Road safety and injury prevention programs in the high school curriculum: Key considerations with examples from the SPIY Program

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Abstract:
Many adolescents partake in transport-related risk-taking that leads to injury. A curriculum based program that decreased adolescent risk-taking behaviours might enable a reduction in the burden of injury. The development of such a program requires careful consideration of a number of factors to ensure a higher likelihood of program effectiveness. The aim of this paper is to identify many of the factors that have been previously demonstrated in the research literature to underlie effective programs. This literature tends to be primarily based on alcohol and drug prevention goals. Key concepts in the design of such programs along with examples from the design of the Skills for Preventing Injury in Youth (SPIY) program are presented. Specifically the concepts include; the selection of target behaviours and participants for change, processes and content which are socio-culturally and developmentally appropriate, approaches facilitated by teachers and developed using established theories as well as consideration of program duration and evaluation. The transport-related risk-taking behaviours that give rise to adolescent injury are potentially amenable to intervention. An understanding of how high schools might be involved in such interventions provides valuable information regarding the prevention and harm minimisation of injury. Conclusions of this paper will be drawn with regard to methods and processes for behaviour change and the challenges faced in implementing such strategies with the SPIY program. Future research and policy implications will also be discussed.

Introduction

This paper aims to highlight information and processes necessary for the design of a high school curriculum program to improve adolescent road safety. Key components of program design are identified with an example of how such components were applied to the recently developed Skills for Preventing Injury in Youth (SPIY) program.

The key components of effective programs were identified from reviewing effective curriculum-based programs, particularly in the drug and alcohol field. The key issues that are explored in this paper include; whether programs can target multiple risk-taking behaviour, be universally implemented among school-based adolescents and be informed by theory. Also included is a discussion regarding the use of interactive methods compared with non-interactive communication methods, the 'dose' or intensity of the program, the facilitator and evaluation considerations. Firstly, however a brief overview of the program is presented.

Brief Overview of the SPIY Program

The SPIY program was designed with the assistance of St John Ambulance and through collaborations with researchers from the Centre for Accident Research and Road Safety - Queensland. The intervention program was implemented in the high school curriculum of Health classes in a sample of South-East Queensland state education schools. It aimed to develop skills in injury prevention and control (including those regarding transport-related injuries) and it combined first aid training with cognitive behavioural prevention strategies. The program targeted change in reducing adolescent risk-taking behaviour and encouraged adolescents to protect their friends from engaging in risk-taking behaviour.

The SPIY program was primarily a set of classroom activities structured to be delivered over eight weeks of 50 minute lessons. Typically each lesson included the presentation of a risk-taking and injury scenario, an introduction to the management of first aid for the resulting injury and a cognitive behavioural strategy for preventing the risk-taking behaviour including through protecting friends. The first aid material was included to provide a context for the severity of injury consequences and the serious nature of risk-taking behaviour. Additional processes such as teacher training, teacher's manual; and a student workbook were designed to support the effective delivery of activities in the curriculum. The program design however required a number of careful considerations and these are discussed in the following sections.

Selecting the Target Behaviour for Change

Some program researchers have suggested that it could be more economical and more effective to target change in more than one risk-taking behaviour within a single program (Aspler, Formica, Fraster, & McMahan, 2006; Dryfoos, 1991; Nigg, Allegrante, & Ory, 2002). They raise the question, "Is it valuable to work on multiple behaviours simultaneously or should one behaviour be addressed at a time?" (Nigg et al., 2002, p672). This approach stresses the similarities in risk-taking behaviours in attempts to change or modify injury outcomes. Realistically the authors raise the issue that schools, "are less interested in having to adopt a separate health promotion program for every separate target behaviour or risk factor" (Nigg et al., 2002, p. 676).

