Distribution of Accidents, Injuries, and Illnesses by Family Type

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ABSTRACT. *Objective.* **To investigate whether family type and psychosocial risks indexed by family type were systematically associated with differences in health outcomes in children.**

Design and Subjects. **The study is based on a longitudinal, prospective study of a large (n = ~10 000) community sample of families, the Avon Longitudinal Study of Pregnancy and Childhood.**

Main Outcome Measures. **Frequency of accidents, illnesses, and medical interventions.**

Results. **At 2 years of age, children in single-parent and stepfamilies were disproportionately likely to experience accidents and receive medical treatment for physical illnesses. In addition, children in single-parent families and stepfamilies were more likely to be hospitalized or receive attention from a hospital doctor for an injury or illness. Exposure to psychosocial risks also were elevated in single-parent families and stepfamilies, compared with intact or nonstepfamilies, and these factors primarily accounted for the connection between family type and children's physical health.**

Conclusions. **The consequences of family transitions on children's health extend beyond traditional mental health and behavioral outcomes and include accident proneness, illness, and receipt of medical attention. The mediating processes are not entirely attributable to social class differences connected to family type and may instead be associated with a range of psychosocial risks that are more frequently found in single-parent families and stepfamilies, compared with intact or nonstepfamilies. Prevention and intervention efforts directed toward children at risk for poor behavioral and mental health adjustment secondary to family disruption should consider children's physical health and health-related behaviors.** *Pediatrics* **2000;106(5). URL: http://www.pediatrics.org/cgi/content/full/106/5/e68;** ***family type, childhood, accidents, injuries, illnesses.***

ABBREVIATIONS. ALSPAC, Avon Longitudinal Study of Pregnancy and Childhood; OR, odds ratio.

Membership in a single-parent family or stepfamily is associated with increased levels of significant behavioral, emotional, and academic problems in children.[1,2] The mechanisms underlying this connection are likely to involve, among other factors, financial adversity, increased stress directly related to family transitions, and increased exposure to additional psychosocial risks.[3,4] Compared with the extensive research base connecting family type (ie, membership in a 2-parent biological family, stepfamily, or single-parent family) and children's psychological adjustment, little is known about the physical health consequences of membership in diverse family types. One study[5] found that children in both single-parent families and stepfamilies were more likely to experience hospitalization or an injury attributable to accident than were children living with both biological parents. A smaller study found that children in single-parent families visited the general practitioner more and experienced more psychosomatic health problems.[6] A further study[7] found a connection between marital disruption and children's health but was not able to distinguish between alternative explanations for this effect. By suggesting a link between family type and significant health outcomes in children, the above studies raise important questions concerning the public health implications of the high rates of divorce and remarriage.

Several questions remain regarding the connection between membership in a single-parent or stepfamily and children's physical well-being. First, it is not clear from previous research if family type and attendant psychosocial risks act in a nonspecific or general manner. Second, there is a need to identify the underlying risk processes. Several key psychosocial risks are disproportionately distributed among step- and single-parent families and may mediate the connection between family type and health.[3,4,8–10] It is, therefore, important to demonstrate that the family type effect on health is not entirely accounted for by, for example, social class differences among family types.

Additionally, individuals who have experienced a parental divorce in childhood, teenage pregnancy, left home early, or prematurely terminated education are more likely to select into a single-parent family or stepfamily and to experience increased levels of current social adversity.[11] It may be that these life-course developmental risks are implicated in childhood accidents and injuries. Thus, one study[12] found that teenage parents with a previous history of behavioral problems in childhood had (subsequently born) children who were more likely to have poor health outcomes at 5 years of age.

Using data from the Avon Longitudinal Study of Pregnancy and Childhood (ALSPAC),[13] the current

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study examines the connection between membership in a single-parent and stepfamily and rates of accidents, injuries, and illnesses in 2-year-olds. We test the hypothesis that this association is mediated by concurrent psychosocial stresses and maternal life-course risks including those that predate the child's birth.

