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Acceptability and feasibility of *Strong & Deadly Futures*, a culturally-inclusive alcohol and drug prevention program for Aboriginal and/or Torres Strait Islander secondary students

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ABSTRACT

Although there are effective alcohol and drug prevention programs available for Australian secondary schools, no effective culturally-inclusive programs exist for Aboriginal and/or Torres Strait Islander students. To address this gap, we developed the *Strong & Deadly Futures* program for young people aged 12–14 years. The web-based program was developed with Aboriginal, Torres Strait Islander and non-Indigenous staff and students at four secondary schools (2 urban, 2 rural). This mixed-methods study reports on qualitative and quantitative feedback from students (n = 235) and school staff (n = 8) in a pilot trial to assess acceptability and feasibility of this curriculum-aligned program. Feedback indicated that students were highly engaged and motivated to learn as a result of the story-based mode of delivery, and teachers reported the ease of program implementation and adaptation. Implications for future school-based health program development are discussed. Overall, *Strong & Deadly Futures* appears to be an acceptable and feasible culturally-inclusive alcohol and drug prevention program. Further research will test the program's efficacy in a randomised controlled trial.

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1. Introduction

Among young Australians (aged 15–24), and consistent with broader Australian trends, alcohol, tobacco and cannabis use has been steadily declining across the last ten years (Australian Institute of Health and Welfare, 2020). Nonetheless, alcohol and other drug (AOD) use remain leading causes of disease and injury burden in Australia (Ciobanu et al., 2018; Toumbourou et al., 2007), and particularly among young people, who disproportionately engage in risky AOD behaviour (Australian Institute of Health and Welfare, 2020; Toumbourou et al., 2007). There are indications that a similar pattern of declining alcohol and tobacco use has been evident among Aboriginal and Torres Strait Islander young people, with falling rates of alcohol and tobacco use and stable rates of

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cannabis use from 2002 to 2014–15 (Australian Institute of Health and Welfare, 2018). However, these data should be interpreted with caution, as the representativeness and generalisability of national surveys relating to Aboriginal and Torres Strait Islander AOD use have been questioned (Chikritzhs, 2021; Chikritzhs & Liang, 2012), and there is considerable variation between and within communities (Zheng et al., 2021).

Early initiation of alcohol and other drug use is associated with a number of negative outcomes, including increased risk of future mental illness or substance use disorders (Mathers et al., 2006; McGee et al., 2000; Rioux et al., 2018; Yuen et al., 2020), sexual risk-taking and violent offending (Wells et al., 2004), and reduced educational attainment (Silins et al., 2015). These are potentially exacerbated for Aboriginal and Torres Strait Islander young people, who have shown earlier ages of alcohol and drug initiation compared to their non-Indigenous counterparts (Australian Institute of Health and Welfare, 2006). In addition, Aboriginal and Torres Strait Islander Australians experience a disproportionate amount of disease burden from alcohol, tobacco and other drugs (Al-Yaman, 2017; Purcell-Khodr et al., 2020; Vos et al., 2008). Consequently, prevention of AOD use has been identified as a priority area in the Australian National Drug Strategy 2017–2026, with particular emphasis on delaying initiation of use in young people (Department of Health, 2017). In addition, recent consultations have stressed the need for culturally-inclusive prevention for Aboriginal and Torres Strait Islander young people (Snijder et al., 2021); a priority also identified by the National Strategic Framework for Aboriginal and Torres Strait Islander Peoples' Mental Health and Social and Emotional Wellbeing 2017–2023 (Department of the Prime Minister and Cabinet, 2017).

Universal prevention programs have been shown to be effective in preventing or delaying alcohol and drug uptake amongst young people (Foxcroft & Tsertsvadze, 2012; Lemstra et al., 2010; Mewton et al., 2018). However, to date the small number of school-based alcohol and drug prevention programs developed for Aboriginal and Torres Strait Islander young people have either not been evaluated or shown no benefit. A recent international systematic review of programs for Indigenous young people identified just four Australian studies that evaluated school-based programs aimed at reducing alcohol or drug use among Aboriginal and Torres Strait Islander adolescents (Snijder et al., 2020). Of these, two reported improvements in substance knowledge but did not include statistical tests of program efficacy (Gray et al., 1998; Sheehan et al., 1995). The other two showed no benefit (Johnston et al., 1998; Malseed et al., 2014). The same review identified effective elements in program development for Aboriginal and Torres Strait Islander young people including skill development, education, cultural knowledge enhancement and community involvement (Snijder et al., 2020). In addition, Aboriginal and Torres Strait Islander Australians conceptualise social and emotional wellbeing holistically; therefore programs aimed at strengthening wellbeing need to recognise the interrelatedness of domains such as body, mind, connection to community and culture (Dudgeon et al., 2017).

To address this gap in prevention, *Strong & Deadly Futures* program was developed for Australian secondary schools. The development process has been reported in detail elsewhere (Snijder et al., 2021). Briefly, it involved the adaptation of an effective mainstream program, *Climate Schools*, in partnership with an Aboriginal and Torres Strait Islander creative design agency (*Gilimbaa*), and staff and students at four Australian secondary schools (n = 77; 53% Aboriginal and/or Torres Strait Islander). *Climate Schools* is an effective web-based program that uses a harm minimisation and social influence approach to reduce alcohol and drug uptake (Champion et al., 2016a, 2016b; Newton et al., 2009, 2014; Teesson et al., 2014, 2017, 2020; Vogl et al., 2009). The key content is delivered via an illustrated story; both this and the co-design approach have been shown to increase engagement amongst students (Conroy et al., 2020; Kaftarian et al., 2004; Newton et al., 2011; Vogl et al., 2012).

Although *Strong & Deadly Futures* is similar in structure (i.e. peer-driven stories and accompanying classroom activities) and theoretically-driven prevention content to *Climate Schools,* the programs differ substantially. *Strong & Deadly Futures* was developed over three years in partnership with an Aboriginal and Torres Strait Islander creative agency, and co-designed with Aboriginal (n = 41) and non-Aboriginal (n = 36) students, who informed the storyline, characters and setting. In addition, *Strong & Deadly Futures* is novel in its holistic approach to building wellbeing and inclusion of Aboriginal cultural components. The key priorities for learning were based on existing evidence-based content and informed by stakeholders in the consultation phase. The program incorporates skill-building strategies for managing stress, effective decision-making, and building self-efficacy within a story infused with Aboriginal and Torres Strait Islander cultures. Together, this provides a holistic, strengths-based approach to building wellbeing. The story is also audio-narrated to increase accessibility of the resources.

Although *Strong & Deadly Futures* was developed with Aboriginal and Torres Strait Islander young people in mind, the target audience for the program includes all Australian secondary students. The story includes a mix of characters – Aboriginal, Torres Strait Islander and non-Indigenous – and is intended to be culturally-relevant for Aboriginal and Torres Strait Islander young people, while also inclusive of non-Indigenous students. The resources have been designed to be flexible enough to be delivered in diverse Australian classrooms, including where Aboriginal and/or Torres Strait Islander students are in the minority. In addition to preventing alcohol and drug use, the program aims to foster awareness and appreciation of Aboriginal cultures amongst non-Indigenous students.