The multiple risk-taking behaviours selected as targets for change of the SPIY program design went beyond a single road safety issue and included drink driving, riding with a drink driver, riding with a dangerous driver, unlawful use of a motor vehicle, motorbike use, risky bicycle use, interpersonal violence and risky behaviour around water. Aspler et al. (2006) suggested that two conditions are necessary for a multi-target behaviour change program; that is, commonality in the target predictor for change and evidence of clustering of the target behaviour. The SPIY program was developed from extensive preliminary research that is not reviewed here (however see, Sheehan et al., 1996; Western, Lynch, & Ogilvie, 2003).

Selecting the Target Participants: School-based Adolescents

There are a number of programs which target change among significant peripheral groups while ultimately hoping to change the risk-taking behaviour of adolescents. Such programs are attempting indirect behaviour change. For example, Perry and colleagues targeted parental change, community wide change in addition to curriculum components for the adolescents in her extensive Project Northland (Perry et al., 2002). In the evaluation there were differences in the effectiveness of the various components with the community components being less effective when compared with the parent component and the curriculum component on self-reported measures of alcohol use (Stigler, Perry, Komro, Cudeck, & Williams, 2006). However, most commonly the adolescents themselves are the direct targets for change.

The vast majority of 14 year olds (the target age of SPIY participants) attend school on a regular basis and thus targeting adolescents in that environment represents an efficient and practical way to reach a large number of adolescents in one attempt (Samples & Aber, 1998). The approach also avoids some of the difficulties associated with identifying a location, ensuring attendance, and facilitating transport (Guerra, Tolan, & Hammond, 1994). There are multiple meta-analyses and reviews which indicate that curriculum can provide an effective mechanism for behaviour change among adolescents (Fields & McNamara, 2003; Tobler et al., 2000; Tobler & Stratton, 1997). The SPIY program aimed to target change with regard to reducing school-based adolescents own risk-taking behaviour as well as increasing their protective behaviour toward friends.

Socio-culturally Relevant Material

There is a requirement for behaviour change programs to be based on the needs of the target group. Adolescents need to feel that a program is relevant for them and, in order to engage students' interest, the program must be meaningful and developmentally appropriate (Buckley & Sheehan, 2004). It is important that ethnically and culturally appropriate language and materials are considered particularly in applying strategies cross-culturally for example, U.S. based programs and ideas to Australia.

According to Nation et al. (2003), the relevance of a program to participants appears to be a primary concern to producing positive outcomes in programs. They suggest that the concept of relevance includes understanding local norms and cultural practices and that culturally relevant refers to both the surface structure of language and the deep structure of sensitive cultural factors influencing development and receptiveness to intervention material and processes. Tobler and Stratton (1997) in their review

of drug education programs suggested that some programs failed to produce an effect of reduced alcohol use because student interest was not obtained. In these cases activities were not considered developmentally appropriate or the activities were abstract and not meaningful. Further, many of the effective programs refer to early developmental research or represent developmentally appropriate work.

There is a critical formative phase of research that should occur prior to the implementation of a program to facilitate the inclusion of relevant material (McBride, 2003; Perry, 1999). This research might involve focus groups or interviews with target groups (for example, school staff, students or parents) so that the content and activities can be effectively tailored to the adolescents who experience the program and thus increase the likelihood that material is developmentally appropriate and meaningful (Coatsworth, Szapocznik, Kurtines, & Santisban, 1997; McCord & Tremblay, 1992).

Activities in the SPIY program were written to focus on risk-taking behaviours and situations that were identified as relevant to the target group. Further, the program material was written in a language consistent with that expressed by adolescents. This information was obtained from focus groups and interviews with local high school teachers (including those in the target schools), curriculum and policy experts, school administrators as well as students in the target schools but in a previous cohort, high risk adolescents and older (Year 12) students of the target schools.

The information from young people was directly applied to program content through the use of scenarios. The scenarios were designed to provide the opportunity for the practical application of skills to situations that were relevant and meaningful. Part of the strategy of the SPIY program was to provide situations and characters within the scenarios that were as relevant to the target audience as possible without requiring participants of the program to divulge their own potentially illegal behaviour in class. As such, the scenarios were based on the findings of the focus groups or from other real case material for less common injuries such as head, neck and spinal injuries. The characters were based on an amalgamation of the traits of adolescents who have influenced the content of the narratives as well as a combination of events and outcomes.

