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LIFESTYLE AND ACCIDENTS AMONG YOUNG DRIVERS

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Abstract—This study covers the lifestyle component of the problems related to young drivers' accident risk. The purpose of the study is to measure the relationship between lifestyle and accident risk, and to identify specific high-risk and low-risk groups. Lifestyle is measured through a questionnaire, where 20-year-olds describe themselves and how often they deal with a large number of different activities, like sports, music, movies, reading, cars and driving, political engagement, etc. They also report their involvement in traffic accidents. With a principal component analysis followed by a cluster analysis, lifestyle profiles are defined. These profiles are finally correlated to accidents, which makes it possible to define high-risk and low-risk groups. The cluster analysis defined 15 clusters including four high-risk groups with an average overrisk of 150% and two low-risk groups with an average under risk of 75%. The results are discussed from two perspectives. The first is the importance of theoretical understanding of the contribution of lifestyle factors to young drivers' high accident risk. The second is how the findings could be used in practical road safety measures, like education, campaigns, etc.

Keywords—Recently qualified driver, Accident exposure, Behaviour, Accident proneness, Risk taking

INTRODUCTION

The problems of young drivers are well known. Several factors contribute to the explanation of their high accident risk, and the ways to structure these problems are many. One way is to structure these factors into four different groups:

- (a) Level of actual knowledge and skill
- (b) Amount of experience
- (c) Individual level of development and maturity
- (d) Social situation and lifestyle.

A great deal of research has been carried out on all these aspects, perhaps to the largest extent in the three first areas, where the focus has often been the discussion of what is most important, experience or age factors, that is, the second and third factors above. The smallest amount of research has been done on the fourth aspect, social situation and lifestyle, which includes how you live, what groups you belong to, and what your interests, activities, and preferences are, etc.

Few of these studies have been focused on the lifestyle profile of young drivers and how this is related to their accident risk. One such study has

been done by Schulze (1990), who shows a relationship between lifestyle profiles of German youngsters and their involvement in accidents. He found several high-risk groups. One of them was the 'action group'. Members of this group differ from those in the other clusters by the great amount of leisure time they spend away from home, especially in pubs, discos, etc. Extra motives (Näätänen and Summala 1976) for car driving are also very important. They favour action films and reject social films, they like rock and punk music and football. They also drink a lot of alcohol. In the study, several other high-risk groups were identified. Due to small samples, however, it has been impossible to achieve statistically reliable differences.

The importance of lifestyle is also supported by general statistics from young drivers' accidents. It is well known that young drivers are involved in many accidents during night hours and weekends. German studies on so-called disco accidents show an overrepresentation of accidents before and after disco visits (Klemenjak and Hutter 1988; Schulze 1989).

Several studies have also shown the importance of alcohol in young drivers' accidents. It has also been shown that alcohol is more dangerous for

young drivers than older drivers (Glad 1985; Mayhew et al. 1986; Donovan, Marlatt, and Salzberg 1983).

AIMS

The aim of the present study is to identify the specific lifestyle profiles among young drivers and to analyse the relations between lifestyle and accidents in which young drivers have been the cause.

The benefits of such knowledge are of two kinds. One is theoretical, i.e. analysing to what extent young drivers' accident risk is related to lifestyle. This is important since we do not know the quantitative relations between different groups of problems, such as level of experience, knowledge of rules, driving skills, psychological factors like personality and maturity, social factors, and lifestyle. The second benefit is to provide a practical basis for traffic safety measures. If high-risk groups can be described in terms of lifestyle, it is possible to define what specific groups one should focus on and through which channels.

It is, however, not possible to draw any conclusions from this study about causes. The relationships found are statistical and do not describe to what extent the accidents are caused by lifestyles.

METHODS AND MATERIAL

In this study, lifestyle is measured as actions. This is based on a model of lifestyle by Miegel (1990) in which lifestyle is structured in three levels—a level of basic values, a level of attitudes, and a level of actions. Each level has four dimensions, where values are described as material, esthetic, ethical, and metaphysical. On the level of actions these dimensions are described as actions of interests, style, morality, and ideology.

This level of actions can, according to Miegel, be used when measuring lifestyle. In the present study this strategy is used. The patterns of different actions are measured, through which specific lifestyle groups are defined.

The data were collected through a questionnaire sent to a sample of young drivers.