Strong & Deadly Futures has the potential to address a critical gap in effective culturally-appropriate prevention. The primary aim of this study was to evaluate the acceptability and feasibility of *Strong & Deadly Futures* as a culturally-inclusive alcohol and drug prevention program for Australian secondary students. To evaluate this, we sought qualitative and quantitative feedback from teachers, students and research support facilitators during a pilot trial in four Australian secondary schools. A secondary aim was to use the feedback to inform refinements to the program.

2. Method

2.1. Aboriginal and/or Torres Strait Islander leadership

Aboriginal and Torres Strait Islander leadership was prioritised throughout all phases of the *Strong & Deadly Futures* development (Snijder et al., 2021) and pilot. Overarching guidance for program development, evaluation and reporting was provided by Aboriginal Investigators (MD, JW), and from the Expert Advisory Group (n = 16; 38% Aboriginal and/or Torres Strait Islander). Stakeholder consultations (n = 42; 40% Aboriginal and/or Torres Strait Islander) informed the initial program scope and priorities, and the program was developed collaboratively with Aboriginal and Torres Strait Islander creative design agency, Gilimbaa, and students at the four schools (n = 77; 53% Aboriginal and/or Torres Strait Islander). Strong & Deadly Futures was developed through a participatory process using culturally-appropriate research methodologies and measures (Snijder et al., 2021). The development followed an appreciative inquiry model (Leeson & Rynne, 2016), where community members identified and built on existing strengths to design their ideal program. Students participated in a range of creative activities, including photovoice sessions (Budig et al., 2018; Wilkin, 2010), an empowering method of capturing information through photography and analysing through shared discussion. The role of an Aboriginal and/or Torres Strait Islander facilitator was established to ensure continued local ownership and input throughout the pilot study. The research measures and methods were presented to and approved by the Expert Advisory Group, and their feedback integrated in the interpretation of findings and reporting.

2.2. Participants and recruitment

Ethical approvals were obtained from the University of New South Wales (ref. HC16927), the University of Sydney Human Research Ethics Committee (ref. 2018/874), and the New South Wales (NSW) Aboriginal Health and Medical Research Council (ref. 1235/16). At the time of the study, there was no Aboriginal-specific ethics body in Queensland (QLD). Approval to conduct research in schools was obtained from the NSW State Education Research Applications Process (ref. 2017410) and Catholic Education Queensland, Brisbane Diocese (ref. 313).

Schools known to the researchers were approached to participate in the development phase of the project (Snijder et al., 2021). The four schools who helped develop the program were then invited to participate in the pilot study (n = 2 rural public schools in NSW; n = 2 urban independent schools in QLD). All schools agreed to participate. Participants were Year 7 and 8 secondary students (aged 12–14 years) and teachers in the schools. Written informed consent was provided from all participants. Parents were provided with information sheets and an opportunity to withhold consent for their children to participate. If a student or parent did not consent, the student was not required to complete the surveys but still completed the curriculum-aligned school-based program, as this was part of their normal education.

2.3. Program

Development of the *Strong & Deadly Futures* program followed consultations with academic, health, government and education stakeholders Australia-wide (n = 42; 40% Aboriginal and/or Torres Strait Islander), and was overseen by an Advisory Group of experts in alcohol and drug prevention, and Aboriginal and Torres Strait Islander health (n = 16; 38% Aboriginal and/or Torres Strait Islander). The story-based delivery structure, and core harm minimisation and social influence components were modelled on the effective *Climate Schools* program (Newton et al., 2009; Teesson et al., 2014, 2020; Vogl et al., 2009). The program development also incorporated elements identified in the systematic review as being effective in preventing substance use amongst Indigenous youth (Snijder et al., 2020). An extensive consultation phase with secondary students (n = 77; 53% Aboriginal and/or Torres Strait Islander) informed the program storyline, which was then drafted with creative design agency, *Gilimbaa*, reviewed at each stage by the Advisory Group, and focus-tested with a subset of staff and students from the consultation phase (n = 8 staff, 48 students). The resulting program is a six-lesson, web-based package combining online illustrated storylines with interactive classroom activities.

Strong & Deadly Futures addresses key learning outcomes relating to social and emotional wellbeing, and targets alcohol, tobacco and cannabis prevention. The program was developed to align with the Australian Year 7 and 8 health and physical education curriculum and NSW personal development, health and physical education curriculum, and is accessed via the strongdeadly.org.au website. Each lesson is 40–50 min in length and contains: a 10-min web-based narrated illustrated story; a choice of companion classroom activities; and teacher and student lesson summaries of the key learning outcomes to reinforce the content. All key learning content is delivered via the illustrated story, encouraging implementation fidelity, because all lessons need to be delivered for students to follow the storyline. Teachers can choose from approximately six activities per lesson, two of which are 'recommended' and the rest 'optional'. Elements of Aboriginal and Torres Strait Islander cultures are embedded throughout the illustrated story, and one optional activity per lesson focusses on Aboriginal and Torres Strait Islander culture; for example, the importance of Elders as role models. All content can be viewed individually on computers/tablets, or as a class using a Smartboard or similar class-based presentation technology.

2.4. Procedure

Local Aboriginal and Torres Strait Islander facilitators (3 female, 1 male) were employed in each school as part of the study to assist teachers to implement the cultural elements of the program and provide research support. Facilitators were from the local community and had an existing relationship with the school. Before the study commencement, facilitators familiarised themselves with the program content, in addition to receiving approximately 2 h training on program delivery and research administration. Facilitators were provided ongoing support via weekly phone calls with the research team.

Teachers implemented *Strong & Deadly Futures* in their Year 7 and/or Year 8 classes (Health and Physical Education; Wellbeing) over six weeks in 2019. Teachers completed online logbooks in Qualtrics (Qualtrics., 2019) after each lesson, and local facilitators recorded their observations of each lesson. Before and after program completion, students completed surveys in class using Qualtrics or by paper-and-pen. Student surveys were accessed via the strongdeadly.org.au website, which required that student complete the pre-survey before they were able to access the program. Following program completion, semi-structured interviews were conducted with teachers, which were conducted, audio recorded and transcribed by facilitators and research assistants. This mixed-method study reports on outcomes relating to student-, teacher- and facilitator-rated acceptability and feasibility of *Strong & Deadly Futures*.

2.5. Measures

2.5.1. Demographic characteristics

Demographic variables were collected from students in pre- and post-program surveys (age, school year, gender and Indigenous identity - Aboriginal, Torres Strait Islander, Aboriginal and Torres Strait Islander, or non-Indigenous). Teacher demographic details were recorded in the first logbook (e.g., age, gender, Indigenous identity and number of years teaching).

2.5.2. Quantitative data

Student surveys. Acceptability and perceived efficacy were assessed by an online survey administered following program implementation (Supplementary Material S1), using measures from a previous *Climate Schools* trial (Teesson et al., 2014). To measure engagement, students were asked to rate how much they liked the lessons, cartoons and activities on 5-point Likert scales (0, *Disliked a lot*; to 4, *Liked a lot*). Students rated relevance of the content to their lives on a 5-point Likert scale (0, *Completely irrelevant*; to 4, *Completely relevant*). To assess perceived efficacy, students were asked to rate whether they thought the skills and information they had learnt were useful and would help them deal with peer pressure and stress. Ratings were on a 4-point Likert scale (0, *No, I don't think they will help at all*; to 3, *Yes, I think they will help a great deal*). Students were also asked to rate how likely they would be to use the skills and information taught in the program in their own lives on a 5-point scale (0, *Very unlikely*; to 4, *Very likely*). In addition, students were asked open-ended questions about what they liked most and least about the program, and for any general comments.