Perry (1999) suggested that the greater the detail and user-friendly the presentation the easier it will be to implement the program. The information in the SPIY program also reflected process issues pertinent to adolescents, for example keeping independent activities short and purposeful as well as being limited in dependence on the written word to help maintain and focus attention. The focus group discussions among adolescents thus aided in understanding how concepts might be operationalised in terms of the content of material and processes of implementation.

Recognising Change through Adolescent Development

Adolescence is a unique developmental period and corresponds with great change in skills and experiences. Several reviewers have indicated that program material needs to be appropriately tailored to the skill levels of the adolescent with regard to their intellectual, cognitive and social development (Steinberg, 2004). For example, during adolescence the relationship with friends changes whereby there is increasing importance during the developmental period of friends affecting behaviour (Armsden & Greenberg,

1987). Such social development and cognitive representation of peers was carefully considered in the design of the SPIY program particularly with regard to the aim of increasing protective behaviour toward friends.

The less common approach of aiming to employ adolescents as a protective factor was based on research such as that by Prinstein and his colleagues' (2001) which found friends' prosocial behaviour was negatively associated with adolescent risk-taking behaviour. Further, research by Smart and Stoduto (1997) found that adolescents report that they protect their friends. About one-third of their adolescent sample reported they intervened to prevent their peers' drug use.

Universal, Selective and Targeted Programs

A related concern with regard to selecting target individuals is whether to implement a program to all adolescents in a given population, to those adolescents with a characteristic that puts them at an elevated likelihood of engaging in risk-taking behaviour or to the adolescents that at an individual level have an identified risk. This approach can be understood in terms of universal, selective and indicated approaches to program design. Universal prevention strategies address an entire population regardless of the level of risk or current risk-taking behaviour. The aim of such an approach is to reach a large number of individuals at once and develop adolescents' skills and strategies so that they have sufficient competence to prevent or reduce engagement in risk-taking behaviour (Leshner, 1997). This approach is typically taken with curriculum-based programs.

Another important consideration is the level of engagement in risk-taking behaviour of the target individuals, that is, with regard to program design, "Should the program target the prevention of a behaviour not yet performed or should the target be the secondary prevention of an established behaviour?" Whilst there might be face validity in targeting individuals at a similar stage of change it is probably only rarely that this will be possible in universal prevention programs such as those conducted through curriculum in schools (Buckley & Sheehan, 2004; Perry, 1999). Most injury prevention and control programs will probably have to be targeted to a group that will include adolescents at different stages of involvement in risk-taking behaviour. For example, some adolescents of the same age might never have consumed alcohol, others might have experimented, whilst others may drink more regularly. Hence a program designed to prevent injury associated with drink driving through school curriculum will be attempting to change the behaviour of participants at potentially different stages of the change process (Buckley & Sheehan, 2004; Longabaugh et al., 2001). As such it is possible that the efficacy of programs may be analysed by separately examining the program's impact on recipients at different stages and then comparing the impact of the program on high risk and low risk adolescents. Further a related concern was highlighted in the multiple evaluations undertaken by Botvin et al. (2004) following the implementation of their school-based intervention. They found that attrition rates were significantly higher for participants already engaged in alcohol use at baseline.

The overall involvement of adolescents in risk-taking behaviour can be understood from local prevalence data which can help draw attention to the stage of involvement in risk-taking behaviour of target adolescents (McBride, 2003). McBride (2003) suggests that the most effective strategy in identifying

an appropriate intervention point is to understand the rates of risk-taking behaviour in the local region. The developmental research for the SPIY program found that in targeting adolescents that were younger than driver licensing age there was still a number who had engaged in the risk-taking behaviour.