METHODS

Study Population

The ALSPAC is a longitudinal, prospective study of women, their partners, and an index child. The study design included all pregnant women living in the health district of Avon, England, who were to deliver their infant between April 1, 1991 and December 31, 1992.[13] It was estimated that 85% to 90% of the eligible population took part. The average age of the women at pregnancy was 28 years and ranged from 14 to 46; <5% were younger than 20 years of age and <1% were older than 40 years of age. Approximately 45% of the women were expecting their first child; 6% of the women had 3 or more children. The families initially selected to take part in the study resemble those in Britain as a whole, based on a comparison with census data.[14]

At several points in the pregnancy and the child's early years women completed questionnaires on a wide range of issues concerning medical health, development, and social factors. Data from the current study are based on a questionnaire concerning family constellation and exposure to psychosocial risks, administered when the children were 21 months old, and on a subsequent questionnaire on accidents and illnesses administered when the children were 24 months old. In addition, data on the parents' childhood history and life-course patterns before the birth of the child were collected from a previous questionnaire administered in pregnancy.

Data on accidents, illnesses, and hospitalizations were available on 10 431 families. The drop in sample across time points is comparable to other large-scale questionnaire-based studies.[15] The sample size for each analysis is based on the maximum sample available. Sample size differs across bivariate and multivariate analyses because of missing data.

Family Type

Families were classified into 5 types based on household composition: intact/nonstepfamily, stepfather family, stepmother family, blended stepfamily, and single-parent family. Stepmother families and blended stepfamilies were combined in analyses because of small sample size and limited power to detect differences.

Children's Health Outcomes

Information on 3 types of accidents was collected: burns/scalds, falls, and swallowing objects. For each of these accident types, both the frequency of occurrence since the child was 15 months of age and whether the accident required medical attention (taking the child to the hospital or doctor) were assessed. A total frequency of all accidents was also computed. Parents reported whether the child had ever experienced any accident that resulted in a scar or disability.

Illnesses requiring medication were assessed according to both common illnesses and over-the-counter medicines (cough medicine, throat medicine, paracetamol) and somewhat less common or potentially more severe illnesses that more frequently require medical attention and prescription medication (antibiotics, medication for diarrhea). Parents reported whether the child required the above medications for a specific illness on 0, 1, or 2 or more occurrences since the child was 15 months of age. To distinguish those risks that identified children with somewhat more severe illness, we analyzed the data according to a dichotomy between 0 to 1 and 2 or more occurrences. Finally, parents reported whether the child had seen a specialist clinic or hospital doctor since the child was 15 months of age.

Social and Demographic Control Variables

Parent self-reported financial difficulties (ability to pay for specific family needs and wants) were included as an index of financial stress and adversity; high financial stress was defined as scoring in the top quartile. In addition, a crowding variable was based on a cutoff of >1 person/room. In addition, the highest achieved level of education was coded on a 4-point scale, with the lowest score indicating minimal educational qualifications and the highest level indicating university degree. Financial difficulties, crowding, and maternal education were included as indicators of social class. Partner education or occupation was not included because such data did not exist for women in single-parent families; maternal occupation was not included as an indicator of social class because a substantial number of women were not in part-time or full-time work.

Psychosocial Risks

Concurrent risks for accidents and injury include the activity scale from a child temperament inventory[16]; children above the 75% percentile were judged to be at possible risk for poor outcomes. Recent stressful life events were assessed according to a measure of 42 stressful life events.[17] The total number of stressful life events endorsed is used; a cutoff score at the 75th percentile identified highly stressed families. Maternal depression was assessed using the Edinburgh Postnatal Depression Scale, based on a clinical cutoff indicating potential clinical depression.[18,19]

Maternal life history risks were defined as having experienced parental divorce, leaving the parental home early (before 18 years of age), and teenage pregnancy. Previous research identifies these 3 risks as indexing a high-risk life-course pattern that is strongly predictive of adult adjustment.[20]

Statistical Analysis

Data are presented in 4 sections. First, we report the incidence of accidents, illnesses, and receiving hospital/doctor visits for the period assessed. Second, we examine the bivariate association between family type and children's health. Third, we examine whether the association between family type and child outcome is maintained after controlling for social class indicators and demographic control factors. Finally, we present the joint effects of family type, social class, and control factors and developmental and concurrent risks on children's health outcomes.

