National Child Development Study

NCDS

user support group

working paper 46

Life events and accidents in the National Child Development Study

David R Jones & Philip Sedgwick

St George's Hospital Medical School

September 1996

Social Statistics Research Unit
*City University * Northampton Square * London EC1V 0HB.*

National Child Development Study User Support Group

Working Paper No: 46

Life events and accidents in the National Child Development Study

David R Jones & Philip Sedgwick

St Georges Hospital Medical School

September 1996

Social Statistics Research Unit
City University, Northampton Square, London EC1V 0HB

Life events and accidents

in the National Child Development Study

David R Jones[1] and Philip Sedgwick[2]

Department of Public Health Sciences
St George's Hospital Medical School
Cranmer Terrace
LONDON
SW17 0RE

Note: This paper is presented unchanged from the draft prepared at St. George's Hospital Medical School in 1990/91, to provide a starting point for analyses of further data on accidents, collected in the 5th sweep of the NCDS, which is now available for analysis and interpretation.

DRJ 11/95

Present address: [1] Department of Epidemiology & Public Health, University of Leicester.
[2]Department of Mental Health Sciences, St. George's Hospital Medical School

Summary

A wide range of environmental, family, social, physiological and psychological factors have been linked with the risk of occurrence of accidents in children and young adults in previous studies. In the National Child Development Study 9NCDS0 more than 12500 out of 17000 subjects have been followed from birth in 1958 to age 23. Interview and questionnaire data relating to the subjects at birth and ages 7, 11, 16 and 23 cover environmental, social, education and behavioural factors and medical history. Here we use data from the NCDS in investigating evidence for a link between experience of stressful life events and subsequent occurrence of accidents resulting in hospital care.

Raised accident risks are clear in those who have had a miscarriage or abortion, whose marriage has ended in widowhood, divorce or separation, and in those who were or became unemployed. Raised risks are also apparent in previously identified high risk groups such as regular consumers of alcohol, and also among those suffering recent convulsions. The patterns of elevated accident risk following life events cannot, however, be explained by the alcohol consumption of the respondents.

Background

Accidents are an important cause of death in childhood (Macfarlane and Fox, 1978), adolescence and early adulthood (Bewley, 1986). Consequently, many studies have sought to describe patterns of accidents and to explore their aetiology. A large variety of factors I have been shown to be associated with raised risks of accidents (Bull, 1961). The categorisation of such factors proposed (Hale and Hale, 1972) in the context of industrial accidents is more broadly applicable; the four categories are i) physical or environmental factors, ii) physiological factors, including age, sex, vision and hearing disabilities, coordination, alcohol consumption, and conditions such as epilepsy, iii) psychological factors, which may include personality characteristics and reactions to stressful events or circumstances and iv) social factors. There are, of course, many interactions and interrelationships between factors in the various categories but few studies (langley *et al.*,1979) have been able to collect information on a wide range of these factors in conjunction with detailed data on the occurrence of accidents. the National Child Development Study (NCDS) on which this paper is based is, to some extent, able to meet these data requirements. Here we shall concentrate on exploration of the extent and nature of relationships between experiencing stressful life events and the subsequent pattern of accidents suffered, while making allowance for the effects of other risk factors.

A role for stress in the aetiology of at least some accidents has been mooted as an explanation of temporarily raised risks of accidents sometimes observed following adverse life events; studies attributing about 30% of fatal road accidents to the involvement of a driver responsible in an earlier quarrel (Conger *et al.*,1959)and a relative risk of 1.5 for accidents of all types following divorce in the previous six months (McMurray, 1970) are frequently cited. Several subsequent studies have suggested that orthopaedic patients (Whitlock *et al.*,1977) and athletes (Bramwell *et al.*,1975)who suffered accidents had raised life change unit scores supposed to reflect the occurrence of adverse life events

(Holme and Rahe, 1967). Many studies of life events and accidents are weakened by now familiar methodological problems (Dohrenwend and Dohrenwend, 1987; Brown and Harris, 1978) including retrospective ascertainment of the life events, questionable weighting of the events, no consideration of the contextual meaning of the event, small samples and poorly chosen control groups. Nonetheless, positive associations have been found in studies using somewhat more rigorous interviewing approaches (Connolly, 1981) or concerned only with very severe events, such as widowhood (Jones and Goldblatt, 1987).

