“Hardcore” problem groups among adolescents

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R-2002-25

INSTITUTE FOR
ROAD SAFETY RESEARCH

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Leidschendam, 2002
SWOV Institute for Road Safety Research, The Netherlands

Report documentation

Number:	R-2002-25
Title:	“Hardcore” problem groups among adolescents
Subtitle:	Their magnitude and nature, and the implications for road safety policies
Author(s):	Therese Wurst
Research theme:	Road users: the relationship between behaviour, surroundings, and accidents
Theme leader:	Drs. D.A.M. Twisk
Project number SWOV:	32.320
Keywords:	Adolescent, driver, behaviour, risk taking, attitude (psychol).
Contents of the project:	There is an exceptionally high accident involvement of adolescent traffic participants. In this study a literature review summarises relevant psychological and psycho-social theories and international research findings on adolescent behaviour. The second part of this report contains an empirical study among Dutch adolescents with the purpose of identifying and describing the magnitude and nature of certain “hardcore” problem groups.
Number of pages:	33
Price:	€ 10,-
Published by:	SWOV, Leidschendam, 2002

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Summary

Contemporary data (see for example Simpson & Mayhew, 1987; Williams, 1987) show that traffic death continues to be the leading cause of death for people aged 15-24 in all western motorised countries. But what are the reasons for this exceptionally high accident involvement of adolescent traffic participants?

The first part of this paper consists of a literature review, summarising relevant psychological and psycho-social theories and international research findings. The empirical evidence supports the existence of organised patterns of adolescent risk behaviour. Risky driving behaviour emerges from these analyses as an aspect of a larger adolescent lifestyle and as embedded in the same set of personality, perceived environment, and behaviour variables as other adolescent problem behaviour such as delinquency, problem drinking, and illicit drug use. These structures of behaviour, taken together, reflect an adolescent's way of being in the world. The utility of this concept of "lifestyle", referring as it does to the constellation or syndrome of risk behaviour, is that it directs the attention to the adolescent as a whole actor rather than to each of the risk behaviours, one after the other.

The second part of the paper consists of an empirical study among Dutch adolescents (aged 10-16). The data was taken from the "Health Behaviour in School-aged Children" (HBSC) Survey, which is a survey conducted every four years in a growing number of countries according to the same protocol and using the same international standard questionnaire. The results in this study suggest that there are certain identifiable groups of adolescents, who show a stronger tendency to engage not only in problem traffic behaviour, but equally also in some other problem behaviour (problem drinking, smoking, gambling and bullying). This is consistent with the idea of a syndrome of problem (risk) behaviour. The data also suggest that this tendency is stronger among males and increases during the course of adolescence. Furthermore, the data also support the notion of "lifestyle". This means that there are certain sub-groups among the adolescent population who have lifestyle-characteristics in common: worse school-performance and health, less close and open relationship with their parents, stronger feelings of general unhappiness, and a stronger tendency to spend more time with their friends. Their upbringing seems to have less influence. Their parent's occupation (socio-economic status) and parent's problem behaviour have no or only moderate influence on the adolescent's problem behaviour. Overall, these findings support the call for more comprehensive prevention- and intervention-programs, dealing not only with the specific problem traffic behaviour like drink-driving, riding as passengers with drivers who used alcohol, or seatbelt negation, but also with the whole lifestyle of the adolescent.

Contents

1. Introduction

Contemporary data (see for example Simpson & Mayhew, 1987; Williams, 1987) show that traffic death continues to be the leading cause of death for people aged 15-24 in all western motorised countries. Also during the teenage years, 13-19, motor vehicles are by far the greatest threat to life. Most studies of vehicle crashes involving teenagers focus on teenage drivers, but many teenagers also die as passengers in motor vehicles, most often in cars driven by other teenagers. Also many teenagers (and pre-teens as well) are killed riding bicycles, mopeds, and motorcycles.

But what are the reasons for this exceptionally high accident involvement of adolescent traffic participants? Is it because adolescents are generally involved in more risky behaviour that leads to traffic accidents? Is there an underlying “trait” that puts some people at a higher risk or is it part of “normal” development during adolescence? Are all adolescents at the same risk, or are there certain sub-groups, which are more at risk to engage in risky (problem) behaviour? If there are such identifiable sub-groups, what are their characteristics? Do they just engage in risky (problem) traffic behaviour or do these adolescents also engage in all sorts of other problem behaviour? The answers to these questions are not just interesting in themselves from the psychological point of view, but they are important for all considerations concerning the planning of successful prevention and intervention programmes.

The following paper consists of two parts: first, a literature review, summarising relevant psychological and psycho-social theories and international research findings in this field, and second, an empirical study among Dutch adolescents (aged 10-16) with the purpose of identifying and describing the magnitude and nature of certain “hardcore” problem groups with regard to various problem behaviour: drink-driving on bicycle or moped, riding in a car with someone who has drunk alcohol, not wearing a seatbelt, problem drinking behaviour, problem smoking behaviour, problem gambling behaviour, and problem aggressive (bullying) behaviour.

2. Literature review and background

2.1. "Problem traffic behaviour" among adolescents and young drivers

One of the main reasons for the exceptionally high accident involvement of adolescent traffic participants seems to be their higher tendency to involve in "risky" behaviour. For example Jonah and Dawson (1987) found in a comparison between younger (16-24) and older (25 and older) drivers that younger drivers generally reported greater risk taking behind the wheel and showed a greater consistency in risky driving than older drivers. In a study among high school students (Arnett, Offer & Fine, 1997) about a quarter of boys and girls reported driving while intoxicated and in a study among college students (Everett, Lowry, Cohen & Dellinger, 1999) almost one third (27.7%) of the students reported that they had driven a car or other vehicle after they had been drinking alcohol and 38.9% reported riding in a car or other vehicle with a driver who had been drinking alcohol. Furthermore, one third of the students (32.2%) reported that they did not always wear a safety belt when driving a car and about half (49.4%) reported that they did not always wear a safety belt when riding in a car driven by someone else.

This behaviour can be classified as "problem behaviour", or more precisely as "problem traffic behaviour", as it occurs during traffic participation. There has been a terminological discussion going on (see Simpson, 1988) about the use of the terms "problem behaviour" and specifically "risky driving" as a descriptive label for driving practices that increase the likelihood of some "negative outcome". The importance of distinguishing between "risky driving" and "risk taking" has been stressed. Risk taking implies deliberate behaviour. It suggests "thrill seeking", "sensation seeking" or "danger seeking". The point is that the concept of risk taking is independent of that of risky driving. Risk taking may or may not result in risky driving and risky driving may or may not be the result of risk taking. The correlation between the two was found to be very low. The term "sensation seeking" (Zuckerman, 1979,1994) has been used for a trait describing the tendency to seek novel, varied, complex, and intense sensations and experiences and the willingness to take risks for such experiences, and it has been found to be related to driving behaviour. The findings of a study by Arnett, Offer and Fine (1997) suggest that the basis of this risk-taking tendency lies in the traits of sensation seeking and aggressiveness. Their findings suggest not only that more aggressive adolescents tend to drive more recklessly, but also that adolescents drive more recklessly when they are in an angry mood. It may be that because sensation seeking and aggressiveness have been found to be higher among male adolescents than among female adolescents, aggressiveness is also one of the links between gender and reckless driving. Furthermore, their data indicate that adolescents have higher levels of sensation seeking and aggressiveness than adults. These differences may contribute to higher levels of risky driving among adolescents. Arnett (1992a) views sensation seeking and adolescent egocentrism as normative developmental features of adolescence that are implicated in the high level of reckless behaviour in that period. Considerable research evidence (see Arnett, 1992a) supports the relation between these factors and the various prominent forms of reckless

behaviour in adolescence. One of the clearest findings in this area is that reckless behaviour does decline after adolescence. Why this is true remains to be established, although it is probable that the biologically based decline in sensation seeking, increasing cognitive maturity, and the assumption of greater personal and occupational responsibilities are involved.

