Original article

Behavioural Change Techniques used in road safety interventions for young people

Techniques de changement du comportement utilisées dans les interventions de sécurité routière chez les jeunes automobilistes

F. Fylan a,∗, S. Stradling b

a School of Social, Psychological and Communication Sciences, Leeds Metropolitan University, Calverley Street, Leeds LS1 3HE, United Kingdom
b Transport Research Institute, Edinburgh Napier University, Merchiston Campus, Edinburgh EH10 5DT, United Kingdom

A B S T R A C T

Introduction. – Death and injury from road traffic is a public health problem worldwide and accordingly there is substantial interest and investment in developing interventions to change road user behaviour. Alongside this, there is growing awareness of the need to evaluate interventions and to identify the most effective mechanisms by which behaviour can be changed. Progress has been hindered due to lack of a common taxonomy with which to define specific techniques used in attempts to change behaviour.

Objective. – Behavioural Change Techniques (BCTs) have been successfully deployed to change a range of different health behaviours. This paper defines a series of BCTs that can be applied in the road safety setting and asks which ones are found in road safety interventions for young road users?

Method. – Abraham and Michie (2008) identified twenty-six techniques used in behavioural change interventions. These BCTs, plus one other adapted from forensic psychology, are classified into nine groupings. Six educational road safety interventions commonly used in the UK with pre-drivers and young, novice drivers are characterised in terms of the BCTs they employ.

Results. – Only a small subset of BCTs are employed in most of the interventions. They concentrate primarily on increasing awareness of the risks associated with a particular behaviour, and the severity of the potential adverse consequences.

Conclusion. – Recommendations are given for improving the effectiveness of road safety interventions for young people including young, novice drivers by increasing the range of BCTs deployed.

© 2014 Published by Elsevier Masson SAS.

R É S U M É

Introduction. – Les décès et blessés lors d’accidents de la route constituent un problème de santé publique dans le monde entier, en conséquence il existe un intérêt et un investissement considérables à développer des interventions pour changer le comportement des usagers de la route. En parallèle, il y a une prise de conscience croissante de la nécessité d’évaluer les interventions et d’identifier les mécanismes les plus efficaces par lesquels le comportement peut être changé. Des progrès ont été entrepris par le manque de taxonomie commune avec laquelle on peut définir des techniques spécifiques utilisées pour changer le comportement.

Objectif. – Les techniques de changement du comportement (TCC) ont été déployées avec succès pour modifier toute une gamme de comportements de santé différents. Cet article définit une série de TCC qui peut-être appliquée dans le domaine de la sécurité routière et interroge lesquelles trouver parmi les interventions à utiliser en sécurité routière pour les jeunes usagers de la route.

∗ Corresponding author.

E-mail addresses: f.fylan@leedsmet.ac.uk (F. Fylan), s.stradling@napier.ac.uk (S. Stradling).

http://dx.doi.org/10.1016/j.erap.2014.02.003
1162-9088/© 2014 Published by Elsevier Masson SAS.
1. Introduction

Using the road as a driver, rider, passenger, cyclist or pedestrian is one of the most common challenges to health in the UK, with 1901 people killed on the roads in 2011, over 23,000 seriously injured and over 203,000 slightly injured (UK Department for Transport, 2012). In the European Union, road traffic collisions are the most common cause of death in people under the age of 60 years, with three times as many men as women dying in this way (European Commission, 2011). With increasing levels of motorisation in the developing world, traffic fatalities are predicted to be the fifth most prevalent killer across the planet by 2030 (WHO, 2009). Trauma from road traffic collisions is therefore a major public health problem (World Health Organization [WHO], 2004, 2009).