Relations between family type and physical health outcomes and psychosocial risk variables are based on categorical methods. Logistic regressions, from which we report the odds ratio (OR), were used to test whether the prediction of health outcomes from family type was accounted for by specific psychosocial risks. Because of the interest in the effect of severe rather than low to moderate level of risk variables, continuous variables were dichotomized at the 75th percentile.

RESULTS

Of the sample children, 7.6% (n = 785) had experienced a burn or scalding since 15 months of age; <1% experienced >1. Of those children who were burned, ~13% received hospitalization or a doctor visit. Twenty-four percent (n = 2471) of the children had experienced a major fall since 15 months of age; <7% experienced >1 major fall. Of those children who did experience a major fall, 27% required hospitalization or a doctor visit. Finally, 5% of the children in the sample swallowed a potentially dangerous object since 15 months of age; a repeated swallowing occurred in <1% of the cases. Of those children who did swallow a potentially dangerous object, hospitalization or a doctor visit occurred in 35% of the cases. Overall, 26% of the sample experienced at least one of the above types of accidents; 15% had 2 or more. In addition, 8% (n = 819) of the children in the sample had ever received a long-term injury resulting from an accident and 8% (n = 782) had ever been left with a scar from an accident. In total, 19% of the children had been to a specialist clinic or hospital doctor since 15 months of age.

Since the children in the sample were 15 months of age, 22% had been given antibiotics on 2 or more occasions; an additional 25% of the children had been given antibiotics on one occasion. Medication for diarrhea was given to 8% of the sample; 2% received medication on 2 or more occasions. Cough medicine was given to 53% of the sample; 26% on 2 or more occasions. Seventy-eight percent of the children in the sample received paracetamol on 2 or more occasions; an additional 14% received such medication only once. Throat medicine was given to 3% of the sample; only 1% received throat medication more than once.

Table 1 presents the connection between family type membership and health outcomes. For each outcome, the first row presents the percent of affected children in each family type; this is complemented in the second row with the OR from logistic regression analysis using children living with 2 biological parents as the index (control) group. Children in single-parent families were significantly more likely to experience a burn/scald (with or without medical attention), 2 or more accidents, a long-term disability, or scar from an accident, compared with children in intact or nonstepfamilies. In addition, children in single-parent families were more likely to require antibiotics, medicine for diarrhea, and to have seen a specialist in the past 15 months. In most cases, the

TABLE 1. Association Between Family Type and Accidents and Illnesses

	2 Biological Parents	Stepfather	Other Stepfamily	Single-Parent
Accidents				
Burn/scald				
%	7.3	8.7	10.7	10.7
OR	—	1.21	1.53	1.53**
Hospital/doctor visit after burn/scald				
%	.7	1.6	1.8	2.3
OR	—	2.26*	2.51	3.32***
Fall				
%	23.9	24.1	24.1	27.2
OR	—	1.01	1.01	1.19
Hospital/doctor visit after fall				
%	5.9	7.5	6.3	6.5
OR	—	1.30	1.06	1.10
Swallow object				
%	4.4	5.4	3.6	5.0
OR	—	1.25	1.20	1.19
Hospital/doctor visit after swallow				
%	1.3	1.8	2.7	2.1
OR	—	1.36	2.02	1.56
2 or more accidents				
%	13.4	14.3	17.9	17.2
OR	—	1.08	1.40	1.34**
History of accidents				
Long-term injury after any previous accident				
%	7.8	8.3	9.8	10.4
OR	—	1.07	1.29	1.39*
Scarred by any previous accident				
%	7.4	7.7	9.0	10.0
OR	—	1.05	1.25	1.40*
Illnesses				
Cough medicine, twice or more				
%	26.0	23.0	25.0	28.8
OR	—	.85	.95	1.15
Throat medicine, twice or more				
%	.9	.9	.9	1.2
OR	—	.98	.98	1.29
Paracetamol/Calpol, twice or more				
%	79.5	72.6	70.3	69.4
OR	—	.68**	.61*	.58***
Antibiotics, twice or more				
%	21.6	24.9	23.4	25.4
OR	—	1.20	1.11	1.24*
Diarrhoea medicine, twice or more				
%	1.9	3.2	4.5	3.8
OR	—	1.69*	2.39	2.03**
Specialist clinic or hospital doctor				
%	18.7	19.2	20.0	24.1
OR	—	1.04	1.09	1.38**