In the current study the emphasis is again on 'major' and more-or-less objectively defined life events, but methodological problems specific to adolescent populations may still arise (monck and Dobbs, 1985). The definition of an accident adopted may be crucial (Stewart-Brown *et al.*,1986); in particular to study only accident incident and of subsequent hospitalisation (Eminson *et al.*,1986). Whilst reporting biases are always a potential problem, particularly if there is 'effort after meaning' - an attempt to provide an explanation for an adverse life event.

Methods

The cohort of seventeen thousand children born in England, Scotland and Wales in the week of 3-9 March 1958 forms the basis of the National Child Development Study. Data describing 98% of cohort members are available from the birth survey and, for those successfully traced at these four subsequent times, at ages 7, 11, 16 and 23. The birth survey includes socio-demographic and obstetric data on each study member obtained from his or her mother and from medical records. At ages 7, 11 and 16 data on the physical, educational and social development of cohort members were obtained from interviews with their parents, questionnaires completed by their teachers, medical examinations by the school health service, and tests and questionnaires completed by the cohort members themselves (Davie *et al.*, 1972; Fogelman, 1983). Most of the data analysed here were, however, obtained by interview with the cohort members at age 23, again covering a wide range of socio-demographic, educational, and health characteristics of the 12532 (76%)

still traceable at this stage. Members of some disadvantaged groups are somewhat over-represented amongst those who drop out, but differences between those successfully followed up and those lost to follow up are generally small (Fogelman, 1983).

Amongst the health related questions in the interview at age 23 were questions on the accident history of the respondent since age 16. Information was sought only about accidents which resulted in a hospital attendance (either in or out-patient). Some details of the nature and timing of the first eight such accidents reported as occurring to each respondent at ages between 16 and 23 were recorded. An ambiguity in the method of administration of the questionnaire yielded lists of accidents in chronological order for some respondents and reverse chronological order for the majority of the remainder, with a small residue of cases with apparently unordered or incomplete data. The 5 cases with missing data are omitted from the analyses presented below; the remaining accident sequences have been sorted into chronological order (by year of age) where necessary.

Most of the other variables utilised in the analyses were also collected at, or derived from data collected at, the interview at age 23. These data include changes in circumstances reflecting the occurrence of major life events (eg divorce, redundancy) since the age of 16, measures of health related behaviour such as alcohol consumption habits, and measures of socioeconomic position including occupation-based social class. The total number of respondents for whom results are reported varies from Table to Table, mainly because numbers at risk for the event reported vary. For example, not all respondents are married or employed and hence at risk for divorce or unemployment. It also arises from incomplete response to questionnaire items or other assessments from which the risk factor measures were derived. Risk ratios in the non-response groups have been examined, but are omitted from the Tables for clarity, since they were close to unity.

80 accidental deaths were numbered among the 282 deaths (including perinatal deaths) of sample members known to have occurred by age 23. Forty six of the 80 accidental deaths

occurred between the ages of 16 and 23. In all of the analyses reported here, accidents requiring hospitalisation as reported by survivors have been used as the outcome measure. Incorporation of death from accidental causes into the analyses, in combination with reported, non-fatal accidents had negligible influence on the results.

Results

11009 accidents leading to hospitalisation between ages 16 and 23 were reported at age 23 by the NCDS respondents. Overall fewer than half (43.9%) reported an accident leading to hospital attendance between ages 16 and 23. The difference between sexes is very marked, almost twice as many females (73.6%) as males (38.5%) reporting no such accident and fewer than ten percent of those reporting 5 or more accidents in the period being female. Only 44 respondents (0.3%) reported 10 or more such accidents; amongst them 5 reported 20 accidents and one 27 accidents. Failure to recall and report the number of accidents suffered was very surprisingly rare. Substantial numbers of accidents of each type, except road accidents to pedestrians, occur in both sexes. Accidents at work and sports accidents are more common in males, and accidents at home in females.

In the light of the distribution of numbers of accidents noted above, the number of accidents reported between the ages of 16 and 23 are analysed in either two or three categories (no accidents/one or more; none/1-4/5 or more). Most results are presented separately for males and females. Since in view of the strong differences in distribution of number of accidents, confounding by sex of relationships between several risk factors and accidents is apparent.