Amongst road-user groups, young novice drivers are at greater risk. The Organisation for Economic Co-operation and Development (OECD) and European Conference of Ministers of Transport (2006) have highlighted that although young drivers under the age of 25 comprise only one-tenth of the population of OECD countries, they account for more than a quarter of fatally injured drivers, and for every 10 young driver fatalities, an additional 13 passenger or other road users die in the same crashes (Huang & Winston, 2011, p. 315). In consequence, risk taking behaviour and crash involvement among young novice car drivers, particularly males, has received considerable research attention. Studies show that poor impulse control, sensation seeking, low constraint, attention problems, low risk awareness, “showing off” and risk taking predict risky driving (e.g., Barkley & Cox, 2007; Begg & Langley, 2004; Clarke, Ward, & Truman, 2005; Cestac, Paran, & Delhomme, 2011; Frank & Lee, 2007; Iversen & Rundmo, 2002; Paaver et al., 2013). Young drivers are more at risk because they fail to anticipate the potential consequences of their risky actions (Kinneer, Kelly, Stradling, & Thomson, 2013). Young drivers underestimate the complexity of the driving task, overestimate their current capability, or both, which results in the driver having a smaller safety margin than they believe (Fuller, 2005, 2011).

Many interventions have been developed to address risky driving behaviour. On a population level, these can be information campaigns that give messages about unsafe driving. On an individual level, high-risk drivers can be targeted. Drivers in the UK who are caught breaking traffic laws, and who therefore present a greater risk, can in certain cases be diverted from prosecution to a behavioural change intervention, such as attending a speed awareness course instead of licence points and a fine. Because of the higher risk presented by young drivers there is substantial interest in developing interventions that can be delivered specifically for young people, before they commit a driving offence or are involved in a collision. Such interventions are targeted at young people before they start driving, when they are learning to drive, and when they are novice drivers. For example, in the UK local authority road safety professionals typically deliver road safety interventions in schools. There are many schemes that aim to promote safe and responsible driver and passenger behaviour, such as wearing a seat belt, complying with the speed limit, and not driving under the influence of drugs or alcohol. Despite the abundance of schemes, and the increasing emphasis on evaluation (Elvik & Vaa, 2004; Hauer, 2007; McKenna, 2010; Roberts, Kwan, & the Cochrane Injuries Group Driver Education Reviewers, 2001), there is little consensus on which intervention approaches, if any, are effective in achieving lasting change in road-user behaviour (Delhomme et al., 1999; Vaa, 2008). Furthermore, it is still the case that relatively few interventions are theory-led or evidence-based (Helman, Ward, Christie, & McKenna, 2011).

However, there is growing collaboration between the research and road safety communities in applying research into driver behaviour to interventions to change driver behaviour. Most commonly applied is the Theory of Planned Behaviour (TPB) (Ajzen, 1985). TPB-based research has been used to suggest the content of messages that might change behaviour by targeting attitudes or norms (e.g. Lewis, Watson, White, & Elliott, 2013; Poulter & McKenna, 2010; Forward, 2009; Elliott & Armitage, 2009) and which TPB constructs should be addressed in road safety interventions targeted at speeding drivers (Elliott & Thomson, 2010). Protection Motivation Theory (Maddux & Rogers, 1983) has also been applied within road safety, and research has suggested messages that could be developed from psychological constructs in this model (e.g. Glendon & Walker, 2013; Simons-Morton, Hartos, Leaf, & Preuss, 2006).

While these theories, and several others, provide guidance on which psychological constructs should be changed in order to change behaviour, they offer little guidance on how to change these constructs. For example, a road safety professional might develop an intervention that might attempt to increase seat belt use by targeting attitudes and perceived behavioural control but the theories do not offer guidance into exactly how this might be achieved. There is now a greater awareness of the need to state exactly how interventions aim to change behaviour.

This is not a problem confined to road safety: it has been recognized that across most areas of behavioural change there has until recently been scant attention paid to defining precisely how changing behaviour has been attempted. Abraham and Michie (2008) described a series of behavioural change techniques (BCTs) which define the “active ingredients” of an intervention and these have been further developed and described for the reduction or elimination of both smoking (Michie, Hyder, Walia, & West, 2001) and alcohol consumption (Michie et al., 2012). Given that road traffic trauma is a public health problem, and that there is a growing body of evidence demonstrating the efficacy of BCTs in the public health arena, there is a strong case for road safety professionals to make use of BCTs when designing interventions and to document

