CLOSIBS), which indicates how many siblings were born within a range of six years from each individual's birth year. In Hungary children start their secondary education at the age of 14. Primary education lasts eight years, and secondary education lasts four years. The six-year interval is arbitrary, but it is chosen because primary and secondary education together last twelve years in

TABLE 3 *The effects of birth order (BO) (panel A), controlled for father's occupational status (DADISEI), father's education (DADEDUC), mother's education (MOMEDUC), and their interaction terms with cohort (panel B), and birth cohort, sex, and the interaction term of sex and birth cohort (panel C), separately for family sizes 1 to 8*

Panel A	Size	BO2	BO3	BO4	BO5	BO6	BO7	BO8
	2	-.045 (.038)						
	3	-.150** (.043)	-.099* (.042)					
	4	-.094 (.053)	-.097 (.052)	.017 (.051)				
	5	-.163** (.062)	-.156* (.061)	-.060 (.060)	.047 (.060)			
	6	-.073 (.076)	-.117 (.074)	-.003 (.073)	.002 (.072)	.159* (.072)		
	7	-.065 (.093)	-.080 (.092)	.103 (.090)	.100 (.089)	.232** (.089)	.262** (.090)	
	8	-.117 (.081)	.012 (.080)	.115 (.079)	.142 (.078)	.299** (.079)	.366** (.079)	.465** (.080)
Panel B	Size	DADISEI	DADISEI* cohort	DADEDUC	DADEDUC* cohort	MOMEDUC	MOMEDUC* cohort	
	1	.054** (.009)	-.002** (.000)	.218** (.077)	.001 (.004)	.607** (.103)	-.017** (.005)	
	2	.023** (.005)	-.000 (.000)	.552** (.042)	-.013** (.002)	.317** (.058)	-.004 (.003)	
	3	.034** (.004)	-.001** (.000)	.371** (.039)	-.006** (.002)	.480** (.056)	-.008** (.003)	
	4	.032** (.004)	-.001** (.000)	.324** (.041)	-.005* (.002)	.664** (.062)	-.015** (.003)	
	5	.023** (.004)	-.001** (.000)	.444** (.044)	-.012** (.003)	.351** (.062)	.004 (.004)	
	6	.002 (.005)	.001** (.000)	.554** (.050)	-.015** (.003)	.325** (.082)	.001 (.005)	
	7	.023** (.005)	-.000 (.000)	.362** (.052)	-.010** (.003)	.410** (.075)	.004 (.005)	
	8	.031** (.005)	-.001** (.000)	.145** (.051)	.008* (.003)	.304** (.093)	.007 (.005)	
Panel C	Size	Cohort	Female	Female* cohort	Constant	R ²		
	1	.087** (.013)	-.975** (.155)	.047** (.009)	.597	.317		
	2	.053** (.006)	-.795** (.081)	.037** (.004)	1.295	.280		
	3	.048** (.006)	-.791** (.070)	.037** (.004)	1.032	.277		
	4	.047** (.007)	-.902** (.068)	.040** (.004)	.883	.213		
	5	.041** (.007)	-.610** (.068)	.025** (.004)	1.116	.164		
	6	.002 (.008)	-.564** (.074)	.023** (.005)	1.396	.178		
	7	.016 (.009)	-.582** (.085)	.021** (.006)	1.006	.175		
	8	.008 (.008)	-.378** (.073)	.012** (.005)	.983	.112		

*significant, $p < .05$; **significant, $p < .01$.

Note: Results represent only one regression for each family size.

Source: Social Mobility and Life History Survey, 1983.