The major objective life events about which data are reported at age 23 in the NCDS are shown in Table 1; some other data are collected at earlier ages, including some indicators of parental death or separation. In most cases the date of occurrence of life events can be only very imprecisely established within the range corresponding to cohort members ages between 16 and 23, for most of these initial analyses it cannot be enequivocally established that occurrence of the

event precedes the occurrence of reported accidents. Nonetheless, as Tables 2-4 show, there are clearly increased risks of accidents in the age range 16 - 23 in those who suffer one of several major life events in that period. In females, the largest odds ratios are associated (see Table 2) with miscarriage, abortion or widowhood, although wide confidence intervals result from the small numbers of events in some cases. No male cohort member reported that his first marriage had terminated in widowerhood by the age of 23. However, in males, termination of (first) marriage by separation or divorce (Table 3) and termination of (first) job by dismissal or redundancy (Table 4) were clearly related to accident risk. The relationship were not so marked in females.

For most of the remaining life events listed in Table 1 odds ratios were either close to unity or based on such small numbers of events or cases that analyses were impossible or uninformative.

Relationships between life events and accident risk may be confounded by other variables, most notably other known risk factors for accidents, such as alcohol consumption, and general socioeconomic indicators. Table 5 explores the relationship of number of accidents reported between ages 16 and 23 with reported typical pattern of alcohol consumption at 23. The expected finding that accident risk correlates strongly with alcohol consumption is confirmed. Those who drink 'most days' have raised odds ratios and the total abstainers and infrequent drinkers generally lower rations (χ^2_1 for trend = 20.8, $p<0.0001$, for males; 4.9, $p<0.0001$ for females), the large group who drink once or twice a week being taken as the reference group.

Convulsions since age 16 as reported at age 23 are clearly related to accident rate reporting in males, as shown in Table 6. Similar results are obtained for females. However, not all plausible risk factors measured in the NCDS do in fact yield evidence of raised accident risk. For example, in those for whom the assessment of coordination or 'clumsiness' was reported by cohort members' teachers when the cohort members were 16 years old there is no apparent increase in

accident risk with increasing clumsiness, as Table 7 indicates. Much the same is true (not tabulated here) of eyesight defects assessed at the same age

Broad socio-economic characteristics may perhaps reflect environmental, educational or behavioural risk factors not yet specifically identified, as well as the consequences of alcohol consumption. There is clear evidence in Table 8 of raised risks in male manual compared with non-manual workers, the categorisation being based on the last job reported at 23. In females the results are less clear cut and are not presented here. Many other measures of socioeconomic circumstances and background, particularly educationally related measures, are of course available in the NCDS.

The combined effects of variables considered in the univariate analyses presented above are explored by means of logistic regression models for the odds ration (McCullagh and Nelder, 1989) of accident risk. This allows investigation of both the relative importance of and interrelations between the various factors vis a vis accident risk.

An important example of such analyses is presented in Table 9; the analysis shows that the association between divorce and accidents set out in Table 3 is not mediated solely through alcohol consumption - as for example could be conjectured as a behavioural response to stress associated with suffering that life event. There are clear independent effects associated with both termination of marriage through divorce or separation (model 6 compared with model 5) and with alcohol consumption (model 5 compared with model 2), as well as a suggestion of an interaction between them. Similar modelling of socioeconomic indicators and other risk factors in conjunction with life event effects in general confirms that the initial raised accident risk ratios cannot be explained by adjustment for these other factors.

Discussion

The NCDS offers a very wide set of data on socio-economic, health, educational and behavioural description of a large

representative cohort followed up from birth to young adulthood. The possibilities for analysis of relations between data on accidents and other characteristics of cohort members are consequently manifold; only a small selection of initially informative analyses have been presented here. Another consequence of use of data from a large multi-purpose study, which of course was not primarily or exclusively designed for investigations of accident aetiology, is that neither the measures of accident experience nor those of risk factors (and in particular, life events) are as comprehensive as is desirable. Nonetheless, despite acknowledged limitations of data items in the NCDS, its broad base and representative nature make it almost uniquely valuable for the present purpose.

The principal measure of accident occurrence available in the NCDS - report by the respondent, or at earlier ages by the respondent's parent, of any accident during the past few years which has led to outpatient or inpatient attendance at a hospital - confounds measures of propensity to report, recall biases, and variability of both perception of an event as an accident and of the need for hospitalisation. In later papers we propose to analyse subsidiary measures of accident severity and outcome available in the NCDS data set. Whether in- or out-patient care was needed, and whether disability resulted from the accident to help separate the risks of occurrence of and severity of consequences arising from accidents. More extensive analyses of the type (road, work, sports, etc), number and timing (relative to life events) of accidents reported is also in progress. Ultimately, however, the utility of increased complexity and sophistication of analyses will be constrained by the data limitations noted above.