Please cite this article in press as: Fylan, F., & Stradling, S. Behavioural Change Techniques used in road safety interventions for young people. Rev. Eur. Psychol. Appl. (2014), http://dx.doi.org/10.1016/j.reap.2014.02.003
the BCTs used in the schemes they deliver. This will enable better comparison of their interventions and facilitate evaluation of which techniques, alone and in combination, are more and less effective in achieving safer road user behaviour. In this paper, we adapt the BCTs applied in the addictive behaviour setting for use in road safety. While these BCTs have been developed specifically to describe interventions that address addictive behaviour, we show how they can be applied in the road safety setting. The aim of this paper is twofold: to describe the BCTs in a way that can be applied to road safety interventions; and to identify which of these BCTs have been used in a range of different UK road safety interventions targeted at young people.

2. Method

The research was undertaken in two stages. In the first stage, we reviewed the 26 BCTs that Abraham and Michie (2008) reported as having been used for use in changing health-related behaviours, with an emphasis on smoking. We assessed each one for its suitability for inclusion in road user interventions and generated a description of the technique as it could be applied in this setting. These descriptions are based on our experience of attending a wide range of interventions and on discussion with colleagues. To these 26, we added a behavioural change method that is used in forensic psychology (e.g., Ward, Mann, & Gannon, 2007): that of agreeing to live a good life. Applied to road safety interventions, this would be agreeing to make a positive contribution to keeping oneself and others safe on the roads (BCT10 in Table 1).

We then grouped the 27 techniques into nine different clusters of BCTs that describe similar activities. The groupings were based on the type of activity involved. For example, consider an intervention that aims to decrease drink driving. There are three BCTs that would be used to give people facts about drink driving; telling people about the increased risk of crashing associated with drink driving; telling people about the consequences of being involved in a crash, or of being caught drink driving; and telling people (or encouraging them to consider) what others would think about them drink driving. These three BCTs were grouped together under the heading “giving information”. There are three BCTs that involve people developing skills around estimating when they are alcohol-free: telling them about alcohol content and how quickly the body metabolises each unit; showing them how to calculate the units they have consumed and when they will be alcohol-free; getting them to practise calculating how many units they have drunk and when they will be alcohol-free and giving them feedback on whether their calculations are correct. These were grouped together under the heading “teaching”.

We then mapped six interventions to change young people’s road user behaviour against the 27 road-user-behaviour-specific BCTs. These six interventions include three school-based interventions targeted at young people (interventions 1–3) and three that are targeted at both young people at school and at young adults (novice or pre-drivers typically aged 17–24) (interventions 4–6).

We chose to include interventions that we have attended personally, as very few interventions are accompanied by detailed manuals that would enable us to undertake such a comprehensive content mapping. This produces some limitations to the research reported in this paper, for example that it is based on interventions available only in the UK, and only on those interventions where the provider has an interest in evaluation and so invited us to attend. Nevertheless, without personally viewing what actually happens during the intervention it would not have been possible to undertake the mapping exercise.

Intervention 1 (11: School Presentation) is a series of presentations that are delivered by road safety professionals and/or by fire officers to young people in schools. We have reviewed and report here on materials from two independent interventions delivered in different geographical areas of the UK to young people between Years 7 and 11 (age 11–16). Each presentation lasts around 45 minutes and uses a PowerPoint presentation. Different presentations are delivered to each school year, and each year has a different target behaviour: using mobile phones; wearing a seat belt; and drink driving. Although the two interventions use different materials, the BCTs employed are the same.

Intervention 2 (12: Crash Analysis) is a forensic science activity for young people, most commonly delivered to Year 10 or Year 11 students [age 14–16] and facilitated by teachers. Young people are presented with a crash scene and they work in small groups to identify the facts that contributed to the crash. Each group receives clues, such as photographs, witness statements and fact sheets (such as braking distances) and use these to answer a series of questions. The target behaviour is wearing a seat belt, drink driving, speeding, and driving fatigued.

Intervention 3 (13: Theatre in Education) is a Theatre in Education production aimed at Year 10 students [age 14–15], although it is also shown to older and younger children. There are several different Theatre in Education companies offering shows with road safety messages. The one included here has the target behaviour of drug driving.