2.5.3. Qualitative data

Teacher interviews. Following program completion, facilitators and research assistants conducted 1:1 semi-structured interviews with teachers to obtain detailed feedback on the acceptability and feasibility of *Strong & Deadly Futures* (Supplementary Material S2). Teachers were asked about program content appropriateness and relevance for their context, and their perceptions of student engagement. Teachers were asked about the process of implementing *Strong & Deadly Futures*, with

further probing to explore: ease of implementation; access to technology; program length; and local adaptations made to the program. They were also asked about program content and structure, integration of program materials, and how *Strong & Deadly Futures* compared to other alcohol and drug teaching material. Finally, teachers were asked about overall program quality, and for any other comments.

Teacher logbooks. Teachers were asked to complete logbooks after each class as a measure of implementation fidelity, and to obtain feedback specific to each lesson (Supplementary Material S3). In the logbooks, teachers were asked to record: activities implemented; any local adaptations made; and whether they had any additional comments about each lesson.

Facilitator observations. To complement the interview data, local facilitators completed observation forms during each lesson, detailing student and staff interactions, and student engagement (Supplementary Material S4). Observations included: which elements of the program were implemented; how they were implemented; and both teachers' and students' responses to the content. Forms were designed using Spradley's (Spradley, 1980) participant observation methods as a guide. Facilitators were also asked to record any general observations they had for each lesson.

2.6. Coding and analysis

Descriptive analyses were performed on student quantitative data using IBM SPSS version 25 (IBM Corp, 2017). All qualitative data, including teacher interview transcripts, teacher logbook responses, and facilitator observations, were analysed by three independent coders (SGB, YW, KR) using NVivo12 (QSR International Pty Ltd, 2018). Data were analysed using an approach guided by framework analysis (Gale et al., 2013; Ritchie et al., 2003). In the first phase, three researchers (SGB, YW, KR) reviewed the entire dataset, including teacher interview transcripts, logbooks and facilitator observation forms. Key themes were identified and a preliminary coding frame was developed for analyses. The qualitative data was then coded by the researchers individually in accordance with the coding frame. If new themes emerged during coding, the coding frame was adapted and researchers recoded the data individually using the new coding frame, with discrepancies resolved by discussion. Finally, codes were revised and merged to reduce overlap, and simplified to capture the most important themes.

3. Results

3.1. Demographic characteristics

Demographic characteristics and data collection completion rates are contained in Table 1 (students) and Table 2 (teachers). The four participating schools had Index of Community Socio-Educational Advantage (ICSEA) scores ranging from 841 to 1059. ICSEA is an index of educational advantage based on family education and occupation data, with a median of 1000 for all Australian schools and a standard deviation of 100 (Australian Curriculum Assessment and Reporting Authority, 2020). In this study, the two independent urban schools had ICSEA scores of 1059 and 1051, indicating greater educational advantage than 70–73% of Australian schools. The two rural state schools had ICSEA scores of 841 and 934, indicating greater educational disadvantage than 83–96% of Australian schools.

Table 1
Demographic characteristics: Students (n = 235).

Students	n (%)
Gender	
Male	112 (47.7)
Female	117 (49.8)
Other	6 (2.6)
Age, years (mean + SD, range)	12.5 ± 0.6, 12-14
Indigenous identity	
Non-Indigenous	216 (91.9)
Aboriginal and/or Torres Strait Islander	19 (8.1)
Grade	
7	217 (92.3)
8	18 (7.7)
Location	
Urban (2 Independent schools)	202 (86.0)
Rural (2 state schools)	33 (14.0)

Note. SD, standard deviation.

Table 2
Demographic characteristics and data sources: Teachers (n = 8).

Teachers	n (%)
Gender	
Male	6 (75.0)
Female	2 (25.0)
Age, years (mean + SD, range)	34.8 ± 3.1, 30-38
Indigenous identity	
Non-Indigenous	8 (100.0)
Location	
Urban (2 Independent schools)	6 (75.0)
Rural (2 state schools)	2 (25.0)
Years teaching (mean + SD, range)	9.4 ± 4.2, 5-14
Completed data sources	
Classes completed the program	13[a]
Teacher interviews	9[b]
Teacher lesson logbooks	29[c]
Facilitator class observation forms	7[d]

Note. SD, standard deviation.
[a] Of the 13 classes, six teachers delivered the program to one class each; one teacher delivered to two classes; and one delivered to five classes.
[b] The teacher who delivered the program to two different classes opted to be interviewed twice (once per class), due to differences in class age and how the program was received.
[c] Total possible logbooks: 78 (1 per lesson x 6 lessons x 13 classes).
[d] Total possible observation forms: 13 (1 per class x 13 classes).

Strong & Deadly Futures was implemented initially in 14 classes across the four schools: 10 in Health and Physical Education classes, and 4 in elective classes. The 14 classes were delivered by 8 teachers. Of these, 5 teachers delivered the program to one class each; 2 teachers delivered to two classes each; and 1 delivered to five classes. One of the elective classes ($n = 18$) withdrew during the program due to timetabling challenges and staff absences, which the teacher noted *"had everything to do with school and nothing to do with the program"*. As a result, 13 classes completed the program.

3.2. Quantitative data

Categorical quantitative data were obtained from student surveys on program acceptability and perceived efficacy. In addition, three open-ended questions recorded general comments and program aspects that were liked most and least. Response rates to open-ended questions were relatively low ($n = 147$, liked most; $n = 112$, liked least; $n = 84$, general comments; of the total sample of $n = 281$), and comments were predominantly single-word responses (for example, liked most: "cartoons"). As a result, responses were grouped into categories, and are reported quantitatively rather than qualitatively.

3.2.1. Acceptability

Engagement. The majority of students endorsed liking the lessons overall, with highest ratings received for the story (Fig. 1). In response to open-ended questions about what they liked most about the program, students cited the illustrations, story or characters most frequently ($n = 98/147$ total responses; 66.7%). Other nominations included: the information and skills they learnt ($n = 25$); and activities or class discussions ($n = 10/147$; 6.8% of responses). In response to what they liked least, 28 students (of 112 total respondents; 25.0%) nominated the illustrations, storyline or characters. Other nominations included: the worksheets ($n =$