OR is calculated with 2 biological parents as the control condition. For 2-parent biological families, sample sizes range from 8081 to 8192; for stepfather families, sample sizes range from 551 to 558; for other stepfamily, sample sizes range from 108 to 116; for single-parent families, sample sizes range from 665 to 681.
* $P < .05$; ** $P < .01$.

percentage (and OR) of risk in single-parent families was greater than that in stepmother/blended stepfamilies; the rate in stepfather families was rarely substantially larger than that found for intact or nonstepfamilies. There was one negative finding: children in stepfamilies and single-parent families were significantly less likely to receive paracetamol/Calpol than children in intact or nonstepfamilies.

Further logistic regression analyses indicated that the effect of family type on health outcomes was, in most cases, significant after controlling for the 3 social class indicators and child sex. Of the 8 health outcome measures that were significantly positively associated with family type in Table 1 (in most cases with single-parent family membership), 3 (long-term injury after any previous accident, scarred by any previous accident, antibiotics) were no longer significantly associated with family type membership after accounting for overcrowding, lack of economic resources, educational attainment, and child sex (not tabled).

The final set of analyses examined the joint effect of family type, social and demographic risks, and concurrent and developmental life-course risks on children's health outcomes. The results from multiple logistic regression analyses are presented in Tables 2 and 3. Analyses are presented for those health outcomes that were positively associated with membership in a single-parent or stepfamily in bivariate analyses. The ORs for membership in single-parent and stepfamily in the analyses in Tables 2 and 3 are almost universally lower than are those in Table 1. This reduction in the ORs reflects the degree to which the social, demographic, concurrent, and developmental life-course risks mediate the connection between family type and children's health outcomes. Importantly, family type is not significantly associated with health outcome measures when other key variables are considered. The single exception to this was seeing a specialist clinic or hospital doctor since 15 months of age. The effect of membership in a single-parent family was substantially reduced once the covariates were introduced (change in OR from 3.32 to 1.39), but it remained significant at $P < .05$. The results in Tables 2 and 3 also indicate that concurrent risks (most consistently maternal depression and stressful life events) and maternal life history risks (most consistently giving birth before age 20 and leaving home before 18 years of age) exerted a consistent and generalized effect on children's health outcomes at 2 years of age.

DISCUSSION

In a large community sample of families in England, an association was obtained between membership in a single-parent family or stepfamily and physical health, defined as accidents, hospitalizations, and receiving medicinal attention for illness. The effect of family type was not, in most instances, accounted for by social class and financial status differences among single-parent families, stepfamilies, and nonstepfamilies. Instead, the family type effect was nearly entirely explained by social and maternal life-course risks that disproportionately affect single-parent families and, to a lesser degree, stepfamilies. The findings add to a small but important set of studies implicating family type and psychosocial risks in children's health outcomes. We discuss interpretations of the findings before turning to the health implications.