2.2. Interrelatedness of problem behaviour

A growing number of studies supports the notion that risky driving behaviour such as impaired driving, speeding and non-use of seat belts are all part of a "risky driving syndrome", which in turn is part of a larger "syndrome of problem behaviour involvement" among adolescents (Elliott, 1987; Jessor, 1987a, 1987b; Jessor, Turbin & Costa, 1997; Maron et al., 1986; Wilson & Jonah, 1988). On this subject a very comprehensive theory has been formulated, namely Jessor's Problem-Behaviour Theory (Jessor & Jessor, 1977; Jessor, 1987a; Jessor, 1987b). More recently, these interrelations of problem behaviour have also been described under the notion of adolescent "lifestyle" (see for example Beirness & Simpson 1987, 1988).

Problem-behaviour theory

Problem-Behaviour Theory (Jessor & Jessor, 1977; Jessor, 1987a; Jessor, 1987b) considers problem behaviour (like any other learned behaviour) as functional, purposive, and instrumental toward the attainment of goals. The primary focus of Problem-Behaviour Theory is on three systems of psycho-social influence: the Personality System, the Perceived Environment System, and the Behaviour System. Within each of these three systems, the explanatory variables reflect either instigations to engage in problem behaviour or controls against it; together they generate a result, a dynamic state called "problem behaviour proneness", that specifies the likelihood of occurrence of normative transgression or problem behaviour. In the theory, problem behaviour is defined as behaviour that departs from the norms (both legal and social) of the society at large. The concept of proneness, in specifying the likelihood of occurrence of problem behaviour, is essentially synonymous with the concept of "risk". All of the theoretical variables in the three explanatory systems may therefore be seen as psycho-social risk factors for problem behaviour. The variables in the Personality System are all at the socio-cognitive level reflecting social meanings and developmental experience: values, beliefs, attitudes, and orientation to self and others. For each variable there is a specified directional relationship with problem behaviour (see Jessor & Jessor, 1977).

Proneness to problem behaviour in the Personality System consists of a lower value on academic achievement, a higher value on independence, lower self-esteem, more external control, greater tolerance of deviance, less religiosity, and greater discrepancy between the positive and the negative functions of problem behaviour. The variables in the Perceived Environment System refer to those perceived aspects of the social context that implicate social norms and expectations, sanctions and controls, and exposure to models. Proneness to problem behaviour in the Perceived Environment System consists of: lower parental support and controls, lower friends controls, lower parent-friend compatibility, greater friends-than parents-influence, lower parental disapproval of problem behaviour, and greater friends approval of problem behaviour. The variables in the Behaviour System illustrate the comprehensiveness of the behavioural

focus of the theory. Indeed, behaviour additional to the kinds of behaviour shown here (marijuana use, sexual intercourse, activist protest, drinking, problem drinking, general deviant behaviour, multiple problem behaviour), such as cigarette smoking, have also been a concern for the research. The possibility that topographically very different behaviour might serve similar functions for adolescents (e.g. repudiating conventional norms, affirming independence from parents, gaining status in the peer group) is what underlies the notion of a structure of problem behaviour. Proneness to problem behaviour in the Behaviour System refers, therefore, to higher involvement in other problem behaviour than the one being predicted or explained, and lower involvement in conventional behaviour.

There is much empirical evidence for the validity of Problem-Behaviour Theory and the possibility to extend it to describe and explain "problem traffic behaviour". Junger, Timman and West (2000) investigated the issue of cross-situational consistency of problem behaviour specifically with regard to the relationship between criminal behaviour and traffic behaviour and found support for the generality of deviance thesis and the idea that behaviour is constant across situations. They also found support for the idea that there are broad traits underlying diverse forms of behaviour. Donovan, Jessor and Costa (1991) found that greater psycho-social conventionality correlates with more regular involvement in health-related behaviour (regular physical activity, adequate sleep, safety belt use, attention to healthy diet). Greater behavioural conventionality (less involvement in problem behaviour such as marijuana use, problem drinking, delinquent-type behaviour, and greater involvement in conventional behaviour such as church attendance) was also associated with greater involvement in health-maintaining behaviour. Jessor (1987a) and Donovan and Jessor (1985) found that in the Personality System higher involvement in risky driving was associated with a lower value on achievement, a higher value on independence (males only), a higher value on independence relative to achievement, a lower attitudinal intolerance of deviance, and a lower religiosity (females only). In the Perceived Environment System, risky driving was associated with less parent-friend compatibility (males only), greater influence of friends relative to parents, fewer parental models for health behaviour, and more friends models for problem behaviour. In the Behaviour System, risky driving was associated with a higher frequency of delinquent behaviour, of times drunk, and of negative consequences of drinking, with greater involvement in smoking, with more frequent use of marijuana, and with greater sexual intercourse experience (males only). Jessor's (1987a) findings were also consonant with those of Maron et.al. (1986) in which failure to use seat belts was related to higher use of alcohol, cigarettes, marijuana, and cocaine, less exercise, and greater preference for fat in the diet.

The notion of "lifestyle"

The etiologic significance of "lifestyle factors" in the motor vehicle accident experience of young people has been very well illustrated in a study by Beirness and Simpson (1988). The principal focus in their study concerned possible differences between the social, psychological and behavioural characteristics of youths who had and youths who had not been involved in a traffic accident. They found variables from Problem Behaviour Theory particularly useful in accounting for risky driving and accident involvement among youths. Drivers reporting accidents could be distinguished from

drivers who had not been involved in an accident on a number of dimensions. As concerns their Personality System accident-involved drivers displayed higher levels of Sensation Seeking, greater tolerance of deviance and more liberal social attitudes towards alcohol. As for their Perceived Environment System drivers who had been involved in a crash scored lower on a scale of Traditional Values. The Traditional Values scale consisted of items concerning the perceived importance of school achievement, parental authority, reliance on parents for support, and communication with parents. The largest group of factors that distinguished accident-involved drivers from non-accident drivers fell within the Behaviour System, particularly behaviour that involve a high risk of negative consequences. Multiple regression analysis was performed to identify the set of variables that best predicted accident involvement among young drivers in the sample. The four best predictors were: frequency of alcohol consumption, having received a traffic ticket, frequency of seat-belt use, and smoking behaviour. Beirness and Simpson's study (1987) provides evidence that lifestyle is associated with traffic crash involvement, not only as a driver but as a passenger, pedestrian and cyclist as well. The influence of social, psychological and behavioural factors on traffic crash involvement is, therefore, not necessarily direct. Rather, the thoughts and behaviour of young people may reflect a more general style of behaviour characteristic of persons who seek out, select or otherwise become involved in situations associated with greater risk of adverse consequences. In this sense, the lifestyle factors noted here may also indicate a higher risk of other types of adverse consequences which may include health as well as safety-related problems.

Influences during adolescence

Three important social groups for bonding and learning are peers, families and schools. Also Jessor's (1977, 1987a, 1987b) Perceived Environmental System was based on the relative importance of parents and peers.