Students in Year 9 were chosen as they represented an appropriate target age group for the aims of the SPIY program. This age target was established after discussions with teachers and extensive review of prevalence literature which identified this as an age at which adolescents were beginning to have some experience with the target risk-taking behaviours yet they were typically not established behaviours. The Year 9 Health curriculum also provided appropriate links for the aims of the program.

There are several authors who suggest that linking with existing curriculum and minimising disruption to the established school program will enhance the likelihood of fidelity by teachers to the program (Fagan & Mihalic, 2003; Farrell, Meyer, & White, 2001). The SPIY program was designed to integrate into the school curriculum. The Health and Physical Education (HPE) curriculum in Queensland provided a natural link given one of the messages of learning within the HPE curriculum includes, *"investigative and learner-centred strategies* (that) *are most effective in enabling learners to make informed choices and to take actions that support their own and others' health and wellbeing."* (p 10, Queensland School Curriculum Council, 1999). Thus students are encouraged in this curriculum to engage in behaviours that protect themselves and others from injury.

The Importance of a Theory-driven Program

"A theory is a system of assumptions and rules to describe, predict and explain the nature of specified phenomena" (Nigg & Jordon, 2005, pg 292). A theory or conceptual framework is needed to describe and outline both the content and process of an intervention design. The decision regarding the content of the program requires the selection of a framework that previously has been shown to predict, with consistency and strength, the target behaviour (or behaviours). Nigg et al (2002) argues that behaviour change theories do more than just explain behaviour but explain the why and how of change, therefore the theory must not only outline the relevant constructs to manipulate and test, it must also bring these constructs to a logically derived posited outcome. The presence of logic, internal consistency and plausibility as enhanced by the use of a theoretical design may increase the likelihood of compliance with the implementation by the school and program facilitator. According to Fagan and Malic (2003) program implementers (such as teachers) who see an intervention as logical are more likely to adhere to instructions and follow program directions. The theoretical basis to design thus has clear implications for implementation success of the program.

The SPIY program drew on the Theory of Planned Behavior (TPB, Ajzen, 1985) to conceptualise and evaluate change in risk-taking behaviour and protective behaviour. Although research is lacking with regard to the TPB and friends' protective behaviour, there is evidence of the TPB adequately explaining risk-taking behaviour (Crane-Ross, Tisak, & Tisak, 1998; Epstein, Botvin, & Spoth, 2003; Norman, Bennett, & Lewis, 1998; Unger, 2001).

The selection of an evidence-based theoretical paradigm or framework to inform the presentation strategies is also required. This framework is to

direct the delivery of the program, that is, provide a guiding framework to answer 'how' to implement the chosen content. There is very little research that is concerned with comparing different theoretical approaches to process design while keeping the content constant (Buckley & Sheehan, 2004). However, many of the well-evaluated behaviour change programs (Botvin, Baker, Dusenbury, Tortu, & Botvin, 1990; Perry et al., 1996; Sheehan et al., 1996) generally have used psychological principles of social learning and cognitive behavioural presentation strategies.

The SPIY program process used cognitive behavioural strategies which posit that behaviour is learnt through modelling, imitation and reinforcement and uses techniques such as instruction and demonstration, behavioural rehearsal, supportive feedback, social reinforcement and extended practice as part of the process of the intervention to implement the chosen content. The SPIY program used a number of cognitive behavioural strategies that aimed to produce change in the TPB constructs.

Fishbein and Ajzen (2005) suggest that some cognitive behavioural techniques may be suitable for a program in which the content is designed using the TPB. In particular, they suggest that a reasoned discussion of negative beliefs of the targeted behaviour could be incorporated into changing the TPB constructs to produce change. One of the advantages of the cognitive behavioural approach is the flexibility of available strategies to affect change. A wide variety of techniques can be used to affect change in cognitions and behaviour and a selection can implemented in any one intervention program. Thus depending on the context of the intervention and the target of behavioural change different strategies may be applied. It is up to the program designers to select methods which fit best with the target context and environment of the proposed intervention.

