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CRIME AND ACCIDENT INVOLVEMENT IN YOUNG ROAD USERS

Marianne Junger [1], Gert-Jan Terlouw [2] and Peter G M van der Heijden [3]

[1] Netherlands Institute for the Study of Criminality and Law Enforcement (NISCALE)
Witte Singel 103; 2313 AA Leiden
The Netherlands

[2] Research and Documentation Centre (RDC); Ministry of Justice
PO BOX 20301; 2500 EH The Hague
The Netherlands

[3] Department of Methodology and Statistics, Utrecht University
Heidelberg 2; 3584 CS Utrecht
The Netherlands

INTRODUCTION

Only a few studies purport a relation between criminal behaviour and accidents and/or injuries. Few authors discuss explicitly the possible relation and how it should be interpreted. There are however, a number of theories, such as anti-social personality theory and other personality theories such as risk-taking, sensation seeking, arousal, or social control and self-control theory, which may espouse the relation between accidents and crime. For others, such as subculture and strain theory, this may be much more difficult. The theories mentioned above which endorse this relation all imply that the relation is spurious: the reason for a relation is that there is a third variable which is causally related to both accidents and crime (see Junger, 1994, for a review). In this article we will examine the relation between accidents and crime. Our point of departure is control theories on crime (social control and self-control theory) and their approach to the possible relation between accidents and crime. The article will start with some theoretical background. The following sections will present the research design, the results and finally, a summary of the main findings and a brief discussion.

THEORETICAL BACKGROUND

The relation between accidents and crime can be examined from a criminological point of view or from the point of view of traffic research. The criminological point of view will be discussed first, and subsequently, the traffic research findings will be discussed briefly.

Criminological Considerations

Basically, it can be argued that there are two approaches to analyze crime (Gottfredson and Hirschi, 1990), that is, studying crime, or studying individual differences. On the one hand one can study the fact itself, namely the crime. Crimes can be examined as specific acts. At what time do they occur, how much money do they provide, which objects are most vulnerable to crime, who are the victims of crime? These questions can be studied without knowledge of the criminal *per se.* To understand why certain crimes are committed at specific moments one has to understand situational circumstances. This approach is known as the 'opportunity' or the 'routine activity approach' (see for example, Cohen and Felson, 1979; and Cornish and Clarke, 1986). On the other hand one can study criminality as a characteristic of persons. This is the analysis of individual differences. Some people are more likely to commit crimes than others, in every situation. It should be

mentioned that situations are not independent of individual differences and that people to some extent shape their own environment.

According to Gottfredson and Hirschi (1990) what is needed are theories for both levels of explanation. But both theories have to be compatible with each other (see also Hirschi, 1986). They argue that self-control theory, which is a theory of individual differences, is compatible with an opportunity approach of crime. In the following paragraphs a number of theories on criminal behaviour, as an individual propensity, will be briefly described. However, it is important to note that both approaches, the situational approach and the individual differences approach, are necessary to understand crime. In addition, it will be proposed later, that these two points of view (situational versus individual differences) can be applied to accident research.

Theories of Individual Propensities to Commit Crime

Until now in criminology there has not been much interest in accident involvement. Despite this lack of interest there are, however, three relatively old studies which report a relation between criminal involvement and unintentional injuries[1]. These are: Robins (1966), Glueck and Glueck (1951) and West and Farrington (1977). However, as far as we know, these are the only studies on this subject from the criminological point of view. These authors do not discuss the importance or the meaning of the relation. Therefore, it is not surprising that, generally, theories or explanations of deviance do not discuss a possible relation between crime and accidents. There are, however, a number of theories which may provide an explanation for a relation between crime and accidents. Theories which imply that various types of problem behaviour tend to come together in the same persons could furnish such an explanation. This implication has sometimes been labelled as the *generality of deviance* thesis (see also later). To explain this clustering in the same persons it seems reasonable (from the perspective of parsimony) to attribute deviant behaviour in general to a single broad personal characteristic. This characteristic will then lead to various forms of risk-taking, problem behaviour and crime. We will briefly discuss examples of these approaches, namely personality theories and control theories.

Personality Theories

An example of a personality theory is the anti-social personality theory of Robins (1966). Sociopathic individuals will exhibit a broad variety of antisocial and problematic forms of behaviour (see Robins, 1966, Farrington, 1992). Another broad personality characteristic is the concept of sensation seeking which was developed by Zuckerman (1979). Sensation seeking has been found to be related to criminal behaviour (Raskin White, Labouvie and Bates, 1985) and to driving behaviour (Heino, van der Molen and Wilde, 1992). A related approach is arousal theory (Ellis, 1990).

Some authors objected against the idea of risk-taking or sensation seeking as a sufficient explanation of crime by arguing that withdrawal behaviour (the opposite of sensation or arousal seeking) is also related to crime (Gottfredson and Hirschi, 1990). Junger and Wiegersma (1993) find support for this line of reasoning. In their study they looked (among other things) at the relation between passive forms of leisure time behaviour (namely doing nothing, watching TV and listening to music) and deviant behaviour as well as accidents. Passive leisure time activities were related relatively strongly to deviant behaviour. The more children are involved in passive forms of leisure time activities, the more they are

[1] Intentional injuries are crimes and suicide or self-mutilation.

involved in deviant behaviour. With respect to accidents it appears that there is a clear trend for children who score high on passive forms of leisure time activities to be relatively more often involved in accidents. Of the children scoring highest on passive leisure time activities 27% were involved in an accident during the last year, while, among those children with the lowest score on passive leisure time activities this percentage is only 12%. This result is to some extent surprising. When one considers the importance of exposure as a cause of accidents, passive leisure time activities might, at first glance, act as a protective factor. Junger and Wiegersma's (1994) findings would suggest that individual characteristics which are associated with passive leisure time activities are also associated with accident involvement.

