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Evaluation of the Effectiveness of a Primary Preventive Program „Clear Picture...!?“ to Increase Traffic Safety

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ABSTRACT: *The present study describes the development of the „Clear Picture...!? course program and examines its effectiveness. „Clear Picture...!?” is a one-day course on alcohol prevention aimed at Estonian adolescents aged 17 to 19 years and is carried out in educational institutions. A traffic psychologist together with the police and an accident victim facilitate the knowledge transfer, personal experience, reflection exercises and experience exchange of accidents caused by alcohol through three modules.*

In the empirical part of the present study, the results with a re-measurement group design (N = 109) examine whether participation in the course program results in a reduction of number of driving under alcohol influence cases, the number of violations in road traffic and the number of general non-traffic-related violations. The changes reflecting the results from the cases which have been registered in the police database are measured one year pre- and post-participation in the course. Whether an increased amount of alcohol consumption among adolescents is a risk factor for more violations within and outside road traffic was tested using AUDIT.

With regard to all dependent variables (violations within and outside traffic) the course program shows reduction after one year from their participation in comparison to the year before the participation. There was no change in regard to the other variables.

Significant interactions between participants and time of measurement on all dependent variables indicate a greater reduction in the registered cases of violations in participants. For students whose results indicated an increased daily consumption of alcohol, more legal violations were registered with the police in Estonia over the two-year observation period than with those with low alcohol consumption. Increased daily consumption of alcohol is therefore a risk indicator for violations within and outside road traffic.

Due to the present study, a traffic risk assessment questionnaire “Clear Picture...!?” was developed, which enables to give immediate feedback to the participants about possible risks and dangers in traffic. It also enables to give directions and recommendations for future behaviour and how to avoid possible traffic risks. Also, AUDIT enables to give feedback to the participants about their possible alcohol problems and gives directions for future use. Relationship was found between problematic alcohol consumption and Traffic Law violations based on AUDIT.

In terms of reducing the number of violations, the course program „Clear Picture...!? has a positive effect on AUDIT <8 as well as AUDIT ≥8 groups.

KEYWORDS: *adolescents, alcohol, drunk driving, prevention, traffic violations*

INTRODUCTION

The course program „Clear Picture...!?“ (Meinhard, 2007) was developed in Estonia and has been running ever since. The course program is aimed at adolescents aged 17 to 19, with or without driving licence, who can be classified as a high-risk group for traffic accidents (Holte, 2012; Sturzbecher et al., 2004).

In order to achieve the EU’s planned average level of traffic safety, the number of people killed in traffic fatalities in Estonia should not exceed 140 in 2010 and 100 in 2015. These goals were achieved, as there were 79 deaths in 2010 and 78 deaths in 2014 in the state (European Commission, 2010). Due to the relatively small population of 1.3 million inhabitants, further improvements can only be expected in small steps.

The main objective of the program is the avoidance of driving under alcohol influence and reducing the danger of alcohol-related traffic accidents and incidents. The program „Clear Picture...!?“ aims to

contribute to increased safety of young people and young adults in the field of primary prevention of traffic violations and risks. The safety in connection with alcohol consumption in particular should be reduced.

The focus of prevention is directed to reduction of risks related to alcohol consumption before driving. The program seeks to trigger development of risk awareness in dealing with alcohol and thereby reduce the likelihood of driving under alcohol influence or accompanying an alcohol intoxicated driver in the vehicle. The work done evaluates the effectiveness of the course program.

THE INTERNATIONAL EXPERIENCE IN APPLYING PREVENTION METHODS

The Bühler, & Thrul (2015) publication assessed the effectiveness of both behavioural and prevention measures through studying reviews and meta-analyses. Efficacy is defined here as preventing, delaying or reducing the consumption behaviour of tobacco, alcohol and other illicit psychoactive substances among children and adolescents.

Key elements of addiction prevention measures in the „Clear Picture...!?” evaluation study are the following: Correct information about the impact of substances should be imparted; the effects assessed as critically as possible; deformed law expectations should be corrected; stay responsible and conscious in consuming alcohol.

