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The Problem of Youth Drugged Driving and Approaches to Prevention: A Systematic Literature Review

Technical Report

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Authorship

Erin Holmes
Contribution: Erin Holmes was involved in the conceptualization of this systematic review and directly responsible for the acquisition, analysis, and interpretation of data for the systematic review. Erin also drafted the various iterations of the systematic review and was responsible for the incorporation of reviewer feedback with guidance and input from her co-authors. She also reviewed the final version before it was submitted and is accountable for all aspects of the final work product.

Ward Vanlaar
Contribution: Ward Vanlaar took the lead on the conceptualization of this systematic review and provided guidance throughout the initial development stages as well as feedback and comments during the editing process. Ward also reviewed each of the iterations of the systematic review and provided strategic support for the incorporation of reviewer comments. Lastly, Ward served as quality control for the final version of the systematic review and thus agrees to be accountable for all aspects of the final work product.

Robyn Robertson
Contribution: Robyn Robertson conceptualized this review and assisted in the development of its presentation strategy. She also provided feedback and comment throughout the entire process regarding the structure and content of the report as well as provided a strategy for the incorporation of reviewers' comments. In addition, Robyn served as quality control for the final version of the systematic review and thus agrees to be accountable for all aspects of the final work product.

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Conflict of Interest

Erin Holmes, is an employee of Traffic Injury Research Foundation, which received a contract from the Canadian Centre on Substance Abuse for work on this study.

Ward Vanlaar, is an employee of Traffic Injury Research Foundation, which received a contract from the Canadian Centre on Substance Abuse for work on this study.

Robyn Robertson, is an employee of Traffic Injury Research Foundation, which received a contract from the Canadian Centre on Substance Abuse for work on this study.

Executive Summary

Introduction

Concern about the frequency of drugged driving among youth is high, as the combination of impairment and lack of driving experience increases their risk relative to other age groups of being involved in a collision. Even when they are not impaired by alcohol or drugs, 16- to 19-year-olds have a fatal crash rate more than four times as high as that of drivers aged 25–34 and nine times as high as drivers aged 45–54 (Mayhew, Simpson & Singhal, 2005). Cannabis use and driving, in particular, is a problem among youth, as cannabis is the drug most commonly found in young drivers who are fatally injured in crashes (Asbridge, Poulin & Donato, 2005; Beasley, Beirness & Porath-Waller, 2011). To reduce the occurrence of drugged driving among youth, targeted prevention efforts are needed to educate, raise awareness, change attitudes and alter behaviour.

This report systematically reviews the literature on prevention initiatives and approaches aimed at reducing drugged driving among youth and to determine their effectiveness. The findings from this review will help to inform the development of future drugged driving prevention initiatives specific to a youth audience.

Methods

Researchers conducted a systematic search of literature from a number of databases. They identified, screened and included as evidence relevant studies that evaluated interventions directed to youth to prevent drugged driving. Of the 106 studies the researchers identified, they included nine studies for analysis.

The researchers also conducted an environmental scan of drugged driving prevention programs and campaigns internationally. In addition to online searches, they reached out to road safety and drug policy experts to inquire about the availability of these types of programs and campaigns.

Key Findings

The available body of youth drugged driving prevention literature is limited and outdated, which makes it difficult to offer conclusive findings as to the effectiveness of initiatives or their features. However, the evidence included in this systematic review does highlight four program models and three awareness campaigns that have proven to be promising in altering youth attitudes and perceptions about drug use and driving.

Some evidence shows that education and prevention programs have a positive impact on increasing knowledge and altering youth perceptions about risky behaviours such as drugged driving. The evidence on media and awareness campaigns is weaker, although it does suggest that the messaging reaches its target audience and increases awareness. However, insufficient evidence exists at this time to indicate that these approaches are effective in changing behaviour.

The programs in the studies use different models with various theoretical underpinnings, structures, delivery mechanisms and content. However, some common features among these initiatives appear promising and can be considered for future interventions:

- Specific approaches, such as encouraging youth to examine their attitudes, think critically, make responsible choices and communicate, could create opportunities for empowerment.

- The teaching of coping skills, life skills and peer pressure resistance strategies, as well as having youth assume leadership roles, could build self-esteem.
- The involvement of parents and engagement of the community could expand the outreach and impact of prevention initiatives.

Data about the prevalence and characteristics of the problem suggest a need to develop and deliver drugged driving prevention initiatives targeted to a youth audience. To better inform these efforts, more research is required to determine the effectiveness of existing programs and campaigns, and to establish agreed-upon best practices.

Conclusions

This systematic review identifies several prevention programs and awareness campaigns that increased participant knowledge and altered youth perceptions about drugged driving. While definitive conclusions about the impact of these programs and campaigns on behaviour cannot be drawn because of the limited body of literature, the review does identify promising prevention strategies that affected knowledge and changed attitudes in this area. Prevention initiatives should consider approaches that include teaching specific skills and critical, reflective thinking about decisions. The involvement of parents and engagement of the community could expand the outreach and impact of prevention initiatives.

1. Introduction: Youth and Drugged Driving

Drugged driving (also referred to as drug driving, drug-impaired driving and driving under the influence of drugs) is the operation of a motor vehicle while under the influence of or impaired by a psychoactive drug (including illicit substances, prescription medications, over-the-counter medications, or a combination of substances and alcohol). When ingested, these substances can impair driver performance, thus creating a public safety risk (DuPont, 2011; Weekes, 2005).

The frequency of this behaviour among young drivers is a specific concern, as the combination of impairment and lack of driving experience may increase their relative risk of being involved in a collision. Even when they are not impaired by substances (alcohol or drugs), 16- to 19-year-olds have a fatal crash rate more than four times as high as that of drivers aged 25–34, and nine times as high as drivers aged 45–54 (Mayhew et al., 2005). Cannabis use and driving, in particular, is a problem among youth as cannabis is the drug most commonly found in fatally injured young drivers (Asbridge, Poulin & Donato, 2005; Beasley et al., 2011).

Youth have particular perceptions about the prevalence, acceptability and risk of drugged driving that increase their likelihood of engaging in this behaviour. Some of these perceptions include the belief that:

- Drugged driving is not a serious problem (Heatley, Bruce & Green, 2011; Marcoux, Vanlaar & Robertson, 2011);
- Drugged driving (particularly driving after consuming cannabis) is safer than alcohol-impaired driving (Patton & Brown, 2002);
- Some drug use does not adversely affect driving ability (Porath-Waller, Brown, Frigon & Clark, 2013);
- Some drug use improves driving ability (due to compensation strategies) (Barrie, Jones & Weise, 2011; Dols et al., 2010; Porath-Waller et al., 2013); and
- The likelihood of detection and apprehension for drugged driving is low (Jonah, 2013; Patton & Brown, 2002).

To reduce the occurrence of youth drugged driving, targeted and effective prevention efforts are needed to educate, raise awareness, change attitudes and alter behaviour. The following review is meant to inform these efforts.

Purpose of Review

The objective of this review is to systematically review the literature studying prevention initiatives and approaches aimed at reducing drugged driving among youth, and to evaluate the effectiveness of such initiatives. The intention is to identify effective prevention programs, interventions, initiatives and approaches aimed at reducing drug use and driving among youth and discuss the quality of the research available. The findings from this review will help to inform the development of future drugged driving prevention initiatives specific to a youth audience.

2. Background and Context

2.1 Magnitude and Characteristics of the Problem

Cannabis[1] (or marijuana) is the most commonly used illicit drug among youth, and is also the most commonly found drug in young drivers who are tested at roadside and who are fatally injured in crashes (Asbridge et al., 2005; Beasley et al., 2011; Health Canada, 2013). The magnitude and characteristics of this facet of the youth drugged driving problem are examined in greater detail below.

2.1.1 Magnitude of the Problem

Three types of data sources provide insight into the magnitude of drugged driving among youth: self-report data, fatality/crash data, and roadside survey data. Most of the data in relation to the magnitude of the problem is self-report; however, some crash statistics support what youth indicate in surveys and questionnaires about their drugged driving behaviour.

Self-report cannabis use data: Cannabis is the most commonly used illicit drug among Canadian youth. According to the 2012 Canadian Alcohol and Drug Use Monitoring Survey (CADUMS)[2], the number of youth aged 15–24 who have used cannabis within the last year is currently more than double that of adults aged 25 and older (20.3% vs. 8.4%) (Health Canada, 2013). In some Canadian jurisdictions, approximately 50% of Grade 12 students have reported consuming cannabis within the last year (Young et al., 2011). Even more concerning, Young and colleagues (2011) reported that 2–5% of students between the ages of 12–18 report using cannabis on almost a daily basis. The availability of cannabis and its frequency of use have the potential to increase the likelihood of youth driving under its influence.

Self-report cannabis use and driving data: The Road Safety Monitor (RSM), a Canadian public opinion poll conducted by the Traffic Injury Research Foundation (TIRF), found that in 2010, of the 21.4% of young drivers who admitted to using marijuana or hashish in the past 12 months, 19.7% reported driving a motor vehicle within two hours of use (Marcoux et al., 2011). Other self-report data, such as the 2011 CADUMS, reveal that 12.6% of 15- to 24-year-olds reported driving within two hours of using cannabis, compared to 10.7% who reported driving after drinking (Health Canada, 2012). Furthermore, a 2011 review of high school student drug use data revealed that up to 21% of Grade 12 students had driven at least once within an hour of using cannabis in their lifetime. When the students were asked if they had been passengers in a vehicle where the driver had used cannabis in the past year, up to 48.8% of Grade 12 students answered in the affirmative (Young et al., 2011).

Results from the National Institute of Drug Abuse's (NIDA) *Monitoring the Future* survey show comparable results in the United States, as more than 12% of high school seniors admitted to driving under the influence of cannabis in the two weeks prior to the survey in 2007 (Johnston, O'Malley, Bachman & Schulenberg, 2008). In 2011, this number rose slightly to one in eight (12.5%) high school seniors (Johnston, O'Malley, Bachman & Schulenberg, 2012). Additional literature reveals that drivers aged 21–25 are 2.5 times more likely to drive after drug use than to drive after drinking (Fergusson, Horwood & Boden, 2008; Maxwell, Freeman & Davey, 2009).

[1] The terms cannabis and marijuana are used throughout this report; the use of these terms is dictated by the language in cited studies. Also, the term cannabinoids is used when referenced by individual studies.

[2] CADUMS is a national survey of alcohol and drug use among Canadian residents age 15 and older, conducted on an annual basis.