A sample of 3,000 youngsters, 20 years old, was randomly drawn from the Swedish population register (SPAR). This group was expected to include 20% who did not have a driver's licence. These were to be excluded from the sample. This was done through the first question, "Do you have a driver's licence?" The questionnaire was answered by 2,190

Table 1. The results from the PCA, description of 10 factors

Factor	Explained variance (%)	Description
Sports	6.4	Active in sports, watches sports activities, caring about the body
Alcohol	6.0	Drinking habits
Extra motives	5.7	Other motives for car driving than transport, i.e. showing off, pleasure, sensation seeking, etc.
Culture	5.6	Classical music, theatre, jazz, rock, playing instruments
Romantic	5.0	Romantic literature and romantic films, clothes, householding
Social engagement	4.3	Political matters, peace movement, human rights, social films
Out and about	4.1	Driving with pals, rock concerts, records, parties, disco, movies
Film	3.8	Video, action films, TV, movies, staying at home
Clothes	3.6	Elegant clothes, tailored clothes, suit, fashion
Cars	3.2	Cars as a hobby, owns a car, riding motor cycle

persons. After excluding 19% without a licence, according to the answers of the first question, the remaining sample consisted of 1,774 persons. The response rate, calculated from the number of expected licence holders, was 74%. Of the respondents 54.7% were men, which corresponds well to the general share of male licence holders in Sweden, 54%.

The main reason that only 20-year-olds were chosen was to control for age differences. They should also have acquired some driving experience, which excludes the choice of completely novice drivers.

The questionnaires were mailed to the respondents. Two reminders were used.

The questionnaires had questions about lifestyle actions including sports, music, movies, reading, dancing, cars and driving, clothing, body care, style, householding, political and social engagement, alcohol and drugs, etc. There were also questions about background factors like sex, rural/urban living, education, occupation, etc. and about involvement in traffic accidents. Respondents were instructed to include material damage and/or bodily injury in their answers about accidents.

The data from the many lifestyle questions of the questionnaire were reduced through a principal

Fig. 1. The lifestyle profile of the first high-risk group.

component analysis (PCA) rotated with varimax. The purpose of PCA is to reduce the number of questions to a limited number of factors that could be used for further analysis.

The PCA resulted in a number of factors (lifestyle components) that were used in the second step, a cluster analysis. The purpose of the cluster analysis was to group the respondents into similar profiles over the lifestyle components. These clusters define the lifestyle groups.

After the cluster analysis, each cluster was analysed with regard to traffic accident risk (accidents/licence holders). A *t*-test was run for each group to calculate if they had been involved in significantly more or less accidents/person than the average of the whole group. Only accidents in which respondents were the cause were used. The significance level was 5%. From these analyses high-risk and low-risk groups were defined.

Accident risk in this study is defined as accidents/licence holder. This is a traditional way to define risk in epidemiological research. In traffic safety research, however, a traditional risk measure is accidents/mileage. The reason that this was not used here is that exposure has been regarded as an important part of lifestyle. Exposure is measured in several aspects like time of day, motives for driving, goals etc. If exposure patterns are included in lifestyle, one can draw conclusions about countermeasures with the purpose of changing the exposure patterns. If, for example, a high-risk group drives a lot during night hours with other motives than transport, the conclusions will be that it is important to change their way of using the car. The basic interest has been focused on how many accidents youngsters have, not their risk per mileage.

RESULTS

The PCA resulted in a reduction of the lifestyle data from 59 items to 10 factors. These 10 factors explained 48% of the variance in the 59 questions about lifestyle. The 10 factors are described in Table 1. The limit was drawn after 10 factors since the explained variance was close to 50%, and each new factor did not add very much to the explanation.

The next step was the cluster analysis. In this the 10 factors from the PCA were used together with some additional questions in the questionnaire about driving habits (time of day, motives for driving) and how often they feel drunk. In the analysis, all answers are standardised and translated into z-values. The z-value zero is the average of the whole group.

The respondents were divided into 15 groups by the cluster analysis, each group with a specific profile over the different lifestyle factors. Using the *t*-test, four groups were found to have a significantly higher accident risk and two groups were found to have a lower risk than the average of the whole sample.

The profiles of these six groups are shown in Fig. 1–Fig. 6. Some explanations to the text in the x-axis of the figures are necessary. The first 10 factors are explained in Table 1. The additional six lifestyle components are:

Drive day = amount of driving during daytime

Drive night = amount of driving during night hours

Drive transp = amount of driving with transport motives

Drive party = amount of driving to parties, etc.

Fig. 2. The lifestyle profile of the second high-risk group.

Fig. 3. The lifestyle profile of the third high-risk group.