Various preventive courses utilised in Austria, Germany and USA were analysed in the above-mentioned study based on the criteria of the EMCDDA quality. Some remarkable elements in the preventive intervention techniques used in the study based on the examples from Austria, Germany and USA were the following:

- Evaluation studies were created for every course model and can be accessed publicly.
- Courses that are carried out in the USA focus mainly on reducing the alcohol use or promoting responsible use of alcohol and reducing the health damage from alcohol consumption. AUDIT[1] is used as an important part of the course in the USA. In Austria and Germany the courses focus on reducing the road traffic accidents. However, AUDIT is not used in Austria and in Germany. In one course (BOB, Schutzengel), the focus is on reducing alcohol consumption.

Based on the information from the studies mentioned, prevention work in the area of alcohol and traffic risk is internationally inconsistent. When working in the primary prevention with young drivers, the influence of peers is remarkable. This can be seen from the Austrian program as well as from the German “Guardian Angel” projects. B-category driver-training in Austria includes a traffic-psychological conversation as part of a groupwork, and it is similarly conducted in the rehabilitation course in Germany (Schubert et al., 2003).

The USA studies have shown that the feedback affects drinking behaviour, especially together with motivational interview. The AUDIT questionnaire is also widely used in the USA to identify problematic drinking habits, as well as to create a starting position for giving personal feedback. The objective of inclusion of AUDIT questionnaire into the USA studies was to screen the participants for possible alcohol abuse.

“CLEAR PICTURE...!?” PROGRAM

The “Clear Picture...!?” study, described here, attempts to reveal the relationship between AUDIT results and specific violations, such as driving under alcohol influence, traffic violations and other violations committed outside traffic.

The scientific basis of the study provides the instructors of the course with theoretical directions and instructions. In addition, it gives the opportunity to rely on the conceptual basis of behaviour and on the theoretically explained methods derived from it. The traffic-psychological training ensures that the course instructors have necessary qualitative prerequisites and experience.

Developed by the author of the present study, the theoretical and methodological structure of the program provides the course instructors with guidance materials. The materials give guidance on connecting personal alcohol consumption (based on AUDIT data) experience and traffic behaviour (violations in traffic). Traffic-psychological training and the experience of the instructors ensure the necessary quality for running the program.

1 AUDIT is an acronym for Alcohol Use Disorders Identification Test. It helps to screen between people with normal and problematic alcohol use (Babor et al., 2001).

The training model was built with the aim to improve road traffic behaviour of adolescents. The design of the model was supported by the views of Sturzbecher (2004), who has found that adolescents have underdeveloped self-monitoring and self-control mechanisms and accordingly make wrong evaluations in high-risk situations. The approach of behaviour evaluation by Kanfer et al (1996) adds learning theory perspective to the model. The theory of self perception by Bem (1967) points out that in specific situations an individual makes self-related conclusions based on momentary attitude and feelings. For example, if an individual has repeatedly driven while being drunk and has not been caught by the police, the individual makes conclusions based on the situation and continues law-breaking behaviour in the future. Similar conclusion can be drawn for various situations. Wilken (2010) suggests that in training situations the cases of irrational thinking should be revealed and cognitively restructured. For example, a way of irrational thinking „If I will not „win“ the acceleration race from a traffic light, I will be worth nothing.“ needs to be restructured.

METHODS OF THE PROGRAM

The training model is built on the exchange of ideas by transactional model of Berne (2001), where the instructors treat the participants like equals to adults. Considerations of Jacques (2000) about different aspects of group behaviour in groups of adolescents are important to notice and to follow.

The course program “Clear Picture... !?” is carried out in a classroom. Such arrangement allows applying specific group work methods, takes characteristics into notice, and which according to Jacques (2000) must respond to the following well-known features of the groups:

- Collective perception
- Common goals, needs or ideals
- Mutual dependence (interdependence)
- Social organisation, depending on norms, roles and status
- Interaction
- Cohesion (group cohesion)
- Membership

During the initial training module, questions are asked in the group work and participants reflect from their personal experience. As a result, trust between the members of the group and the instructor develops while the participants are feeling equal to the instructor.