Intervention 4 (14: DVD Discussion Resource) is a DVD which shows people discussing a road situation they were involved in (such as crashing, or driving without insurance) and the consequences of their decisions and actions. It also includes a schedule that instructors use to guide discussions with young people after they have viewed the DVD clips. This covers issues of blame, consequences and prevention. Instructors typically show three different video clips, each followed by a group discussion. It can be shown to both pre-drivers and young drivers of a range of ages, typically 15–25 years of age. The target behaviour is wearing a seat belt, having valid motor insurance, drug driving, drink driving, and concentration.

Intervention 5 (15: 1-day Workshop) is a one-day workshop aimed at pre-drivers and young drivers age 17–25. It uses an interactive format in which the importance of seat belts is addressed, the effects of drugs and alcohol on the body, and therefore on driving are explored, and the emotional consequences for the family of a young person who has died in a road collision are described. The target behaviour is wearing a seat belt, drug driving, drink driving (including “the morning after”), and unofficial races with peers.

Intervention 6 (16: Accident Survivors) is a presentation by one or two people who have survived an accident and who are living with the consequences. It can be shown to young people of a range of ages. The presenters have different injuries, sustained in different types of accident, including road collisions. They talk to the audience about their accident, the recovery process, and how their injuries have affected their lives. A series of videos are shown to help young people to make good choices about risks. Participants have the opportunity to ask the presenters questions. When delivered as part of a road safety programme, the target behaviour is seat belts, drink driving and speaking out if the driver is driving in a way that is unsafe.

3. Results

The 27 road user behaviour BCTs are shown in Table 1, together with examples of how they can be applied in road user behavioural change interventions. They are grouped as:

- giving information about the negative consequences of the unwanted behaviour;
| Group 1: giving information | BCT 1 | Information about risk | Giving people information about the increased risk associated with the target behaviour, e.g., the greater risk of crashing if you speed or use a mobile phone while driving |
| Group 1: giving information | BCT 2 | Information about consequences | Telling people about what might happen to themselves and/or others if they are involved in a collision, get demerit points, lose their licence, etc. This could include physical, psychological or financial consequences |
| Group 1: giving information | BCT 3a | Information about other people's approval | Telling people or encouraging them to consider what other people think of them engaging in the target behaviour. “Other people” can be those the person knows or those who are a credible source. For example, telling young males that their girlfriends are not impressed by them driving fast, and instead, think they are being stupid, or a video by a high-profile professional, celebrity or sportsperson on why they don't drive in that way |
| Group 2: teaching | BCT 4 | Instruction | Telling people how they can achieve the target behaviour. For example, telling children how to find a safe place to cross the road, telling drivers how to identify the speed limit |
| Group 2: teaching | BCT 5a | Demonstrating | Showing people how to do the target behaviour. For example, taking children on a walk to show them how to check if it is safe to cross the road, or pointing out to drivers where to look for speed limit gateway signs or demonstrating how to do a commentary drive |
| Group 2: teaching | BCT 6a | Feedback on performance | Observing people carrying out the target behaviour and giving them feedback on how they are doing and what they can do to improve further. For example, watching them try a commentary drive and giving them tips on how to improve |
| Group 3: planning | BCT 7a | Setting general goals | Getting people to set a goal for what they are going to achieve, for example to drive at an appropriate speed within the speed limit, to always wear a seat belt or to always cross the road at a pedestrian crossing |
| Group 4: agreeing | BCT 10a | A different way of driving | Getting people to choose a different way of driving that will involve different life choices. They commit to becoming a positive force in their world and choosing drive in a way that protects rather than endangers themselves and their communities |
| Group 5: supporting | BCT 13a | Observing others | Identifying how these goals are to be met, including specifying when and where the target behaviour will be carried out and how it will be achieved. For example, to avoid talking on a mobile phone while crossing the road a young person can agree with their friends that they will phone or text when they arrive home rather than on the journey home |
| Group 5: supporting | BCT 14a | Gaining social support | Anticipating what might prevent people from carrying out the new behaviour and identifying how they can overcome any potential difficulties |
| Group 6: implementing | BCT 16 | General encouragement | Watching other people perform the behaviour. This can be in person or on a video clip |
| Group 6: implementing | BCT 17a | Setting graded tasks | Identifying other people who can help achieve the target behaviour. This might be asking friends for support, such as not to distract them while driving, or asking an employer to change an appointment schedule to reduce the risk of speeding |
| Group 6: implementing | BCT 18a | Follow-up | Encourage the person to talk themselves (out loud or silently) though they will achieve or maintain the target behaviour. For example, it might be self-talk about being able to handle peer pressure around not wearing a cycle helmet, or conducting a commentary drive to help identify hazards and changes in speed limits |
| Group 7: monitoring | BCT 19a | Keeping a record | Giving the person praise and encouragement while they try to change, independent of the success they actually have in changing. For example, telling them that they are being responsible if they drive more slowly, or that they are keeping their friends safe if they insist on them wearing seat belts |
| Group 7: monitoring | BCT 20 | Using cues | Setting the person tasks that are initially easy to perform and then gradually increase in difficulty until they have mastered the new behaviour. For example, teaching a child to cross the road might involve first teaching them to identify a safe place to cross, then how to look and listen for approaching traffic |
| Group 7: monitoring | BCT 21a | Reviewing goals | Making contact with the person again after the intervention to remind them of their behaviour change aspiration. For example, sending a magazine to young people that contains road safety messages or stories, or sending a handy tool (e.g., tyre pressure monitor) to drivers after they have attended a course |