Control Theories of Crime

Control theories all start with an assumption on human nature: *crime is given, non-crime has to be explained*. The tendency to act out of self-interest and to commit crimes does not have to be learned. It is present among all human beings. People are naturally inclined to pursue their own inclinations (see also Reiss, 1951; Briar and Piliavin, 1965; Nye, 1982; Hirschi, 1969, 1986). Consequently, in order to explain delinquency, the central question according to Hirschi is not 'why do they do it' but 'why don't we do it' (Hirschi, 1969). According to control theories control mechanisms are necessary to restrain people from getting involved in crime. We will discuss briefly two forms of control theories, namely self-control theory and social control theory.

Self-control Theory: Gottfredson and Hirschi (1990) proposed self-control as the main barrier which stands between people and the possibility to commit a crime. Gottfredson and Hirschi (1990) defined self-control as *the tendency of people to pursue short-term interest without considering the long-term consequences of their acts*. A high self-control prevents crime, a low self-control cannot prevent it and thus increases the *likelihood* of criminal behaviour (in combination with the presence of situational constraints).

Gottfredson and Hirschi (1990) stress that offenders do not specialize and are involved in all sorts of crimes as well as in many other forms of behaviour. All these types of behaviour have certain crime characteristics in common, namely, that they provide instantaneous rewards without much effort. As a result offenders will tend to be involved in the use of drugs, alcohol and tobacco, and in accidents. Accidents and crime are both consequences of (low) self-control, and people involved in accidents have, to some extent, the same characteristics as offenders. The idea that deviance is a very broad category has been labelled by the authors the *generality of deviance* (see also Gottfredson and Hirschi, 1990, Hirschi and Gottfredson, 1994).

The main factor in the formation of self-control is socialization. Gottfredson and Hirschi (1990) argue that self-control is established early in life and that is remains relatively stable after, approximately, age 8. They point to the large amount of evidence showing that deviance and problem behaviour is stable over the entire life course. However, the way in which (low) self-control expresses itself can change in different periods of life. Interestingly, law breaking behaviour with respect to traffic regulations appears to be very stable as well. Chesham, Rutter and Quine (1991) showed that the best predictor of law breaking (in traffic) is 'past law breaking', suggesting, according to the authors 'that this type of behaviour is habitual in nature' (Chesham, Rutter and Quine, 1991, p. 153).

Social Control Theory: Another type of control theory is social control theory, which was developed by Hirschi (1969) prior to his self-control theory (see above). Hirschi (1969) argued that *the bond to society* acts as the control mechanism that inhibits our deviant

tendencies. Just as self-control, the social bond is the result of a socialization process. The bond to society has several components:
- *Attachment to significant others* is the emotional or affective element.
- *Commitment* to conventional subsystems is the 'rational component' of the bond: a desire to conform and to invest in the future in a conforming way. People are bound to society by what they have (and might lose) but also by what they hope to obtain: the probable rewards in the future. "Thus, 'ambition' and/or 'aspiration' play an important role in producing conformity" (Hirschi, 1969, p. 20-21).
- *Involvement* in conventional activities: when people are strongly involved in conventional activities they probably have less opportunities to commit delinquent acts.
- *Beliefs* in conventional values constitute the moral element of the bond. Social control theory claims the existence of a common value system with respect to delinquency within society or in the group whose norms are violated. But, although this value system is generally accepted by everyone, not all people feel the same commitment to these values. Social control theory states that each society or culture rejects delinquent behaviour. There are no cultures or subcultures in which delinquent behaviour is valued positively. Even delinquents realize that criminal behaviour is prohibited, and accept these norms as a general principle.

According to Hirschi (1969) the elements of the bond are connected to each other. For example, when a child respects his parents (attachment), he will also accept their value system (Hirschi, 1969; p. 30). Interestingly, Suchman (1970), independently of Hirschi (1969) argued that social controls serve to restrain criminal behaviour as well as accident involvement. He reports a relation between injury liability and deviant behaviour and argues that social controls provide (one of) the process(es) leading to a relation between accidents and social deviance (Suchman, 1970). According to Suchman, social controls serve to protect the individual from harm. *"Social controls may also serve to regulate hazardous consumer products such as poisons and lethal weapons. Obviously, a great many social controls, traffic laws and safety regulations, for example are aimed directly at reducing harmful anti-social behaviour. To the extent that social controls are violated by the individual, we may hypothesize that he places himself in a situation of additional risk of injury or death."* (Suchman, 1970).

In the present study social control theory was used as a theoretical framework. It provides us the background variables to which accidents and crime will be related.

Similarity with Traffic Research

Comparable to the distinction between crime (the fact) and criminality (individual differences in crime-proneness), in accident research one can distinguish between the attributes of the individual and situational characteristics and exposure.

Situational approach: The study of the situations in which accidents occur is an important area of research. For example, neighbourhoods having relatively dense traffic and relatively few playgrounds have higher accident rates among children than neighbourhoods with less traffic and more playgrounds. Weather conditions are also related to accident rates (for more information on situational factors, see for example, Foot, Chapman and Wade, 1982; a special issue of Social Problems, (nr 2) 1987; Elander, West and French, 1993).

The study of accident liability: In the field of traffic research, the interest in the individual characteristics of those involved in accidents was an important subject of inquiry before and just after the second World War. At that time 'accident proneness' was the term used. Although in some respects these studies seem 'old fashioned', most of these studies did

control for confounding factors (such as driving experience and exposure) and were careful in the data acquisition process and attentive to possible flaws such as differential validity of self-reports on accident (see also Sorensen, 1994).[2] An example of this type of research is the study on the 'accident-prone automobile driver' by Tillmann and Hobbs (1949). They describe two studies which compared high accidents drivers with low accident drivers. The first study concerned taxi drivers. They found that high accident taxi drivers differed from the low accident drivers on almost all the background factors which were studied. In childhood they showed more conduct disorders, at school they had higher records for truancy, their work record was poorer (more short time jobs, less well-adjusted in their job), their social adjustment was poorer (e.g. less friends), when married they were more often unfaithful to their wives, they had a history of childhood accidents, and, finally, their driving habits were worse. These results were checked on drivers with high and low accident records selected from the general population. The results confirmed the first study. For example, it was shown that low accident drivers were known to juvenile and adult courts in only 1% of the cases. For high accident drivers this was 17% and 34%, respectively. The well-known conclusion of the authors is that 'a man drives as he lives' (Tillmann and Hobbs, 1949, p. 329).