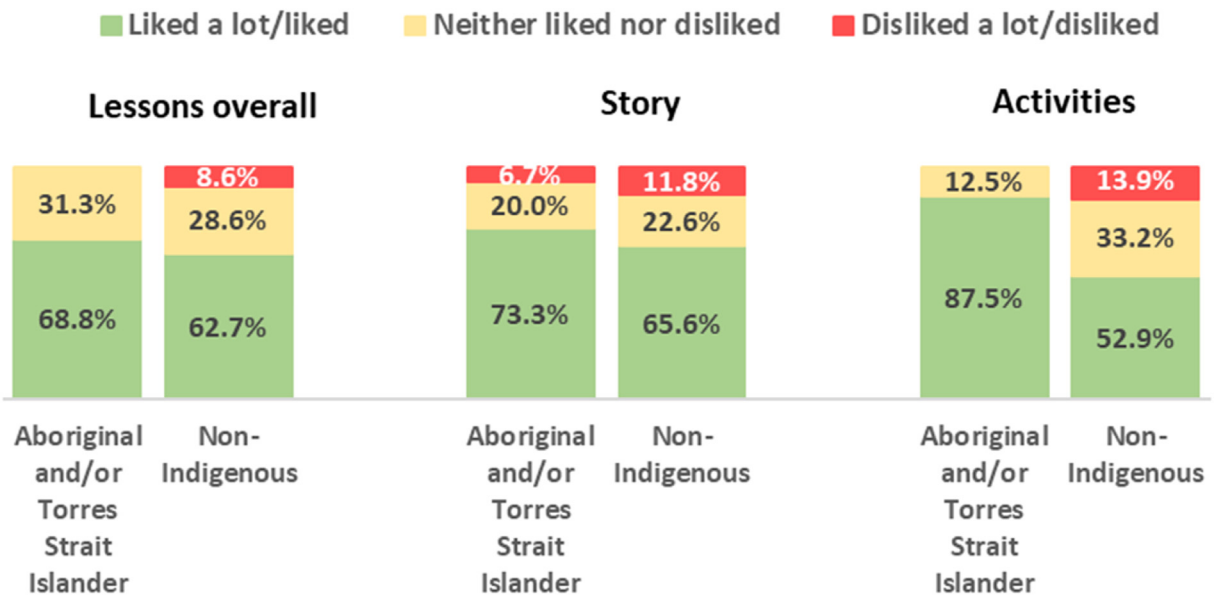

Fig. 1. Aboriginal and/or Torres Strait Islander (n = 16) and Non-Indigenous (n = 181) Student Ratings For Lessons, Stories and Activities.

22), activities ($n = 11$), role plays ($n = 1$) or class discussions ($n = 1$).

Appropriateness. Approximately half of the students (50% of the Aboriginal and/or Torres Strait Islander students; 45.1% of non-Indigenous students) said the program content was relevant to their own lives, followed by around one-third who were unsure (37.5% Aboriginal and/or Torres Strait Islander; 29.3% non-Indigenous), and a quarter who considered it irrelevant (12.5% Aboriginal and/or Torres Strait Islander; 25.5% non-Indigenous). This ambivalence may have been driven by a perception that students their age were not engaging in alcohol or drug use; one student commented generally that *"..it didn't really relate to our lives because we aren't doing drugs or alcohol or smoking cigarettes"*.

Perceived efficacy. The majority of students (53.3% of Aboriginal and/or Torres Strait Islander students; 63.9% of non-Indigenous students) reported that they were likely to use the information and skills taught in *Strong & Deadly Futures* in their own lives. Just over a quarter of students (46.7% Aboriginal and/or Torres Strait Islander; 26.2% non-Indigenous) were unsure, and a minority (0% Aboriginal and Torres Strait Islander; 9.8% non-Indigenous) thought they were unlikely to use it. Most students also reported thinking that the *Strong & Deadly Futures* content would be 'somewhat' or 'very helpful' for dealing with peer pressure (80.5%), stress (78.6%), and alcohol and drugs (85.2%; disaggregated by Aboriginal and Torres Strait Islander identity in Fig. 2). Although these proportions varied slightly between Aboriginal and/or Torres Strait Islander and non-Indigenous students, the Aboriginal and/or Torres Strait Islander sample was small ($n = 15$) and therefore susceptible to large percentage changes.

3.3. Qualitative data

Qualitative data were obtained from the semi-structured teacher interviews, the teacher logbooks and facilitator observation forms. All eight teachers completed the semi-structured interviews, with one teacher electing to be interviewed twice; once for each class they taught. Teachers had been asked to complete logbooks after each lesson, resulting in a total possible 78 logbooks (1 per lesson x 6 lessons x 13 classes); and facilitators to complete observation forms to record classroom interaction and engagement during the lessons, resulting in a total possible 13 observation forms (1 per class). However, in both cases, completions were relatively low ($n = 26$ logbooks, 33.3% completed; $n = 7$ observation forms; 53.8% completed).

Because the semi-structured interviews were detailed and in-depth, and the logbooks and observation forms were brief, the interview

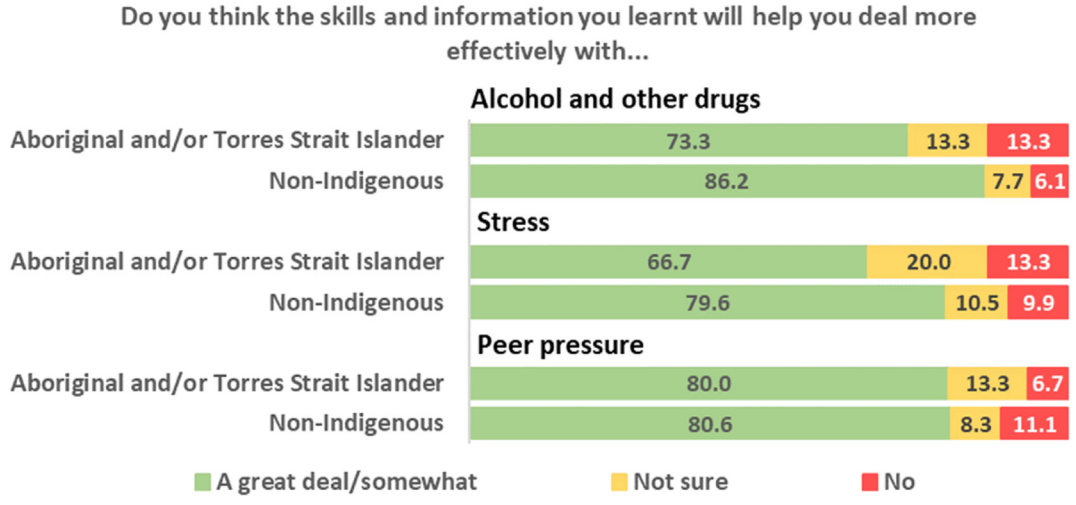

Fig. 2. Aboriginal and/or Torres Strait Islander (n = 15) and Non-Indigenous (n = 181) Student Perceptions of Program Efficacy.

responses heavily influenced the themes that arose during coding. From the initial 20 potential themes hypothesised, four final key themes were identified through the coding process regarding acceptability: engagement, appropriateness, content and structure acceptability and perceived efficacy; and four regarding feasibility: implementation fidelity, program length and timing, ease of implementation and functionality (Fig. 3). A summary of the data sources by theme are contained in Supplementary Material S5. Examples of feedback for each theme are contained in Table 3; although open-ended student responses were not included in the qualitative analyses, they have been included in the Table where relevant.

3.3.1. Acceptability

Engagement. One of the strongest themes to emerge from the qualitative data was that students were highly engaged in tasks, responded with interest to content, and motivated to participate in the lessons. Teachers and facilitators volunteered that students found the story engaging in seven of the nine semi-structured interviews, and in six of the seven classroom observation forms. In particular, most (n = 6 of 7) facilitator observation forms indicated that students enjoyed the romance between the two main characters, with references to students *"clapping and cheering"* at the end of the final story. Teachers commented that the story format made the content *"friendly"*, accessible, and provided context that encouraged students to consider different perspectives: "*I think* [the story] *engages them a little bit more because it actively involves them … and gives them a chance to look at different people's perspectives*". There were relatively few criticisms of the story or story-based methodology of delivering information, and these mostly revolved around the *"politically correct"* nature of the language, conversations or story.