Drive around = amount of driving without specific aim

Feel drunk = how often they feel drunk.

The most characteristic signs of the first high-risk group are that they are seldom active in sports, they often drink, and they have more extra motives when driving than the average. They are a little more out and about and are very interested in cars (Fig. 1). Seventy-nine percent of the group are men.

The second high-risk group has somewhat different combinations. Their interests in sports are average, they often drink, just like the first group. They drive very seldom with extra motives, however, but often use the car for transport to defined goals. They score high on cultural activities and on clothes. They also have a higher interest in cars than the average. They drive a lot, both during day and

Fig. 4. The lifestyle profile of the fourth high-risk group.

Fig. 5. The lifestyle profile of the first low-risk group.

night hours (Fig. 2). The predominance of men is not so obvious in this group as in the first, 62%.

In the third high-risk group the drinking habits score very low. Very often they have extra motives for driving, and they also drive a lot, most often during night hours. They are not as interested in social engagement as the average. Instead they like cars, clothes, film, and being out and about (Fig. 3). Seventy-nine percent of this group are men.

The fourth and the last high-risk group differs from the others by their very low scores on being out and about. They are not interested in clothes and they are not very socially engaged. They do not drive very often and when they do, extra motives are very important (Fig. 4). Sixty-one percent in this group are men.

In the first low-risk group the most obvious pattern is that they seldom drive. The only factors they score a little higher on are Culture, Romantic and Social engagement (Fig. 5). In contrast to the high-risk groups, the majority, 69%, are women.

Fig. 6. The lifestyle profile of the second low-risk group.

Table 2. Description of the high- and low-risk groups with regard to size and accidents

Group	Size of the group in % of respondents	Accidents in % of all accidents	Average accident risk per person
High-risk no. 1	10.1	14.9	0.59
High-risk no. 2	4.9	7.6	0.65
High-risk no. 3	1.9	3.1	0.66
High-risk no. 4	4.0	6.6	0.66
Low-risk no. 1	23.4	14.6	0.25
Low-risk no. 2	5.6	3.2	0.23
Whole sample	100	100	0.40

The second low-risk group has a slightly more deviant profile. They are very interested in sports and they very seldom drink alcohol. They often drive during night hours and they often drive to parties. They are often out and about but are not very interested in films or in clothes (Fig. 6). In this group as well, women dominate with 68%.

The size of the groups, their accident risk, and their share of the total number of accidents are shown in Table 2. All together the high-risk groups are 22% of the respondents and their share of the accidents is 32%, i.e. approximately 50% higher risk.

In Fig. 7 the accident risk of these six groups is plotted together with the curve of accident risk in the population from the police records. The risk levels are indexed so the average risk of 18- to 19-year-olds has been set to 1. From the plots can be seen that the high-risk groups have an overrisk of 800% compared to drivers over 26 years, while the

Fig. 7. Standardised accident risk (accidents/licence holder) in the population (police records) compared to the high- and low-risk groups of the study.

“young driver overrisk” in the low-risk groups, is only 300%.

DISCUSSION

Before drawing any conclusions from the results, one must take some methodological aspects under consideration.

Two of the statistical procedures used in this study, PCA and cluster analysis, are dependent on the researchers' subjective interpretations and decisions. In the PCA an approximation is done by reducing a number of variables into a few factors. In this case, the researcher makes the decisions about how large a proportion of the variance that should be explained in the factors used. If all factors from the analysis are included, the number of factors will be the same as the number of variables put in to the PCA. No reduction would have been done. In this study a limit of 50% explained variance has been used. This was achieved with 10 factors. The rest of the variance, 50%, is explained by the 49 factors not used. Each new factor contributes very little to the variance.

In the same way, the cluster analysis includes approximations. When grouping individuals into clusters, the procedure optimises the profiles and finds the distribution where the distances from the profile of each group are minimised. The profiles, however, will not be perfect until you have as many profiles as individuals. By grouping them together, there will always be approximations that you cannot fully control.

The next problem in the analysis is, of course, the *t*-test of significance. There is always a little probability of chance, in this case not over 5%, that random effects have influenced the result.

The results show a high probability that there are relationships between lifestyle and accident risks in traffic. Four high-risk and two low-risk groups were found. The hypothesis of relationship can thus be confirmed.

One conclusion is that all young drivers do not have the same high accident risk. The risk varies a lot among drivers. Some of them cause a lot of accidents, others cause few or no accidents. It is well known that among young drivers women's risk is lower than men's and that alcohol consumption is related to accident risk as well as weekend and nighttime driving. Accidents in connection with disco visits are common. Driving with extra motives like showing off and impressing, sensation seeking, competition, pleasure, etc. is also well known to be related to accident risk (Gregersen 1993, for an overview).