After World War II the term accident proneness was largely abandoned. The search for individual differences got less attention until the last decade (see Lester, 1991). These 'individual characteristics' include deviance. West, Elander and French (1993) looked at the connection between the intention to commit crimes and accident rates. They find a relatively strong relation which is in part mediated by *thoroughness*[3] and speed. Other examples can be found in Sivak (1983, 1987), Hansen (1988), Hilakivi *et al* (1989), Rothengatter (1993), Parker, West, Stradling and Manstead (in press). For thorough reviews we refer to, among others, Lester (1991) and Elander, West and French (1993).

To conclude, this article will address two questions. First: is there a relation between accidents and crime and, second: are background factors which are known to predict delinquency also predictors of accident involvement? If the answer on this last question is affirmative this will support the spuriousness thesis by showing that a third factor may explain the relation between accidents and crime. To find out whether there is support for the 'common etiology thesis' a series of background variables generally known to be related to crime have been related to accident involvement. As stated above, the suggestion is that if both dependent variables are, to a certain extent the product of the same individual differences, there should be overlap between the correlates of crime and the correlates of accident involvement. Up to now there is a lot of indirect evidence in support of the spuriousness thesis (see Junger, 1994, for a review). But no study up to now investigated directly whether or not accidents and crime have common correlates among theoretically relevant variables. The variables used in the present study cover the main aspects of adolescent life: family, school and leisure. The variables and the scale construction are based on Hirschi's (1969) social control theory[4].

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[2] For example Tillmann and Hobbs (1949) note that 'particularly those with a high number of accident records tended to minimize the number of accidents and to exaggerate the magnitude of their driving experience' (p. 324). This is interesting because this tendency will decrease the differences found between high and low accident drivers.

[3] Thoroughness measures decision making in general. It is measured by questions such as: 'Do you plan well ahead'.

[4] More information on the scale construction can be obtained from the first author.

THE RESEARCH DESIGN

The data from the present research come from a study conducted by the University of Utrecht (UU). For the part on delinquent behaviour, the UU collaborated with the Ministry of Justice. The sample consists of youngsters aged 12-24 who belong to a random sample of 9000 households. The households are representative of Dutch households with respect to the number of persons in the household, the age of the head of the household, and the region. The non-response[5] was 34.5%. In total 2918 adolescents were interviewed. These types of samples provide a good picture of relatively 'average adolescents', but ethnic minority youngsters and very deviant adolescents (e.g. drug-users) are probably under-sampled.

The data were gathered by means of interviews. However, for reasons of privacy, the questions on delinquent behaviour were asked by means of a small written questionnaire at the end of the interview (for more information see Meeus and 't Hart, 1993; and Rutenfrans and Terlouw, 1994).

The Delinquency Measures

28 questions have been asked about delinquency and deviant behaviour[6]. All questions had a similar structure. The first question is: 'have you ever ...'. After a positive answer the following question is 'how often during the last year'. The answers have been summed to form various scales. First, two general scales are available:
- a *delinquency ever* scale which is a count of the different types of self-reported offences ever committed by each respondent.
- a *delinquency scale last year* which is the sum of the frequency scores for all self-reported offences committed during the preceding year.

Secondly, the 28 questions have been divided in four subscales on substantive grounds.
- *property crimes* which include questions as *using public transport without a valid ticket, shoplifting, stealing things at school, stealing a bike or a moped, pickpocketing,* and *burglary*.
- *violence against persons* which includes questions as *carrying a weapon, threatening someone with physical violence, fighting*, and *hurting someone with weapon*.
- *vandalism* including questions as *graffiti, destruction*, and *arson*.
- *alcohol and drugs* including questions about consumption of *hashish, marihuana, heroin, speed, LSD*, and *alcoholic beverages*.

The last four scales have an 'ever' and a 'last year' version. Table 1 presents the frequency distribution of the scales used in the following analysis. Globally the delinquency scales are in line with what self-report studies usually find.

The self-report method has been found sufficiently valid and reliable for etiological research where the goal of the study is to order the children from low to high on a deviance or delinquency scale (see Elliott and Ageton, 1978, Hindelang, Hirschi and Weis, 1981, Junger, 1990).

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[5] The non-response rate was computed without counting the number of people who moved, or could not be located.

[6] Although a few questions do not concern delinquent acts, for practical reasons we will refer to the scales as 'delinquency scales'.

TABLE 1

Percentage of self-reported behaviour, ever and last year (N = 2918)

NUMBER OF CRIMES (variety)	PROPERTY	VANDALISM AGAINST PERSONS	VIOLENCE	DRUGS	TOTAL
EVER					
NONE	38.2	57.1	65.5	66.2	23.8
1	21.9	33.5	23.0	28.9	17.4
2	13.8	8.4	9.0	4.5	12.9
3	10.1	2.1	2.0	0.4	11.2
4	6.5	-	0.4	-	8.7
5	4.0	-	-	-	6.8
6	2.5	-	-	-	5.1
7	1.5	-	-	-	3.9
8	0.6	-	-	-	3.1
9	0.4	-	-	-	2.1
10 OR MORE	0.2	-	-	-	5.1
TOTAL	100	100	100	100	100
LAST YEAR					
NONE	68.8	86.4	80.0	83.7	51.9
1	17.7	11.4	15.9	15.1	21.3
2	8.4	1.9	3.5	1.1	11.4
3	2.9	0.2	0.4	0.1	6.9
4	1.1	-	0.1	-	3.2
5	0.7	-	-	-	2.2
6	0.2	-	-	-	1.0
7	0.2	-	-	-	0.7
8	-	-	-	-	0.8
9	-	-	-	-	0.3
10 OR MORE	-	-	-	-	0.2
TOTAL	100	100	100	100	100

The Accident Measures

Accidents have been measured by the following questions:

> *We would like to know whether you have ever been involved in a traffic accident or another type of accident. Could you tell us whether this has ever happened to you. If so, could you say whether this was last year or prior to that?*

The answers are summed up and combined into two traffic accident scales, *ever* and *last year*. A separate question was asked about having been involved as a passenger in a traffic accident. This was done to make explicit to the respondent that this type of accident should not be confused with the other types of accidents (in which the respondent is the driver). The reason for this is that accidents as a passenger will generally not be the responsibility of the respondent.