Program Strategies: The Importance of Interactive Participation

Several meta-analyses of substance programs reached a conclusion that interactive programs are more effective than information only or affect-targeted programs (see Cuijpers, 2002; Tobler & Stratton, 1997). For example, using Socratic methods that have a high degree of student interaction and include greater skills training (Sussman, Rohrbach, Patel, & Holiday, 2003). Such methods typically require the active involvement of participants rather than information presented didactically in lecture format (Tobler & Stratton, 1997). Effective programs thus may require training for example in practising alternative less-harmful behaviours, assertiveness and role playing new skills. The effective programs provided active hands on experience and increased skills for participants when they are tailored clearly and explicitly to program goals (Durlak & Wells, 1997). The meta-analysis by Tobler and Stratton (1997) identified interactive programs to be at least twice, and up to four times, more effective than non-interactive programs. McBride (2003) suggested that the exchange of ideas and experiences provides a critical catalyst for change in that there is an opportunity to practice new skills and obtain feedback on the skills that are practiced.

As an example of an interactive process from the SPIY program, in one lesson a role play exercise was included whereby students were to create alternative endings (or beginnings) to the scenario whereby there would be less chance of injury. That is, students were to find any place in the original script that would provide an alternative ending of less harm. A discussion was

to follow whereby the realism of the alternative endings was evaluated as a group. The discussion and acting included consideration of the role of the friendship group present in the scenario. Students examined factors that influence the likelihood of risk-taking behaviour and considered an alternative behaviour that they feel has a lower likelihood of risk for injury and were thus to consider behavioural strategies to prevent injury.

This lesson sought to draw students' attention to the few barriers to, and potential ease with which students could perform preventive and low risk behaviours. The target theoretical construct focused on the presence of factors that support or obstruct the ability to perform the behaviour. Rehearsal and demonstration of the ability to prevent risk-taking can be part of an effective way to reduce risk-taking behaviour (Ellickson, 1993) and helps strengthen adolescent's belief that they can perform alternative lower risk behaviour.

Facilitator

There are number of different options in the choice of a program facilitator that have a demonstrated effect on reducing risk-taking behaviour, for example peers, college students, general classroom teachers, health education specialist teachers, mental health professionals, researchers, and law enforcement officers. Whilst few programs generally do not test the effect of different deliverers there are some exceptions such as Botvin (2000). Further Cuijpers (2002) compared the overall effect of programs delivered by different individuals through a meta-analysis. She found that peer-led programs (typically same age or a few years older) to be somewhat more effective than adult-led programs (such as those delivered by teachers, mental health workers, researchers). According to the author, there were large differences between the effectiveness studies, with some indicating greater effects for the adult-led programs and others for the peer-led programs.

In terms of face validity, it would appear that the programs which are delivered by individuals perceived as peers might have high relevance because of their clear direct association with the social and normative aspects of the target behaviour for change. Some recent meta-analysis of school based prevention programs show support for the effectiveness of peer-led programs (for example, Cuijpers, 2002). However Tobler et al (2000) concluded that peer-led programs were no more effective than programs delivered by teachers or mental health workers. The review did contain a very broad definition and included the opportunity for peer interaction among class members as part of the definition of peer-led. The authors suggested that it was the peer interaction that was the important variable in effectiveness not merely the presence or absence of a peer leader. Further peer-led programs are often require greater intensity in training as peers don't always have skills in behaviour management that teachers, for example, already have.

Training is a necessary component of effective curriculum program (Monahan, 1995). Ennet et al. (2003) found that around two-thirds of the substance use programs in their review used effective content but only about one-sixth used demonstrated effective delivery methods. Those teacher-leaders with most recent professional training and who felt comfortable with interactive methods, were most likely to use effective delivery methods compared with those with a larger time gap between professional training and

less comfort with facilitating interactive methods. Thus this research suggests that a skilled teacher with adequate training is needed. According to Nation et al. (2003) the effectiveness of a program can be enhanced when facilitators are sensitive, competent and have received sufficient training in both the program content and process. However, even with sufficient training, effectiveness can be compromised by staff turnover (Fagan & Mihalic, 2003; US Department of Justice, 1995), and by school climate and principal support (Fagan & Mihalic, 2003) amongst other factors.