TABLE 2. Prediction of Accident Variables From Joint Effects of Risk Variables

	Burn/Scald OR (95% CI)	Burn/Scald With Hospitalization OR (95% CI)	2 or More Accidents OR (95% CI)	Specialist/ Hospital OR (95% CI)
Social and demographic risks				
Child sex (male)	1.50 (1.27–1.78)***	2.35 (1.39–3.96)**	1.36 (1.19–1.54)***	1.25 (1.11–1.39)***
Family type				
Intact/nonstepfamily	1.00	1.00	1.00	1.00*
Stepfather	1.00 (.71–1.42)	1.64 (.73–3.65)	.87 (.66–1.15)	.97 (.76–1.25)
Other stepfamily	1.44 (.76–2.74)	2.60 (.62–10.97)	1.30 (.77–2.19)	1.09 (.66–1.79)
Single-parent	1.18 (.86–1.62)	2.01 (.98–4.13)	1.03 (.80–1.32)	1.39 (1.11–1.73)**
Education				
No qualifications	1.00	1.00	1.00**	1.00*
Minimum	.94 (.76–1.17)	1.18 (.67–2.06)	1.14 (.96–1.36)	1.06 (.91–1.24)
A levels	1.00 (.78–1.27)	.74 (.36–1.52)	1.16 (.96–1.41)	1.37 (1.16–1.62)**
University degree	1.07 (.80–1.42)	.31 (.09–1.07)	1.42 (1.14–1.77)**	1.37 (1.13–1.66)**
Overcrowding	1.11 (.91–1.36)	.78 (.44–1.39)	.93 (.79–1.09)	1.11 (.97–1.28)
Financial strain	.84 (.69–1.03)	.89 (.51–1.53)	1.19 (1.03–1.38)*	1.06 (.93–1.21)
Concurrent psychosocial stress				
Life events	1.29 (1.08–1.55)**	1.22 (.73–2.06)	1.60 (1.39–1.83)***	1.18 (1.04–1.34)**
Child temperament activity	1.16 (.97–1.39)	.88 (.52–1.49)	1.23 (1.08–1.41)**	1.06 (.94–1.20)
Maternal depression	1.29 (1.01–1.64)*	1.11 (.56–2.19)	1.39 (1.16–1.66)***	1.20 (1.01–1.42)*
Maternal life history risks				
Teenage pregnancy	1.53 (1.21–1.92)***	2.14 (1.21–3.78)**	1.31 (1.09–1.57)**	.87 (.73–1.04)
Left home <18 y	.99 (.79–1.23)	1.03 (.57–1.87)	1.10 (.93–1.30)	1.18 (1.01–1.37)*
Parental divorce	1.31 (1.06–1.62)*	1.21 (.69–2.13)	1.17 (.99–1.38)	1.02 (.88–1.19)

The control condition for multilevel variables is provided above; it is assumed to have a relative risk of 1. The *n*s for the analyses involving all variables range from 8116 to 8215. For the variables with multiple levels (family type and education), the significance of the overall step is given at the control condition.
CI indicates confidence interval.
* $P < .05$; ** $P < .01$; *** $P < .001$.

TABLE 3. Prediction of Accident and Illness Variables From Joint Effects of Risk Variables

	Long-Term Injury OR (95% CI)	Scarring From Injury OR (95% CI)	Antibiotics OR (95% CI)	Medicine for Diarrhea OR (95% CI)
Social and demographic risks				
Child sex (male)	1.73 (1.46–2.04)***	1.78 (1.51–2.11)***	1.38 (1.24–1.53)***	1.54 (1.12–2.11)**
Family type				
Intact/nonstepfamily	1.00	1.00	1.00	1.00
Stepfather	.87 (.61–1.24)	.91 (.63–1.29)	1.11 (.89–1.39)	.90 (.47–1.73)
Other stepfamily	1.20 (.61–2.33)	1.15 (.57–2.32)	1.19 (.75–1.88)	2.43 (.96–6.14)
Single-parent	1.02 (.74–1.40)	1.03 (.75–1.42)	1.14 (.92–1.42)	1.52 (.90–2.53)
Education				
No qualifications	1.00**	1.00**	1.00**	1.00*
Minimum	1.48 (1.18–1.85)***	1.46 (1.16–1.84)**	.79 (.64–.91)***	.83 (.58–1.20)
A levels	1.54 (1.21–1.98)***	1.45 (1.13–1.87)**	.84 (.72–.98)*	.50 (.31–.81)**
University degree	1.45 (1.09–1.95)*	1.38 (1.02–1.85)*	.88 (.73–1.05)	.59 (.33–1.03)
Overcrowding	1.04 (.85–1.27)	1.02 (.84–1.25)	1.02 (.89–1.16)	1.08 (.75–1.56)
Financial strain	1.21 (1.00–1.45)*	1.18 (.98–1.43)	.99 (.87–1.12)	.92 (.65–1.31)
Concurrent psychosocial stress				
Life events	1.56 (1.31–1.85)***	1.56 (1.31–1.86)***	1.26 (1.16–1.42)***	1.45 (1.04–2.02)*
Child temperament activity	1.20 (1.01–1.42)*	1.22 (1.03–1.45)*	.99 (.88–1.11)	1.52 (1.11–2.08)**
Maternal depression	1.10 (.87–1.40)	1.09 (.86–1.39)	1.18 (1.00–1.38)*	1.56 (1.04–2.35)*
Maternal life history risks				
Teenage pregnancy	1.28 (1.02–1.28)*	1.27 (1.00–1.60)	.97 (.82–1.14)	1.25 (.83–1.90)
Left home <18 y	1.33 (1.08–1.63)**	1.25 (1.01–1.55)*	.96 (.83–1.11)	.83 (.55–1.27)
Parental divorce	1.07 (.87–1.32)	1.10 (.88–1.36)	.98 (.85–1.13)	1.30 (.89–1.90)