It is a well-known fact (see for example Zimbardo & Gerrig, 1999) that during adolescence, the influence of the family decreases while the influence of peers increases. Although the family appears to have an important influence on adolescent alcohol use, research findings have been inconsistent. Some have suggested that family influences are small after the impact of peers is taken into account, while others have contended that family variables make a unique and significant contribution to adolescent alcohol consumption. A study of Bahr, Marcos, and Maughan (1995) found that family bonding had small but significant direct effects and moderate indirect effects on both the frequency of alcohol use and the amount of alcohol consumption. Living in a family where other family members have a problem with alcohol or other drugs appears to increase the chance that an adolescent has friends who drink and use other drugs. However, the risk appears to be considerably smaller than the influence of family bonds. Furthermore, the data did not show evidence of direct learning from other family members: after the effect of peers was taken into account, living in a family where someone has an alcohol or drug problem was not associated with an increased frequency of drinking nor with increases in the amount of alcohol consumed. Aas and Klepp (1992) report a study (by Bank at al., 1985) which showed that parents' norms were positively, although not significantly related to adolescents' self-reported drinking in Norway. Relative importance of parents' and friends' norms was reversed from the

U.S. (parents most important) to France (friends most important). In Norway, friends' norms were associated more strongly than parents' norms to self-reported frequency of drinking, but the difference between friends' and parents' influence was not significant. In Aas and Klepp's (1992) survey among Norwegian students, norms attributed to parents had a significant impact on self-reported drinking, even after controlling for norms attributed to friends. However, norms attributed to friends had a bigger impact on self-reported drinking than did those attributed to parents.
Junger and Wiegersma (1995) found that children involved in accidents are more likely to have friends who smoke; having parents who smoke was not related to accident involvement.

So it can be argued (see Arnett, 199b), that any theory that is intended to explain adolescent reckless behaviour must address not only the developmental predisposition that may incline adolescents toward participation in such behaviour, but also the socialisation environment. In considering the socialisation of adolescents, it is not enough to consider only the family and peers as influences in adolescent socialisation. By adolescence, in Western cultures, the influence of the family has attenuated. Although the family remains important, other factors must be taken into account as well: the school, the neighbourhood or community, the legal system, the cultural belief system, and the media.

Discussion and implications for intervention
Overall, the empirical evidence supports the existence of organised patterns of adolescent risk behaviour. Risky driving behaviour emerges from these analyses as an aspect of a larger adolescent lifestyle and as embedded in the same set of personality, perceived environment, and behaviour variables as other adolescent problem behaviour such as delinquency, problem drinking, and illicit drug use. These structures of behaviour, taken together, reflect an adolescent's way of being in the world. The utility of this concept of "lifestyle", referring as it does to the constellation or syndrome of risk behaviour, is that it directs the attention to the adolescent as a whole actor rather than to each of the risk behaviours, one after the other.

What this complexity suggests is that prevention/intervention efforts which are comprehensive promise to yield greater success than those that are more limited in scope. Programs that fail to engage multiple risk domains are unlikely to be successful or to generate lasting effects (see also Jessor 1991, 1992). Second, programs need to design efforts that can simultaneously reduce risk and promote protection; neither strategy alone would seem optimal for effective change.

Still one general problem in attempting to influence problem traffic behaviour is that those who contribute most to the problem and whom one would therefore most like to influence, are among the least susceptible to behaviour change through educational programs. The traits, values, and peer associations of the "high risk" or "hardcore" subgroup are such that changing their behaviour via educational programs is a difficult task (see also Williams, 1987).

3. Empirical study

3.1. Introduction

Does every traffic participant have the same chance of having an accident? Is 20% of the population responsible for 80% of the accidents? These questions have haunted the traffic safety community for decades. Now that it has become apparent in other fields of social safety that deviant behaviour is concentrated in certain niches of the society, these questions are getting new attention. Moreover, the answers to these questions have direct implications for recommended measures. If unsafety is equally shared by all traffic participants in the population and accidents happen by chance (to be in the wrong place at the wrong time), then general measures are called for. However, if certain identifiable groups are more vulnerable than others, more specific and well targeted measures are required. With respect to targeted measures, the stability of the group characteristics are also relevant, as well as the nature of the behaviour.
Therefore, the objective of this study is to:

1. identify and describe the magnitude and nature of the group of adolescents which report engaging in problem traffic behaviour (especially drink-driving on bicycle or moped) or “hardcore” problem traffic behaviour (reported engaging into all three of the problem behaviour: drink-driving on bicycle or moped, riding in the car with someone, who had drunk alcohol, and not always wear a seatbelt when riding in a car);
2. identify and describe the magnitude and nature of the “hardcore” group of adolescents who report not only to engaging in problem traffic behaviour, but also report additionally engaging in various other problem behaviour like problem drinking behaviour, problem smoking behaviour, problem gambling behaviour and problem aggressive (bullying) behaviour; and to describe the relationship between reported problem traffic behaviour and other self-reported problem behaviour;
3. describe the relationship between observed parents’ problem behaviour (as reported from the point of view of the adolescents) and adolescent’s problem behaviour.

3.2. Method

The sample
The “Health Behaviour in School-aged Children” (HBSC) Survey is a survey conducted every four years in a growing number of countries according to the same protocol and using the same international standard questionnaire. The overall aim of the survey was to gain new insights to and to increase the understanding of health behaviour, lifestyles and their context in young people.
The study was initiated in 1982 by researchers from England, Finland and Norway. Shortly thereafter, the project was adopted by the World Health Organisation for Europe as a WHO Collaborative Study. The 1991-92 survey had been conducted in 29 European countries, Canada, the USA, and Israel. The 1991-92 HBSC Survey was also carried out among a representative sample (N= 5360) of schoolchildren (aged 10-16 years) in

the Netherlands. For the purpose of the present study the latter data were used.
Three age groups of young people were sampled with a year between each pair. The time periods are designed to represent the onset of adolescence (age 11); the challenge of physical and emotional changes (age 13); and the middle years when very important life and career decisions are beginning to be made (age 15).

The questionnaire
In the HBSC survey questionnaires have been chosen as the standard instrument for the collection of data. Most of the questions included were pre-categorised. The questionnaires were administered in the classroom (leading to nearly 100% response-rate) and all respondents were guaranteed anonymity. The questionnaire consisted of 168 questions. Each HBSC survey included a core set of questions in each country covering health related behaviour such as tobacco use and alcohol consumption, medication use, exercise pattern, leisure-time activities, eating patterns and dental hygiene; perceptions of personal health and well-being, physical ailments; personal capacity (psycho-social adjustment) including mental health, self concept, and body image; perception of family relations and support, as well as bullying; perceptions of the school and its influence; measures of objective and perceived wealth, and parental occupation. Additionally to the HBSC core questions, the Dutch questionnaire also included questions on gambling and questions regarding traffic behaviour.

Selection of data for analysis
As an already existing database was used for the present study, it was necessary to operationalise/(re-)define some key-variables to investigate the present research questions.
Concerning “problem traffic behaviour”, a distinction was made between two aspects of adolescent’s problem traffic behaviour: the first one was the aspect of drink-driving, indicating the rather active aspects of problem traffic behaviour; the second one was “hardcore” problem traffic behaviour, additionally taking into account two further aspects, the aspect of riding with others after these people had drunk alcohol, and the aspect of not wearing a seatbelt when riding as passengers in a car.
Concerning other problem behaviour investigated in this study, problem drinking behaviour, problem smoking behaviour, problem gambling behaviour and problem bullying behaviour (as indicator for aggressiveness) were chosen. Adolescents were classified as showing “problem drinking behaviour” when they reported having had more than five glasses of alcoholic drinks during the last weekend; they were classified as showing “problem smoking behaviour” when they reported to smoke more than 25 cigarettes per week; classified as showing “problem gambling behaviour” when they reported to gamble at least once a week, and as showing “problem bullying (as an indicator of aggressive) behaviour” when they reported often to join into bullying other pupils.
From the total sample of 5360 adolescents, whose data had been entered in the HBSC-NL-II database, 36 cases with inconsistent answer patterns were removed. From the remaining 5324 cases, those that had not given an answer to the key-question concerning drink-driving (missing N=892) were also removed.