A second question concerns other types of accidents.

> *Were you ever involved in another accident, such as a fall? Did you fall into the water (almost drown), get injured by fire of fireworks, during a fight, by machines or anything else?*

The answers on this additional question were added to the previous two scales. This results in two accident total scales, *ever* and *last year*, which contain the information on traffic accidents and other types of accidents.

It should be noted that the wording of the second question, which asks about injuries as a result of a fight, produces a contamination problem with respect to the main goal of this study which is to study the relation between crime and accidents. Getting injured in a fight may lead to a positive score on the delinquency scale as well as on the accident scale. But in this example both scores result from the same event. This is not what this study aims to measure. To control for this problem all analyses were performed for the four accidents scales separately. The frequency distribution of the scales is shown in Tables 2 and 3.

TABLE 2
Percentage of respondents experiencing accidents (N = 2918)

	NONE	LAST YEAR	PREVIOUS TO LAST YEAR	N
TRAFFIC				
(1) AS PEDESTRIAN	94.2	0.4	5.4	2915
(2) AS CYCLIST	74.3	5.6	20.1	2909
(3) DRIVING MOPED	87.3	3.6	9.1	2909
(4) DRIVING MOTORCYCLE	99.5	0.3	0.2	2910
(5) DRIVING A CAR	92.4	3.5	4.0	2908
(6) AS PASSENGER	74.4	4.2	21.4	2904
(7) TOTAL	68.9	6.6	24.5	2893

TABLE 3
Percentage of respondents experiencing one or more accidents (N = 2918)

	TRAFFIC		TOTAL*	
	LAST YEAR	EVER	LAST YEAR	EVER
NONE	87.1	58.0	81.7	41.9
1 ACCIDENT	12.4	33.3	16.7	38.2
2 ACCIDENTS	0.5	7.3	1.4	15.6
3 ACCIDENTS		1.1	0.1	3.7
4 ACCIDENTS		0.1		0.4
5 ACCIDENTS				0.2

* TRAFFIC AND OTHER ACCIDENTS

Social Control Measures

A short review of the scales and the variables used in the following analysis is presented below. Whenever a scale was used the number of variables on which the scale is based and Cronbach's alpha are give in brackets. Examples of the type of questions included in the scale are given as well. The variables and scales pertain to bond with parents and friends, school and orientation towards the future, dating and working, values, leisure time activities and exposure.

Attachment: bonds with parents/friends

1. *Family integration* (3 questions) measures the extent to which the respondents feel attached to their family. For example, it was asked whether the family-members 'usually go their own way'. (Cronbach's alpha: .81)
2. *Family climate* (2 questions) measures whether the respondents like their parents and the degree of supervision they experience ('when I go out my parents know where I go'; Cronbach's alpha: .71).
3. *Affective bond with parents* (2 questions) measures the affective bond between the respondent and the child. Respondents are asked to what extent they 'can talk with their parents' and to what extent they consider 'their parents as their best friends'. (Cronbach's alpha: .77)
4. *Attachment to friends* (6 questions) measures the extent to which one's best friends contribute to feelings of security (questions were selected from the Utrecht-Groningen Identity Development Scale; see Meeus and Dekovic, 1993; Cronbach's alpha: .89).

Commitment: school and orientation towards the future

5. *Importance of school* (6 questions) is a scale which measures the degree to which respondents think school and education are important. (Cronbach's alpha: .84)
6. *Orientation towards the future* (6 questions) measures the degree to which respondents are committed to education in relation to their future ('one has to work hard to achieve something in life'; Cronbach's alpha: .68).
7. *Pleasure in study* (5 questions) is a scale which measures the extent to which respondents find pleasure in their school work ('I like to work hard'; Cronbach's alpha: .70).
8. *Work ethics* (5 questions) is a scale based on questions like 'A permanent job is a source of happiness', 'a career is important'. (Cronbach's alpha: .80)

Dating and work

According to Hirschi a child has to develop *career lines* in relation to education, a future profession and the *'passage to adult status'. These career* lines are "surrounded by conventional evaluations of appropriateness with respect to timing and by conventional evaluations of success or failure." (Hirschi, 1969, p. 162). Dating and having a job while at school has been interpreted by Hirschi (1969) as showing a lack of commitment towards conventional goals and conventional patterns of behaviour for children.

9. *Dating* 'Do you have a boy/girlfriend?'
10. *Number of dates* 'How many dates/relationships have you had -before your actual boy/girlfriend?
11. *Having a job.*
12. *Do you get pocket money* from your parents.
13. *Actual net income.*

Values

14. *Values towards violence* (6 questions) measures the opinion of the respondents

towards a number of violent offences ('a boy threatens someone with a knife'; Cronbach's alpha: .96)
15. *Values towards vandalism* (5 questions) measures the opinion of the respondents towards various forms of vandalism (destroying someone's moped on purpose; Cronbach's alpha: .88)
16. *Values towards fencing* (2 questions) measures the opinion of the respondents towards two questions on fencing (buying something you know has been stolen; Cronbach's alpha: .91)[7]

Leisure time activities
Similar to dating and having a job, leisure time activities are indicative of the extent to which children which to conform and invest in their future educational and professional careers (Hirschi, 1969).
17. *Number of friends* the respondent goes out with.
18. Number of *evenings spent away from home* (your home)
19. *Where do the respondents usually go when they go out* (coded in conventional versus non-conventional activities ('conventional' meaning: family, cinema, theatre..., and 'unconventional' meaning: going to the station to hang around, going to the coffee shops...).
20. *Being bored* ('How often do you feel bored').