Please cite this article in press as: Fylan, F., & Stradling, S. Behavioural Change Techniques used in road safety interventions for young people. Rev. Eur. Psychol. Appl. (2014), http://dx.doi.org/10.1016/j.reap.2014.02.003
Table 1 (Continued)

| Group 8: managing and coping | BCT 22<sup>a</sup> | Time management | Helping people to fit the new behaviour, plus any practice required, into their lifestyle. For example, highlighting the need to leave more time for journeys in order to resist the temptation to speed or to save time by crossing at an unsafe place rather than walking to the pedestrian crossing.
| Group 9: feeling good | BCT 23<sup>a</sup> | Stress management | Helping people to identify and manage any stress associated with change so that they are better able to focus on and achieve the target behaviour.
| | BCT 24<sup>a</sup> | Self-motivation | Encouraging the person to identify the benefits of changing their behaviour and therefore, to increase their motivation to change. For example, this might be getting people to identify the benefits of not having any points on their licence and reminding themselves of this while they are driving.
<sup>a</sup> These BCTs are not used in any of the six interventions included in this study.

- teaching people how to undertake the target behaviour;
- planning how to undertake the target behaviour;
- agreeing to undertake the target behaviour;
- supporting people to undertake the target behaviour;
- implementing the acquisition and maintenance of the target behaviour;
- monitoring progress in developing and maintaining the target behaviour;
- managing and coping with change;
- feeling good through identifying incentives to acquiring and maintaining the target behaviour.

The BCTs identified in the six different road safety interventions are shown in Table 2. They all provide information about the risk associated with unwanted behaviours, such as not wearing a seat belt or driving under the influence of alcohol or drugs (BCT 1) and information about the consequences to the individual if they are involved in a collision (BCT 2). The workshop-based intervention (I5) can take an interactive approach to showing people why they are at increased risk, for example by using props such as ‘beer goggles’ which mimic the blurred vision that can arise from alcohol consumption. Young people can put them on and try to walk around. Around half the interventions involve showing pictures of crash scenes and the remainder involve people talking about their experiences. All of the interventions make use of one of these two BCTs. Four of the six interventions make use of discussion (BCT 4), such as telling people how to identify a safe place to cross, telling them to refuse a lift from a driver who is under the influence, and telling them about the circumstances that can lead up to making an inappropriate decision and about a safer course of action. Five of the six interventions make use of identifying and overcoming barriers to change (BCT 19). Most of these interventions are identifying barriers that other people experienced and which led to their crash. The workshop-based intervention, I5, is able to explore the individual barriers that young people might face. Five of the interventions provide general encouragement to people to stay safe (BCT 16), for example praising them as being a responsible young person who wishes to protect themselves and other people. One of the interventions makes use of using cues (BCT 20), in this case to recognise an internal cue (experiencing uncertainty about the extent of a risk) and then to apply a strategy to decide whether the risk is acceptable. This intervention was the only one to encourage young people to identify themselves as a role model who could influence the behaviour of others (BCT 26).