The Berne Crossed Transaction Model (2001) assumes that communication between people is based on three personality levels. These are Parent, Adult and Child ego states, which represent the status of communication. The communication between the participants and the instructors should be designed to be as open and trusting as possible in order to achieve course effectiveness. This assumes communicating at the Adult level. Especially, during the third module, it is important for the police to communicate using the Adult level.

CARRYING OUT THE COURSE

The course program “Clear Picture...!?” needs to raise risk awareness in participants, which can be achieved by sharing experiences during group work. Knowledge deficiency needs to be compensated through the knowledge of blood alcohol assembly and decomposition, alcohol influence, risks evolving from alcohol consumption and punishment in the form of alcohol violations. Specific techniques need to be implemented, so that drivers and passengers will not drive under alcohol influence in the future. Other high-risk behaviours that go beyond the topic of alcohol are also subject of an experience-related topic in the course. Other issues such as speeding, driving in an overcrowded motor vehicle and driving without licence are also addressed. Through increasing knowledge and attitude change the course participants need to be brought to a level which ensures their safe driving behaviour in the future.

The date and terms of the course to be conducted with sixth year of secondary schools and vocational schools (group sizes, the possibility of using projectors, availability of black board) are agreed beforehand between the school representative and the course instructor. The course instructor makes an introduction to the course in the beginning of the first module and explains the structure and duration of the course program. The participants are then divided into small groups. One after another, each group solves three traffic-related exercises. After solving the last exercise, one person from each group presents the results of their own group. Other groups can ask questions and the instructor comments on

the results. It is important to bring forth the particular problems and risk behaviours from the results and propose possible solutions.

In the second module participants pass through an obstacle course wearing drunkbuster goggles (0,8 ‰). It should be worked out how the impairment of alcohol affects driving. The participants are required to discuss what they saw to change in participants who were “under alcohol influence”, and the discussion should reveal the effect of alcohol on the condition; they are all sober, however, the one person performing the exercise is “drunk”. The instructor gives feedback and presents the correlation between accident risk and blood alcohol concentration (Krüger, 1995).

The course instructor explains how to calculate blood alcohol concentration with the Widmark model (1932). The difference between breath alcohol concentration (mg/l) and blood alcohol concentration (‰) is explained.

In the third module participants meet a police officer and a traffic accident victim. Both presentations last for 45 minutes. The police officer gives a PowerPoint presentation of two traffic accidents that happened in real life. The presentation is based on the information and mistakes that were identified by the young drivers and passengers in the groupwork in the first module. The police officer provides a detailed overview of the accident events: starting with the meeting, how the events developed until the traffic accident, giving details of the accident and the consequences.

The disabled person presents himself briefly and then presents his experiences in three parts: 1. activities before the accident, 2. The accident, consequences, and rehabilitation, 3. Life with the disability. The purpose of handicaps report is to open up about the changes in life resulted from the accident. The focus is not on the emotional side and on the hard circumstances, rather practical points are opened, for example money and time cost. The aim is to show practical changes in life after the accident.

HYPOTHESES OF THE STUDY

The hypotheses of this study are based on the objectives of the course program “Clear Picture ...!?” and it should be checked whether these are achieved. Firstly, the aim is to avoid driving - myself and others - under alcohol influence. The achievement of these goals is tested with the hypotheses. The course “Clear Picture...!?” focuses through selective prevention on risk behaviours, which come from alcohol consumption, but also on other risk behaviours, which are committed in traffic or outside traffic. Anglo-American studies, which measure alcohol prevention, check the drinking habits of students. Also, possible health risk identifications were controlled through AUDIT questionnaire linked with other risks (Walters et al., 2009). The study by Beck and colleagues (2010) found that increased alcohol consumption among students are involved with traffic risks.

Therefore, it was tested with four hypotheses, whether there is a connection between increased violations and alcohol consumption and whether it derives from alcohol disorder.