Fatality/crash data: In Canada, between 2000 and 2010, the number of fatally injured drivers between the ages of 16 and 19 who had drugs in their system (both illicit and prescription medications)[3] rose from 23.6% to 39.2% (Brown, Mayhew & Vanlaar, 2013). It should be noted, however, that this is not necessarily attributed to an increase in the problem itself, as the percentage may also reflect an increase in the number of drivers being tested for the presence of drugs.

Beirness, Beasley and Boase (2013) examined the same data to determine the extent to which psychoactive drugs are involved in driver fatalities among Canadian youth aged 16–24 over a 10-year period. Their initial review of the data suggested that drivers are sometimes tested for a wide variety of drugs, including many substances not known to have psychotropic properties and unlikely to cause driving impairment (e.g., acetaminophen, statins). Therefore, as an initial step, all substances listed in the TIRF fatality database were recoded into categories that correspond to those used by the Drug Evaluation and Classification (DEC) program: central nervous system (CNS) depressants, inhalants, dissociative anaesthetics, cannabis, CNS stimulants, hallucinogens, and narcotic analgesics (International Association of Chiefs of Police, 1999). The findings from this work revealed that the percentage of fatally injured drivers aged 16–24 who had psychoactive drugs detected in their systems has increased from 27.9% in 2000 to 40.0% in 2010. It is important to note, though, that the rate of drug testing among this age group has increased dramatically over this period of time, from 37.4% in 2000 to 55.4% in 2010, which may account for some of the observed increase.

Further analysis of fatality data by Beasley et al. (2011) appears to validate Canadian self-reporting data as it revealed that of those drivers who tested positive for drugs following their death in a car crash, 68.6% of those under the age of 19 and 54.2% of those aged 19 to 24 tested positive for cannabis.

In the United States, cannabinoids, which include any derivatives of cannabis, regardless of legality, accounted for 43% of the drugs detected in fatally injured drivers under the age of 24 (ONDCP, 2011).

Roadside survey data: The results of a recent roadside survey in British Columbia conducted by Beasley and Beirness (2012) identified cannabis as the most common drug type detected in drivers of all age groups with the exception of those 55 years and older. While the numbers are small, the data did reveal that cannabis was the most common drug detected in drivers aged 16 to 18. In the United States, the 2007 National Roadside Survey revealed that drivers aged 16 to 20 had the highest percentage of marijuana positive tests (15.2%) of any age group (Lacey et al., 2009).

2.1.2 Characteristics of the Problem

While cannabis use and driving is clearly an issue among youth, certain factors increase the likelihood of engaging in this behaviour. Several risk factors and characteristics of young cannabis-impaired drivers and youth who choose to be passengers of cannabis-impaired drivers emerge from the literature.

In a survey of 6,087 Grade 10 and 12 students in Atlantic Canada, Asbridge and colleagues (2005) found several factors that correlate with an increased likelihood of driving under the influence of cannabis. Students were more likely to: be male; be in Grade 12; live in rural locales; have used a fake ID to get alcohol; and drive under the influence of alcohol. Students who drove under the influence of cannabis in the past year were more than four times as likely as cannabis-free drivers to have been involved in a collision.

3 This includes all prescription drugs, both those with known psychoactive properties and those without such known properties. Given the lack of knowledge about the effect of many substances on driver performance, the presence of any drug is recorded. This approach has been consistently applied for all data years to ensure comparisons over time are valid.

Porath-Waller and Fried's (2007) survey of 307 Grade 9–12 students in Ontario noted that the more frequently a youth uses drugs, the more likely that youth will be to drive after using drugs or get in a vehicle with a driver who is impaired. An analysis of Michigan driver records and student (Grade 10) survey data from a sample of 5,033 individuals by Shope and colleagues (2004) found that, in general, those who use substances at higher levels are more likely to receive an increased number of driving infractions, including drugged driving.

A longitudinal study of the health, attitudes and behaviour of a New Zealand birth cohort (N = 1,037) found that young adults who engage in persistent drugged driving tend to report low constraint, high substance use, alcohol dependence, cannabis dependence by age 21, juvenile arrest, previous traffic convictions and collisions, and aggressive behaviour (Begg & Langley, 2002; 2004). Poor school performance and high truancy rates were also found to increase the likelihood of driving after using cannabis (O'Malley & Johnston, 2007).

An analysis of 2008 CADUMS data (sample size of 16,672 Canadians aged 15 and older) by Cartwright and Asbridge (2011) found that one of the most common risk factors for being a passenger of an alcohol- or cannabis-impaired driver is age. Youth who have frequently ridden with an adult under the influence of cannabis or alcohol are found to be at higher risk of being passengers of peers who drive under the influence. In addition, youth who consume cannabis frequently are at an eightfold increase of being passengers of a cannabis-impaired driver. Cartwright and Asbridge (2011) also determined that youth who have driven after using cannabis are six times more likely than those who have not to be passengers of a cannabis-impaired driver, and those who live in rural communities with few transportation options are at increased risk.

2.2 Attitudes and Perceptions about Drugged Driving among Youth

Youth are generally concerned about the issue of drugged driving; however, their level of concern is not as great as that of the public. Self-report data from the 2010 RSM public opinion poll reveal that 82.1% of young Canadian drivers (respondents aged 16–24) viewed young drinking drivers as a very or extremely serious problem, which was comparable to the perceptions of adults. However, opinions were more divergent on the issue of youth drugged drivers, as only 69.6% of young respondents identified it as a very or extremely serious problem (compared to 83.1% of adults) (Marcoux et al., 2011).

It appears that young drivers do not necessarily equate the same level of risk to driving under the influence of drugs as they do to driving under the influence of alcohol. In the 2010 RSM, only 70% of youth drivers agreed that they could not drive home safely after taking illegal drugs; this number rose to 86% in relation to driving after consuming alcohol.

Many students also believe that drugged driving is common among their peer group. In a survey of 576 students (average age of 15.9 years) in Atlantic Canada, Heatley and colleagues (2011) reported that 28% of respondents felt their peers would not be concerned with alcohol-impaired driving, and 40% felt their peers would not be concerned with drugged driving. Youth perceptions of peers' attitudes of drugged driving is, therefore, important, as it can increase or decrease the likelihood that they themselves will adopt the perceived viewpoint and engage in the behaviour (Rosenbloom, Beigel, Perlman & Eldror, 2010).

Another common perception among youth is that drugged driving is not a harmful behaviour. Not only do youth believe that drugged driving is less of a risk than drunk driving, but some operate under the misconception that certain drugs can actually improve driver performance (Dols et al., 2010; Porath-Waller et al., 2013). For example, in a 2011 survey of Australian college students, Barrie and colleagues (2011) found that students believed that illegal drugs such as

methamphetamines made them more alert while driving and that being high as a result of using cannabis is the 'safest way' to drive under the influence.

Many youth perceptions about drugged driving also apply specifically to cannabis use and driving. In a survey conducted by Patton and Brown (2002) of 4,680 Manitoba high school students (average age 16.7 years), approximately 19% of respondents saw nothing wrong with driving under the influence of cannabis, compared to less than 5% who felt the same way about driving after consuming alcohol. As for gender differences, over 25% of male students and 13% of female students thought that it was all right to drive under the influence of cannabis (Patton & Brown, 2002).

Students who used marijuana thought that they would be able to hide their level of intoxication and could compensate and adjust to their drug use by simply driving slower (Patton & Brown, 2002). In a qualitative study involving focus groups with 76 youth (aged 14–19) across Canada, Porath-Waller and colleagues (2013) found a common theme among participants: they believe cannabis is safe and has the effect of increasing focus, subsequently improving concentration while driving. The youth further noted that drunk driving is more dangerous, regardless of their opinions about cannabis use.

Part of the reason for the disparity between concerns about alcohol-impaired driving and drugged driving (particularly cannabis) among youth may be due to a perceived lack of enforcement or confusion about the legal consequences of the latter. Another potential explanation is that youth do not fully understand the nature and extent of impairment that substances such as cannabis cause. Youth often believe that there is no way to test for drugs such as cannabis at the roadside (Patton & Brown, 2002). This speaks to a lack of knowledge about both laws and enforcement techniques. To reinforce this point, a survey of Canadians conducted by Jonah (2013) found that only 27% of youth aged 16–19 perceive being stopped or charged by police for cannabis-impaired driving as very likely to happen.

In a summary of the literature on this issue, Vanlaar and colleagues (2008) identified other factors that can influence levels of concern about unsafe driving behaviours. These include:

- Perceived likelihood of occurrence and seriousness of the consequences of the risky behaviour;
- Perceived prevalence of the behaviour;
- Locus of control (a lack of control over a situation increases feelings of concern); and
- Social amplification (increasing fear or concern through communication in social capacities).

In addition, one's perception of whether others share similar beliefs (in the context of this review, whether they believe that their peers hold favourable attitudes toward drugged driving) can validate one's own position or potentially alter behaviour; also referred to as the 'bandwagon effect.'

Summary

Data from self-report, fatality and roadside survey studies about drugged driving reveal a cause for concern due to the frequency of youth driving after using drugs, particularly cannabis.

Certain age, behavioural and contextual characteristics place youth at a greater risk of engaging in drugged driving or being passengers of a drug-impaired driver. In addition, youth perceptions about the prevalence, acceptability and risks of drugged driving also put them at increased risk for doing so. These perceptions include the beliefs that drugged driving is not a serious problem and does not adversely affect driving ability, and that it is safer and less easily detected than alcohol-impaired driving (particularly driving after consuming cannabis). Beliefs and attitudes such as these influence how youth respond when placed in a situation where they are more prone to either drive under the influence of drugs or be the passenger of a drug-impaired driver.

3. Methods

A systematic search of the literature was conducted, which involved the collection of various articles related to the study topic from a number of databases (such as Cochrane summaries, Campbell Library, Health Evidence, Centre for Reviews and Dissemination, Project Cork, PsycINFO, PubMeb, and the CCSA library). From these, particular studies were selected based on their relevance (i.e., whether they contained information related to youth drugged driving prevention or programming).

TIRF's library was also used for the review. This library includes over 30,000 written and electronic materials dealing with various subjects related to road safety research. These materials include research reports, journal articles and conference proceedings.

To locate relevant grey literature including technical reports and other publications, the researchers used Google to conduct an online search. The detailed search strategy for this systematic review can be found in Appendix A.

In addition to the initial literature search, reference lists of included studies and related reviews were scanned to further identify resources that met the inclusion criteria. Publications were reviewed for inclusion based on title, abstract, and finally, full text.