Measures of exposure
21. *Moped.* No direct information on moped ownership was available. But, in a question on hobbies, respondents could mention their moped. Respondents who mentioned their moped as a hobby were considered to be moped owners. In this way a proxy of moped ownership was obtained. It seems plausible that actual ownership might be higher. The problem is that boys who mention their moped as a hobby may not constitute a random sample of the entire group of moped owners. Therefore, the answer on this question may in part reflect the types of hobbies people have instead of ownership. However, as not many measures of exposure are available this question was kept in the analysis.
22. *Doing sports in a club* or another organisation.
23. Number of *hours of sport* per week.

RESULTS

The first question this study attempts to answer is: is there a relation between crime and accidents?

The Relation Between Crime and Accidents

The results for the ever and the last year data are presented in Figures 1 and 2. A higher involvement in delinquency is positively correlated with accidents. Both figures suggest that the relation is linear. Further analyses investigate whether the relation holds for different types of accidents, for different types of crimes and for various age and gender categories.

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[7] It should be noted that the frequency distribution of these three value scales is very skewed. When the scales are categorised into five categories (of equal ranges) from very strongly, strongly, it appears that: (1) 98,9% of the respondents condemn violence strongly; (2) 0,2% and 96,7% of the respondents condemn vandalism very strongly and strongly, respectively; (3) 0,2% and 96,5% of the respondents condemn fencing very strongly and strongly respectively. Apparently all respondents strongly condemn delinquent behaviour.

FIGURE 1

ACCIDENTS EVER, ADOLESCENTS 12-24 YEAR OLD

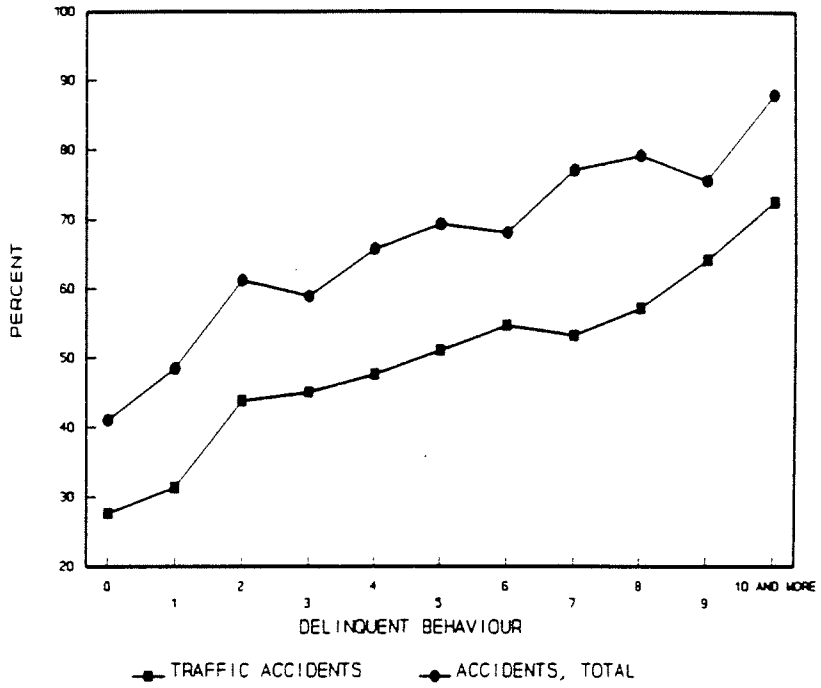
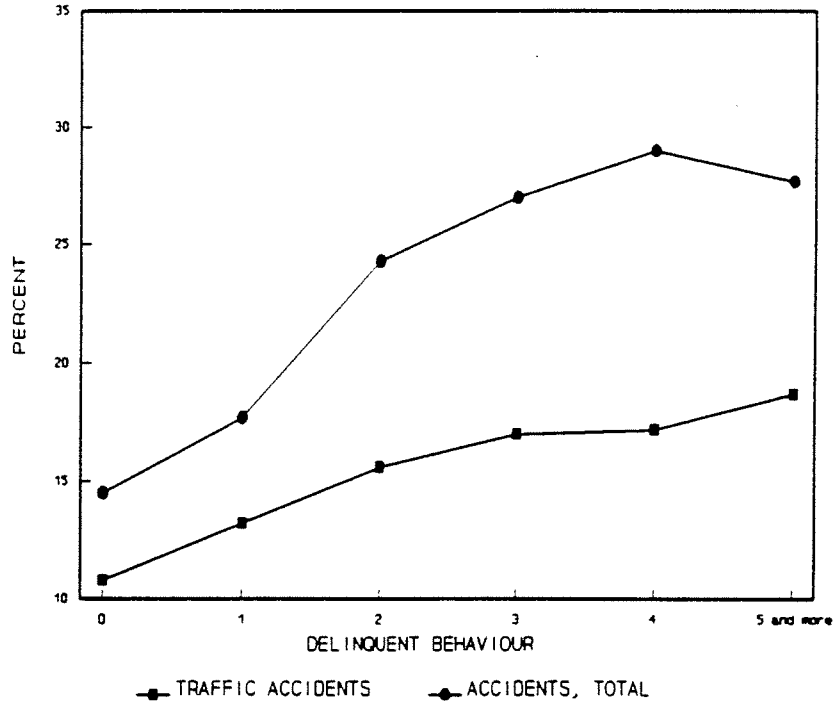