3.3. **Results**

Description of sample
Of the 4432 cases selected for analysis, 2584 (58.3%) were male and 1848 (41.7%) female. With respect to age, 1099 (24.8%) were in age-group 1 (average 11.5 years), 1678 (37.9%) in age-group 2 (average 13.5 years), 1286 (29.0%) in age-group 3 (average 15.5 years), and 369 (8.3%) were older. The distribution concerning age and sex can be seen in *Table 1*.

	Male	Female	Total
Age-group 1 (average 11.5 years)	630	469	1099
Age-group 2 (average 13.5 years)	983	695	1678
Age-group 3 (average 15.5 years)	737	549	1286
Older	234	135	369

Table 1. *Characteristics of the sample concerning sex and age*.

The magnitude and nature of the group of adolescents with reported problem traffic behaviour
To study the first research question concerning the magnitude and nature of certain identifiable groups of adolescents, who report taking certain traffic risks, “problem traffic behaviour” was defined as reported drink-driving (DD) on bicycle or moped, reported riding in a car with someone who had drunk alcohol (RA), and reported not always wearing a seatbelt (SB) when riding in a car.
In the sample 346 adolescents (7.8%) reported that they had been drink-driving (DD) on a bicycle or moped, almost half of the adolescents (49.5%) indicated that they did not always wear a seatbelt when riding in a car (SB), and about a quarter (24.2%) reported that they had been riding in a car with someone who had drunk alcohol (RA).
“Hardcore” problem traffic behaviour (HT) was defined as the occurrence of multiple problem traffic behaviour within one person. *Table 2* shows the frequencies of occurrence of HT.

	N	% of Total
Drink-driving on bicycle/moped (DD)	346	7.8
Riding in a car with someone who had drunk alcohol (RA)	1190	24.2
Not always wearing a seatbelt (SB)	2644	49.5
Problem drinking behaviour (PD)	509	11.5
Problem smoking behaviour (PS)	424	9.6
Problem gambling behaviour (PG)	292	6.6
Problem bullying (aggressive) behaviour (PB)	193	4.4

Table 2. *Frequencies of reported problem behaviour*.

As can be seen in *Table 3*, the most frequent combination of problem traffic behaviour in this sample was RA and SB with 718 cases, followed by DD and SB with 216 cases, and DD and RA within 115 cases. 73 adolescents in this sample showed HT after the strict definition of occurrence of all problem traffic behaviour (DD+RA+SB).

Drink-driving on bicycle/moped (DD)	Riding in a car with someone who had drunk alcohol (RA)	Not always wearing a seatbelt (SB)	N	% of Total
	+	+	718	16.2
+		+	216	4.9
+	+		115	2.6
+	+	+	73	1.6
Note: in each table row presence of behaviour is indicated by +				

Table 3. *Occurrence of "hardcore" problem traffic behaviour (HT)*.

To describe the characteristics (nature) of this group of adolescents, who show problem traffic behaviour, first the group of the drink-drivers (DD) was compared with the group of adolescents who did not drink-drive (n-DD) with regard to various background variables. As *Table 4* shows, the DD differed significantly (Pearson Chi-Square at .01, 2-sided) from the non-DD in sex, age, urbanisation, reported school performance, reported health, reported general feeling about life, relationship with parents, and frequency of meeting with peers. There was no significant difference in SES (measured by father's occupation and mother's occupation). The DD were mostly males (78.9% compared to 56.6% in the n-DD group), rather older (82.6% were average 15.5 years or older compared to 33.5%), came from less urbanised areas (64% came from villages or the countryside compared to 53.8%), reported worse school-performance (64.1% reported average or below average school performance compared to 49.4%), reported worse health (9.3% reported being not very healthy compared to 3.6%), reported being less happy about life at present (13.2% reported being not very happy or not happy at all compared to 7.7%), had less close relationship with parents (10.8% reported never to talk with their parents about things that interest them compared to 4%) and see their friends more often (64.5% see their friends 4 to 5 times per week compared to 40.7%).
Second, the "hardcore" problem traffic behaviour group (HT) was compared to the non-"hardcore" problem traffic behaviour group (n-HT) with regard to various background variables. As can be seen in *Table 5*, the HT were also significantly (Pearson Chi-Square at .01, 2-sided) mostly male (79.5% compared to 57.3% in the n-HT group), older (78.1% were average 15.5 years or older compared to 35.2%), reported worse school-performance (64.4% reported average or below average school performance compared to 49.6%), reported worse health (20.8% reported being not very healthy compared to 3.6%), reported being less happy about life at present (16.9% reported being not very happy or not happy at all compared to 7.5%), had less close relationship with parents (18.1% reported never to talk with their parents about things that interest them compared to 4%) and see their friends more often (71.2% see their friends 4 to 5 times per week compared to 41.2%). There were no significant differences in terms of the SES (father's occupation and mother's occupation) and the urbanisation.

Relationship between problem traffic behaviour and other problem behaviour

The second research question focused on the relationship between problem traffic behaviour and other problem behaviour.

In this study “other problem behaviour” were problem drinking behaviour, (PD), problem smoking behaviour (PS), problem gambling behaviour (PG), and problem bullying behaviour as an indicator of aggressive behaviour (PB). Problem drinking behaviour (PD) was defined as reported having had more than five glasses of alcoholic drinks during the last weekend, problem smoking behaviour (PS) was defined as reported smoking more than 25 cigarettes per week, problem gambling behaviour (PG) was defined as reported gambling once a week, and problem bullying behaviour as an indicator of aggressive behaviour (PB) was defined as reported often joining into bullying other pupils.

As shown in *Table 2*, in this sample 509 adolescents reported problem drinking behaviour (PD), 424 reported problem smoking behaviour (PS), 292 reported problem gambling behaviour (PG), and 193 reported problem bullying (aggressive) behaviour (PB).

Focusing on the differences between DD and n-DD concerning these other problem behaviour, there were significant differences (see *Table 4b, part B*) concerning PD (61.2% compared to 10%), PS (45.5% compared to 8.7%), PG (20.9% compared to 5%), and PB (11.9% compared to 3.7%).