The analyses presented offer some evidence of raised accident risk associated with several major and objectively measured loss life events, notably miscarriage, abortion, widowhood and unemployment. However, several cautionary notes must be sounded, again in this initial stage of investigation. Although relatively major and objectively verifiable life events have been chosen for analysis, it should not be assumed that the impact of any particular kind of event will be uniform throughout all sufferers; no direct measures of the contextual meaning (tennant *et al.*, 1979) of events for

each respondent are available. Propensity to report life events may also vary, and may even be related to propensity to report accidents. In many of the analyses it is not formally possible to determine the order of occurrence of the life events and accidents reported, hence imputations of causality, however plausible, must be made cautiously.

A wide range of possible confounding factors have been measured in the NCDS and an even wider range could in principle be important. The results of a small number of key analyses adjusting for major measures of alcohol consumption have been reported, but in view of the complexity of the NCDS database, a large number of other possibilities remain.

What are the implications of these initial findings from the NCDS for accident prevention programmes? If the associations between major life events and accident risk in some individuals are upheld by further investigation of this data set, they will be of some use in identifying subgroups of the population of young adults who are at high risk of suffering accidents. This will help to target preventive campaigns, or interventions such as bereavement counselling intended to offer support to those at risk. However, the attributable risks in the case of some of these relationships are, unlike the relative risks, small. Much more hence remains to be investigated in the aetiology of accidents; collection of further accident data in the forthcoming fifth sweep of the NCDS should at least allow continuation of investigation of continued accident propensity until cohort members are in their early thirties.

Acknowledgments

We are pleased to be able to thank staff at the ESRC Data Archive for facilitating access to the NCDS data set, Peter Shepherd and Chris Power of the Social Statistics Research Unit at City University for advice, and Lai Sim Tang for computing and statistical assistance.

Table 1

Major objective life events described in NCDS data set at age 23

Death of father
Death of mother
Termination of 1st marriage: death of spouse,
divorce,
or separation

Death of child
Miscarriage
Abortion
Termination of 1st (also last) job: redundancy
or dismissal

Period of unemployment

Table 2

Accident frequency at ages 16-23 in females in NCDS by experience of miscarriage, abortion or widowhood (as reported at age 23)

No of Accidents	Life event suffered: No	Life event suffered: Yes	Odds Ratio (95% ci)
	a) Miscarriage		
0	4066	269	[1]
1-4	1384	125	1.37 (1.09,1.71)
5+	17	5	4.45 (1.42,12.9)
	b) Abortion		
0	4066	232	[1]
1-4	1384	106	1.34 (1.05,1.71)
5+	17	4	4.12 (1.16,13.1)
	c) Widowhood (in the ever married only)		
0	4368	5	[1]
1+	1526	7	4.01 (1.15,14.5)

Table 3

Accidents at ages 16-23 in males

by end of (first) marriage

as reported at age 23

	End of marriage		
No of Accidents	None	Separation /divorce	odds ratio (95% ci)
0	2375	35	[1]
1 - 4	3378	97	1.95 (1.30,2.93)
5+	323	16	3.36 (1.76,6.36)

Table 4

Accidents at ages 16-23 in males

by redundancy from 1st job

as reported at age 23

	First job termination:		
No. of Accidents	Not left	Redundancy	Dismissal
0	892	143	83
1-4	1013	234	148
Odds ratio [1]		1.44	1.57
(95% ci)		(1.14,1.82)	(1.17,2.11)
5+	84	24	16
Odds ratio [1]		1.78	2.05
(95% ci)		(1.06,2.97)	(1.10,3.77)

Table 5

Accidents at ages 16-23 by sex and frequency of alcohol consumption as reported at age 23

	Alcohol consumption				
No of Accidents	Never	Special Occasions	Less than once/week	1-2 times /week	Most days
Males					
0	105	188	224	1225	661
1+	114	219	321	1881	1377
Odds Ratio	.71	.76	.93	[1]	1.36
(95% ci)	(.53,.94)	(.61,.94)	(.77,1.13)	(1.20,1.53)	
Females					
0	287	1059	760	2103	404
1+	102	320	280	741	205
Odds Ratio	1.01	.86	1.05	[1]	1.44
(95% ci)	(.79,1.29)	(.74,1.00)	(.89,1.23)	(1.19,1.75)	

Table 6

Accident frequency at ages 16-23 in males by experience of fits since 16 as reported at age 23

No of Accidents	Fits since 16 No	Yes	Odds Ratio (95% ci)
0	2335	65	[1]
1-4	3331	142	1.53 (1.13,2.09)
5+	319	20	2.25 (1.30,3.86)