Gingiss et al. (2006) highlighted methods of training to increase teachers' adherence including technical assistance and coaching. Strategies recommended to foster teacher commitment should include: checklists and guidelines (Wandersman et al., 1998), recruitment and training of staff champions (Roberts-Grey, Solomon, Gottlieb, & Kelsey, 1998), templates for assessing modification, incentives, on-site coaching (Gingiss et al., 2006) workshops for implementers (Kam, Greenberg, & Walls, 2003), and fully documented manuals (Mowbray, Holter, Teague, & Bybee, 2003). Training is required to impart knowledge, skills and desire (Fagan & Mihalic, 2003; Perry, 1999). Thus beyond transference of knowledge of operations and delivery, training can help foster commitment to the program and generate enthusiasm. Trained teachers compared with untrained teachers were more likely to fully implement a program and implement a program with greater fidelity (McCormick, Steckler, & McLeroy, 1995) and this appears to correspond with improved outcomes for students (Ross, Luepker, Nelson, Saavedra, & Hubbard, 1991; Taggart, Bush, Zuckerman, & Theiss, 1990).

The SPIY program included a teacher training program on the delivery of strategies and activities. This training program was developed in conjunction to the teacher's manual. All Year 9 Health classroom teachers attended a one-day workshop to discuss the rationale and the implementation of the content and strategies. Perry's (1999) suggestion that stipends for training are needed to cover substitutes or locums and that training should not be held after hours or on weekends were followed.

The goal of the teacher training in the SPIY program was to ensure quality of program delivery and increase standardisation of delivery. Teacher training included the presentation of information on the content and the encouragement of skill development such as facilitating group discussions and role-plays. Perry (1999) suggests that the training itself should be designed to be interesting, active as well as informative and skills building. Teachers who facilitated the SPIY program were made aware of the aims of the research program and of the intervention and a clear rationale was presented regarding each individual activity and overall aims. Although the SPIY program is manual-based and provides a detailed script of activities, teachers were encouraged to deliver material to meet the immediate needs of the individual adolescents in their classroom in order promote discussion. The training thus was essential to encourage consistency in activities, aims, and strategies.

In addition to the teacher training and teacher's manual, there was additional supportive material in the SPIY program including a student workbook. The students were each provided with a workbook that was used during each of the lessons except lesson 1. The workbooks were divided into sections for each subsequent lesson and typically contained the relevant

scenario (with text and a pictorial representation). Basic information regarding first aid, activity worksheets and some space for simple pen and paper tasks were also provided. The workbooks were distributed by teachers at the beginning of the lesson and collected again at the end of the lesson to ensure that all students had their workbook for each week.

'Dose'

Evidence for a required 'dose' for intervention effectiveness has not yet been established. In this case dose refers to the amount and intensity of program material, for example the number and length of sessions (Buckley & Sheehan, 2004). Programs vary widely in duration and length from a brief single hour session to multiple sessions with boosters in following years (Loveland-Cherry, 2005). Typically effective interventions include a follow-up or booster session in order to enhance the durability of impact (Buckley & Sheehan, 2004; Loveland-Cherry, 2005; Nation et al., 2003).

Research from the field of drink driving interventions (Wells-Parker, Bangert-Drowns, McMillen, & Williams, 1995) suggests that programs of longer duration are not necessarily more effective however systematic programs that are spread over time [say one hour programs run weekly for ten weeks] are more likely to demonstrate behaviour change (Buckley & Sheehan, 2004). In practice it is rare that extended periods of time are available from schools and even the most formally structured research interventions are rarely delivered exactly as designed (Gottfredson, 2001). Research by Gottfredson regarding implementation indicated that only one-quarter to one-half of programs outside a research development and testing phase were implemented similarly to research programs in terms of type and number of session offered.