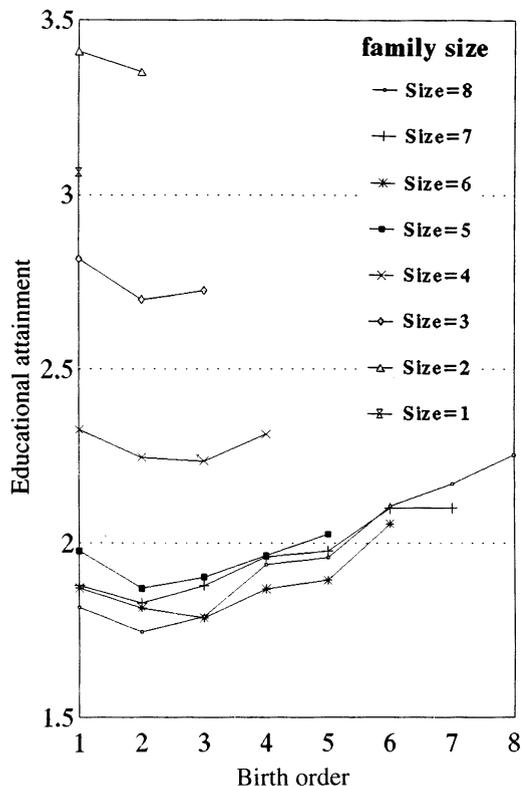


FIGURE 3 *Education by family size and birth order, controlled for sex, birth cohort, socio-economic family background, and the interaction terms of sex and family background with cohort [Source: Social Mobility and Life History Survey, 1983]*

Hungary. Thus, on average, during primary and secondary education, it is the siblings who are in the age-range from six years younger to six years older than the respondent, who are the most serious competitors for parental resources.¹¹

Is it true that birth-order effects can, at least to some extent, be attributed to the number of siblings that are so close in age that they draw on the same parental resources? Or is it true that close spacing is beneficial because the investment of cultural resources can take place more efficiently? In order to find out, we consider the impact of the CLOSIBS variable as well as changes in the impact of birth order after controlling for CLOSIBS. The results are presented in Table 4. The impact of CLOSIBS is

significant for four out of seven sizes, and the direction of its effect is positive. We do not see large changes in the original uncontrolled pattern of birth order. These findings can be interpreted as a verification of the idea that, at least in Hungary, financial resources do not determine one's educational outcome. Having many siblings at small age-intervals does not explain, for example, why middleborns in large families, who can be considered as being hindered most by siblings close in age, do worse than first- or last-borns. As a matter of fact, middle-borns seem to do worse when their unfavourable density position is controlled for, suggesting that close spacing partly offsets the negative consequences of being middleborn.

First-borns do relatively better after CLOSIBS is controlled for. Since CLOSIBS is a variable that is assigned to individuals rather than families, we can infer that first-borns profit less from the siblings who are close in age than later-borns. This is a plausible interpretation, if we consider inter-sibling interaction, since first-borns only have younger siblings, who are less likely than older siblings to be of any help. Older siblings are thought to be facilitators, providing contacts and resources which enhance their younger siblings' attainments (Benin and Johnson, 1984). This socialization process does not apply to the oldest child of the family.

TRENDS

We will now discuss the results concerning trends. For each family size, we will interpret the effects of the variable COHORT, as well as the interaction effects of COHORT with gender (FEMALE) and with measures of family background (DADISEI, DADEDUC, and MOMEDUC).

Trends in the Impact of Gender

In both Table 2 and Table 3, the interaction effect of gender and cohort is positive for all sib-sizes, which indicates that women in Hungary are compensating for their initially disadvantageous position. This interaction effect is strongest for small families, where the initial difference between the educational attainments of the sexes is largest. The cohort

TABLE 4 *The impact of spacing (number of siblings within an age-range of six years from the respondent: CLOSIBS) and birth order (BO), controlled for sex, parents' education, father's occupational status and cohort*

Size	BO2	BO3	BO4	BO5	BO6	BO7	BO8	CLOSIBS
2	-.225** (.075)							.105* (.041)
3	-.173** (.056)	-.138* (.070)						.009 (.022)
4	-.148* (.061)	-.208** (.071)	-.100 (.076)					.031 (.017)
5	-.237** (.067)	-.278** (.074)	-.210** (.080)	-.117 (.082)				.037* (.015)
6	-.105 (.080)	-.169* (.086)	-.074 (.090)	-.084 (.094)	.071 (.096)			.017 (.014)
7	-.136 (.097)	-.199 (.102)	-.065 (.106)	-.084 (.111)	.019 (.115)	.042 (.117)		.041** (.015)
8	-.170* (.083)	-.086 (.088)	-.012 (.093)	-.007 (.098)	.130 (.103)	.180 (.108)	.281* (.111)	.026* (.012)

*significant, $p < .05$; **significant, $p < .01$.