There were no date limitations placed on the search. The following inclusion criteria were applied to identify articles relevant to the topic:

- Does the study evaluate (either process or outcome) a program or campaign that aims to prevent drugged driving in some capacity?
- Does the study evaluate a program or campaign that has a youth target audience?
- Was the study published in English?
- Was the study publicly available?

In total, 70 references were identified through the databases and TIRF library search. An additional 36 references were identified through Google search. Of these 106 studies, 85 were excluded during title or abstract screening owing to a lack of relevance. (A list of excluded studies is available upon request.) In instances where it was unclear from the abstract if the study was relevant or if the abstract fulfilled all study criteria, the full text was retrieved and reviewed. Upon completion of the full text review, an additional 12 studies were excluded. This left nine studies, which were included for analysis. (See Appendix B: PRISMA Diagram.) An assessment of the quality of each individual study is found in the evidence table in Appendix C. All studies with an evaluation component were included in the review because of limited literature in this area.

Some studies contained relevant information about drug-impaired driving but did not conduct an evaluation of a prevention initiative per se. Such studies were not included in the evidence table but were used to provide relevant context and information in other areas of this report.

4. Results: Effectiveness of Drugged Driving Prevention Programs and Campaigns

To date, evaluation of the effectiveness of drugged driving prevention initiatives for youth has been limited. The systematic review identified nine studies that evaluated a drugged driving prevention program or campaign. Combined, the nine studies evaluated four programs and three campaigns. This section describes these initiatives and summarizes their effectiveness. Where possible, commonalities among programs are also highlighted.

The evidence table in Appendix C provides a more detailed overview of each of the studies reviewed, including study design, location, population, sample size, findings, and strengths and limitations.

4.1 Education and Prevention Programs

For the purposes of this systematic review, evaluations of four education and prevention programs were included as evidence. Three of the evaluated programs were American and one was Canadian.

The Alcohol and Substance Abuse Prevention (ASAP) Program[4] in New Mexico exposes youth to real-life social and medical consequences of alcohol and substance abuse through visits and interviews with patients and their families at the University of New Mexico Emergency Department (ED) and Trauma Center. The goal of ASAP is to allow students to witness the consequences of risky behaviour in an effort to educate and deter them from engaging in this behaviour themselves. Established in 1982, the program integrates the prevention model of social learning theory with life skills training, coping strategies and social competencies. The core program model also emphasizes basing prevention in schools through collaboration with educators and integration into curricula. Youth are relied upon as peer educators and are responsible for promoting safety within their schools and communities at large.

The visits to the ED are meant to initiate discussion among youth and promote critical thinking, coping strategies, and reinforce positive values and attitudes. Participants receive communications training to prepare them for interviewing patients with alcohol and drug problems, many of whom may have been hospitalized for a motor vehicle collision. Students then make three supervised four-hour visits to the ED and one visit to a detention facility, where they are encouraged to discuss their feelings and thoughts about their patient interactions. The students then present their experiences to peers and family members. Another topic of discussion during the program is how to address peer pressure to drink, use drugs and drive under the influence of substances.

Bernstein and Woodall (1987) conducted an evaluation of ASAP using a pre-test, post-test and eight-month follow-up design that compared the effectiveness of the program with traditional classroom models in changing perceptions of the riskiness of drinking, using drugs and driving. The study sample was comprised of 33 predominantly Hispanic Grade 7 middle school students who were randomly assigned to an experimental (17 students) or control group (16 students). Both experimental and control groups received the Berkeley Health Education Curriculum for one semester, which presents the consequences of alcohol and drug use through a workbook, homework assignments, role-playing exercises and small group exercises. The experimental group participated in ASAP, whereas the control group did not.

[4] The ASAP Program is no longer administered.

The evaluation revealed a significant difference (p =.049) related to attitudes between the experimental and control groups. The experimental group perceived the riskiness of driving under the influence of drugs or alcohol to be greater over time, whereas the control group's perception of riskiness for driving under the influence decreased over time. No significant differences were found related to knowledge of consequences or self-reported behaviours between the two groups. In other words, the impact of the ASAP program on participant attitudes increases over time.

Researchers noted that important elements of the ASAP program include reaching students at a young age, integrating prevention efforts within schools, providing opportunities for dialogue and critical thought among peers, addressing perceptions of risk of substance use and driving, and creating peer educators who can be active in schools and the community.

Life Skills Training (LST) is a preventive intervention that teaches middle and high school students alcohol and drug resistance skills and norms against drinking and drug use through group discussion, demonstrations, modelling exercises, feedback, reinforcement and behavioural homework assignments. The program is based in problem behaviour theory (PBT), which assumes that adolescents engage in negative behaviour to achieve a perceived goal within their environment (e.g., attempting to fit in with peers). Life Skills Training focuses on developing cognitive behavioural skills in an effort to resist peer pressure and build self-esteem and, subsequently, eliminate problem behaviour.

The program is a three-year intervention that is commonly delivered in Grades 6–8 or 7–9 and can be administered by teachers, counsellors or youth peer leaders. The first year of the program consists of 15 sessions; the number of sessions decreases in subsequent years (10 and five sessions, respectively). The structure of the program is somewhat flexible in that sessions can be delivered on a weekly basis or together in intensive courses. These sessions focus on three areas: information about drug use, social skill development and self-management skills.

Griffin and colleagues (2004) conducted a longitudinal randomized trial utilizing self-report data collected from students and matched to Department of Motor Vehicles (DMV) driving records to evaluate the effectiveness of LST. The objective of the study was to determine whether participation in the program reduced risky driving behaviour among high school students. The final sample consisted of 2,042 students (1,360 in the experimental group and 682 in the control group). A randomized block design was chosen, consisting of two experimental groups (LST with a one-day training workshop for providers and LST with videotaped training for providers) and one control group (no intervention). Students in the experimental groups received LST in Grade 7, followed by booster interventions in Grades 8 and 9. The self-report data on demographics and substance use were obtained from participants in Grades 7, 10 and 12; the DMV data (number of traffic violations and number of points on the driving record) was collected approximately six years after the initial collection of the program data.

A statistically significant finding of the study was that students who participated in LST were less likely to have violations (p = .0205) and points (p = .0239) on their driving records compared to those who did not complete the program, controlling for the effects of gender and alcohol use, although this is an indirect measure of success for the outcome of drugged driving (Griffin, Botvin & Nichols, 2004).

The **A.D.D.Y. (Alcohol, Drugs, Driving and You) Program**[5] was developed in 1982 by a non-profit organization in Colorado that specializes in drug and alcohol abuse educational programs. It is a comprehensive program targeted at Grade 10 students and designed to prevent adolescent drinking, drug use and driving after these behaviours. The program provides facts and figures to dispel misconceptions and increase knowledge of the consequences of impaired driving. Additional

[5] The A.D.D.Y. Program is no longer administered.

goals include increasing knowledge of how substances impair driver performance, supporting alternatives to impaired driving, and developing responsible attitudes. A.D.D.Y. encourages involvement of parents and promotes interaction of parents with their children to discuss impaired driving. It also empowers youth to take the lead in developing prevention and awareness activities within their schools and community.

The program uses a variety of delivery mechanisms and materials including a curriculum, educational posters, discussion guides for students and parents, student activity and media kits, and teacher training videos. The curriculum is designed to be delivered in health, driver education or other special issues classes over the course of five to 15 days (dependent on how many activities are included, e.g., classroom discussions, debates, role-playing, etc.). Lesson material focuses on the effects of alcohol and drugs on driving, legal consequences associated with use, myths and facts, and how to resist peer pressure and instead make responsible choices. The education posters use a humorous as opposed to fear-based approach to "reinforce positive prevention messages" (Young, 1991, p.22). The discussion guide assists families to establish dialogue about the consequences of impaired driving. The student activity kit and assembly guide encourage youth to take the lead on developing public service announcements (PSAs) and implementing a school assembly on the issue of alcohol- and drug-impaired driving.

Young (1991) summarized several evaluations of A.D.D.Y. conducted in the 1980s. In 1984, an evaluation of 544 students from Colorado high schools used a pre-test and post-test design to determine whether A.D.D.Y. participants experienced cognitive or attitude changes. The study found significant gains in student post-test knowledge of drugs and drug classifications, effects of alcohol and drugs on driving, causes of collisions, and legal matters related to driving under the influence. In addition, those students who participated in the program reported a significant reduction ($p<.01$) in aggressive driving behaviours (no definition of these behaviours was offered).

The following year, an additional 1,173 Colorado high school students were surveyed with similar results. Significant positive changes ($p<.05$) in acceptance of responsibility for driving were noted. Moreover, the students who completed A.D.D.Y. also had significant gains ($p<.001$) in their knowledge of the effects of alcohol and drugs, and in understanding their decision-making in alcohol and drug situations (Young, 1991).

Finally, in 1986 a national pre-test, post-test evaluation was conducted. A sample of 808 students in 34 classrooms from nine states was compared against a control group of 220 students from 12 classrooms. Students who completed the A.D.D.Y. program had higher scores in a number of areas. Of particular interest, the experimental group was significantly more likely to avoid riding with an impaired driver ($p<.1$) and to understand the impact of impaired driving ($p<.1$) than students in the control group. The study also found gender differences, as attitude changes for females were more desirable than those of males, especially related to willingness to take responsibility for themselves ($p<.05$) and willingness to avoid driving while impaired ($p<.1$). The program was also favourably received by teachers nationally, with a mean rating of 3.35 on a 4-point scale (Young, 1991).

The researchers identified several valuable aspects of the A.D.D.Y. program. These include a flexible curriculum, multiple activities and components, and a comprehensive approach that involves students, parents, schools and the community. Continued evaluation of the program through student surveys and stakeholder focus groups (consisting of teachers, students and community members) to inform curriculum updates also serve to enhance and tailor content. One innovative aspect of this program is that "culturally enriched" versions were developed and piloted to reach particular high-risk segments of the youth population, specifically Native American students. In the development and implementation of any drugged driving education or prevention program, it is worth considering whether it can be adapted to various cultural groups to improve messaging and be more relevant.

The **P.A.R.T.Y. (Prevent Alcohol and Risk-Related Trauma in Youth) Program** is a Canadian program developed in Toronto in 1986 that addresses issues related to teens taking unsafe risks (such as alcohol consumption, drug use and associated risky behaviours like unprotected sex and driving under the influence). The one-day program is designed to raise awareness about the potential for injury and to encourage youth aged 15 and older to make responsible decisions. The P.A.R.T.Y. Program is delivered in a hospital setting with the goal of providing youth with "information about trauma that will enable them to recognize potential injury-producing situations, make prevention-oriented choices, and adopt behaviours that minimize unnecessary risk" (Banfield, Gomez & Kiss, 2011, p.732). While first developed in Canada, the program has since been implemented internationally with noted success in countries such as Australia.