FIGURE 2

ACCIDENTS DURING LAST YEAR, ADOLESCENTS 12-24 YEAR OLD

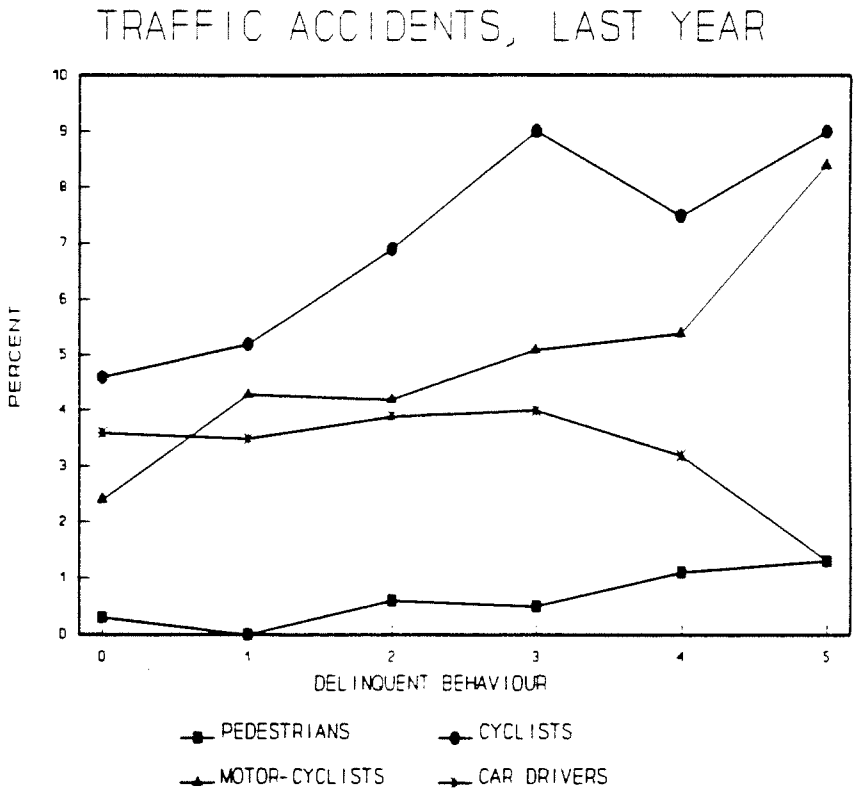


Types of crime: Our data show that the relation between crime and accidents holds when controlled for type of crime. All results for the *ever* scales are significant. For the *last year* scales the 10 relations are statistically significant with the exception of alcohol and drug use and vandalism which are not significantly related to traffic accidents last year. For vandalism, however, there clearly is a trend in the percentage

of respondents with traffic accidents increasing from 12.6% (no vandalism) to 20.6% (highest vandalism score).

Differences according to mode of transportation: Figure 3 shows the relation between different types of accidents, namely pedestrian accidents, cyclists, motor-cyclists, and car drivers.[8] The results show that overall the relation remains unchanged. Generally, involvement in delinquency is positively related to involvement in accidents. There are two exceptions: car drivers accidents and pedestrians accidents (both for the last year). As for pedestrians, though statistically non-significant, the percentages increase in the expected direction (it should be noted that the numbers for the last year data are quite small for pedestrian accidents and accidents as a car driver).

FIGURE 3



Control for gender and age: Finally, it was investigated whether the relations between crime and accidents also hold when controlling for gender and age.[9] To this end, a loglinear analysis was performed on cross-tables of the five delinquency measures and the 2 accident measures controlling for gender and age simultaneously. The most parsimonious model was selected that was (1) nonsignificant, and (2) for which the difference with a less restrictive model was nonsignificant either.

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[8] It should be noted that Figure 3 is based on the total sample for accidents as a pedestrian or a cyclist but only on the respondents of 16 years and older for accidents while driving a motor-cycle and for the respondents of 18 years and older for accidents while driving a car. The selections result from the legal minimum age to drive a moped or a car.

[9] Control for socioeconomic status was not performed, as delinquency is basically unrelated to socioeconomic status in this study as in most self-report studies (see Rutenfrans and Terlouw, 1994; see also Junger, 1990)

The odds ratios for each of the 10 relations are presented in Table 4.[10] The results can be summarised as follows.

- The relation crime-accidents still exists when controlling for age and gender. The five (ever) delinquency-scales are positively related to both accident-scales. Although the odds ratios may seem small at first glance, it should be remembered that they concern adjacent cells. However, one can also compute the odds ratio of cells with the minimum score on the total delinquency scale ever (0) and those with the maximum score (10 or more). this gives a better idea of the strength of the relationship. This odds ratio is 3.63. The comparable odds ratio for property crimes is 5.13, for violent crimes it is 3.57, for vandalism it is 2.09 and for alcohol and drugs it is 1.64.[11]
- The relationship is linear (in terms of odds ratio).
- The most complicated interaction effects are unnecessary. The relation between crime and accidents does not differ for combinations of sex and gender .
- Small differences exist in the strength of the relation according to gender (in 5 of the 10 tables) and age (2 of the 10 tables). Globally, the relation between crime and accidents is somewhat stronger for girls than for boys and for younger adolescents in comparison with older adolescents.[12] This means that groups with lower crime rates show a relatively strong relation whereas groups with higher crime rates produce a relatively weak relation.

TABLE 4
Odds-ratios (log-odds ratio)

ACCIDENTS	MEAN	GENDER		AGE			
		MEN	WOMEN	12-14	15-17	18-20	21-24
1. DELINQUENT TOT.	1.14 (.129)	0.98(-.021)	1.02(.021)	-	-	-	-
2. PROPERTY	1.23 (.204)	-	-	1.15(.14)	0.99(-/01)	0.95(-.05)	0.93(-.08)
3. VIOLENCE	1.53 (.424)	0.90(-.108)	1.11(.108)	-	-	-	-
4. VANDALISM	1.45 (.369)	-	-	-	-	-	-
5. ALCOHOL AND DRUGS	1.28 (.246)	-	-	-	-	-	-
TRAFFIC							
1 DELINQUENT TOT.	1.14 (.127)	0.97(-.029)	1.03(.029)	-	-	-	-
2 PROPERTY	1.23 (.211)	0.96(-.045)	1.05(.045)	1.18(.16)	1.02(.02)	0.92(-.08)	0.91(-.10)
3 VIOLENCE	1.56 (.444)	0.89(-.121)	1.13(.121)	-	-	-	-
4 VANDALISM	1.41 (.340)	-	-	-	-	-	-
5 ALCOHOL AND DRUGS	1.30 (.264)	-	-	-	-	-	-

[10] Details can be obtained from the first author.