In relation to the classroom activities, facilitators observed that students were actively engaged: "*Students are highly motivated to engage in an open discussion … and are keen to extend their knowledge*"; and that they expressed surprise: "*quickly surprised to find that the numbers are quite a lot lower than what they thought*"; or showed curiosity about the content: "*students are intrigued by the content and ask many task-related questions*". Interactive activities were preferred by teachers and were observed by facilitators as most engaging for students; for example: *"Students seem to respond the best to activities where they are encouraged to get up out of their seats and move through the classroom"* (urban facilitator). Positively-regarded activities included class quizzes (mentioned in n = 1 interview, 1 logbook, 1 observation form); class discussions (n = 2 interviews, 1 logbook, 2 observation forms); and role plays (n = 1 interview, 2 observation forms). One teacher (urban) reported that *"the factual parts at the beginning, brainstorming with facts, that really engaged the kids"*, while a rural teacher said that *"it was great to share some personal stories which made the students open up as well, great for relationship building"*.

The least engaging elements of the program were the worksheets. One rural teacher said that "*some of the worksheets and activities were quite bland and students struggled to engage … Class discussion works better, as well as doing hands-on activities*". The same teacher recommended moving away from worksheets and focussing on interactive activities generally, in addition to recommending simplifying, scaffolding or revising a number of worksheets: *"Worksheets need to be more structured with explicit instructions of where to write and what to do – would suggest cutting down on worksheets"*. Two teachers recommended other worksheet adaptations: providing students with direct access to worksheets through the website, rather than via the teacher; or condensing and/or reducing the total amount.

Appropriateness. Overall, teachers perceived that *Strong & Deadly Futures* was relevant and relatable for students. In more than half (n = 5/9) of the nine semi-structured interviews, teachers mentioned that the concepts were relevant, and that the story format made the content relatable. When asked whether the program was more appropriate for Year 7 or 8 students, the urban teachers who delivered the program with Year 7 felt the content and style was appropriate for that age group: "*… it was really good I would say for Year 7 students. I don't know if it would be ideal for Year 8's and 9's, given the cartoon factor*", whereas the two rural teachers who taught Years 7 and 8 preferred teaching the program in Year 8: "*Year 8 enjoyed it a lot more and were more into the discussion*" (Table 3). Three of the teachers (2 urban, 1 rural) indicated that the literacy level of the program was appropriate for their classes, which included both Years 7 and 8. One urban teacher commented that the narration of the illustrated storyline helped with *"cutting through"* reading and writing barriers. Although two (1 urban, 1 rural) facilitators observed that some language was unfamiliar to students, such as *"cannabis"* and *"self-efficacy"*, one urban teacher noted that although there were some words students might not know, *"it's a good skill for them"*.

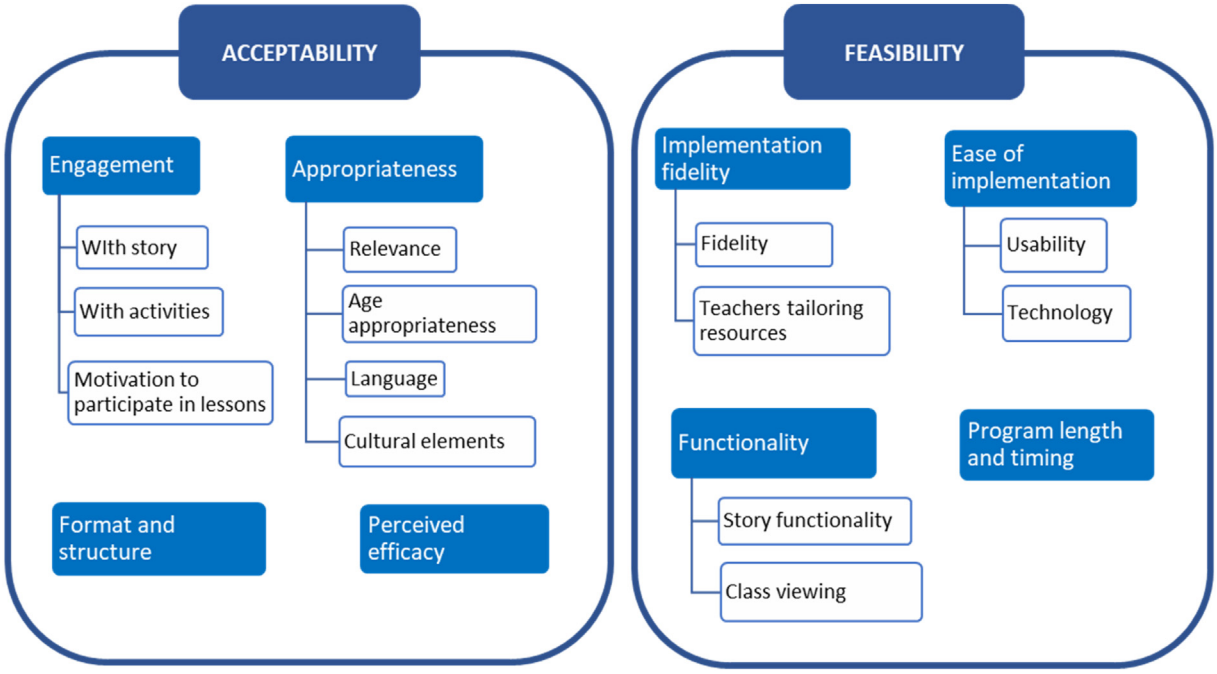

Fig. 3. Themes and sub-themes for acceptability and feasibility of Strong & Deadly Futures.

Table 3
Themes for acceptability and feasibility of Strong & Deadly Futures from qualitative data.