The program is offered on a weekly basis during the course of the school year to groups of 35–40 students who are accompanied by a teacher or adult facilitator and, in some instances, with groups of at-risk youth. Participants follow the occurrence of a traumatic injury from the event through to rehabilitation and community reintegration and interact with a healthcare team, law enforcement, social workers and individuals who have sustained injuries to understand the potential consequences of risk-taking behaviour. At the completion of the program, students sign a "Contract for Life" that represents a commitment to minimize risk, and are assigned follow-up activities (such as creating PSAs, letter-writing and role-playing) to facilitate and encourage discussion with peers and family members.

Banfield and colleagues (2011) examined the effectiveness of the P.A.R.T.Y. Program in preventing traumatic injuries from 1992 to 2004. A study group of 1,281 program participants was matched with a control group based on age, gender, residential area and initial year in database. Hospital discharge database information and provincial health claim data were collected to determine the incidence of traumatic injury for both the study and control groups. Fewer traumatic injuries were found to occur among the study group (43.3%) compared to the control group (47.4%, $p = .02$). Individuals in the control group were at a 21.8% greater risk of traumatic injury. Another significant finding was that the reduction of traumatic injuries was greater among females (4.9%) as compared to males (3.8%, $p = .04$). As noted by the authors, this finding is consistent with Canadian economic burden of injury data, which show that males aged 15 to 19 have a higher rate of injury than their female counterparts in the categories of violence, suicide, falls and transport (Banfield et al., 2011).

Ho and colleagues (2012) conducted a retrospective cohort study on the effectiveness of the program in reducing risk-taking behaviours among the juvenile offender population between 2006 and 2010. All P.A.R.T.Y. Program participants during this period completed pre-program and post-program questionnaires. These questionnaires were designed to assess changes in perceptions and knowledge of risk-taking behaviour after completing the program. During the study timeframe, 3,659 juvenile offenders were sentenced by court magistrates; of that number, 225 were referred to the P.A.R.T.Y. Program.[6] These offenders tended to be male, of European or Aboriginal descent, and had no prior offences. Survey results revealed a significant portion of these offenders reported that participating in the program would modify their attitude on risk-taking behaviours (21% before and 57% after, $p<.001$).

Additional data were obtained from the Department of Health and Western Australia Police to assess the incidence of subsequent injuries and offences of all juvenile justice offenders. Those who participated in the P.A.R.T.Y. Program had a lower incidence of subsequent traffic or violence-related offences compared to those not referred to the program (3.6% versus 26.8%). Juvenile offenders

[6] There were no set referral criteria to the P.A.R.T.Y. Program for the purposes of this study. All that was required was agreement on an action plan (which could include program participation) between the magistrate and the juvenile offender.

who participated in the program also had lower incidences of injuries leading to hospitalization (0% versus 1.6%) and alcohol or drug-related offences (0% versus 2.4%).

While the P.A.R.T.Y. Program is not specifically focused on drugged driving prevention, it does have implications for the reduction of this behaviour among participants. Research has shown that motor vehicle crashes account for the majority of traumatic injuries among youth (Banfield et al., 2011; Ho et al., 2012). The two studies included in this review note that the program has been successful in modifying youth attitudes on risk-taking behaviours, which may be transferable to drug use and drug-impaired driving.

Summary

Based on the four programs included in this review, evidence does suggest that education and prevention programs are effective in changing youth perceptions or attitudes and knowledge. Program participants reported changes in perception of drugged driving risk (ASAP) and attitudes on risk-taking behaviours (P.A.R.T.Y.), and increased knowledge of drugged driving issues (A.D.D.Y.). Weak evidence suggests these approaches influence behaviour changes such as reductions in aggressive driving behaviours (A.D.D.Y.) and avoidance of being a passenger of impaired drivers (A.D.D.Y.).

4.2 Media and Awareness Campaigns

In recent years, the number of campaigns specific to the issue of drugged driving has increased. However, similar to drugged driving prevention programs, the majority of these campaigns have not been evaluated for effectiveness. Evidence from evaluated Canadian, British and Scottish campaigns is presented in this subsection.

For more information about the specifics of campaigns, please refer to Appendix C, which contains a summary of many past and current international drugged driving awareness campaigns identified during the course of the environmental scan.

The *Drugged Driving Kills: Why Drive High?* (DDK) campaign was developed in Ottawa as a joint project between Ottawa Public Health and Carlington Community and Health Services. This campaign is unique, as it is an entirely youth-driven communications campaign that is also multicultural and inclusive in its development approach. The campaign had a target population of youth aged 13 to 25.

The primary goal of the campaign was to enable youth to "make informed, healthier decisions regarding cannabis use and decrease the problematic behaviour of driving impaired by marijuana." Several accompanying objectives were also established: increased awareness about the effects of cannabis on health, increased awareness about the risks of driving after using cannabis and riding with a cannabis-impaired driver, and creation of a supportive environment that promotes healthy attitudes, skills and resiliency (Marko & Watt, 2007). The overarching goal and objectives were to be accomplished through education and skill development as well as collaborations and partnerships within the community.

Another important aspect of the project was to adhere to the Holden model, a framework for cultivating youth empowerment. In Holden's conceptualization, youth empowerment occurs through engagement and participation, which can be achieved only when adult influence is minimal (Marko & Watt, 2011). Factors such as group structure (i.e., leadership opportunities, involvement in the decision-making process), group climate (i.e., level of cohesion, efficacy), and the degree or nature of adult involvement can either positively or negatively affect communication, collective youth participation, and ultimately, the desired outcome of empowerment.

Prior to the development of the campaign, stakeholders were brought together to discuss how to address cannabis issues. Once drugged driving was selected as a focus, DDK was implemented in a stepwise approach.[7]

The campaign launch was aligned with the academic school year and lasted six to 12 weeks; a second, shorter campaign was launched to coincide with graduation. Based upon initial campaign analysis, recall of the content was high and the target audience agreed that the messaging resonated (Marko & Watt, 2007). Moreover, because of the level of involvement of community partners and the continued collaboration among those involved in the campaign, dissemination of materials and resources was prolonged and widespread.

In an evaluation of campaign development, Marko and Watt (2011) conducted focus groups to determine to what extent the youth-led, adult-guided framework fostered leadership and empowerment among youth. The qualitative study design involved focus groups with youth advisors and adult facilitators involved in campaign development. Each focus group had three participants and lasted for a total of 90 minutes. Questions were designed to "obtain information about the structure of the youth advisory group, the group climate, and adult involvement in the group" (Marko & Watt, 2011, p. 322). Once the data were collected, thematic coding was completed and the resulting themes were compared to assess the model's success, from both youth and adult perspectives.

Focus group findings were generally quite positive. The youth advisors felt that the campaign helped them foster leadership skills, which allowed them to effectively communicate drugged driving messages to their peers. The greater the role that youth took on in the planning, development and implementation of the campaign, the more confident they became in engaging in outreach with peers and the community (Marko & Watt, 2011). The youth advisors also saw value in the multicultural nature of the project, which increased group cohesion. The adult facilitators made an important contribution by providing youth with relevant topic information and assisting them in digesting and understanding drugged driving research and facts. The sharing of information created constructive dialogue and allowed youth to validate their beliefs on the subject. Toward the end of the process, as the youth advisors assumed more responsibility, they began to embody characteristics of the facilitators such as openness, honesty, inclusiveness and respectfulness (Marko & Watt, 2011). In this way, the youth became empowered.

While the evaluation of DDK focused specifically on campaign development as opposed to outcomes on drugged driving attitudes and behaviours, an important lesson learned is the benefit of strategic planning and engagement with the target audience. The messaging was believable and easily understood because it was developed in consultation with youth. The peer-led strategy also lent credibility to these efforts, because it allowed youth to discuss the issue and arrive at their own conclusions (Marko & Watt, 2007; 2011). The campaign was also culturally appropriate due to the involvement of youth from a variety of ethnic backgrounds. Lastly, the high level of collaboration and involvement of community partners helped to address issues as they arose and facilitated greater reach of campaign messages through the dissemination of uniform information.

The ***Drug Driving… You'd Be Off Your Head*** campaign was implemented in the United Kingdom in 2003 to raise awareness about the penalties associated with drugged driving, reduce collisions, and address the issue of drugged driving among 17- to 25-year-olds; it was later re-launched in 2006 and

7 The steps included: recruiting youth advisors from various ethnic communities to inform messaging; training, empowering and engaging youth advisors throughout the development of the project; surveying high school students to gauge awareness and beliefs about cannabis use; establishing partnerships and protocols for the transfer of information among involved parties; holding regular meetings with community partners to establish roles and responsibilities; developing appropriate multicultural messages and ensuring that they maintain cultural relevance when produced; determining the best time to launch the campaign; identifying and recruiting youth leaders from local high schools to employ a peer-led approach and lend credibility to campaign messages; and delivering the campaign using various mechanisms including PSAs, posters, print media, transit shelter advertising, etc. (Marko & Watt, 2007).

2008. The campaign featured four PSAs: two focused on the penalties and social consequences associated with drugged driving, and two highlighted the roadside drug testing process used by law enforcement. Beer mats and washroom posters that featured campaign images were distributed to more than 400 bars, pubs and clubs across London.

During the duration of the campaign, drug-related road deaths decreased from 12 in 2002 to 0 in 2004 (in the Durham region). A survey tracking changes in attitudes and knowledge about drugged driving penalties was conducted following the initial launch of the program. By 2005, the survey had more than 4,000 respondents. A key outcome finding was that awareness increased to over 40%, two years post-launch among the target age group (Raes, Pil, Van den Neste & Verstraete, 2007).[8]

The ***Drug Driving*** campaign was implemented in 2002 by the Scottish Road Safety Campaign and the Association of Chief Police Officers in Scotland. The campaign was targeted at youth aged 17–24 years and focused on raising awareness of the likelihood of drugged driver detection through a humorous advertisement.

A three-pronged evaluation was conducted by Ormston (2003) to determine the effectiveness of this campaign in increasing awareness and understanding about the ability of law enforcement to detect the presence of drugs. The first phase of the evaluation involved a series of questions about the advertisement being included in the Scottish Opinion Survey (SOS). This was followed by a separate quota survey administered to a sample of 730 Scottish drivers six to ten weeks after the campaign was launched, and five peer focus groups. Paired depth interviews[9] were conducted with five drivers in the target age bracket along with their partners or close friends.