H 1. Less Traffic Law violations are registered by the police a year after participants attend the course „Clear Picture...!?“ than a year before participants attend the course. These include driving without driving licence, driving while under alcohol influence, driving by car and by other means of transport, for example by bicycle.

H 2. Less violations outside traffic are registered by the police a year after participants attend the course „Clear Picture...!?“ than a year before participants attend the course. These include all law violations, which are not committed in traffic. Examples include theft, Alcohol Law violations, physical mistreatments, while sober and while intoxicated.

H 3. Study participants with 8 or more AUDIT points (Maaroos, et. al. 2010) are suspectedly having an alcohol disorder. They have higher number of general Traffic Law violation cases than participants with less than 8 points.

a) „Clear Picture...!?“ course participants with 8 or more AUDIT points have more Traffic Law violations (T0 and T1 together) registered by the police than participants with 7 or less points in AUDIT.

b) One year after taking part in the „Clear Picture...!?“ course, participants with 7 or less points in AUDIT have less Traffic Law violations registered by the police than participants with 8 or more points in AUDIT.

In order to evaluate the effectiveness of the course program „Clear Picture...!?“, a prospective study was carried out with two measurement times (T0 and T1). The course program was implemented according to the modules described above. Subsequently, features such as sample, dependent and control variable (AUDIT), study design and statistical processes will be described, which will be used to control hypotheses.

SAMPLE, DATA ACQUISITION, PROCESS

For the sampling, after Estonian Road Administration inquiry, six vocational schools, which is 18% of all vocational schools in Estonia, and ten 11th grades (out of 12 grades) of secondary schools, which is 4,5% of all secondary schools in Estonia (Haridus- ja Teadusministeerium[2], 2016), took part in the „Clear Picture...!?“ course program. Schools that wanted to participate in the course program were located geographically all over the country.

The Estonian Road Administration in accordance with regional education departments chose the schools, where it was possible to carry out the courses. The schools showed interest in traffic-related courses and gave their acceptance to carry out the course in their school. The students that happened to take part in the course depended on the dates that the school and the training team agreed on and the timetable that the students had on the selected date. The trainers did not have a chance to intervene in the selection of people that participated in the course.

The link to the online questionnaire, which was set up in a cloud in Google Docs format, was sent to each student by the school via email after the course had ended. 422 participants filled in the questionnaire out of 984 possible students (response rate 42.7%). 134 (32%) answers were unusable, because the personal data was incomplete or had not been filled in at all.

The encoded data was forwarded to the police, who had a special right to compare the statistics data of participants. After police gave back the data and the missing data was deducted, 109 participants (61% of men and 39% of women) remained and their data was used in the study.

Wilcoxon Sign-Rank Test (Rasch, Friese, Hofmann & Naumann, 2014) was used to calculate Traffic Law violations (including driving under alcohol influence) between two time measurements (T0 and T1).

RESULTS

Table 1 shows the results for hypotheses 1 and 2, which have been calculated using Wilcoxon Sign-Rank Test.

2 Haridus- ja Teadusministeerium means ministry of education and research

Table 1. Average number (standard error in brackets) of violations per person one year before and one year after passing the training, p-values show the statistical significance of the change (Wilcoxon Sign-Rank Test).

	Before (T0)	After (T1)	*p*-value
Traffic Law violations	0.18 (0.05)	0.03 (0.02)	0.003
Other violations	0.15 (0.05)	0.00 (0.00)	-0.001

H1. The course program participants have a decline in all Traffic Law violation cases, including driving sober as well as driving while under alcohol influence. The change (T1-T0) on Traffic Law violations was statistically significant ($p = .003$).

H2. The course program participants have a decline in all law violation cases outside traffic. The change (T1-T0) in all law violations outside traffic was statistically significant ($p = -.001$).

Participants in the “Clear picture... !?” course program are separated into two groups (AUDIT < 8 points and ≥ 8 points). Twenty (18%) people out of 109 participants are suspected to have an alcohol-related disorder.