	Teacher comments (n = 8)	Facilitator comments (n = 4)	Student comments (n = 235)
Acceptability			
Engagement	*"… by having the animation and the language and putting it into a story, allowed the students to kind of engage better … it's friendlier."*	*"The students show clear excitement in finding out what happens in the end of the cartoon series and are therefore highly engaged in the class … The romantic side story of the cartoon worked really well in keeping all of the classes entertained and engaged."*	*"I enjoyed watching the cartoons; it was fun understanding real-life concepts in an animated context."*
	" … the pre and post activities for the cartoons were great. Roleplay activities were also great."	*"Students are highly engaged in the task, electing to spend a portion of their lunch time presenting and viewing each group's presentations."*	[liked least] *"How they were very story-like and not realistic in some ways. "* [liked most] *"the skits we did after watching the episodes."*
	" … too many worksheets. Class discussion works better as well as doing hands on activities."	*"Most students are engaged in the task with one student spotted doing further research on his laptop regarding link between mental health and alcohol use."; "Students are motivated and excited to share their ideas. It is clear that they have enjoyed the lessons and have learned a lot from them … "*	*"some of the worksheets were a bit boring".*
Appropriateness	*"The concepts and that were really good, and it was really relevant to the kids."; "The slideshows really related to what the students would be going through at this stage of their life … "*	*"The students feel like they can relate to Amy's feelings and use Amy's experiences to draw on their own experiences."*	*"Although it was informative, they tried to make it relevant to our age group and situations."; " … it didn't really relate to our lives because we aren't doing drugs or alcohol or smoking cigarettes."*
	"I found that our Year 8's were much more into it than our Year 7's. I think our Year 7's found it a bit confronting at first, whereas the Year 8's had done some drug stuff [education] *and they probably had a bit more exposure to it."*	*"Year 8 is better to start the program with anyway because they are a little bit more mature … I felt like the year 7s thought this doesn't apply to me, like 'I don't do drugs or alcohol or smoke, it doesn't apply to me' … "*	Year 7 student: *"it didn't really relate to the majority of grade 7. "* Year 8 student: *"grade 7's would relate more"*
	"Some of the conversations were a bit unrealistic … "; " … the literacy was perfect for their level … "	*"Students made fun of the word 'deadly' a lot."*	
	"..had a good focus on Indigenous culture which also made it more able to be identified with our Aboriginal students … "; " … Was fine for all backgrounds, though the Aboriginal perspective/activity in each lesson sometimes didn't flow on very well within the lesson … "	[During one of the cultural activities] *"Approximately 1/4 of the class raise their hand to offer their ideas and experiences with many children sharing their stories of moving from another culture or school."*	[Liked most] *"It's Australian."*
Format/structure	*"There was pretty clear flow and for each activity, being able to pick and choose what you felt best suited your class was a good option."; " … being able to pick from a choice of content is really flexible for us as teachers … "; "I think the kids would like a work booklet to go with it. So getting all the worksheets and putting it as one … "*	n/a	n/a
Perceived efficacy	n/a	*"As an observer it was clear to me that the students had learned a lot in between the first and second surveys."; "The students clearly know a lot of the information and key points which have been addressed over the last few weeks."*	[Liked most] *"Learning how to deal with situations like these which will probably happen to me one day"; "I learnt a lot about drugs and alcohol."*
Feasibility			
Implementation fidelity	*"I just added a bit more factual content in the beginning … I added in the stigma about advertising for alcohol, advertising for cigarettes and how it's affected rates of people actually adopting smoking or drinking …"; "I didn't find it necessary to use the worksheet for some of the activities … We would just do it, in a discussion or in a role-play … "*	*"The teacher has prepared his own true or false questionnaire in the area of alcohol awareness … "; "By transforming the activity into an exam, the teachers were able to gauge how well the students were doing as a result of the program individually."; "The teacher took a different approach to the activities this week. He created a quiz on a website … "*	n/a
Ease of implementation	*"I've found it really easy to use. The links, everything is there for you, it's effectively a teacher cookbook, which*	*"Despite the fact that a relief teacher had the class today, the course work was uninterrupted as it was easy to*	n/a

(*continued on next page*)

Table 3 (*continued*)

	Teacher comments ($n = 8$)	Facilitator comments ($n = 4$)	Student comments ($n = 235$)
	is very good in terms of the busyness of a teacher's schedule. … Anyone could pick up this program and deliver it appropriately."	*pick up by another teacher who had been sent the log-in details and activities by the class' regular teacher."*	
	"The kids all have their own computers so it was pretty easy to find and access computers."; " … some of the logins didn't work despite us creating them ourselves … "	*"Issues with logging in and re-setting passwords etc."*	
Program length and timing	*"I honestly think that in a ten-week term, we could cover that 6 units in a term."; "I think it's probably about right … for a term's worth of work."*	n/a	n/a
Functionality	*"We watched all the videos as a group which was much better than watching them individually, as students could laugh together, make comments, ask questions if they weren't sure what happened, and make predictions after scenes …*	*"There is significantly less discussion because the students aren't watching the cartoon together .. Seeing the cartoon together makes the students seem to want to interact more and ask more questions … "*	
	"I found that [the slides] a bit tough having to keep clicking all the time. It could be a lot easier if it was a click and then if you clicked again that would stop it."		*"It would be cooler if the cartoon was an animation, instead of slides. Or if there was an option for it to autoplay, had to keep clicking on the next button. Other than that, I loved it."*

[a] Student comments are spontaneous responses to open-ended questions about what they liked most or least, and whether they had any other comments.

In terms of the appropriateness of the cultural elements of the program, four teachers (3 urban, 1 rural) indicated that Aboriginal and/or Torres Strait Islander and non-Indigenous students were equally receptive to the program. Two urban teachers commented more broadly that the content either promoted an understanding that not everyone had the same background, or that many students could relate to being from a non-mainstream culture: *"I think it's a great opportunity for the students to understand that everyone comes from a different background"*. One urban facilitator also noted that many students related to the experience of being from another culture (Table 3). One rural and one urban teacher commented that although the content of the cultural activities was good, they were not always well integrated into the broader lesson, and sometimes required further explanation for students (Table 3). This suggestion will be used to refine the program in future. Feedback was not sought from students in relation to cultural appropriateness.

Format and structure. Teachers reported in the interviews ($n = 3/9$, all urban) that the structure and integration of materials worked well, and there were clear links between lessons, or between the story and activities. Three urban teachers indicated that delivering content via a story was a good way to encourage students to engage with the material: *"It's like their favourite TV series … they know what's going on each week"*. Two urban teachers commented that they liked the flexibility of choosing between activity options: *"being able to pick from a choice of content is really flexible for us as teachers to … work out what suits our students in particular"*. One rural teacher recommended collating student worksheets into a single booklet for ease of dissemination.

Perceived efficacy. In five of the seven observation forms, facilitators observed that students had increased knowledge and/or retained information over the course of the program: *"It is clear in the answers shared that most students took away a lot of information from the first video"; "Students show signs of excellent information retention, approach the subject matter in a mature fashion, explore the ideas presented in today's lesson with an open mind and a willingness to further their knowledge"*.

3.3.2. Feasibility and implementation fidelity

Implementation fidelity. All teachers delivered the key learning content (i.e., the story) as intended. In addition, all teachers implemented both recommended brainstorming activities in each lesson, plus an average of two optional activities per lesson. Three classes implemented at least one of the cultural activities over the six-lesson program, and two of the classes implemented a cultural activity each lesson. It is worth noting, however, that implementation data was incomplete: 26 of 78 teacher logbooks were completed, and seven of 13 observation forms, meaning that the activity counts may be underestimates.

While teachers maintained the fidelity of the core program content, they frequently took advantage of the program flexibility to adapt activities to their classes. Three teachers (1 urban, 2 rural) and two facilitators mentioned adapting the delivery format of the activities, such as changing worksheets to small group discussions or role plays. Teachers also created new activities ($n = 4$ observation forms; 2 interviews) using the program content, including quizzes, 'academic relays' (where students formed two lines and wrote answers to the teacher's questions on the board, before running to the back of the line), and creating an exam from the coursework. Apart from the exam, all adaptations and new activities had a strong focus on interactivity. One facilitator commented positively on student engagement with the interactive quizzes in particular: "*The students took to it with so much enthusiasm that I don't believe they realised how much they were learning in the process*".