Findings from the evaluation indicated that the advertisement was successful in reaching the target audience, as 76% of survey respondents of the SOS and 70% of quota survey respondents remembered viewing a drugged driving advertisement.

The evaluation further identified several barriers that were encountered in uptake of the messaging by the targeted age group. For instance, youth had difficulty identifying with the characters portrayed in the advertisement because they appeared to be too old and under the influence of alcohol as opposed to drugs. Moreover, the qualitative interviews revealed that many individuals perceived a lack of enforcement accompanying the campaign, which diminished the overall message.

Summary

Based on the three studies included in this review, some evidence suggests that media and awareness campaigns are effective in reaching the target audience and raising awareness about drugged driving issues, but are less effective at increasing knowledge and understanding. Campaign messages focused on making healthier decisions about drugged driving, as well as increasing awareness of law enforcement's ability to detect drug-impaired drivers and the consequences associated with this behaviour. The process evaluation of the DDK campaign also identified the value of using a youth-led, adult-guided framework to foster leadership and empowerment among youth participants.

8 Additional information about this evaluation was unavailable.

9 For the paired depth interviews, a core participant (aged 17–24) was recruited who held a full licence and some experience of cannabis use. Some of these participants were recruited through the driver survey and others were recruited using a door-to-door approach. The core participant was asked to bring a friend or significant other to participate in an interview with the hope being that by interviewing these individuals together, they would "feel more confident about engaging with the topic, but also that they would reflect on, build on, or challenge each other's accounts" (Ormston, 2003, p. 37). The final sample of five pairs consisted of one couple, two pairs of female friends, and two pairs of male friends.

4.3 Recent Drugged Driving Initiatives Developed for Youth

Two additional examples of drugged driving prevention programs are described below. These programs are fairly new and have yet to be evaluated for effectiveness; as such, they are not included in the review's evidence table. However, these initiatives were designed specifically for a youth demographic, deal directly with the issue of drugged driving prevention, and incorporate many of the elements of the programs included in the review of evidence. These programs serve as examples of what is currently being done in North America to prevent youth drugged driving.

The Drugs & Driving program was created by the Centre for Addictions Research of BC with funding from Health Canada. The program has two components: a module and the creation of a community coalition. The Drugs & Driving Module aims to "help Grade 10 students develop the knowledge and skills needed to implement a broad social marketing strategy for addressing drug-impaired driving in their communities" (Reist, Dyck, & Bodner, 2011, p. 3). The module uses a constructivist approach and focuses on teaching health literacy, which encourages students to develop skills and strategies to address issues such as drug use through knowledge as well as their own social reality and experiences. The module is comprised of six one-hour lessons and contains a variety of activities. It also uses different engagement and delivery strategies such as online games, exercises and contests.

The six lessons include:

- Spreading the word about alcohol and other drugs;
- Character and other factors that influence behaviour;
- Knowing your network and its influences;
- Understanding our social contracts;
- Understanding and influencing social norms; and
- Presentation day.

The second portion of the program is the creation of a community coalition through outreach efforts. Mobilizing a community can bring awareness to the issue of drugged driving and promote social responsibility on the part of all community members. The objective of establishing a coalition is to implement the social marketing campaign that students develop in the module component. The Centre for Addictions Research of BC has produced a guide to aid in these efforts and to assess the effectiveness of coalitions once formed.

The Teen Drugged Driving: Community Awareness Activity Toolkit was developed by the U.S. Office on National Drug Control Policy (ONDCP). It contains activities to guide education and engagement of youth, their parents and communities in efforts to reduce drugged driving. The *Community Awareness Activity Toolkit* includes examples of how to approach the issue of teen drugged driving through engagement with the community. The program is comprehensive and uses multiple delivery strategies to engage a younger audience. It also seeks to involve parents in the education and prevention process.

Similar to the *Drugs & Driving Program*, the activities contained in the toolkit are designed to raise awareness about drugged driving, educate and engage parents and teens about the issue, provide tips and advice to identify the risks of drugged driving, and encourage local media to help raise awareness of the issue. Examples of activities and resources include developing a drugged driving prevention night (aims to help community and youth organizations partner with schools, law enforcement and other agencies to engage parents and teens in a discussion about the issue); a

panel or roundtable discussion guide; “D.Driver” activity for teens (using video games and real-life scenarios to help teens gain a better understanding of the potential consequences of drugged driving); a facilitator discussion guide; and a drugged driving poster contest activity for teens (challenges teens to think critically about the dangers of drugged driving to inspire the development of their own visual expressions about the issue). The toolkit represents an innovative approach to addressing the youth drugged driving problem.

5. Discussion

The limited and outdated body of literature available in the area of youth drugged driving prevention makes it difficult to draw clear, definitive conclusions about the effectiveness of initiatives or their features. The evidence included in this systematic review does indicate that education and prevention program models that have been evaluated have proven promising in altering youth attitudes, perceptions and knowledge related to drug use and driving. Media and awareness campaigns can raise awareness of the issue. But enough literature does not currently exist to support assertions of effectiveness related to behaviour change. These studies also identify indicators that could be used to evaluate such programs.

However, based on the few studies included in the review, evidence does somewhat support the effectiveness of the described program models in the former categories:

- Participants in the ASAP program experienced a change in their perceptions of the riskiness of driving under the influence of drugs or alcohol over time, whereas a control group experienced the opposite (Bernstein & Woodall, 1987).
- Students who participated in LST were less likely to have violations and points on their driving record in comparison to students in a control group (Griffin et al., 2004), which suggests potential behavioural differences.
- The A.D.D.Y. Program evaluations found gains in student post-test knowledge on a variety of topics, including the effects of drugs on driving, understanding decision-making in alcohol and drug situations, and understanding the impact of impaired driving (Young, 1991). Participants also reported significant reductions in aggressive driving behaviours, greater acceptance of responsibility for driving, and greater likelihood of avoiding being a passenger of an impaired driver (Young, 1991).
- Students who completed the P.A.R.T.Y. Program were found to have fewer traumatic injuries than a control group (Banfield et al., 2011), which again suggests positive behaviour change as a result of the intervention. Juvenile offenders who participated in the Australian version of the program reported that the experience modified their attitudes on risk-taking behaviour (Ho et al., 2012). The evidence seems to support the change in attitude, as those in the study group had lower incidences of subsequent traffic or violence-related offences, injuries leading to hospitalization, and alcohol or drug-related offences (Ho et al., 2012).

Engagement with community and parents: While each of the programs uses different models with various theoretical underpinnings, structures, delivery mechanisms and content, some commonalities did emerge. Two of the programs, A.D.D.Y. and LST, emphasize the importance of education and are integrated into the larger school setting by involving or connecting with the community and parents. The ASAP and P.A.R.T.Y. programs also have ties to schools, but primarily take place in emergency departments or trauma centres. The focus of these two programs tends to move past the provision of facts or transfer of knowledge and instead emphasizes the risks and consequences associated with certain behaviours. Specific themes also run through most of these programs, as they encourage youth to examine their attitudes, think critically, and make responsible choices. Dialogue is encouraged as youth are expected to share their thoughts and feelings on issues such as drug use.

Life skills: Other common elements of these programs are the teaching of coping skills, life skills and peer pressure resistance strategies. Youth are given opportunities to assume leadership roles and provide their peers with support and guidance, building self-esteem in the process. Each program

attempts to involve parents in the lives of their children, often through discussion activities. The programs also include efforts to engage the community at large, particularly in the P.A.R.T.Y. and A.D.D.Y. programs. Lastly, all of the programs use a variety of activities to keep youth participants interested, engaged and motivated.

Each of these approaches or strategies appears to be promising among youth participants, particularly in increasing drugged driving knowledge and altering perceptions. More research is needed to determine which individual program features produce the best outcomes and whether these types of initiatives are effective in ultimately changing behaviour (i.e., reducing drugged driving).

The media campaigns included in this review had limited evidence that suggested the messages reached the target audience and increased knowledge. The development and implementation process used in the *Drugged Driving Kills* campaign encompassed many of the approaches found in prevention programs. Whereas the other campaigns included in this review were delivered with the primary purpose of raising awareness, the DDK sought to empower youth as well as educate them.

Through the use of media campaigns, the messages used in these types of programs can be delivered to a larger youth audience. Opportunities do exist to use elevated concern around the issue of drugged driving to influence opinions and, subsequently, influence behaviour change (Vanlaar & Yannis, 2006). As noted previously, youth often view drugged driving as a normal practice and believe risk is limited (e.g., consequences) associated with the behaviour. Therefore, education and awareness programming and campaigns must endeavour to address misconceptions surrounding risk and deliver messaging that will raise concern to an appropriate and realistic level among the youth target population (Marko & Watt, 2007).

Through the course of the review, some additional promising prevention strategies were identified. These include:

- Develop targeted and tailored initiatives;
- Let youth inform the drugged driving initiative;
- Address youth attitudes and perceptions about drugged driving;
- Use consistent and appropriate messaging that will resonate with a youth audience;
- Be strategic with implementation timing;
- Recognize the power of peer influence;
- Involve parents;
- Mobilize the community; and
- Conduct enforcement in conjunction with drugged driving education and awareness.

In reviewing the prevention evidence, an important caveat should be kept in mind: prevention alone cannot address the youth drugged driving problem. Instead, a multi-faceted and comprehensive approach is required that involves a combination of legislative initiatives and enforcement strategies (e.g., roadside oral fluid testing [see Freeman, Davey, Palk, Lavelle & Rowland, 2008]) as well as education programs and awareness campaigns (Beirness, Swann & Logan, 2010). Enforcement efforts are necessary because they reinforce common education messages about risk of detection and consequences associated with driving under the influence of drugs (Organization of American States, 2012). Overall, it is important to recognize the value of coupling effective prevention initiatives (e.g., educational programming and targeted awareness campaigns) with enforcement to create drugged driving deterrence among youth. Although this review focused on drug-impaired driving, lessons learned may be found from successful initiatives related to drinking and driving.

5.1 Implications for Research

The issue of youth drugged driving prevention has yet to be extensively researched in terms of effectiveness of programming and campaigns. As a result, opportunities abound to develop future research projects related to this topic. To fill existing gaps in literature, the following types of studies are recommended to inform the development and implementation of effective prevention programs and campaigns that will resonate with the target youth audience.