Note: Results represent only one regression for each family size.

Source: Social Mobility and Life History Survey, 1983.

variable is expressed in real years, and our sample spans cohorts over thirty years, so, in large families, women are doing about as well as men at the end of the investigated period, whereas in small families women have even surpassed their male siblings. A reason for this may be that for Hungarian men lucrative manual jobs are available, so it is not necessarily worthwhile for them to attend tertiary education (Szelényi and Aschaffenburg, 1993).

Trends in the Impact of Family Background

Father's occupational and educational status affect educational attainment positively in all sib-sizes. Taking together the results presented in Panel B from Table 3, we can conclude that the impact of father's education and occupation are not systematically related to family size. Blake's assertion about the difference between large and small families in the impact of family SES on schooling is not confirmed by Panel B from Table 3. According to Blake (1985), the effect of family background increases with sib-size. She believes that children from small families have many advantages of a personal and intellectual nature, due to a family setting that encourages

them to study and go to college (Blake, 1986). None the less, Mare and Chen's more sophisticated reanalysis (1986) does not come up with systematic sib-size interaction effects. Our findings confirm the absence of these interaction effects. In short, Blake's interpretation rested on an artefact caused by censoring of schooling levels (cf. Mare and Chen, 1986). This problem is not present in our analysis, because our dependent variable is highest level of completed education. Ceiling effects will not be present because the average educational attainment of the offspring of small families is still far from the highest level that can be attained.

The observation that the impact of indicators of family background is not dependent on family size, implies that we cannot conceive of the investment of resources as a straightforward division of the total amount of resources between the number of children. If the parental resources which facilitate children's schooling were divisible in such a way, marginal increases in parents' schooling, income, or other factors which index those resources should help children in small families most. Children with many siblings should benefit less, because for them equivalent

increases in resources are spread more thinly. According to Mare and Chen (1986), this implies larger effects of family background in small families. Since these larger effects are not found, socio-economic background seems to measure a family's social, cultural, or educational climate in general rather than face-to-face interactions or the financial means available per child. Furthermore, Mare and Chen argue, parents who intend to provide their children with sufficient resources in order to guarantee a high educational level may simultaneously decide to restrict the number of children. Parents who want to provide their children with sufficient resources are able to avoid serious strains on these resources. This may partly explain why educational resources do not behave as if they could be quantified. If it is true that factors such as family climate or parental aspirations govern these processes, we must acknowledge that we are dealing with largely unmeasured concepts that are inter-related in complex ways and thus poorly understood.

The largest problem involved might be that family size is related to unmeasured family factors derived from parental aspiration levels. If this is the case, the effect of family size is attenuated. The ideal solution to this problem is to include information on parental educational aspirations, measured before family formation starts. In that case, family size can be modelled as being dependent on aspirations, and educational attainment on both aspirations and family size, and the true effect of family size can be estimated. Such information is not available to us. Another conceivable solution is to apply a simultaneous equation approach, but we do not consider this feasible due to the absence of appropriate instrumental variables. We come to the conclusion that it is possible that the negative effects of family size, and maybe also spacing, are attenuated in our analysis. However, birth order cannot be affected by planning, and accordingly the effects of birth order cannot be biased.

Another noticeable feature of our analysis is that we observed that the standardized regression coefficients (not included in the tables) show that father's education is far more

important than father's occupation. This is congruent with the prediction that, in Hungary and capitalist societies alike, cultural resources are more influential than economic resources.

