Developing an alcohol and other drug serious game for adolescents: considerations for improving student engagement

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Abstract

Objectives: To explore perceptions of alcohol and other drug (AOD) education and digital game design preferences among Australian adolescents with the goal of identifying key factors to promote engagement in an AOD serious game for Australian secondary school students.

Methods: Semi-structured focus groups were conducted with 36 adolescents aged between 13 and 18 years. Qualitative data was analysed using thematic analysis.

Results: Participants described heightened engagement with AOD education that incorporated relatable and relevant real-life stories and interactive discussions. They also expressed a desire for learning to focus on practical strategies to reduce AOD harm and overcome social pressure to use AOD. Participants highlighted the importance of incorporating relatable characters and context-relevant scenarios in promoting engagement, and identified social elements, player choice, and optimal challenge as important game design considerations.

Conclusions: A focus on meaningful realistic scenarios, relatable characters, relevant information and practical skills may promote high school aged students' engagement with AOD educational content. Game designs incorporating social elements and decision-making opportunities may be conducive to promoting engagement and enhancing learning.

Implications for public health: Findings from this study can be used by researchers and game designers for the development of future AOD serious games targeted at Australian adolescents.

Key words: serious games, alcohol, drugs, drug education, school

Alcohol and other drug (AOD) use among young people is a public health concern given AOD use is the leading cause of total burden of disease in males, and the second (alcohol) and third (illicit drugs) leading causes of disease burden in females.[1] Regular heavy AOD use among adolescents can have behavioural and neurobiological consequences,[2,3] is associated with alcohol-related harms and substance use disorders[4,5] and has been linked to increased risk of suicide ideation and attempt.[6] Determinants of AOD use among adolescents include individual (e.g. personality traits, attitudes, knowledge), family (e.g. modelling behaviours and attitudes, rule-setting), school and community (e.g. engagement, relationship with teachers)[7,8] and peer and social factors (e.g. influence of friends, group dynamics).[9–11] Secondary schools provide an ideal environment for delivering AOD education to adolescents, targeting knowledge and skills to minimise harms associated with both experimental and prolonged AOD use.[12] In Australia, school-based AOD education is delivered within Health and Physical Education (HPE) curriculum for students in years 7 through 10.[13] A 2012 systematic review reported that only a limited number of AOD programs in Australian secondary schools had demonstrated effectiveness in reducing alcohol, tobacco and cannabis use, and none for 'other' drugs.[12] Several factors can impede traditional AOD education programs efficacy, including non-engaging and non-interactive delivery of subject material, cumbersome upskilling and/or training requirements for teachers, and implementation issues.[12,14–18]

Use of digital technology in classrooms can improve student engagement and knowledge acquisition.[19,20] It can also facilitate larger-scale dissemination of evidence-based programs with improved implementation fidelity.[19,21] Online and computer-based AOD education programs targeting adolescents have demonstrated reductions in AOD use, intentions to engage in AOD use and AOD-related harm.[21] A novel application of digital technology in classrooms is the use of serious games for educational purposes.[22] Serious games can be defined as computer "software that merges a non-entertaining purpose *(serious)* with a video game structure *(game)*"[23,p2] and have shown to be effective in improving

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Submitted: January 2022; Revision requested: May 2022; Accepted: June 2022
The authors have state the following conflicts of interest: Edith Cowan University were contracted by Sideffect Australia to develop an AOD online serious game for Australian high school aged students.

Aust NZ J Public Health. 2022; 46:682-8; doi: 10.1111/1753-6405.13287

knowledge, motivation to learn, general problem-solving skills, strategic thinking and cognitive skills,[24] and have begun to be trialled in AOD school education settings.[25,26] Given the ability to motivate learning, promote problem solving[24] and to deliver complex health messages,[27] serious games may be a suitable platform for targeting individual (e.g. knowledge and attitudes) and peer and social influences of AOD use (e.g. promoting harm reduction knowledge and teaching refusal skills whilst maintaining social standing). A 2014 systematic review of serious games in AOD education found research failed to compare serious games to other forms of AOD education, suggesting more research is necessary.[25] Similarly, a 2018 systematic review specific to alcohol-related virtual reality applications suggested more empirical evaluative research is warranted.[28] Nonetheless, serious games are rapidly becoming more popular for AOD and other forms of public health education[26] given the clear contributions serious games can make towards positive learning experiences.[29]

Formative research is imperative in intervention and program development as it enables researchers to understand target populations' attitudes and beliefs on the topic area, and to identify preferences and considerations to promote engagement and adoption.[30] Although formative phases have been conducted in previous AOD app and game development studies,[26,31] approaches exploring user-preferences and factors surrounding engagement and adoption prior to content development appear limited, and mechanisms that engage students (particularly males) in AOD education are not well understood.[26,32] Participatory design,[33] co-design,[34] intervention mapping[30] and iterative user-centred design frameworks[31] are systematic user-centred approaches that involve enlisting end-users before (i.e. formative research) and throughout the design and development of health interventions. Studies adopting user-centred approaches for development of health apps report high user engagement and acceptability.[31,33,35–38] Further, identifying and considering students' needs and expectations is crucial in digital education programs for promoting engagement and learning.[39] Exploring game style preferences, perceived gaps in AOD education and AOD education delivery preferences may assist to identify factors to promote engagement and learning in AOD educational games.