- Outcome evaluations of existing youth drugged driving programs and campaigns to determine whether they increase knowledge, alter perceptions and attitudes, and ultimately, behaviour.
- Evaluations of youth drugged driving media campaigns to determine relative effectiveness of specific campaign themes and messages and whether they resonate with young drivers.
- Survey or focus groups of youth to determine which drugged driving prevention messages would most resonate and potentially increase the likelihood of thinking critically about the behaviour and making a decision not to engage in that activity.
- Survey of youth to not only gauge attitudes about drugged driving or the frequency of drugged driving behaviour, but also to identify the extent of knowledge about drugged driving, laws, consequences and perceptions about harm and social acceptability of drugged driving (specifically, cannabis use and driving). This information can be used to inform the development of education (prevention) programs, graduated driver licensing curricula components and awareness campaigns.
- Process evaluations of youth drugged driving programs and campaigns during their development and implementation. These evaluations would be similar to the one conducted by Marko and Watt (2007; 2011), focusing on documenting what works well and what challenges arise during the creation and delivery of these programs and campaigns. The evaluations would make future efforts better informed and common barriers to successful implementation easier to overcome.

6. Conclusions

The purpose of this systematic review was to identify effective prevention programs, interventions, initiatives and approaches aimed at reducing drug use and driving among youth. Relevant studies that evaluated interventions to prevent drugged driving and have a youth target audience were identified, screened and included as evidence.

Some evidence supports the idea that education and prevention programs are effective in increasing participant knowledge and altering youth perceptions of risky behaviours such as drugged driving. The evidence for media and awareness campaigns is weaker, although it does suggest that the messaging reaches its target audience and increases awareness. Evidence that these approaches are effective in changing behaviour remains insufficient.

These initiatives share some commonalities that appear promising and can be considered for future interventions:

- Specific approaches, such as encouraging youth to examine their attitudes, think critically, make responsible choices and communicate, could create opportunities for empowerment.
- The teaching of coping skills, life skills and peer pressure resistance strategies, as well as having youth assume leadership roles, could build self-esteem.
- The involvement of parents and engagement of the community could expand the outreach and impact of prevention initiatives.

While these strategies offer a basis on which to improve youth drugged driving prevention initiatives, the existing body of literature needs to be expanded. To better inform these efforts, more research is needed to determine the effectiveness of existing programs and campaigns and to establish agreed-upon best practices. It would be beneficial not only to evaluate programs that are currently delivered (such as those presented in Section 4.3) but also to include evaluation frameworks within programs and campaigns that are in the process of being developed.

In conclusion, this systematic review revealed that while gaps exist in youth drugged driving prevention literature, several approaches show promise and should be pursued in the development and implementation of initiatives. The frequency of youth drugged driving establishes a clear need to deliver these education programs and awareness campaigns. The absence of informed and evidence-based initiatives misses an opportunity to target youth for prevention efforts and to reduce the drugged driving problem among this high-risk segment of the population. Future attention should therefore be devoted to the evaluation of initiatives to identify effective features and strategies for prevention.

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Appendix A: Search Strategy

The following search strategies were used to identify literature and information relevant to this systematic review of youth drugged driving prevention initiatives.

Academic Literature Search Strategy

Table 1. Academic literature search strategy

Source	Search parameters
Cochrane summaries	Browsed section on tobacco, drugs and alcohol dependence. Searched: driving
Campbell library	drugged driving prevention (all text) impaired driving (all text)
Health Evidence	impaired driving prevention
Centre for Reviews and Dissemination	impaired driving
Project Cork	drug misuse AND driving AND prevention (keywords) Driving AND prevention (keywords)
PsycINFO	prevention (IT) AND driving under the influence (IT)
PubMed	(“Automobile Driving”[MeSH]) AND “Substance-Related Disorders/prevention and control”[MeSH] (“Cannabis”[MeSH]) AND “Automobile Driving”[MeSH] (“Accidents, Traffic”[MeSH]) AND “Cannabis”[MeSH] (“Cannabinoids”[MeSH]) AND “Automobile Driving”[MeSH] (2012-2013) (“Automobile Driving”[MeSH]) AND “Marijuana Abuse”[MeSH] (2012-2013) (“Automobile Driving”[MeSH]) AND “Marijuana smoking”[MeSH] (2012-2013)
Google Scholar	allintitle: driving prevention drug allintitle: driving prevention cannabis allintitle: driving prevention marijuana allintitle: driving preventing drugs allintitle: youth drug driving prevention allintitle: youth impaired driving prevention allintitle: youth drug driving program allintitle: youth drug driving campaign allintitle: student drug driving prevention allintitle: student drug driving program allintitle: student drug driving campaign
CCSA library	Driving (Subject) DWI & prevention (Subject) Prevention & Drug use and driving (Subject)

TIRF Library Search Strategy

In searching TIRF's library, the following variables were created:

- Age variable: youth; adolescent; teen; student; beginner; novice; school age; offspring; child; juvenile; secondary school; college; university; year/age 15; year/age 16; year/age 17; year/age 18; year/age 19; year/age 20
- Drug variable: cannabis; marijuana; marihuana; THC; cocaine; methamphetamines; heroin; substance; drug; illicit
- Driving variable: driving; driver; vehicle; motorcycle; traffic
- Prevention variable: prevention; program; campaign; education; awareness; deterrence

Searches were then conducted to identify articles that had titles that contained at least three of the above variables.

Grey Literature Search Strategy

The following Internet search parameters were used to identify grey literature publications:

- "drugs and driving prevention"
- "drugged driving prevention"
- "drugged driving" prevention
- "drug influenced driving prevention"
- "drug influenced driving" prevention
- "drug impaired driving prevention"
- "drug impaired driving" prevention
- "drug use and driving" prevent
- "preventing drugs and driving"
- "drug driving prevention"
- "preventing drug driving"
- "preventing drug driving" evaluation
- "preventing drug driving" review
- "driving under the influence of drugs" prevention
- "preventing driving under the influence of drugs"
- "prevention of driving under the influence of drugs"

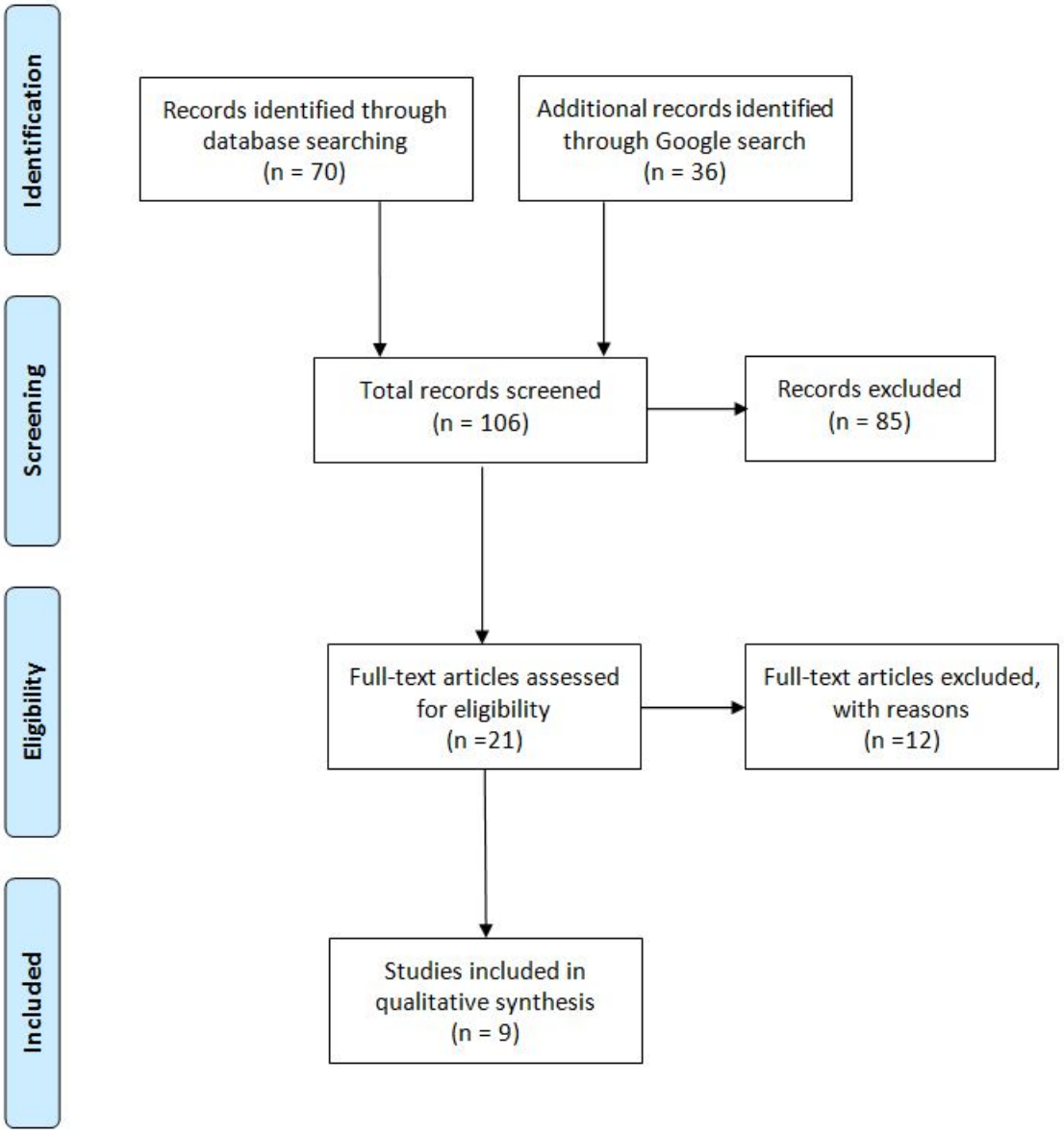
Road Safety and Drug Policy Experts Contacted

In an effort to identify youth drugged driving prevention initiatives, the following individuals were contacted for their insights:

- Troy Costales
  Safety Division Administrator, Oregon Department of Transportation
  Vice Chairman, Governors Highway Safety Association
- Dr. Robert DuPont
  President, Institute for Behavior and Health
- Dr. Jane Maxwell
  Senior Research Scientist, Center for Social Work Research, The University of Texas at Austin
- Kendell Poole
  Director, Tennessee Governor's Highway Safety Office
  Chairman, Governors Highway Safety Association
- Dr. Kevin Sabet
  Director, Drug Policy Institute, University of Florida

Appendix B: PRISMA Flow Diagram

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)



Based on Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. *PLoS Med*, *6*(6): e1000097.