The interaction effect of cohort with father's occupational level (Table 3, Panel *B*) shows that the impact of father's status is diminishing over cohorts. The effect sizes imply that for the youngest age-groups the impact of father's occupational status has almost disappeared. This observation seems to indicate a general trend towards more openness, and probably to a decreasing significance of financial resources in educational careers in Hungary (cf. Ganzeboom *et al.*, 1990). The effect of father's education on schooling is on its way down as well, but less sharply. Again there is no clear pattern between sib-sizes.

Mother's education is more influential in small sib-ships, but in these families its effect is decreasing most rapidly. In fact, the effects of mother's schooling are only decreasing significantly in relatively small families (those with one, three, or four children).

Trends in the Impact of Family Size

Both in Table 2 (Panel *B*) and Table 3 (Panel *C*), cohort has a significant positive effect on educational attainment within families with one to six children. This is not surprising, since in Hungary the overall pattern since World War II has been one of extending educational careers. At the same time, it is clear that the impact of cohort decreases as sib-size grows, until it loses its significance altogether for sib-sizes of seven and more. As can be seen from Table 1, this result cannot be attributed to an uneven division of family sizes over cohorts. The interpretation of the variable COHORT is not seriously biased by the decrease of average family size over time.

The diminishing impact of cohort for increasing family sizes confirms our hypothesis. Further computations show that family size has a significant negative effect ($-.071$) over all individuals in the oldest cohort. The interaction effect of size and cohort is significant too ($-.004$). These estimates imply that in Hungary the effect of family size has increased

from about $-.07$ for the oldest cohort, to about $-.19$ for the youngest cohort.

We have already argued that large family size may be increasingly associated with a detrimental socio-economic situation. Indeed, according to our results, the association between family size and schooling level has become stronger. To check if this is really due to a growing association between low SES family background and family size, we have computed multiple correlation coefficients between family size and the three measured indicators of family background (father's education, mother's education, and father's occupation) for the three groups of birth cohorts we presented in Table 1. This coefficient increases over birth cohorts: from $.143$ for the cohorts born between 1928 and 1937, to $.258$ for the middle cohorts, and to $.322$ for the cohorts born between 1948 and 1958. This observation can be used to explain why large family size is increasingly associated with lower educational attainment. If the relationship between unmeasured educational resources and family size also increases over cohorts, it is plausible that large families have not taken part in the process of educational expansion (Blake, 1986). This result is hard to interpret in terms of resource-dilution theory, and we tend to support Blake's interpretation.

CONCLUSIONS

To summarize, we have found that family structure has substantial and significant effects on educational attainment. Birth order, family size, and spacing have independent effects on educational attainment. Within small families, early-borns attain higher average schooling levels, whereas within large families first-borns and late-borns do best. Between families the amount of resources plays an important role, as can be seen from the differences in attainment between children from different family sizes, where those from small families show higher levels of education. Close spacing has a positive effect on educational outcomes.

Major studies (Ernst and Angst, 1983; Hauser and Sewell, 1985) have argued that birth-order and spacing effects are basically a

result of erroneous methodology, mainly because appropriate controls are not included in the model. Our large and detailed Hungarian data-set facilitated a design in which effects for cohort and family background (father's occupation, father's education, and mother's education) could be modelled. The use of sibling data made it possible to investigate educational outcomes within families. In addition, the size of the data-set allowed us to control the effects of birth order for family size.

Indeed we found some proof that spacing has a direct effect on educational attainment. Contrary to expectations derived from original sibling resource-dilution theory as formulated by Blake (1981, 1989), close spacing is positively related to educational outcomes, although the effects are rather weak. This implies that the resources that are at stake in Hungary with respect to education, are not of a kind that is more strongly diluted as children are closer in age. On the contrary, in Hungary it seems beneficial if children are able to share certain resources with closely spaced siblings.

We cannot simply conclude that the presence of closely spaced siblings as such is an advantage in the educational career. Being born into a large family, especially as a middle-born, does seem to dilute the kind of resources that enhance educational attainment. It is only after controlling for these factors that it turns out to be an advantage if one's siblings are close in age. Many siblings do dilute parental resources, but this dilution is partly offset if parents are able to invest their cultural resources more efficiently, that is by offering them to several children at the same time. This is easier when siblings are of comparable ages, because in that case the total attention given to each child does not have to decrease with closer spacing.