The new findings in this study show how these factors are combined in specific groups among drivers. That some of them are connected has also been shown earlier (Evans, Wasielesky, and von Buseck 1982; Deutsch, Sameth, and Akinyemi 1980; Lawson and Arora 1982; Wilson and Jonah 1985), but not how.

The lifestyle groups that were found in the study have not been given any names, as they would probably be wrong and very subjective. Each reader would probably interpret such a name in his own way. Consequently, it is better to let the readers themselves create pictures of the groups, based on their own interpretations of the profiles. The study is, however, the first step towards this understanding, and should be followed by a closer analysis using qualitative methods as interviews and observations.

How can these results be used? It depends on whether or not the statistical relationship between lifestyle and accident risk is a matter of cause or not. If it is, one should consider if one should use measures for changing lifestyles or lifestyle components. It is probably impossible and unethical to try to change the lifestyle as a whole of these high-risk drivers. Of course, besides traffic, many other factors, which explain why they have developed their specific lifestyles, are involved.

The most obvious advantage of the study is that it makes it possible to classify young drivers into high-, average-, or low-risk groups. This possibility might be used in different ways and with different purpose. One goal could be to use the classification in order to stop the most dangerous drivers from driving. A classification form could be used in connection with the licensing test. This, however, is not a strategy in line with the general and political view, i.e. that driving is everyone's right.

A better way is to focus on changing behaviour among the drivers in the high-risk groups, to make them drive more safely. To do this, traditional methods like group-specific campaigns, teaching, and training, etc. could be used. Most of these traditional methods, however, are based upon a strategy where authorities of some kind tell the drivers how to behave. This is seldom very effective. Another strategy is to give individual drivers preconditions by which they can find out needs for behavioural changes themselves. This kind of educational strategy is used in many circumstances, within both traffic and nontraffic education. In the traffic education of young children in schools, this kind of problem-oriented education is increasing. The idea is to change from learning rules and behaviour by heart, to an understanding of traffic and risks, where children are helped to draw conclusions themselves

about what is dangerous, what others must change, and what they could do themselves (Nilsson 1992).

The strategy of self-produced decisions has also been evaluated in a traffic safety experiment within the Swedish Telecom (Gregersen and Morén 1990; Brehmer, Gregersen, and Morén 1993). Professional drivers were divided into small groups where, following a specific procedure, they discussed and defined their road safety problems and made suggestions about what measures the company ought to take and what they could do themselves as drivers. The discussion resulted in lists of suggestions to the company and individual decisions, i.e. about ways of driving. The results from this experiment showed a reduction of accident risk of about 50% compared to a control group.

Another example of a positive effect from this strategy is taken from health education. Arborelius and Bremberg showed that their method, called "It's your decision!", did change health behaviour among school children. The method is based on group discussions in combination with self-diagnosis of certain health factors, leading to individual decisions about how to reach better health (Arborelius and Bremberg 1990).

A closely related method, used in health promotion, is the use of a "health-meter", a self-diagnostic form composed of questions about a number of health factors. The results of the self-diagnosis can be used individually or in group discussions to draw conclusions about one's own health, one's risks, and what changes of behaviour, etc., are needed to improve health (Trell 1990).

This idea could also be used to improve safety among young drivers. The process would be to gather young drivers in groups, i.e. in school or in driving school or in other places where young people meet. The boys and girls are instructed to fill in a "Traffic Safety Meter" that, based on the findings from this study, classifies them into risk groups according to how they describe their lifestyle. Together with necessary information about traffic safety, accident causes, etc., this could be used in group discussions that end up in individual decisions about what to change.

The strategy implies the development of a "Traffic Safety Meter" that young drivers can fill in and that is easy to draw conclusions from. It should be self-evaluating and more or less automatically define the respondent's lifestyle profile and risk rate.

There are two reasons why it is important to add an evaluation to such a strategy for improved traffic safety. The first reason is the most obvious, to evaluate if the method really has an influence

on traffic safety. The second reason is to analyse whether or not the lifestyle patterns found in this study cause the differences in accident risks. One way to analyse this further is to make interventions with the purpose of changing lifestyle components. If it is possible in a controlled study to change such components and to measure if the changes influence accident risk, it is also possible to draw conclusions about the nature of the relations between lifestyle and accident risk.

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