Appendix C: Included Studies

The studies included in this review are listed below. Table 2 is an overview of the included studies that provides an outline for each study and a summary of the evaluated prevention initiative, along with study design, location, population, sample size, outcomes and findings, strengths and limitations, and whether the study was peer reviewed.

Banfield, J., Gomez, M., & Kiss, A. (2011). Effectiveness of the P.A.R.T.Y. Program in preventing traumatic injuries: A 10-year analysis. *Journal of Trauma, Injury, Infection, and Critical Care, 70*(3), 732–735.

Bernstein, E., & Woodall, W. (1987). Changing perceptions of riskiness in drinking, drugs, and driving: An emergency department-based alcohol and substance abuse prevention program. *Annals of Emergency Medicine*, *16*(12), 1350–1354.

Griffin, K., Botvin, G., & Nichols, T. (2004). Long-term follow-up effects of a school-based drug abuse prevention program on adolescent risky driving. *Prevention Science, 5*(3), 207–212.

Ho, K., Litton, E., Geelhoed, E., Gope, M., Burrell, M., Coribel, … Rao, S. (2012). Effect of an injury awareness education program on risk-taking behaviors and injuries in juvenile justice offenders: A retrospective cohort study. *PLoS ONE, 7*(2): e31776. doi:10.1371/journal.prone.0031776.

Marko, T., & Watt, T. (2007). *Drugged Driving Kills Project. Why Drive High? campaign.* Ottawa: Ottawa Public Health and Carlington Community and Health Services.

Marko, T., & Watt, T. (2011). Employing a youth-led adult-guided framework: "Why Drive High?" social marketing campaign. *Family & Community Health, 34*(4), 319–330.

Ormston, R. (2003). *Evaluation of the drug driving TV advert.* Edinburgh: Scottish Executive Social Research.

Raes, E., Pil, K., Van den Neste, T., & Verstraete, A. (2007). *DRUID deliverable 7.1.1. Review of guidelines, booklets, and other resources: State of the art.* Ghent: Ghent University.

Young, C. (1991). Alcohol, drugs, driving and you: A comprehensive program to prevent adolescent drinking, drug use, and driving. *Journal of Alcohol and Drug Education, 36*, 20–25.

Table 2. Overview of included studies

Citation	Prevention Initiative	Study Design	Location	Population	Sample Size	Outcomes/Findings	Strengths and Limitations	Peer Review
Banfield, J., Gomez, M., & Kiss, A. (2011). Effectiveness of the P.A.R.T.Y. (Prevent Alcohol and Risk-Related Trauma in Youth) Program in preventing traumatic injuries: A 10-year analysis. *Journal of Trauma, Injury, Infection, and Critical Care*, *70*(3), 732-735.	P.A.R.T.Y. Program **Theory:** Not specified. **Duration:** One-day program. **Content:** Addresses issues related to teens taking unsafe risks. The program is designed to raise awareness about potential injury through hospital visits and encourages teens to make responsible decisions. Upon completion of the program, participants are given follow-up activities to facilitate and encourage ongoing discussion. **Facilitator:** Teacher or adult facilitator accompanies; interaction with patients, healthcare team, law enforcement, and social workers.	This study assessed the effectiveness of the program in preventing traumatic injuries during a 10-year period (1992–2004). A study group of program participants was matched with a control group based on age, gender, residential area and initial year in database. A retrospective review of hospital discharge database information and provincial health claim data was done to determine incidence of traumatic injury for both the study and control groups.	Ontario	The sample consisted of program participants (high school students) who were matched with control subjects. Exact age was not noted; a range of 15–19 was given.	1,281 randomly matched pairs of program participants and controls.	Findings indicated that there were fewer traumatic injuries in the study group than in the control group. Those in the control group were at a 21.8% greater risk of a traumatic injury than the study group. The difference was stronger in females (p=.04) and before the graduating driver licensing system implementation (p=0.4).	**Strengths:** Randomly matching pairs on four different variables; 10-year study design. **Limitations:** Retrospective use of two electronic databases to obtain data used for comparison between the two groups. A change in the coding system used for diagnosis of injuries and therapeutic activities performed by physicians made it difficult for the researchers to categorize the main diagnosis of the traumatic injury.	Yes
Bernstein, E., & Woodall, W. (1987). Changing perceptions of riskiness in drinking, drugs, and driving: An emergency department-based alcohol and substance abuse prevention program. *Annals of Emergency Medicine, 16*(12), 1350-1354.	*Alcohol and Substance Abuse Prevention Program (ASAP)* **Theory:** The program incorporates both social learning theory and life skills training and coping strategies. **Duration:** Three supervised four-hour visits to the emergency department and a single visit to a detention facility.	This study used a pre-test, post-test, and eight-month follow-up evaluation design to assess the effects of the ASAP program. Questionnaires were administered to randomly selected experimental and control groups at three different	New Mexico	The sample consisted of Grade 7 students. 61% male and 39% female. Age was not noted,	33 students: 17 students were in the experimental group. 16 students were in the control group.	Findings indicated that the experimental group's perception of the riskiness of driving under the influence of alcohol or drugs increased over time (p=.049). The perception of riskiness for the control group decreased over time. No significant differences were found between the two groups in relation to knowledge and behaviour.	**Strengths:** The longitudinal follow-up design of the study. **Limitations:** The sample size was very small and almost entirely Hispanic so it is not possible to generalize the results. The study was also conducted more than 20 years ago.	Yes

	Content: The program allows students to witness the consequences of risky behaviour. How to address peer pressure to drink, use drugs and drive under the influence is also covered. **Facilitator:** Medical students, emergency department staff and teachers supervise the visits. Students also interview patients.	intervals to assess knowledge, attitudes and behaviours related to alcohol and drug use.		although students were likely 12 or 13 years of age. Sample was 97% Hispanic.				
Griffin, K., Botvin, G., & Nichols, T. (2004). Long-term follow-up effects of a school-based drug abuse prevention program on adolescent risky driving. *Prevention Science,* 5(3), 207-212.	*Life Skills Training (LST)* **Theory:** The initiative is based on problem behaviour theory (PBT). **Duration:** Three years (15 sessions, 10 sessions, 5 sessions) — not specified in study, but general LST program model. **Content:** The program teaches alcohol and drug resistance skills, norms against drinking and drug use, and uses material designed to facilitate the development of both personal and social skills. **Facilitator:** Teacher, counsellor or peer leader.	This study examined long-term follow-up data from a large-scale randomized trial to determine the extent to which participation in a school-based drug abuse prevention program during junior high school led to less risky driving among high school students. The randomized block design had two experimental conditions and one control group.	New York	The sample consisted of high school youth. 53% male and 47% female. Median age of 18.1 years.	2,042 youth: 1,360 youth who received the prevention program. 682 youth in the control group.	Findings indicated that males were more likely to have violations and points on their driving records than females and that regular alcohol users in Grade 12 were more likely to have violations and points compared with non-drinkers and those who drank infrequently. Students who received LST during junior high school were less likely to have violations and points on their driving records relative to controls who did not receive the prevention program, after controlling for the effects of gender and alcohol use.	**Strengths:** The longitudinal and long-term follow-up of participants; use of DMV records in addition to self-report data to measure risky driving; alcohol use and gender (risk factors for risky driving) were incorporated into the regression model and controlled for. **Limitations:** The sample was largely suburban and white so it is unclear to what extent the results can be generalized to other subgroups of youth.	Yes
Ho., K., Litton, E., Geelhoed, E., Gope, M., Burrell, M., Coribel, J., McDowall, A., & Raos, S. (2012). Effect of an injury awareness education program on risk-taking behaviors	*P.A.R.T.Y. Program* **Theory:** Not specified. **Duration:** One-day program.	This study examined the effectiveness of the program in reducing risk-taking behaviours among the juvenile offender population between 2006 and 2010.	Western Australia	The sample consisted of juvenile justice offenders referred to the program.	225 juvenile justice offenders.	Findings indicated that the incidence of subsequent traffic or violence-related offences was significantly lower for youth who had attended the P.A.R.T.Y. program compared to those who did not attend the program — 3.6% compared to 26.8% (p=.001). Those who participated in the program had	**Strengths:** Use of pre- and post-survey design; combining self-report data with additional data from the Western Australia Police and Department of Health. **Limitations:** Sample of juvenile	Yes

and injuries in juvenile justice offenders: A retrospective cohort study. *PLoS ONE,* 7(2), e31776.	**Content:** Addresses issues related to teens taking unsafe risks. The program is designed to raise awareness about potential injury through hospital visits and encourages teens to make responsible decisions. Upon completion of the program, participants are given follow-up activities to facilitate and encourage ongoing discussion. **Facilitator:** Teacher or adult facilitator accompanies; interaction with patients, healthcare team, law enforcement and social workers.	A retrospective cohort design was used. Program participants completed pre- and post-questionnaires to assess changes in perceptions and knowledge. Additional data were obtained from the Dept. of Health and Western Australia Police to assess the subsequent injuries and offences of all juvenile justice offenders.		85% of those referred were male. 19% of those referred were of Aboriginal descent. The median age of referred offenders was 16.3		lower incidences of injury leading to hospitalization (0% compared to 1.6%) and lower incidences of alcohol or drug-related offences (0% compared to 2.4%) than those who did not participate. Self-report survey data also indicated that participation in the P.A.R.T.Y. program would modify the juvenile's attitude on risk-taking behaviours.	justice offenders may not be representative of general youth. There may be unmeasured bias related to the attitudes of magistrates or offenders. The authors also identified the follow-up period as being relatively short (median of 33 months).	
Marko, T., & Watt, T. (2007). *Drugged Driving Kills Project: Why Drive High? campaign.* Ottawa: Ottawa Public Health and Carlington Community and Health Services.	*Why Drive High? campaign* **Theory:** Holden's framework for modeling youth empowerment (used to develop and implement the campaign). **Implemented:** In 2006 by Ottawa Public Health and Carlington Community and Health Services. **Target audience:** Youth aged 13–25. Emphasis on multicultural communities, particularly English, French, Chinese, Arabic and Somali. **Approach:** Multicultural radio advertisements combined with additional delivery mechanisms. **Message:** To create awareness about: "the adverse health effects of cannabis; the adverse effects of	This report summarized the experiences of the development and implementation of the DDK project and was meant to inform future drugged driving prevention interventions. Included is an overview of the challenges that were faced, some of the lessons learned from the process, and recommendations for the development and implementation of similar campaigns by other agencies.	Ontario	N/A	N/A	Lessons learned from reviewing the development and implementation of this social marketing campaign that could inform future efforts include: In a youth-led model, the participants should be representative of the target population; Enlist the assistance of community partners; Provide participants with incentives to get involved; Maintain group cohesion by having adult facilitators who can ensure effective and regular communication; Empower youth to encourage their continued contribution and engagement; Consider the contribution of parents as potential intermediaries; Align timelines with community events involving the target group; Properly train the youth who are involved in the project; and	**Note:** This report is not a formal evaluation of the DDK project; however, it does provide insight into the development and implementation of the campaign. In describing the challenges and lessons learned, this report is a more detailed companion piece to the later Marko and Watt article (2011).	No