[11] In all cases the odds ratio is computed for the likelihood of 3 accidents versus 0 accidents and a minimum score versus a maximum score of the various delinquency scales.

[12] It should be noted that correlations computed between crime and accident for the different age and gender groups do show the opposite: stronger effects for boys and for older children. Although correlations are often reported in studies like ours, it would be better to refrain from doing this. The reason is that correlations are only a good measure for association between variables if the two variables follow a bivariate normal distribution. Bivariate normality presupposes normality of each of the variables separately. The margins of the two variables crime and accident show that both variables are not normally distributed. The uniform association model does not assume anything about the distribution of the margins, because it is based on the odds ratio, and the odds ratio is a measure that is independent from the margins.

The question is how this last result can be explained. Our interpretation is based on the two main approaches in the study of crime: opportunity and individual differences. Our suggestion is that the effect of *opportunity* on delinquent behaviour increases while the effect of individual propensities (proportionately to opportunity) weakens when adolescents grow up. Opportunities for crime seem to be related to age and gender. It is well known that delinquents spend more time away from their home than non-delinquents (see Junger, 1990, Junger and Wiegersma, 1994). Similarly, girls spend less time outside home and are supervised more closely by their parents than boys (see for example Junger-Tas and Junger, 1984). This is also found in the present data. It appears that the number of evenings out (per week) is 3.8 for boys and 3.5 for girls ($p<.0001$). Among the youngest respondents this is 2.6 while it is 4.1 for the oldest respondent (18 and older, ($p<.0001$; there is no interaction between age and gender). All this suggests that girls and young adolescents spend more time at home while boys and older adolescents spend more time outside home. Being away from home is a risk factor for crime as well as for accidents. Consequently, boys and older adolescents are more at risk for crime and for accidents than girls and younger adolescents. As the present analysis did not include opportunity factors, opportunity would appear as 'error' in the present analysis. Although crime and accidents are both the result of individual differences as well as the result of exposure and opportunity, our suggestion is that the relative weight of individual factors decreases when opportunities/exposure increases. This makes plausible that the relation between crime and accident is stronger in demographic groups with little opportunities for crime and accidents (girls and young adolescents) and weakens in demographic groups with more opportunities for crime and more exposure to accidents (boys and older adolescents). In other words, when there is more exposure we find weaker relations, when there is less exposure, we find stronger relations.

Social Control, Accidents and Crime

The second research question is whether social control variables can predict accident involvement as well as involvement in crime. Table 5 presents the simple and the multiple correlations between the background variables and delinquent behaviour and traffic accidents. The findings for accidents as a total are analogous to those for traffic accidents which is why only the findings for the latter are reported.

The main conclusions can be summarised as follows:
- Of the 23 variables related to both dependent variables, 14 are related to delinquent behaviour as well as to accident involvement in the same direction. In one case (values towards violence) no relation is found for both dependent variables. So there clearly is an overlap in the results between the correlates of crime and accidents for 15 variables. Globally, it would appear that children who are low on the delinquency scale and have few accidents are characterised by a strong family integration, a good family climate, an orientation towards the future. These children enjoy school and their study, do not date often, have no job and have little money to spend, and do not go out a lot. In addition exposure correlates positively with delinquency and with accidents.

TABLE 5

Correlations and multiple correlations between the background factors and delinquency and between the background factors and traffic accident involvement

	Delinquency	Traffic Acc.
BONDS WITH FAMILY/FRIENDS		
1. Family integration (strong)	-.15**	-.08**
2. Family climate (weak)	.19**	.08**
3. Affective bond parents (weak)	.14**	.03
4. Bond with friends (weak)	-.06**	-.08**
SCHOOL FACTORS		
5. Importance of school (none)	.13**	.01
6. Orientation towards the future (yes, much)	-.15**	-.08**
7. Pleasure in study (much)	-.29**	-.09**
8. Work ethics (poor)	.10**	.03
DATING/WORK		
9. Dating (yes)	-.16**	-.14**
10. Number of dates (many)	.30**	.15**
11. Employment (yes)	-.19**	-.15**
12. Pocket money (no)	.15**	.19**
13. Having money (much)	.18**	.20**
VALUES		
14. Towards violence (positive)	-.02	-.01
15. Towards vandalism (positive)	.09**	-.003
16. Towards fencing (positive)	.16**	.02
LEISURE TIME		
17. Number of friends you go out with (many)	.10**	.01
18. Going out (yes)	.30**	.16**
19. Place to go out (unconventional)	.12**	.04
20 Boredom (often)	.03	-.07**
EXPOSURE VAR.		
21. Motor-cycle (yes)	.09**	.14**
22. Sport (no)	.06*	.07**
23. Hours of sport (many)	.15**	.07**
Multiple R: (23 independent variables)	.51	.31

*0.01 > p >.001; ** p <.001

Overall: 14 related to both dependent variables ('double variables')

It should be noted that a number of variables predict involvement in crime in the opposite direction from what is usually assumed. Some authors (Sampson and Laub, 1993) have argued that having a partner (in this case, dating) and having a job should inhibit delinquent behaviour. In the present study we find the opposite: dating, having a job and (as a result of the job) having money to spend, increases the likelihood of delinquent behaviour. As mentioned above, Hirschi (1969) argues that these findings can be understood by considering the meaning of these variables in relation to the bond to conventional society. These three variables should be seen as operationalisations of a lack of commitment, for example, to education. Children strongly committed to education and to conventional values do not have time for a job, therefore have less money to spend. And children strongly bonded to their parents will probably not date at an early age.