None of the interventions employ any techniques involving agreeing the changes that will be made, supporting change or managing change. The BCTs not included in any of the interventions are indicated in Table 1. For some of these, there are logistic and practical barriers to inclusion in time-limited, one-to-many presentations, but not for all.

4. Discussion

We have grouped and described a series of 27 BCTs that can be used in road safety interventions. These techniques and the way in which they have been grouped together could be of value to road safety professionals when planning and designing new interventions in the future. They may also be useful to professionals who are reviewing their schemes and considering how to enhance or evaluate them: the BCTs can provide a framework for measuring different predictors of behaviour before and after the intervention.

Our analysis of which BCTs have – and which have not – been used in a series of interventions aimed at young people demonstrates that typically only a limited range are used. Techniques that involve providing young people with information about risks and the consequences of being involved in a collision are most common. School-delivered programmes based on PowerPoint presentations frequently show young people pictures of crash scenes to help them to understand the physics of being involved in a collision and the physical injuries that can be sustained. However, they do not use any BCTs involving agreeing change, supporting change, or managing and coping with change. In theoretical terms, this approach can be aligned with Protection Motivation Theory (Maddux & Rogers, 1983). Specifically these interventions increase threat appraisals but do not address coping appraisals, which involve facilitating perceptions of how effective the new type of behaviour will be in removing the threat or increasing self-efficacy to make the change. Ignoring this part of the theory is likely to reduce the effectiveness of the intervention (Lewis, Watson, & White, 2010). Indeed, across a range of different target behaviours, gain-framed rather than loss-framed messages are often shown to be more effective (e.g., Latimer, Brawley, & Bassett, 2010) and road safety messages that increase positive affect are more effective (Lewis, Watson, & White, 2008).

The Task-Capability Interface Model (Fuller, 2005, 2011), which posits that loss of control of the vehicle arises as a consequence of the driver overestimating their safety margin, suggests that BCTs targeted at raising young people’s awareness of the discrepancy between their perceived and actual safety margin would be an
effective means of reducing casualties in young drivers. The most relevant BCTs to achieve this are BCT 6 (giving young drivers feedback on their performance), BCT 8 (encouraging them to form specific intentions, such as to reduce speed when approaching a corner or not to overtake unless there is ample opportunity to do so safely), BCT 11 (practising, such as taking further driving lessons and working towards the Advanced Driving Test), BCT 13 (observing other young people’s driving and what they do wrong), BCT 15 (reminding themselves that they are not as skilled as they think) and BCT 19 (keeping a record, for example of near misses, and learning from that). None of these were found in the interventions we examined targeted at young drivers. Similarly, the limited evidence available on how best to achieve behavioural change in driving interventions demonstrates that messages that are very clear about what precisely needs to change (most closely aligned to BCT 8) are more effective than giving general encouragement to drive safely (BCT 16) yet five of the six interventions here address BCT16 and none address BCT8.

We conclude that if road safety interventions are to achieve substantial and sustained change in behaviour they would benefit from being based more clearly on theoretical models of behaviour change and making use of BCTs that are congruent with the target behaviour. Developers of interventions should specify which BCTs they are using in both intervention manuals and evaluation reports. In this way, it will be possible to compile an evidence base on which BCTs achieve effective, long-term change and thereby contribute to reducing road casualties.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References

Lewis, I., Watson, B., White, K. M., & Elliott, B. J. (2013). The beliefs, which influence young males to speed and strategies to slow them down: Informing the content of anti-speeding messages. Psychology & Marketing, 30(9), 826–841.