	Drink-drivers (DD)	Non-drink-drivers (n-DD)	Signi-ficant
N	346	4086	
A. General background variables			
Sex			*
male	78.9%	56.6%	
female	21.1%	43.4%	
Age			*
age-group 1 (average 11.5 years)	2.3%	26.7%	
age-group 2 (average 13.5 years)	15.0%	39.8%	
age-group 3 (average 15.5 years)	51.7%	27.1%	
age-group 4 (older)	30.9%	6.4%	
Place of living (urbanisation)			*
city (incl. suburbs)	13.0%	19.0%	
smaller town	22.9%	27.1%	
village	53.9%	49.5%	
countryside	10.1%	4.3%	
Place of living (urbanisation)			*
city (incl. suburbs)	13.0%	19.0%	
smaller town	22.9%	27.1%	
village	53.9%	49.5%	
countryside	10.1%	4.3%	
Father's occupation (SES)			
low	5.1%	4.4%	
middle	73.6%	74.0%	
high	21.2%	21.6%	
Mother's occupation (SES)			
housewife	47.2%	44.1%	
low	20.1%	18.3%	
middle	27.2%	31,8%	
high	5.6%	5.8%	
School performance (self-rated)			*
below average (bad)	5.3%	2.2%	
average	58.8%	47.2%	
good	29.5%	45.8%	
very good	6.4%	4.8%	
Health (self-rated)			*
very healthy	24.2%	29.9%	
normally healthy	66.5%	66.5%	
not very healthy	9.3%	3.6%	
* Pearson Chi-Square significant at .01 (2-sided)			

Table 4a. *Comparison between adolescents, who reported drink-driving on bicycle/moped (DD) and non-drink-driving adolescents (n-DD).*

	Drink-drivers (DD)	Non-drink-drivers (n-DD)	Signi-ficant
N	346	4086	
A. General background variables			
General feeling about life at present			*
very happy	33.6%	35.3%	
quite happy	53.2%	57.1%	
not very happy	7.9%	5.8%	
not happy at all	5.3%	1.9%	
Do you often talk with your parents about things that interest you?			*
never	10.8%	4.0%	
sometimes	48.4%	44.6%	
often	28.6%	33.0%	
very often	12.2%	18.4%	
How often do you see your friends after school hours?			*
never (I don't have friends)	0.6%	2.3%	
once a week or less	6.5%	21.1%	
2 to 3 times per week	28.4%	35.8%	
4 to 5 times per week	64.5%	40.7%	
* Pearson Chi-Square significant at .01 (2-sided)			

Table 4a. *Comparison between adolescents, who reported drink-driving on bicycle/moped (DD) and non-drink-driving adolescents (n-DD).*

	Drink-drivers (DD)	Non-drink-drivers (n-DD)	Signi-ficant
N	346	4086	
B. Other problem behaviour			
Drinking habits			*
no problem drinking behaviour	38.8%	90.0%	
problem drinking behaviour	61.2%	10.0%	
Smoking habits			*
no problem smoking behaviour	54.5%	91.3%	
problem smoking behaviour	45.5%	8.7%	
Gambling habits			*
no problem gambling behaviour	78.1%	95.0%	
problem gambling behaviour	20.9%	5.0%	
Bullying (aggressive behaviour)			*
never joins into bullying	18.9%	26.9%	
sometimes joins into bullying	69.2%	69.4%	
often joins into bullying	11.9%	3.7%	
C. Parent's problem behaviour			
Parent's drink-driving			
never witnessed parents driving a car after drinking alcohol	75.2%	79.0%	
has witnesses parents driving a car after drinking alcohol	24.8%	21.0%	
Parent's drinking habits			*
both parents drink less often than once a week	24.9%	35.5%	
at least one parent drinks weekly	39.6%	34.0%	
at least one parent drinks daily	35.4%	30.5%	
Parent's smoking habits			*
no parent smokes	33.1%	42.7%	
at least one parent smokes	66.9%	57.3%	
Parent's gambling habits			
no parent gambles	91.7%	90.7%	
at least one parent gambles	8.3%	9.3%	
* Pearson Chi-Square significant at .01 (2-sided)			

Table 4b. *Comparison between adolescents, who reported drink-driving on bicycle/moped (DD) and non-drink-driving adolescents (n-DD)*.

	"Hardcore" problem traffic behaviour (HT)	Non-"hardcore" problem traffic behaviour (n-HT)	Signi-ficant
N	73	4359	
A. General background variables			
Sex			*
male	79.5%	57.3%	
female	20.5%	42.7%	
Age			*
age-group 1 (average 11.5 years)	4.1%	27.0%	
age-group 2 (average 13.5 years)	17.8%	37.8%	
age-group 3 (average 15.5 years)	52.1%	27.5%	
age-group 4 (older)	26.0%	7.7%	
Place of living (urbanisation)			
city (incl. suburbs)	11.0%	18.8%	
smaller town	23.3%	26.5%	
village	56.2%	50.2%	
countryside	9.6%	4.5%	
Father's occupation (SES)			
low	4.5%	4.6%	
middle	77.6%	73.9%	
high	17.9%	21.6%	
Mother's occupation (SES)			
housewife	58.2%	44.3%	
low	23.9%	17.9%	
middle	14.9%	31.5%	
high	3.0%	6.3%	
School performance (self-rated)			*
below average (bad)	9.6%	2.2%	
average	54.8%	47.4%	
good	26.0%	45.5%	
very good	9.6%	4.9%	
Health (self-rated)			*
very healthy	20.8%	30.1%	
normally healthy	58.3%	66.3%	
not very healthy	20.8%	3.6%	
General feeling about life at present			*
very happy	32.4%	35.7%	
quite happy	50.7%	56.7%	
not very happy	5.6%	5.7%	
not happy at all	11.3%	1.8%	
* Pearson Chi-Square significant at .01 (2-sided)			

Tabel 5a. *Comparison between adolescents, who reported "hardcore" problem traffic behaviour (HT) and non-"hardcore" problem traffic behaviour adolescents (n-HT).*

	"Hardcore" problem traffic behaviour (HT)	Non-"hardcore" problem traffic behaviour (n-HT)	Signi-ficant
N	73	4359	
A. General background variables			
Do you often talk with your parents about things that interest you?			*
never	18.1%	4.0%	
sometimes	50.0%	44.7%	
often	25.0%	33.0%	
very often	6,9%	18,3%	
How often do you see your friends after school hours?			*
never (I don't have friends)	1.4%	2.1%	
once a week or less	8.2%	20.6%	
2 to 3 times per week	19.2%	36.1%	
4 to 5 times per week	71.2%	41.2%	
* Pearson Chi-Square significant at .01 (2-sided)			

Tabel 5a. *Comparison between adolescents, who reported "hardcore" problem traffic behaviour (HT) and non-"hardcore" problem traffic behaviour adolescents (n-HT)*.

	"Hardcore" problem traffic behaviour (HT)	Non-"hardcore" problem traffic behaviour (n-HT)	Signi-ficant
N	73	4359	
B. Other problem behaviour			
Drinking habits			*
no problem drinking behaviour	27.7%	86.2%	
problem drinking behaviour	72.3%	13.8%	
Smoking habits			*
no problem smoking behaviour	42.2%	89.8%	
problem smoking behaviour	57.8%	10.2%	
Gambling habits			*
no problem gambling behaviour	75.3%	94.7%	
problem gambling behaviour	24.7%	5.3%	
Bullying (aggressive behaviour)			*
never joins into bullying	11.1%	27.0%	
sometimes joins into bullying	69.4%	69.1%	
often joins into bullying	19.4%	3.8%	
C. Parent's problem behaviour			
Parent's drink-driving			*
never witnessed parents driving a car after drinking alcohol	37.0%	80.7%	
has witnesses parents driving a car after drinking alcohol	63.0%	19.3%	
Parent's drinking habits			*
both parents drink less often than once a week	18.6%	36.1%	
at least one parent drinks weekly	35.7%	34.1%	
at least one parent drinks daily	45.7%	29.9%	
Parent's smoking habits			*
no parent smokes	23.5%	42.7%	
at least one parent smokes	76.3%	57.3%	
Parent's gambling habits			
no parent gambles	85.9%	91.2%	
at least one parent gambles	14.1%	8.8%	
* Pearson Chi-Square significant at .01 (2-sided)			

Table 5b. *Comparison between adolescents, who reported "hardcore" problem traffic behaviour (HT) and non-"hardcore" problem traffic behaviour adolescents (n-HT)*.