Table 2 shows average number of Traffic Law violations and other violations of participants with AUDIT < 8 or ≥ 8 points.

a) Study participants with 8 or more points in the AUDIT (with suspected alcohol-related disorder) have a higher number of violations in the overall observation period than subjects with a lower score.

Table 2. Average number (standard error in brackets) of Traffic Law violations (including driving while under alcohol influence) per person depending on the AUDIT result, p-values show statistical significance of differences between groups (Wilcoxon Test), (N = 109)

	AUDIT < 8	AUDIT ≥ 8	*p*-value
Traffic Law violations	0.57 (0.22)	4.00 (1.64)	0.001
Other violations	0.47 (0.12)	1.15 (0.45)	0.082

b) All „Clear Picture...!?“ course participants had a significant decrease in all police-registered violations from T0 to T1 ($p < .001$).

There was no significant interaction between group affiliation and registered law violations ($p = .087$), illustrated in Figure 1.

A year prior to taking the course (T0), a total of .23 law violations per person were registered for the participants with <8 points in the AUDIT; in the year

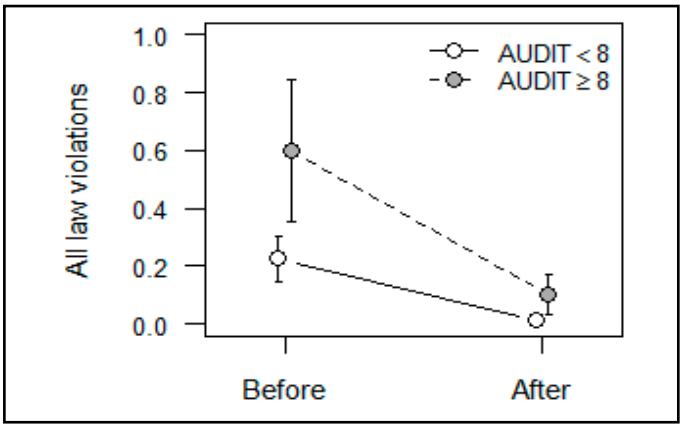

Figure 1: Average number (± standard error) of all law violations per person one year before and one year after passing the training depending on AUDIT result (N=109).

following the course participation (T1), .01 law violations per person were recorded.

For T0, participants with ≥8 AUDIT had .60 registered violations per person, while T1 had .10 registered violations per person. The Wilcoxon Rank Sum Test reveals (Table 3) that T0 participants with AUDIT <8 and participants with AUDIT ≥8 differ significantly (p = .032). There was also a significant difference between the participants at T1 (p = .030), Table 3.

Table 3. Presentation of the results of hypothesis 3b) Registered law violations in AUDIT <8 points and ≥ 8 points in the participants (N = 109)

	AUDIT < 8 (n = 89)	AUDIT ≥ 8 (n = 20)	p-value[a]
Before (T0)	0.23 (0.080)	0.60 (0.245)	**.032**
After (T1)	0.01 (0.011)	0.10 (0.069)	**.030**
Change	-0.21 (0.081)	-0.50 (0.224)	.087

Remarks. [a]Wilcoxon Rank Sum Test for differences between groups. Significant results (p < .05) are written in bold.

To sum up, it was found that all people with AUDIT ≥ 8 points and who had been registered in the police database had at least one criminal act and at least one violation of the Alcohol Law.

DISCUSSION OF THE RESULTS

The „Clear Picture...!?“ is a one-day program that shows efficacy of alcohol and traffic subjects, although the efficacy is only measured after one year since taking part in the course. The average number of Traffic Law violation cases (including driving under alcohol influence) decreased from 0.18 in the year before the observation date to 0.03 in the following year. It is in accordance to the results of the ANDREA study (Bartl, 2002), in which a 50% reduction in problematic behaviour is described as “magical 50%”.