Ease of implementation. Five teachers (3 urban, 2 rural) reported in the interviews that *Strong & Deadly Futures* was easy to implement, with minimal preparation required: "*Anyone could pick up this program and deliver it appropriately*". Two urban teachers commented positively on the value of lesson plans and variety of activity options and resources: "*as a teacher, resources – they're invaluable and the lesson plan is fantastic so that just made it easier*". In addition, two urban facilitators commented in class observation forms that relief teachers implemented lessons with ease, despite having no background knowledge of the program: "*As this teacher was a relief teacher he was unaware of the exact structure of the lesson .. Despite the alteration in the way the class was presented, all of the key messages were still addressed and all of the students remained engaged*".

Teacher perceptions of implementation of the web-based program delivery method were mixed. Five urban teachers taught classes where students had their own laptops and found the computerised content easy to use and access. One rural teacher taught a class where students had their own laptops, but had multiple technological issues related to the website being blocked or trouble with student registration on the website. In the other rural school, students were supplied tablets to access the program, however this was not ideal because of the workload involved to

charge the tablets simultaneously before classes. Technological issues were largely resolved by teachers logging in for students, or by watching the cartoons as a group, negating the need for students to log in.

Program length and timing. Teachers responded positively about the program length and timing. Four urban teachers indicated in the interviews that there was enough content in the six-lesson program to extend the program for more than six weeks. This was due to the volume of program content, and to general classwork interruptions from timetabling (i.e. Health and Physical Education classes alternated between practical and theory classes), teacher absences and miscellaneous disruptions (e.g. fire drills, school camps): "*..especially with schools, you plan a 6-week unit and then something happens like we had the fire drill … and then I was away … so six or seven weeks of solid content will fit into a 10-week term most of the time*".

Functionality. Although the illustrated stories were designed to be viewed individually by students, many teachers ($n = 3$ urban, 1 rural) preferred that the class watch as a group. Two urban teachers noted that it was easier to monitor students' attention when watching as a group; one rural teacher and one facilitator commented that student engagement was higher when viewed collectively, as it facilitated interactivity and discussion: "*Sometimes we'd pause the video and then talk about what had just happened or whether people had anything to add to it*". The illustrated story required that viewers click to load each slide, designed to ensure students were paying attention throughout. However, all teachers ($n = 8$) found this frustrating, and two (1 urban, 1 rural) commented that the transition between slides caused students to lose focus. This functionality was also raised by students ($n = 4$) as what they enjoyed least about the program. All teachers recommended changing the format to allow the story to play automatically. One urban teacher who taught the program in multiple classes also indicated that they were not able to click a single button to go back to the start of the slideshow; instead having to click back through all the slides.

3.4. Program refinements

Refinements made to the program as a result of feedback are contained in Supplementary Material S6. Changes include: revising activities to reduce reliance on worksheets and increase emphasis on interactivity; creating a student workbook; recommending class (over individual) viewing of the program by default; revising the story to autoplay; and simplifying the teacher logbooks. In addition, a future phase of the project will involve extensive collaboration with diverse Aboriginal communities to enhance and extend the cultural activities and more clearly integrate them into program lessons. This development phase will be completed prior to a large randomised controlled trial of the program.

4. Discussion

This study investigated the acceptability and feasibility of *Strong & Deadly Futures,* an Australian-first culturally-inclusive alcohol and drug prevention program for secondary students. The primary aim was to assess acceptability and feasibility, and collect feedback to inform program refinements.

The integration of Aboriginal and Torres Strait Islander culture into a school-based alcohol and other drug prevention program was well-received by both Aboriginal and Torres Strait Islander and non-Indigenous students. The central component of the program features a story with two core and seven peripheral Aboriginal and/or Torres Strait Islander characters (and three core and two peripheral non-Indigenous characters), and cultural elements are woven into the storyline. For Aboriginal and Torres Strait Islander Australians, culture is an essential component of wellbeing; a source of resilience that is critically important in the development of strong positive identities (Bourke et al., 2018; Lovett et al., 2020). Embedding Aboriginal and Torres Strait Islander content throughout the program recognises the centrality of culture to health and wellbeing, and is consistent with evidence that cultural knowledge enhancement is an important element of effective drug prevention for Aboriginal and Torres Strait Islander youth (Snijder et al., 2020). In addition, the story-based methodology respects the Aboriginal and Torres Strait Islander tradition of delivering information and sharing knowledge through 'yarning' (Geia et al., 2013). This approach also aligns with the Australian Government's priority to integrate Aboriginal and Torres Strait Islander education across the curriculum (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008).

Although *Strong & Deadly Futures* prioritises Aboriginal and Torres Strait Islander culture, the program demonstrated inclusivity for and acceptance by non-Indigenous students. Consistent with previous experiences piloting content for the *Climate Schools* programs, students found the story-based method of delivery highly engaging (Champion et al., 2015; Conroy et al., 2020; Newton et al., 2011, 2012), frequently citing the animations, characters or storyline as their favourite element of the program. Teachers reported that Aboriginal and/or Torres Strait Islander and non-Indigenous students were equally receptive to the story, and one teacher suggested that incorporating cultural elements made the program more relatable for students from other minority cultural backgrounds. Students also reported that they thought the information and skills they learned would help them in future. As a result, *Strong & Deadly Futures* demonstrated that a program designed for Aboriginal and Torres Strait Islander youth can be inclusive and accepted in diverse classrooms, including where Aboriginal and Torres Strait Islander students are in the minority.

Strong & Deadly Futures was found to be acceptable by both students and teachers. Program content was reported to be age-appropriate, with relevance slightly skewed towards Year 8. A quarter of the students reported that the content was not relevant to them, although this rate was considerably lower amongst Aboriginal and Torres Strait Islander students (12.5%), perhaps reflecting the cultural salience of the program. Open-ended comments suggested that students may have perceived the content as being irrelevant because they were not using alcohol or drugs. However, *Strong & Deadly Futures* was deliberately designed to be delivered before the majority of youth have been exposed to alcohol or drugs (McBride, 2003; Newton et al., 2011) with the objective of preparing youth with skills and knowledge before prevalence of use increases. Current rates of alcohol, tobacco and cannabis use put the average age of initiation between 16 and 17 years (Australian Institute of Health and Welfare, 2020), although earlier ages are reported for Aboriginal and Torres Strait Islander young people (Australian Institute of Health and Welfare, 2006; van der Sterren et al., 2016), suggesting that the 12–14 year age group is an appropriate age to target. In addition, the program content aligns with the Year 7 and 8 Australian school curriculum for alcohol and drug education, suggesting that the material is developmentally appropriate. Consistent with this, most teachers reported that the program would be relevant for either Year 7 (student ages 12–13) or Year 8 (ages 13–14); though teachers who taught both grades favoured Year 8.

Overall, students in rural schools seemed harder to engage than those in urban schools. It was difficult to assess whether this was a challenge associated with the rural school context, the program, or with the method of delivering the program in an elective class. In the urban schools, the program was delivered in students' regular Health classes, where attendance was expected. By contrast, the rural schools offered the program as an elective subject, where students were removed from their usual classes and had the option of attending; an approach which was less successful in maintaining student engagement. This was further exacerbated by staffing challenges in one of the schools, which influenced their ability to run the program and ultimately resulted in one of the classes dropping out. Rural schools were also more likely to cite issues with technology not working, and although the issues were overcome, these represented an additional challenge. These issues reflect the importance of program flexibility to support implementation – for example, by offering multiple technological options for accessing the program – and will be further examined in a future trial with a larger sample of rural schools.