Efficacy and Effectiveness Research

Although there is evidence from a growing body of research that interventions are effective in well-controlled settings, Glasgow et al. (2003) suggest that few of these are consistently and effectively implemented and supported in non-research based contexts. The authors suggest that the slow translation of research findings to practice is a result of different underlying logic and assumptions fundamental to efficacy and effectiveness research. Efficacy research aims to ascertain the impact of an intervention under ideal conditions, that is, asks the question, "Can the intervention work?" In contrast effectiveness research asks, "Does the intervention work under routine conditions?" (Buckley & Sheehan, 2004). The strict standardisation of circumstances that is needed in efficacy research creates greater confidence that any findings are attributed to the intervention (Streiner, 2002). On the other hand, the goal of effectiveness research is to understand whether an intervention works within a broadly defined population and set of circumstances. Glasgow et al (2003) suggest that the characteristics of a successful intervention in efficacy research is fundamentally different from the characteristics of interventions in effectiveness research. They assert that characteristics such as intensity, complexity and standardisation reflect efficacy research contrasting with effectiveness research which is said to require broad appeal and adaptability.

The SPIY program was primarily effectiveness research. Attempts were made to develop resources that have a greater chance of continuing to be implemented without the support of research funding. Effectiveness

research should ascertain whether an intervention is successful in the 'real world'. The drawback to effectiveness research is that an insignificant result runs the risk prematurely rejecting the program. This rejection might be under the assumption that the program could not be successful rather than for any number of reasons such as, poor selection, implementation or adherence (Streiner, 2002).

Evaluation Issues

The implementation of a program as anticipated by the designers is not guaranteed and this is true even when adopting a program already established as best practice. Instead, the adoption of such programs in different settings to the original evaluations has met with a wide variety of outcomes (Fagan & Mihalic, 2003). Durlak and Wells (1997) highlighted that there are few reports on program implementation. In their review of more than 1200 published studies of adolescent behaviour change programs, only 5% reported data on program implementation. According to Dumas et al. (2001) the demonstration of fidelity to the program represents a key methodological requirement and is critical in the evaluation and understanding of the effectiveness of the research. Fidelity in the context of program design refers to the degree to which components are deliverable in a comparable manner to all participants as true to conceptual theory and the goals of the underlying research. Both the content and process elements to the program must include methods that enhance the likelihood of fidelity. It is the extent to which researchers understand fidelity to the program that enables the differentiation between implementation failure and program failure (Harachi, Abbott, Catalano, Haggerty, & Fleming, 1999).

Battistich et al (1996) found stronger effects of programs (of drug use and delinquency prevention) whereby there was a high degree of implementation of the program material as designed. Rohrbach, Graham and Hansen (1993) found that high integrity to the program's design was associated with immediate positive outcomes regarding lower substance use. In this study the integrity to program design was associated with teachers who had fewer years of teaching experience, strong self-efficacy, enthusiasm, preparedness, and their principal's encouragement.

An outcome evaluation is necessary to understand the effectiveness of the program and beyond effectiveness evaluation it can also help in guiding decisions about future developments of the program. The choice of methods of the evaluation design, outcome measures and any moderator variables stem from the chosen theory that guided program development and the program aims (Farrell et al., 2001). Design issues such as selecting units of analysis (school versus individual), randomisation of treatment and control groups and follow-up procedures depends also on the resources available for evaluation, including school resources. Further the selection of outcome measures depends on the theoretical basis of the program, with appropriate attitudinal measures or knowledge measures reflecting the contents of the individual program. Measures of the behavioural outcomes should reflect the target goals for change including target behaviours. Measurements should include items with strong psychometric properties that reflect the age, cultural and demographic characteristics of the target population (Glanz, Rimer, & Lewis, 2002).