Results showed that the „Clear Picture...!?“ course participants had less registered traffic violation cases after a year since the observation date. The reduction in the cases of traffic violations may be due to the fact that the course uses a combination of theoretical knowledge, practical examples from police, and real-life experiences from a traffic accident victim. It is not possible to give a final answer to the question about the effectiveness of the “Selective Prevention”. The number of law violations outside traffic (all registered traffic violation cases, except driving under alcohol influence and traffic violation cases, such as theft, violation crimes with and without alcohol influence) after a year since taking part in the „Clear Picture...!?“ course declines in participants. 18% of participants have AUDIT ≥8, which means problematic alcohol consumption.

It was proven that over the duration of the study, course participants who get at least AUDIT ≥8 (inclined to alcohol disorder) have 2.5 times more outside Traffic Law violations registered by police than participants who get less points. Over the duration of the study, “Clear Picture...!?” course participants with AUDIT ≥8 points have 7 times more Traffic Law violations registered by police than participants with <8 points. It proves that alcohol abuse and law violation cases are correlated to each other.

Figure 1 illustrates that the course program has a positive effect on participants with AUDIT ≥8 and <8.

So far no other preventive intervention study has been found, where:

- The aim was to change the traffic behaviour, and to manualise the training process.
- The efficacy of intervention had been evaluated by using police database records.

The relationship between AUDIT alcohol use and abuse questionnaire score and the frequency of documented violations of law has been shown. The study results have implications to raise the quality through course guidance and technical proposals. The modules of the „Clear Picture...!?“ course model confirmed the decline in law violation cases, that

were due to alcohol and also without alcohol, both in traffic and outside traffic. It has proven to be unnecessary to change either the duration or the content of the course. The combination of traffic psychological intervention with police and a traffic accident victim in this format influences adolescents positively in terms of traffic and in the subject of alcohol. The innovational growth should take place through cloud-computing, where a questionnaire is completed before the beginning of the course and which helps to understand the course content. This allows course participants to reveal their personal results. In addition, this way the course instructor can see the group scores and individual scores, which the course instructor can then rely on during the course. Through this kind of cloud-computing development, it is possible to involve, for example parents or other people, to take part in the prevention activity and which may enable to offer traffic safety training to parents and other people. This kind of prevention method directed towards parents (Spoth et al., 1999) could be an idea for improving the „Clear Picture...!?“ course model. In the course program „Clear Picture...!?“, the motivating interview and feedback play an important role, as well as e-CHUG studies or intervention techniques, that are personalised with alcohol feedback in single or group settings as well as computer-based (Walters et.al.2009). The course model „Clear Picture...!?“ has similarities to prevention model BOB (VIAS Institut, 1966), whereby both target groups are students since 11th grade (out of 12 grades) and they are aimed to have an emotional effect. The information is forwarded through explanations and presentation of traffic accidents, and drunkbuster goggles are used. There are similarities to Austrian traffic psychological conversation (§13c(FSG-DV)), which lasts for 100 minutes, whereas „Clear Picture...!?“ lasts for 270 minutes.

Many changes will have been made by 2019 in the methodics and duration of the “Clear Picture...!?” course program. For example, the drunkbuster goggles are not in use anymore and the activity has been replaced with more effective solutions. During the course, AUDIT was used after a seminar, which enabled to use the data for analysis, but did not give feedback to the course participants. If the course would receive their AUDIT results before the beginning of the course – which would be possible through cloud-computing – it would be possible to use the results during the course. The AUDIT results would enable to give feedback based on alcohol amount that has a damaging effect on health, and which in turn would enable to show a positive effect necessary for traffic safety. By 2019 there have been made technical changes, which enables giving feedback about the dangers of alcohol consumption to the course participants through cloud-computing before attending the course.

According to Estonian National Traffic Safety program until 2025, „Clear Picture...!?“ is a compulsory training for high school students to prevent traffic risks. The results of this study helped to develop a risk-rating questionnaire in Estonia for young people and other driver groups (for example those who are under rehabilitation for driving under alcohol influence or driving without driving licence), which is used in every day life. This study revealed some information about „bottleneck problems“, which can be taken into consideration by trainings and studies involving a much larger number of people.

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