Strong & Deadly Futures demonstrated good usability for teachers, and the results of this study offer a number of implications for future school-based health promotion programs. First, as indicated above, story-based delivery of information was highly effective in engaging young people. Second, there was a strong preference amongst teachers for interactive modes of delivery. Teachers consistently prioritised class collaboration, from the preference to viewing the story collectively, to preferentially selecting interactive models of delivery for the companion class activities. Facilitators also volunteered that engagement was highest when students were able to *"get up out of their seats and move through the classroom"*. Finally, school-based programs need to be flexible. The *Strong & Deadly Futures* model, with 10 min of standardised core content and a selection of adaptable activity options, appeared to be easy for teachers to implement, but flexible enough for them to tailor delivery for their classrooms, while maintaining adherence to the program content and learning outcomes.

In terms of feasibility, *Strong & Deadly Futures* was easily able to be implemented with fidelity. Implementation fidelity is a well-recognised and critical challenge for maintaining program efficacy in different settings (Mihalic, 2004). With this in mind, *Strong & Deadly Futures* was designed to facilitate fidelity in a number of ways to aid effectiveness. The program is computerised, with all material delivered through the strongdeadly.org.au website. This means standardised, non-onerous and flexible delivery, requiring little to no staff training. Embedding the key content within a story encourages complete, sequential delivery of the material, while increasing the likelihood of maintaining student interest. Indeed, all teachers delivered the entire program (i.e. all six illustrated story lessons in full and as intended) and the recommended activities before and after the cartoon, as well as a variety of optional class activities, including those with an Aboriginal and Torres Strait Islander focus. Although teachers adapted the delivery format of some of the companion class activities, adherence to the content and learning outcomes was maintained. Teachers reported ease adapting activities to suit individual class or student needs where required, and in some cases, teachers created new activities or assessments, demonstrating the program's flexibility. In addition, on at least two occasions relief teachers delivered the material despite having no prior knowledge or exposure to it. Through this combination of standardised core content and flexible optional activities, *Strong & Deadly Futures* therefore showed preliminary evidence of supporting implementation fidelity, and was consistent with previous findings that school-based drug prevention programs are more likely to ensure fidelity by "minimizing complexity while maximizing flexibility" (Mihalic et al., 2008).

A number of limitations need to be noted. Firstly, the schools involved in the pilot trial were the same as those involved in developing *Strong & Deadly Futures*. Although they were the same schools, a delay of two years between the initial co-development (2017) and pilot study (2019) resulted in no overlap in participating students. Nonetheless, this development approach means the program may have been uniquely relevant to the participating schools. Given the significant diversity amongst Aboriginal and Torres Strait Islander communities, a program developed with these communities may not generalise to other communities across Australia. Additionally, although participating schools were from a mix of socioeconomically advantaged and disadvantaged regions, the limited sample size made it difficult to assess generalisability of the program for different communities. Therefore, future consultation, adaptation and testing in a broader range of culturally, geographically and socioeconomically diverse communities will be required to determine the program's efficacy outside the bounds of the development schools.

A second limitation was that some data were incomplete. Notably, just 26 of 78 (33%) teacher logbooks and seven of 13 (54%) facilitator observation forms were completed. Three teachers (two rural, one urban) completed logbooks for all lessons; three (all urban) completed for some lessons; and two (urban) teachers did not complete any. Observation forms were completed for seven of the eight teachers, and partially completed for the remaining teacher. Although the reasons for non-completion were unclear, it is possible that the logbooks were too onerous to complete. While the facilitators completed the observation forms in class or immediately after, teachers were required to fill them in at the end of the school day or during recess or lunch. Accordingly, they may have forgotten to complete their logbook or not had time to do so. Within the context of low completion rates, the inclusion of multiple sources of data (interviews, observation forms, logbooks and surveys) allowed us to triangulate data across sources and to capture a breadth of information needed to assess acceptability and feasibility. The logbooks and observation forms will be simplified to reduce burden in the next phase of the trial.

A final limitation was the relatively small sample size of Aboriginal and Torres Strait Islander students. The *Strong & Deadly Futures* development involved students selected from Aboriginal and Torres Strait Islander leadership programs in three of the four schools, which helped to achieve a greater representation (53%) of Aboriginal and Torres Strait Islander students. To determine implementation feasibility and to assess acceptability for all students, we elected to deliver the program in the standard classroom setting for the pilot trial, and thus a lower proportion of Aboriginal and Torres Strait Islander students were included in the sample. Although the number of Aboriginal and Torres Strait Islander participants was small ($n = 19$), the overall representation in the sample (8%) was greater than the proportion in the Australian population (Australian Bureau of Statistics, 2016). The sample proportion also reflected the heterogeneity of the involved schools, which ranged in size from approximately 17 to 210 students per grade, and with Aboriginal and Torres Strait Islander students comprising between 3 and 40% of the student population. Including a mix of schools – large and small, remote and metropolitan, and with differing proportions of Aboriginal and Torres Strait Islander students – was considered important to ensure diversity of schools and settings. However, to further assess acceptability amongst Aboriginal and Torres Strait Islander students, a larger sample with more targeted recruitment will be required.

In conclusion, *Strong & Deadly Futures* shows good preliminary acceptability and feasibility as a culturally-inclusive alcohol and drug prevention program for Australian secondary schools. Implications for future school-based health program development include: complementing standardised core content with adaptable activities to aid generalisability and implementation fidelity; a strong focus on interactivity and class collaboration; and that the story-based methodology for delivering core content both supports implementation fidelity and is highly engaging for students. In addition, building Aboriginal and Torres Strait Islander cultures into health promotion programs provides an important opportunity to recognise and celebrate Aboriginal and Torres Strait Islander cultures while remaining inclusive and acceptable for non-Indigenous students. The next stage of this research will involve a cluster randomised controlled trial to assess the efficacy of *Strong & Deadly Futures* to reduce alcohol and drug uptake and improve wellbeing amongst Aboriginal, Torres Strait Islander and non-Indigenous students across Australia.

CRediT authorship contribution statement

K. Routledge: Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Supervision, Project administration. **M. Snijder:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – review & editing, Supervision, Project administration, Funding acquisition. **N. Newton:** Conceptualization, Methodology, Writing – review & editing, Supervision, Funding acquisition. **J. Ward:** Conceptualization, Methodology, Writing – review & editing, Funding acquisition. **M. Doyle:** Methodology, Writing – review & editing, Funding acquisition. **C. Chapman:** Conceptualization, Methodology, Writing – review & editing, Funding acquisition. **K.E. Champion:** Conceptualization, Methodology, Writing – review & editing, Funding acquisition. **B. Lees:** Methodology, Investigation, Data curation,

Writing – review & editing. **S. Garlick Bock:** Formal analysis, Investigation, Data curation, Writing – review & editing. **Y. Wang:** Formal analysis, Data curation. **P.W. Olthuis:** Writing – review & editing. **K.S.K. Lee:** Conceptualization, Methodology, Writing – review & editing, Funding acquisition. **M. Teesson:** Conceptualization, Methodology, Writing – review & editing, Funding acquisition. **L. Stapinski:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of competing interest

Nothing to declare.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmmh.2022.100073.

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