Table 7

Accidents at ages 16-23
by coordination as reported at age 16

No of Accidents	Coordination		
	Normal	Mildly Clumsy	Persons Markedly Clumsy
0	4670	296	17
1+	3658	245	13
Odds ratio	[1]	1.06	0.98
(95% ci)		(1.88,1.26)	(.45,2.11)

Table 8

Accident frequency at ages 16-23 in males by social class (based on last job) reported at age 23

	Social Class		
No of Accidents	Non-Manual	Manual	Odds Ratio (95% ci)
0	775	1014	[1]
1-4	956	1825	1.46 (1.29,1.65)
5+	81	210	1.98 (1.50,2.63)

Table 9

Logistic models of proportion experiencing one or more accidents at ages 16-23 as function of sex, alcohol consumption and termination of marriage

	Model	Deviance	df
1.	Null	1649.4	7
2.	Sex[a]	106.7	
6			
3.	Alcohol[a]	1393.9	6
4.	Divorce	1618.7	6
5.	Sex + Alcohol	66.8	5
6.	Sex + Alcohol + Divorce	6.0	4
7.	Sex + Alcohol + Divorce + Alcohol x Divorce interaction	2.8	3

[a] each as a 2 level factor: male/female; drinking most days/other consumption categories; divorce or separation/other categories.

References

Bewley, B. (1986). The epidemiology of adolescent behaviour problems. *British Medical Bulletin* **42**, 200-203.

Bramwell, S.T., Masuda, M., Wagner, N.M. and Holnes, T.H. (1975).Psychosocial factors in athletics injuries. *Journal of Human Stress* **1**, 6-20.

Brown, G.W. and Harris, T. (1978). *Social origins of depression: a study of psychiatric disorder in women.* Tavistock: London.

Bull, J.P. (1961). Accidents and their prevention. In: *Theory and Practice of Public Health* (ed. W. Hobson), Oxford University Press: Oxford.

Conger, J.J., Gaskell, H.S., Glad, D.D., Hassel, L., Rainey, R.F., Sawrey, W.L. and Turrell, E.S. (1959). Psychological and psychophysiological factors in motor vehicle accidents. *JAMA* **169**, 1581-1587.

Connolly, J. (1981). Accident proneness. *British Journal of Hospital Medicine* **26**. 470-481.

Davie, R., Butler, N.R. and Goldstein, H. (1972). *From birth to Seven.* Longmans: London.

Dohrenwend, B.S. and Dohrenwend, B.P. (1978). Some issues in research in stressful life events. *Journal of Nervous and Mental Dis* **166,** 7 - 15.

Eminson, C.J., Jones, H. and Goldacre, M. (1986. Repetition of accidents in young children. *Journal of Epidemiology and Community Health* **40,** 170-173.

Fogelman, K.(ed) (1983). *Growing up in Great Britain.* Macmillan: London.

Hale, A.R. and Hale, M. (1972). *Industrial accidents: a review of the literature.* HMSO: London.

Holmes, T.H. and Rahe, R.H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research* 11, 213-218.

Jones, D.R. and Goldblatt. P.O. (1987). Cause of death in widow(er)s and spouses. *Journal of Biosocial Science* **19,** 107-121.

Langley, J.,Dodge, J. and Silva, P.A. (1979). Accidents in the first five years of life. *Australian Paediatrics Journal* **15**, 255-259.

Macfarlane, A. and Fox, A.J. (1978). Child deaths from accidents and violence. *Population Trends* 12, 22-27.

McCullagh, P. and Nelder, J.A, (1989). *Generalised Linear Models*. 2nd edition. Chapman and Hall: London.

McMurray, L. (1970). Emotional stress and driving performance: the effect of divorce.*Behav.Res.Highway.Safety*, 1, 100-114.

Monck, E. and Dobbs, R, (1985). Measuring life events in an adolescent population: methodological issues and related findings. *Psychological Medicine* 15, 841-850.

Stewart-Brown, S., Peters, T.J., Golding, J. and Bijur, P. (1986). Case definition in childhood accident studies: a vital factor in determining results. *International Journal of Epidemiology* 15, 352-360.

Tennant, C., Smith, A., Bebbington, P. and Hurry, J. (1979). The contextual threat of life events: the concept and its reliability. *Psychological Medicine* 9, 525-528.

Whitlock, F.A., Stoll, J.R. and Rekhdahl, R.J. (1977). Crisis, life events and accidents. *Austrialian and New Zealand Journal of Psychiatry* 11, 127-132.