	cannabis while driving a motor vehicle and riding with a drug-impaired driver; and, to create a supportive environment that promotes healthier attitudes, skills, and resiliency." **Other content:** Transit shelter advertising, transit interior advertising, poster campaigns, print media, and an interactive game/display. **Duration:** Six to 12 weeks with a second booster session of the social marketing campaign to coincide with events such as graduation.					Engage community partners in the process and establish roles and responsibilities at the outset.		
Marko, T., & Watt, T. (2011). Employing a youth-led adult-guided framework "Why Drive High?" social marketing campaign. *Family & Community Health, 34*(4), 319-330.	*Why Drive High? campaign* See above for campaign details.	Qualitative focus group evaluation (60 to 90 minutes) to examine three project assumptions: 1) "When youth are actively involved in the planning and evaluation of activities on matters of importance to them, they become empowered." 2) "Adult involvement, group structure, and group climate are key factors that contribute to the achievement of positive group outcomes." 3) If the project's framework is successful, the ultimate outcomes are: "youth facilitators become social agents of change; youth are able to alter community awareness and opinions; and, youth express a high	Ontario	Three youth advisors and three adult facilitators who were involved in the project since its development participated in the focus groups.	3 youth and 3 adults.	Findings from the focus groups revealed the following: The project was successful in engaging "multiethnic youth in community action." The youth advisors had the opportunity to demonstrate leadership when they communicated messages to their peers. The adult facilitators helped the youth to understand the research about cannabis and drugged driving. Discussion provided youth with an opportunity to validate their own beliefs which, in turn, helped them better communicate this information to peers. Adult characteristics such as being open, honest, respectful, and encouraging discussion influenced youth involvement. "Youth-to-youth" messaging developed credible information for basing the campaign. There was some evidence of youth empowerment as the campaign	**Strengths:** Focus groups were conducted by a trained evaluator and transcribed and analyzed using N-Vivo software; thematic coding was utilized and verified for quality assurance using a second evaluator. **Limitations:** Small sample size, particularly with the youth advisors (eight were eligible to participate).	Yes

		level of satisfaction collectively from their experiences and contributions."				progressed, particularly as youth took ownership of the project. The exchange of ideas fostered inclusivity and improved group cohesion. When the youth were confident that they could positively contribute and influence other youth, this led them to take on larger "social change" roles within their community. The youth advisors began to take on the desirable characteristics of the adult facilitators by the end of the process.		
Ormston, R. (2003). *Evaluation of the drug driving TV advert.* Edinburgh: Scottish Executive Social Research.	*Drug Driving campaign* **Implemented:** In 2002 by the Scottish Road Safety Campaign and the Association of Chief Police Officers in Scotland. **Target audience:** Drivers aged 17–24. **Approach:** Humorous TV advertisement. **Message:** Raise awareness of the likelihood of being detected for drugged driving. **Other content:** None.	Three-pronged evaluation to determine the effect-iveness of the campaign in increasing awareness and understanding about the ability of law enforcement to detect the presence of drugs. The first phase of the evaluation involved a series of questions about the advertisement included in the Scottish Opinion Survey (SOS). This was followed by a separate quota survey administered to a sample of 730 Scottish drivers six to 10 weeks after the campaign was launched, and five peer focus groups. Paired depth interviews were conducted with five drivers in the target age bracket along with their partners or close friends.	Scotland	The SOS is conducted monthly and involves interviews with 1,000 adults aged 16 and older. The quota survey sample was comprised of 730 individuals based on a sampling strategy to include a disproportion ate number of younger drivers aged 17–24 (target age group).	1,025 Scottish drivers age 16 and older (SOS sample). 730 drivers (quota survey sample). 5 peer focus groups (total number of participants in focus groups not known). 10 individuals (5 male and 5 female) in paired depth	Findings from the evaluation indicated that among the target age group, awareness of the advertisement was very high. The focus groups and interviews revealed that the target group easily understood the messages and content of the advertisement and learned new information as a result. The qualitative research identified several areas for improvement. The first was that young drivers felt that the advertisement lacked credibility because they did not believe that police would actively enforce drugged driving laws and that the likelihood of detection was low. They also did not have a clear sense of what the consequences of failing a drug test would entail. Another issue was that the young drivers did not relate to the characters depicted in the advertisement as they thought they were too old and appeared to be under the influence of alcohol as opposed to drugs. From these findings, several suggestions for improvement of the advertisement and future campaigns	**Strengths**: Using a multi-pronged design with both quantitative and qualitative components; allowing participants to recruit family and friends to create an environment more conducive to discussion in the focus groups/interviews. **Limitations:** Contracted research that has not been peer reviewed; lack of information about the final demographics of samples makes it difficult to determine whether results can be generalized. Also, conclusions rely entirely on self-report data.	No

				The qualitative focus groups and paired interviews were created through recruitment of a core participant who met certain demographic criteria (age, cannabis use, and holding a driver's licence) who then invited friends. Half of the core participants were recruited through the driver survey.	interviews.	were offered: Target the key demographic by using more young people in the advertisement. Distinguish between drunk driving and drugged driving. Provide specific examples of "drugs or drug-taking scenarios." Create different advertisements for different types of drugs; target various subsets of drug users. Emphasize the legal consequences of drugged driving. Couple advertising campaigns with enforcement efforts.		
Raes, E., Pil, K., Van den Neste, T., & Verstraete, A. (2007). *DRUID deliverable 7.1.1. Review of guidelines, booklets, and other resources: State of the art.* Ghent: Ghent University.	*Drug Driving… You'd Be Off Your Head* **Implemented:** In 2003 by the Northumbria police, Local Authority Road Safety Officers' Association (LARSOA), Cleveland police and Durham constabulary. Re-launched several times. **Target audience:** 17- to 25-year-olds. **Approach:** Four PSAs: two focused on the penalties and social consequences associated with drugged driving and two highlighted	A survey tracking changes in attitudes and knowledge about drugged driving penalties was conducted following the initial launch of the program.	United Kingdom (England)	Young drivers. Further demographic information is not available.	In excess of 4,000 respondents.	A key finding from the survey was that awareness of drugged driving penalties among the target group increased to approximately 40% two years after the campaign's launch.	**Note:** A description of survey methods is not available; this does not allow a critical examination of the quality of the research and findings.	No

	the roadside drug testing process used by law enforcement. **Message:** Increase awareness about the consequences and penalties associated with being caught for drugged driving. Emphasizes that these consequences are the same as for drunk driving. **Other content:** Beer mats, washroom posters, website, artwork on buses.							
Young, C. (1991). Alcohol, Drugs, Driving and You: A comprehensive program to prevent adolescent drinking, drug use, and driving. *Journal of Alcohol and Drug Education, 36*(2), 20-25.	*A.D.D.Y. Program* **Theory:** Not specified, but likely Social Norms Theory. **Duration:** The course can be delivered over five to 15 days to Grade 10 students depending on what activities are used (program consists of a curriculum, educational posters, discussion guides for students and parents, and student activity and media kits). **Content:** The program provides facts and figures to dispel misconceptions and to increase knowledge of the consequences of impaired driving — it is designed to change social norms. Additional goals include increasing knowledge of how substances impair driver performance, supporting alternatives to impaired driving, and developing responsible attitudes. **Facilitator:** Teachers; also involves parents and community members.	The article summarizes previous evaluations of the ADDY program conducted by The Prevention Center. The 1984 evaluation used a pre-test, post-test design to determine whether participants experienced cognitive or effective changes. The 1985 evaluation used a comparable design. The 1986 national evaluation also used a pre-test, post-test design. It assessed "the cognitive and effective changes that occurred in students who participated in the A.D.D.Y. curriculum as compared to those in control classes." This evaluation also examined whether there were significant differences	Colorado (1984; 1985) U.S. national (1986)	Each of the three evaluations described by Young involved high school students. Further demographic information was not provided.	**1984:** 544 students from Colorado high schools. **1985:** 1,173 students from Colorado high schools (26 classrooms). **1986:** 808 high school students (34 classrooms in 9 states) in the experimental group 220 students (12 classrooms) in the control	**1984 results:** Significant gains in student post-test knowledge of drugs and drug classifications, effects of alcohol and drugs on driving, causes of collisions, and legal matters related to driving under the influence. In addition, those students who participated in the program reported a significant reduction ($p<.01$) in aggressive driving behaviours. **1985 results:** Significant positive changes ($p<.05$) in acceptance of responsibility for driving were noted. Students who completed A.D.D.Y. also had significant gains ($p<.001$) in their knowledge of the effects of alcohol and drugs, and understanding their decision-making in alcohol and drug situations. **1986 results:** Students who completed the A.D.D.Y. program had significantly higher scores relative to the control group in a number of areas — total cognitive score ($p<.025$), knowledge of alcohol effects ($p<.01$), knowledge of drug effects ($p<.025$), knowledge of BAC ($p<.1$), and knowledge of laws and consequences ($p<.1$). The experimental group was	**Strengths:** The article presented findings from three different studies which all show varying degrees of effectiveness of the A.D.D.Y. program. The use of a national evaluation with a control group strengthens findings and allows for greater generalizability. **Limitations:** An absence of detailed discussion of methods makes it difficult to assess the overall quality of these evaluations. Given that the original sources are unpublished manuscripts, there is an absence of peer review for the evaluations themselves.	Yes

		related to gender, class subject area, and teacher training methods.			group.	significantly more likely to avoid riding with an impaired driver (p<.1) and to understand the impact of impaired driving (p<.1) than students in the control group. The study also found gender differences as effective changes for females were more desirable than those of males, especially as related to willingness to take responsibility for themselves (p<.05) and willingness to avoid driving while impaired (p<.1). The program was also favourably received by teachers nationally with a mean rating of 3.35 on a 4-point scale.		