Focusing on the differences between HT and n-HT, as shown also in *Table 5b, part B,* there was the same pattern of significant differences concerning PD (72.3% compared to 13.8%), PS (57.8 compared to 10.2%), PG (24.7% compared to 5.3%), and PB (19.4% compared to 3.8%).

In the group of DD about two out of three (61.2%) adolescents also showed PD, nearly every other adolescent (45.5%) also showed PS, two out of ten (20.9%) showed PG and one out of ten showed PB (11.9%). In the group of the HT nearly three quarters (72.3%) also showed PD, nearly six out of ten (57.8%) also showed PS, every fourth (24.7%) also showed PG, and every fifth (19.4%) also showed PB.
The frequencies of these occurences of multiple problem behaviour including drink-driving and “hardcore” traffic behaviour are shown in *Table 6* and *Table 7*.

Drink-driving on bicycle/moped (DD)	Problem drinking behaviour (PD)	Problem smoking behaviour (PS)	Problem gambling behaviour (PG)	Problem bullying behaviour (PB)	N
+	+				199
+		+			131
+	+	+			87
+			+		72
+	+		+		55
+				+	41
+		+	+		35
+	+			+	28
+	+	+	+		28
+		+		+	24
+			+	+	21
+	+		+	+	16
+	+	+		+	16
+		+	+	+	11
+	+	+	+	+	8
Note: in each table row presence of behaviour is indicated by +					

Table 6. *Occurrence of multiple problem behaviour including reported drink-driving on bicycle/moped (DD)*.

Hardcore problem traffic behaviour (HT)	Problem drinking behaviour (PD)	Problem smoking behaviour (PS)	Problem gambling behaviour (PG)	Problem bullying behaviour (PB)	N
+	+				47
+		+			37
+	+	+			24
+			+		18
+	+		+		14
+				+	14
+		+	+		11
+	+			+	9
+	+	+	+		9
+		+		+	9
+			+	+	8
+	+		+	+	6
+	+	+		+	6
+		+	+	+	5
+	+	+	+	+	4
Note: in each table row presence of behaviour is indicated by +					

Table 7. *Occurrence of multiple problem behaviour including "hardcore" problem traffic behaviour (HT). HTs reported drink-driving on bicycle/moped, riding in a car with someone who had drunk alcohol, and not always wearing a seatbelt when riding in a car*

Taking a closer look at the occurrence of multiple problem behaviour including DD, as shown in *Table 6*, there were 199 adolescents who reported DD and PD, 131 who reported DD and PS, 87 who reported DD, PD and PS, 72 who reported DD and PG, 55 who reported DD, PD and PG, 41 who reported DD and PB, 35 who reported DD, PS and PG, 28 who reported DD, PD and PB, 28 who reported DD, PD, PS and PG, 24 who reported DD, PG and PB, 21 who reported DD, PG and PB, 16 who reported DD, PD, PS and PB, 11 who reported DD, PS, PG and PB, and 8 adolescents reported DD and all other problem behaviour (PD+PS+PG+PB).

With respect to the occurrence of multiple problem behaviour including HT (see *Table 7*), there were 47 adolescents who reported HT and PD, 37 who reported HT and PS, 24 who reported HT, PD and PS, 18 who reported HT and PG, 14 who reported HT, PD and PG, 14 who reported HT and PB, 11 who reported HT, PS and PG, 9 who reported HT, PD and PB, 9 who reported HT, PD, PS and PG, 9 who reported HT, PG and PB, 8 who reported HT, PG and PB, 6 who reported HT, PD, PS and PB, 5 who reported HT, PS, PG and PB, and 4 adolescents reported HT and all other problem behaviour (PD+PS+PG+PB).

Within the two hardcore problem groups of eight adolescents who reported DD, PD, PS, PG, and PB and of four adolescents, who reported DD, RA, SB, PD, PS, PG and PB, no specific homogeneous groups could be identified in terms of background variables.

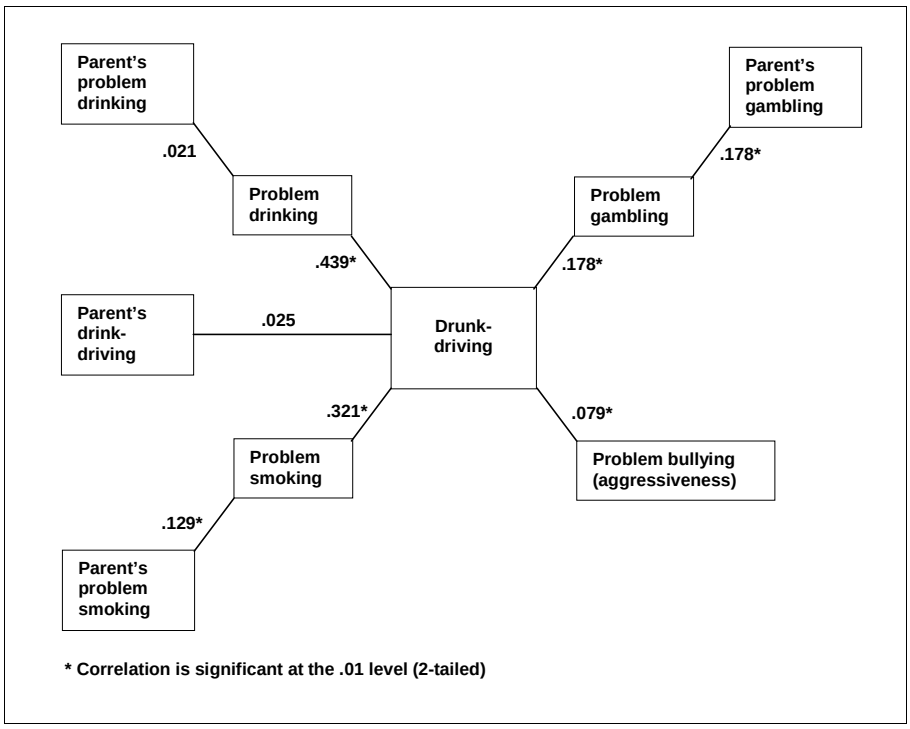

Figure 1. *Relationships (Spearman's rho) between reported drink-driving on bicycle/moped (DD) and problem drinking behaviour (PD), problem smoking behaviour (PS), problem gambling behaviour (PG), problem bullying behaviour (PB), and parent's drink-driving (PDD).*
Relationships (Spearman's rho) between PD and parent's problem drinking habits (PPD), PS and parent's problem smoking habits (PPS), and PG and parent's problem gambling habits (PPG).

With regard to the relationships between problem traffic behaviour and other problem behaviour (see *Figure 1* and *Figure 2*), there were significant correlations (Spearman's rho, significant at the 0.01 level, 2-tailed) between DD and PD (.439), DD and PS (.321), DD and PG (.178), DD and PB (.079), HT and PD (.229), HT and PS (.198), HT and PG (.100), and HT and PB (.068).

The relationship between parent's problem behaviour (as reported by adolescents) and adolescent's problem behaviour
The third research question explored the relationship between the adolescent's problem behaviour and the problem behaviour of their parents. Problem behaviour of the parents were operationalised as parents driving a car after drinking alcohol (as observed by their children) (PDD), parent's problem drinking habits (PPD) (adolescents reported that at least one parent drinks daily or weekly), parent's problem smoking habits (PPS) (adolescents reported that at least one parent smokes), and parent's problem gambling habits (PPG) (adolescents reported that at least one parent gambles).