Another explanation for the positive impact of spacing may lie in the allegedly more intensive interaction between siblings of similar ages. This intensified interaction may help siblings, for example by enhancing their social competence, which is beneficial for their educational success. This last point is stressed

by the increasing advantages of first-borns after spacing is controlled for, which demonstrates that first-borns do not benefit from the presence of closely spaced siblings. Only older siblings who are closely spaced seem to be helpful with regard to one's educational level. Older siblings can be regarded as facilitators, because they are able to provide help and information.

The apparent predominance of cultural resources in Hungary affects the impact of family structure. With regard to birth order predictions based on the idea that parental financial resources are dominant match predictions based on the proposition that cultural resources are the dominant resources. Both perspectives predict that first- and last-borns do best. This gave way to the hypothesis that the effects of family structure will not be different for the case of Hungary when compared to other countries. In fact, our results on birth order are very much like those obtained by Blake (1989) for the USA. We can add that the finding of these patterns must be largely a result of the differential accessibility of cultural resources. This interpretation is strengthened by the results on spacing, which can only be explained if we assume the leading role of cultural resources in educational careers.

NOTES

1. Resources are not only actively provided or restricted by parents, but also by other siblings (Blake, 1989: 161). This point of view has been expressed mainly by confluence theory, but this theory restricts itself to statements referring to the impact of siblings on the intellectual family climate, and not to family interaction. Resource theory is more explicit as it covers the question of which siblings may deplete which resources, so we do not have to allude to confluence theory to support this statement.
2. We must note that the only serious confirmations of this hypothesis have come from studies that examined the effect of a variable called 'sibling density', which was comprised of both spacing and family size (Kidwell, 1981; Powell and Steelman, 1990). This design fails to confirm that spacing is in itself an important factor.
3. Of course the upper age limit does not solve the problem of the deceased siblings completely. If we assume that the chance of underestimating the number of siblings who have ever lived is highest in the older families, then we can suppose that we underestimate the negative impact of number of siblings. Since large families are mostly found among the older cohorts,

the chance that these families have actually been larger than the number of living siblings reported is larger than in younger, smaller families.

4. It is unlikely that the fact that we are dealing with dependent observations increases the significance of the effects of birth order and spacing, because these are individual-level variables and thus have within-family variance. Of course this does not hold for family background, which varies only between families.
5. In addition, we have carried out the computations reported in Tables 2 and 3 using only independent observations, i.e. primary respondents. Leaving out the information on siblings led to inconsistent results as a consequence of the loss of cases and information. The effects of family structure can be analysed more thoroughly with information on complete sibships (Hauser and Sewell, 1985).
6. This division into three birth cohorts is only used in Table 1 to show the demographic change that has taken place with regard to family size. In the analysis itself, the cohort variable is expressed in single years.
7. All OLS regression models are also estimated with logistic regression equations. The results of these will be discussed briefly in the section on birth-order effects.
8. We have tested the legitimacy of assuming a linear cohort-effect by adding a quadratic term, which was never significant. The same holds for the interaction of gender and cohort.
9. If parental status is assessed just after marriage, parental status will be estimated correctly for early-borns and underestimated for later-borns, but the consequences with regard to the impact of birth order are exactly the same.
10. The logistic regression parameters can be obtained on request from the first author.
11. We also examined the impact of CLOSIBS with other age intervals to see if our choice of six years would yield results that were significantly different from other intervals. This turned out not to be the case. To illustrate this, we present the results of the analysis that is shown in Table 4, but now with an age interval of three years. If we do this, the last column of Table 4 (CLOSIBS) would look as follows: .029 (size 2), .016 (size 3), .033 (size 4), .070** (size 5), .028 (size 6), .042* (size 7), and .029* (size 8). Only in two-child families is the difference large, because in such families it is clearly more uncommon, and thus a sign of peculiar family circumstances, to have one sibling who is more than six years older or younger, than it is uncommon to have one sibling who is more than three years older or younger.

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