The control condition for multilevel variables is provided above; it is assumed to have a relative risk of 1. The *n*s for the analyses involving all variables range from 8116 to 8215. For the variables with multiple levels (family type and education), the significance of the overall step is given at the control condition.
CI indicates confidence interval.
* $P < .05$; ** $P < .01$; *** $P < .001$.

Epidemiologic and public health research highlights a robust connection between social factors and physical health.[10] Following this approach, several studies have now identified specific environmental and child factors associated with an increased likelihood of injury in young children[21] (but see reference 22). Several of the most commonly identified risk factors in previous research were identified in this study, including being male, membership in a single-parent or stepfamily,[5] high levels of parent-reported childhood activity,[23,24] maternal mental health problems,[25] and a history of teenage parenthood.[26] What is relatively novel about this report is the consideration of the joint effects of psychosocial risk factors, while controlling for multiple indicators of social class and the assessment of both accidents and illnesses in a large community sample followed prospectively since pregnancy.

Overall, the effects of family type and, more specifically, the psychosocial risks indexed by family type on children's health outcomes seem to be generalized rather than specific; however, there was variation in the effects of family type and specific and more proximal risk factors. Where no or minimal psychosocial prediction was obtained, it seems likely that the outcome was not predicted because it was relatively normal and, therefore, not linked to risk status (eg, falls, very minor illnesses such as cough) or was extremely infrequent and, therefore, difficult to predict (swallowing objects).

The sample size and study design provided important leverage to determine which psychosocial risks that covary with single-parent and stepfamilies account for the added risk. Teenage pregnancy and early home leaving were consistently associated with children's health outcomes. The reasons why these risks, which were experienced long before the child's birth, would predict the health of children several years later require further consideration. The findings suggest that there are aspects of the mother that directly or indirectly carry risk for children's health. Direct risks may arise from activity level or other behavioral risks, which may have a genetic component.[27] Indirect routes include the possibility that the parent, who may have a history of risk-taking, provides a high-risk family environment for the child, which may include poor parental monitoring and supervision.

In contrast, children born to mothers with life-course trajectories characterized by less than optimal patterns of relationship formation, childbearing, and educational attainment are likely to experience adverse social conditions that, in turn, compromise children's health. There is, for example, evidence for a link between family stress and compromised immuno-functioning in adults and to a lesser degree in children.[28] Regardless of the factors that increase exposure to adverse social circumstances, the source of social adversity did not arise from crowding, financial strain, and low education, because these variables were also included in the analysis.

The finding that higher education was associated with higher rates of some negative health outcomes (eg, 2 or more accidents) was unanticipated and contrasts with previous work.[29] The finding may reflect more accurate reporting of some health outcomes in higher compared with lower socioeconomic groups or may reflect a real difference attributed to an unspecified cause. The uncertainty about the nature of this effect provides a reminder of the limitations of self-reported data. There may be biases in reporting because of poor or distorted recall of information,

and this may distort the true estimates of effect. However, the limitations of self-reported data must be set against the benefits of data from large-scale population samples.

One key implication of this study is that family stress and associated risks are a public health matter rather than simply a matter for the mental health, social service, and education sectors. Because of the limitation of not knowing the context of the specific injuries and illnesses examined in this report, we would caution against too literal extrapolation from these findings to health costs. Nevertheless, intervention and prevention efforts geared to children whose parent(s) experience a divorce or remarriage should also consider health outcomes such as accidents and illnesses. Positive impact at that level may well have a health-promoting effect by reducing the need for medical intervention, including general practitioner and hospital visits. Finally, it is important to note that the outcome measures were in terms of both treatment and morbidity. Findings concerning these 2 types of health outcomes are not synonymous[30,31] and may lead to somewhat different conclusions.

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