While there were significant relationships (Spearman's rho at .01, 2-tailed) between HT and PDD (.132), PG and PPG (.178), and PS and PPS (.129),

there were no significant relationships between DD and PDD (.025), and PD and PPD (.021) as shown in *Figures 1* and *2.*
There was no significant difference between the DD and n-DD groups (see *Table 4b, part C*) with regard to having witnessed their parents driving a car after having drunk alcohol (PDD) and with regard to their parents gambling habits (PPG). There were significant differences between the DD and n-DD groups with regard to parent's drinking habits (PPD) and parent's smoking habits (PPS). The DD group reported more often that their parents smoke (55.9% compared to 57.3% in the n-DD group) and that their parents drink alcohol regularly (75% compared to 64.5%).

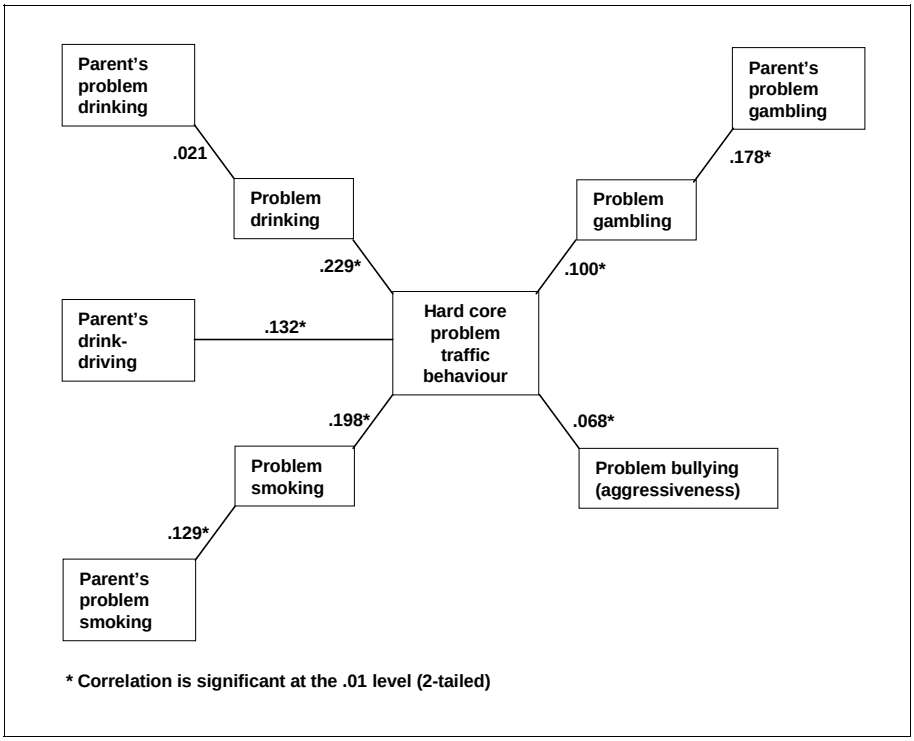

Figure 2. *Relationships (Spearman's rho) between "hardcore" problem traffic behaviour (HT) and problem drinking behaviour (PD), problem smoking behaviour (PS), problem gambling behaviour (PG), problem bullying behaviour (PB), and parent's drink-driving (PDD).*
Relationships (Spearman's rho) between PD and parent's problem drinking habits (PPD), PS and parent's problem smoking habits (PPS), and PG and parent's problem gambling habits (PPG).

The comparison of the HT and n-HT groups (see *Table 5b, part C*) showed significant differences with regard to having witnessed their parents driving a car after having drunk alcohol (PDD), parent's drinking habits (PPD) and parent's smoking habits (PPS), but not parent's gambling habits (PPG). The HT group reported PDD significantly more often than the n-HT group (63% compared to 19.3% in the n-HT group): the same applied to PPD (81.4% compared to 64%) and PPS (76.3% compared to 57.3%).

7. Discussion and summary of findings

Given the high number of adolescents dying every year on the roads in western motorised countries, the objective of this study was to identify and describe the groups of adolescents, which are most at risk. More specifically, the objective of this study among Dutch adolescents (aged 10-16) was to identify and describe the magnitude and nature of the group of adolescents, which reported engaging in problem traffic behaviour (especially drink-driving on bicycle or moped) or "hardcore" problem traffic behaviour (reported engaging into all three of the problem behaviour: drink-driving on bicycle or moped, riding in the car with someone, who had drunk alcohol, and not always wear a seatbelt when riding in a car); identify and describe the magnitude and nature of the "hardcore" group of adolescents, who report not only to engage in problem traffic behaviour, but also report additionally engaging in various other problem behaviour like problem drinking behaviour, problem smoking behaviour, problem gambling behaviour and problem aggressive (bullying) behaviour; describe the relationship between reported problem traffic behaviour and other self-reported problem behaviour; and describe the relationship between observed parent's problem behaviour (as reported from the point of view of the adolescents) and adolescent's problem behaviour.

In this sample of 2584 Dutch boys and 1848 Dutch girls aged between 10 and 16 years, about every twelfth (7.8%) reported that he/she had been drink-driving on a bicycle or moped, every fourth (24.2%) reported that he/she had been riding as a passenger in a car with someone who had drunk alcohol, and every second (49.5%) reported that he/she did not always wear a seatbelt when riding in a car.

There was a "hardcore" problem traffic behaviour group of 73 adolescents (1.6% of the sample), who reported having engaged into all three forms of problem traffic behaviour. In a comparison of this "hardcore" problem traffic behaviour group with the adolescents, who had not reported "hardcore" problem traffic behaviour, the following significant differences (Pearson Chi-Square at .01) have been found: The "hardcore" problem traffic behaviour group contained more males; they were older; had a worse self-rated school performance; they considered themselves as less healthy; they indicated that they were less happy about their lives; they reported talking less often with their parents about things of their interest, indicating a less good and close relationship with their parents; and they reported spending more time with their friends. They did not differ in socio-economic status (measured by parent's occupation) and degree of urbanisation of their place of living.

Focusing just on the drink-driving behaviour, the comparison of the drink-drivers with the non-drink-drivers showed the same pattern of differences, except that they also differed in degree of urbanisation (drink-drivers lived in more rural areas).

The second research question dealt with the relationship between the engagement in problem traffic behaviour and other problem behaviour. More than a tenth (11.5%) of the sample reported problem drinking behaviour (having had more than five glasses of alcoholic drinks during the last weekend), almost one tenth (9.6%) reported problem smoking behaviour (smoking more than 25 cigarettes per week), one fifteenth (6.6%) reported problem gambling behaviour (gamble at least once a week), and

less than a twentieth (4.4%) of the sample reported problem bullying (aggressive) behaviour, indicating that they often joined into bullying others. The comparison between the drink-drivers and the non-drink-drivers showed significant differences concerning all four forms of problem behaviour. The drink-drivers showed more frequent problem drinking, problem smoking, problem gambling, and problem bullying (aggressive) behaviour. The same pattern was found in the comparison between the adolescents in the “hardcore” problem traffic behaviour and non-“hardcore” problem traffic behaviour groups. The relationships between these other problem behaviour and problem traffic behaviour were all significant and in the expected direction, even tough some were small. The strongest relationships were between drink-driving and problem drinking (Spearman’s rho=.439) and drink-driving and problem smoking (.321).

The present study also focused on identifying the magnitude of “hardcore” problem groups. The number of adolescents in this sample who reported engaging in “hardcore” problem traffic behaviour as well as in all other forms of problem behaviour was only 4, and the group engaging in drink-driving and problem drinking, problem smoking, problem gambling, and problem bullying consisted of only 8 adolescents. The members of these “hardcore” problem groups varied concerning their background data and therefore did not form a homogeneous group.