The evaluation of the SPIY program included both an outcome evaluation and process evaluation. The process evaluation involved focus groups with students and teachers and aimed to, firstly understand adolescents' and teachers' perspectives of the SPIY program and secondly adolescents' and teachers' perceptions of change in participants' attitudes and behaviour after involvement in the SPIY program. In addition, an observer was employed to identify adherence to the material, the response of students to the material, and the way in which teachers altered the material. An outcome evaluation was also included whereby there was a comparison with an assessment at post-intervention follow-up and six months after completion of the program with baseline measures and relative to a non-intervention control group. The outcome evaluation included an assessment of change in risk-taking behaviour and injury as well as the processes that were theoretically expected to change in the program.

Conclusions

The paper highlighted key components to be considered in effective program design. It is suggested that it is possible to target behaviour change toward multiple risk-taking behaviours. Further according to the research, the program goal should acknowledge that the target for change considers the target individuals, and their developmental and cultural needs. In order to understand the overall developmental stage and socio-cultural environment of the target adolescents focus groups appear an appropriate data collection method. These findings were used in the SPIY program to ascertain issues regarding culture, language and meaning of injury, risk-taking behaviour and risk and protective factors from the perspective of the target adolescents. An effectiveness trial provides an understanding of the real-world implementation of the program and can be tailored toward increasing the likelihood schools would be involved and continue to use the program without the involvement of researchers. There is evidence that teachers can be effective facilitators, that the dose of the program should include a booster session and that the program should be theory driven.

There are however a number of challenges with regard to the development of high school curriculum programs that were evident through the design of the SPIY program. Primarily these issues focused on the demands of making best use of finite resources and working with the many competing demands within schools. Competing demands within the school curriculum placed restrictions on the amount of material able to be included in a program. However by integrating material into existing curriculum requirements and targeting a reduction in similar risk-taking behaviours within a single program, it increases the potential for greater coverage of material. An important policy implication regarding the integration of material into the school curriculum thus indicates for education departments and schools to recognise value in the learning and skills associated with a road safety curriculum program.

The high school curriculum is not the only way to promote road safety. To ensure a greater reach of the messages additional methods of delivery, beyond the curriculum might be enlisted, perhaps through targeting change at a community, parental or teacher level. Although identification and discussion of such approaches were not the aim of this paper, future research might

examine how the curriculum approach can best be integrated with other delivery processes.

Developing a curriculum program that is relevant to target individuals requires much preliminary research with one of the challenges in this area being the additional costs that such a process incurs. Whilst it is necessary for programs to be relevant to the target audience, the development of pertinant material highlights the great resources and time that are need to be invested in creating worthwhile road safety curriculum. Similarly investment must be made in the training of program facilitators. The research, particularly from evaluations of alcohol and drug curriculum programs, clearly indicates the need for interactive programs. The skills needed of facilitators must not be under-estimated as without their appropriate delivery the effectiveness of the program is greatly compromised and thus appropriate resources and energy allocated to training is required.

Any curriculum program must be evaluated both with regard to the way in which it was implemented according to program aims regarding target outcomes and with regard to its effectiveness. Although the evaluation of the SPIY program used an observer rating as a method of data collection, future research might examine less intrusive methods of assessing fidelity. This element of process evaluation is in addition to whether the program created change in the target behaviours and the processes that were identified by theory to create the change in the target behaviours.

Previous school-based behaviour change programs have had modest success. This paper looked at the core components of behaviour change programs aimed at adolescent risk-taking behaviour change. In a meta-review of reviews of interventions researchers asserted that effective programs, "were comprehensive, included varied teaching methods, provided sufficient dosage, were theory driven, provided opportunities for positive relationships, were appropriately timed, were socio-culturally relevant, included outcome evaluation, and involved well trained staff"(Nation et al., 2003, p.449). Although road safety curriculum in high school settings requires some careful consideration there should still be optimism for its impact in improving road safety.

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