Overall, it appears that it is easier to predict delinquency than to predict traffic accidents. The multiple correlation for delinquent behaviour is higher (.51 versus .31). It appears more

difficult to predict (statistically) accidents than it is to predict involvement in delinquent behaviour. This should not come as a surprise. As mentioned above, it is well known that many situational factors do influence the occurrence of an accident. West, French and Elander (1991) reported a correlation of .305 between accidents in one year and accidents in the previous three years. They state that this size of a correlation "provides a broad upper limit on the likely size of any correlations between predictor variables and accident rates" given the fact that so many situational elements and random factors do influence the occurrence of an accident (West, French and Elander, 1991, p. 5).

In additional analyses, not reported here, it was checked whether these relations do still hold after controlling for gender and age. Overall this appears to be the case. In some cases it appears that variables are related to the dependent variables at some ages but not at others.[13]

CONCLUSIONS

In this article two questions were investigated. First: is there a relation between accidents and crime and, second: are background factors which are known to predict delinquency also predictors of accident involvement? The results show that the answer on the first question is positive. There is a relatively strong relation between accidents and crime. This relation globally holds for different types of crime, for different types of traffic accident (accidents as pedestrians, or while driving a bicycle, a motor-cycle or a car) and for the total number of accidents. It also holds after controlling for age and gender. The relation appears to be linear. The higher respondents score on the delinquency scales, the more likely they are to have been involved in an accident. Finally, it appears that the relation is slightly stronger among girls and among young adolescents than among boys and older juveniles.

This last finding might be explained if one accepts the idea that individual factors are more important as causes of crime among groups with less opportunities for crime, such as girls and young children, and that opportunity factors play a stronger causal role in groups with more opportunities for crime, such as boys and older children. Although results from the literature support the idea that crime and accidents may be related (see above), few studies show so clearly a strong relation between these two concepts. As our findings are relatively new, a task for future research would be to try to replicate the present results, preferably with better measures of accidents.

The answer to the second question is also positive. 23 independent variables have been related to involvement in crime and involvement in accidents. There is a comparatively large overlap between the correlates of crime and of accidents: 14 variables predict crime as well as accidents. Generally, children who function well in their family, are future oriented and like school, do not date and do not have a job and who do not go out are unlikely to have been involved in delinquent behaviour and are also unlikely to have been involved in an accident. Exposure to accidents, measured by motor-cycle ownership and sporting does increase the likelihood of accidents as well as the likelihood of delinquency. The dating and working variables seem to be, as a group, the strongest correlates of accident involvement.

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[13] This appears to be the case for variables such as going out dating, having a job and having money. Globally, it appears that the importance of these variables as predictors of crime diminishes as children grow older. Details can be obtained from the first author.

These results support the idea that accidents and crime share, to some extent, a common etiology. However, the causal process(es) can not be deduced unequivocally from the present analysis. The fact that measures of social control (based on Hirschi, 1969) predict accidents as well as crime supports the thesis that social control mechanisms work as a protective mechanism against involvement in both, as was suggested by Suchman's (1970). The results support a self-control interpretation to the extent that self-control theory is the only theory (except for Suchman's (1970) hypothesis) explicitly stating that a relation between crime and accidents is to be expected. It also supports the generality of deviance thesis, which states that broad categories of deviant behaviour are interrelated.

When looking at the results in very general terms, there is strong support that socialization is related to crime and accidents, considering the relations of the family and school variables with both accidents and crime. But other interpretations can not be excluded. It is possible that, temperamental factors such as sensation seeking, or other theoretical approaches such as arousal theory or anti-social personality, can (also) explain the present results. Future research should try to sort out with more precision how processes leading to deviance also lead to accident involvement. There are a number intervening processes in terms of risk-taking/risk-seeking behaviour, choice of speed, time spend outside, etc., which should be investigated.

A few points should be noted in conclusion:
- It is known that surveys of the general population, such as the present study, do have difficulties in reaching the most delinquent and the most problematic youths (for example, because these youngsters are less often at home when an interviewer tries to reach them). They usually also under-sample ethnic minorities (Hindelang, Hirschi and Weis, 1981; Elliott and Ageton, 1985). This means that the present sample is probably slightly biased towards the more conventional, not-delinquent part of the youth population from which it is drawn.
- It seems more difficult to statistically predict accidents than it is to predict involvement in delinquent behaviour. It is clear that accidents are influenced by situational factors, and by the behaviour of other traffic participants. These factors do also influence delinquent behaviour, but probably not as strongly as is the case with accident involvement.

- The present data do not include information on whether or not the youngster bears (some) responsibility for the accident. It should be noted that accidents which involve a particular youngster can be the result of deviant behaviour of another child or an adult. Not all accidents which happen to individuals are the result of risks taken by themselves. Elander, West and French (1993) mention that, when one considers accidents for which the individual can be held responsible (because of driving too fast or drinking alcoholic beverages), associations between individual characteristics and accident involvement become much stronger. However, some findings show that violations of traffic regulations (which are a strong correlate of accidents) are associated equally with passive accidents (for which the driver is not responsible) and with active accidents (for which the driver can be hold responsible; Parker, West, Stradling and Manstead, in press). The authors suggest that passive accidents should not be construed in terms of *simply bad luck*. They state that individuals involved in these *passive* accidents in one reporting period have a higher risk of involvement in similar accidents in a second reporting period. Future research should investigate this in more detail.

To conclude, we think the relation between accident and crime, if confirmed by future research, is a relatively new fact in the field of criminology and of traffic and accident research. It challenges all disciplines involved to search for an adequate explanation.

Finally, the present findings may eventually have policy implications. It could be argued that if there is a relation between accidents and deviant behaviour, then health authorities, accident prevention authorities and crime prevention authorities share an interest in common background factors: crime prevention programs and health policies will need, to a certain extent, to focus on the same variables and on the same persons.

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