The last objective of this study was to describe the relationship between observed parent’s problem behaviour (as reported from the point of view of the adolescents) and adolescent’s problem behaviour. There were small, but significant relationships between parent’s problem gambling and children’s problem gambling (Spearman’s rho= .178), parent’s problem smoking and children’s problem smoking (.129) and parent’s drink-driving and children’s “hardcore” problem traffic behaviour (.132). Contrary to what was expected, there was no significant relationship between parent’s drink-driving and children’s drink-driving (.025) and parent’s problem drinking and children’s problem drinking (.021).

8. Conclusions

This data of this present study suggest that there are certain identifiable groups of adolescents, who show a stronger tendency to engage not only in problem traffic behaviour, but also equally into some other problem behaviour (problem drinking, smoking, gambling and bullying). This is consistent with the idea of a syndrome of problem (risk) behaviour. The data also suggest that this tendency is stronger among males and increases during the course of adolescence.

Furthermore, the data also support the notion of “lifestyle”, which means that there are certain sub-groups among the adolescent population who have lifestyle-characteristics in common: worse school-performance and health, less close and open relationship with their parents, stronger feelings of general unhappiness, and a stronger tendency to spend more time with their friends. Their upbringing seems to have less influence: they don’t differ with regard to their parent’s occupation (socio-economic status) and parent’s problem behaviour have no or only moderate influence on the adolescent’s problem behaviour.

Overall, these findings support the call for more comprehensive prevention- and intervention-programs, dealing not only with the specific problem traffic behaviour like drink-driving, riding as passengers with drivers who used alcohol, or seatbelt negation, but also with the whole lifestyle of the adolescent.

References

Aas, H. & Klepp, K.I. (1992). *Adolescents´ alcohol use related to perceived norms*. Scandinavian Journal of Psychology, 33, pp.315-325.

Arnett, J. (1992a). *Reckless Behaviour in Adolescence: A Developmental Perspective*. Developmental Review, 12, pp. 339-373.

Arnettt, J. (1992b). *Socialization and Adolescent Reckless Behaviour: A Reply to Jessor*. Developmental Review, 12, pp. 391-409.

Arnett, J., Offer, D. & Fine, M. (1997). *Reckless Driving in Adolescence: 'State' and 'Trait' Factors*. Accident Analysis and Preview, 29 (1), pp. 57-63.

Bahr, S.J., Marcos, A.C. & Maughan, S.L. (1995). *Family, Educational and Peer Influences on the Alcohol Use of Female and Male Adolescents*. Journal of Studies on Alcohol, July 1995, pp. 457-469.

Bank, B.J., Biddle, B.J., Anderson, D.S., Hauge, R., Keats, D.M., Keats, J.A., Marlin, M.M. & Valantin, S. (1985). *Comparative research on the social determinants of adolescent drinking*. Social Psychology Quarterly, 48, pp. 164-177 (cited in Aas & Klepp, 1992).

Beirness, D.J. & Simpson, H.M. (1987). *Alcohol use and lifestyle factors as correlates of road crash involvement amongst youth*. In: T. Benjamin (Ed.), Young Drivers Impaired by Alcohol and Other Drugs, pp. 141-148, London: Royal Society of Medicine Services.

Beirness, D.J. & Simpson, H.M. (1988). *Lifestyle Correlates of Risky Driving and Accident Involvement Among Youth*. Alcohol, Drugs and Driving, 4 (3-4), pp. 193-204.

Donovan, J.E. & Jessor, R. (1985). *Structure of problem behaviour in adolescence and young adulthood*. Journal of Consulting and Clinical Psychology, 53, pp. 890-904 (cited in Jessor, 1987a).

Donovan, J.E., Jessor, R. & Costa, F.M. (1991). *Adolescent Health Behaviour and Conventionality-Unconventionality: An Extension of Problem-Behaviour Theory*. Health Psychology, 10 (1), pp. 52-61.

Elliott, D. (1987). *Self-reported Driving While Under the Influence of Alcohol/Drugs and the Risk of Alcohol/Drug-Related Accidents*. Alcohol, Drugs and Driving, 3 (3-4), pp. 31-43.

Everett, S.E., Lowry, R., Cohen, L.R. & Dellinger, A.M. (1999). *Unsafe motor vehicle practices among substance-using college students*. Accident Analysis and Prevention, 31, pp. 667-673.

Jessor, R. (1987a). *Risky Driving and Adolescent Problem Behaviour: An Extension of Problem-Behaviour Theory*. Alcohol, Drugs, and Driving, 3 (3-4), pp. 1-11.

Jessor, R. (1987b). *Risky driving and adolescent problem behaviour: theoretical and empirical linkage*. In T. Benjamin (Ed.), Young Drivers Impaired by Alcohol and Other Drugs, pp. 97-110. Royal Society of Medicine Services, London.

Jessor, R. (1991). *Risk Behaviour in Adolescence: A Psychosocial Framework for Understanding and Action*. Journal of Adolescent Health, 12, pp. 579-605.

Jessor, R. (1992). *Risk Behaviour in Adolescence: A Psychosocial Framework for Understanding and Action: Reply to J. Arnett*. Developmental Review, 12, pp. 374-390.

Jessor, R. & Jessor, S.L. (1977). *Problem Behaviour and Psychosocial Development: A Longitudinal Study of Youth.* New York: Academic Press.

Jessor, R., Turbin, M.S. & Costa, F.M. (1997). *Predicting Developmental Change in Risky Driving: The Transition to Young Adulthood*. Applied Developmental Science, 1 (1), pp. 4-16.

Jonah, B.A. & Dawson, N.E. (1987). *Youth at risk: Age Differences in Risky Driving, Risk Perception, and Risk Utility*. Alcohol, Drugs and Driving, 3 (3-4), pp. 13-29.

Junger, M., Timman, R. & West, R. (2000). *Cross-situational consistency in crime and traffic.* In press – unpublished manuscript

Junger, M. & Wiegersma, A. (1995). *The relations between accidents, deviance and leisure time*. Criminal Behaviour and Mental Health, 5, pp. 144-174.

Maron, D.J., Telch, M.J., Killen, J.D., Vranizan, K.M., Saylor, K.E. & Robinson, T.N. (1986). *Correlates of seat belt use by adolescents: implications for health promotion*. Preventive Medicine, 15, pp. 614-623 (cited in Jessor, 1987a).

Simpson, H.M. & Mayhew, D.R. (1987). *Demographic Trends and Traffic Casualities Among Youth*. Alcohol, Drugs and Driving, 3 (3-4), pp. 45-62.

Simpson, H.M. (1988). *Discussion: Models: Theoretical and Empirical*. Alcohol, Drugs and Driving, 4 (3-4), pp. 221-224.

Williams, A.F. (1987). *Effective and Ineffective Policies for Reducing Injuries Associated with Youthful Drivers*. Alcohol, Drugs, and Driving, 3 (3-4), pp. 109-117.

Wilson, R.J. & Jonah, B.A. (1988). *The Application of Problem Behaviour Theory to the Understanding of Risky Driving*. Alcohol, Drugs and Driving, 4 (3-4), pp. 173-191.

Zimbardo, P.G. & Gerrig, R.J. (1999). *Psychologie* (7th ed.). Springer, Berlin.

Zuckerman, M. (1979). *Sensation seeking: Beyond the Optimal Level of Arousal*. Erlbaum, Hillsdale, NJ.

Zuckerman, M. (1994). *Behavioural Expressions and Biosocial Bases of Sensation Seeking*. Cambridge University Press, New York.