The purpose of this study was to identify considerations for development and explore factors to promote engagement in an AOD serious game for delivery in HPE classes in Australian secondary schools. The aims were to (1) identify perceived gaps in contemporary AOD education and preferred delivery styles, and (2) identify AOD education serious game design preferences and considerations.

Methods

A qualitative study design using semi-structured focus groups was adopted to explore adolescent perspectives. A data-driven thematic analysis approach was adopted[40] to explore the perceptions of current AOD education, user-preferences and considerations for game design, and gain insight into factors surrounding engagement in an AOD serious game. Ethics approval was granted by the Edith Cowan University Human Research Ethics Committee (2020-01560-LOMBARDI).

Participants

Purposive sampling was employed to capture perceptions from a range of adolescents from across the Perth metropolitan region. Students (*N*=36, *n*=18 male, *n*=18 female) in years 9 to 12 (mean age 15.7 years, *SD*=1.20, range 13 to 18 years) from a range of socioeconomic (SES) backgrounds and public and private schools, and exposure to video games were recruited. Adolescents reported how often they played video games: 41.2% played games daily, 17.6% a few times a week, 20.6% at least once a week, 14.7% at least once a month, and 5.9% never (however, had played in the past or had prior exposure through siblings or friends). All participants were recruited via an external recruitment company with a database of approximately 40,000 people from amongst the general population in Western Australia. Participants were remunerated for their time to the value of 70 Australian dollars. Prior written consent was obtained from all participants and parental consent was also obtained for those aged less than 18 years.

Procedures

A semi-structured interview guide was developed consisting of open-ended questions designed to encourage open discussion and to explore factors thought to promote engagement of an AOD serious game. Questions were developed under two pre-defined topics including: (1) perceptions of AOD education and (2) preferences and considerations for game design.[9] Questions relating to entertainment and educational games were asked first followed by more sensitive questions relating to perceptions of AOD education.[41] Interview guides are available in the supplementary file.

Focus groups took place in October 2020 at Edith Cowan University, Mount Lawley. Six focus groups comprising of six students with equal gender balance were conducted. Students were grouped by high school year (9 and 10; 11 and 12) and SES (low, middle, high). Focus groups were facilitated by two members of the research team (JN and JW). JN is a health scientist with experience in conducting qualitative user-experience research and JW is a game designer also with qualitative and user-experience research practise.

Data analysis

Focus groups were audio recorded and transcribed verbatim. Two members of the research team (SH and HB) independently coded transcripts using NVivo 12 qualitative data analysis Software (QSR International Pty Ltd). Both SH and HB have experience in simulation and digital technology research with a focus on health education. Following principles of data-driven thematic analysis[9,40] and adopting a 'critical friends' approach[42] themes and sub-themes were refined in an iterative manner until the research team reached common agreement on interpretation of themes.[42]

Results

Results are presented under three overarching themes: (1) perceptions of AOD education, (2) general game design preferences, and (3) specific game design preferences. Data identified as relating to certain topics within each overarching theme were identified and coded together under sub-themes. Themes, sub-themes, descriptors and exemplar quotes are presented below. These themes were consistently revealed across participant subgroups with no noted differences in theme interpretations across gender, age-groups, SES, or public versus private school attendance.

Perceptions of AOD education

Delivery style and engagement

Participants typically described their experience with school-based AOD education as being delivered through traditional didactic (or lecture-style) lessons with teachers delivering information via PowerPoint slides or handouts. These delivery methods were typically viewed as lacking engagement.

> *[In] my class they just briefly talk about it [AOD] and then they usually just give you a worksheet, go off and do research, and it's the end of the class.* (female, year 9, high SES)

> *I think the classes where no one is engaged is like a health teacher who just has the same PowerPoint from 20 years ago and just goes over the same statistics that people are saying. There's no interaction, it just doesn't feel relatable to us now.* (female, year 12, mid SES)

> *I guess there's not much interactivity in my class besides writing in a book, otherwise, it's just answering questions that the teacher asks you or having your answers written down on the board but there's not much else to it.* (male, year 9, low SES)

Some mentioned use of video-based resources that teachers would sometimes draw on; however, participants described the videos as typically being based on 'hardcore' drug use in North America or found storylines to be over-exaggerated, limiting applicability to personal context.

> *We watched a few videos on lifestyles of people who are using hardcore drugs. And it was mainly things in America though, so it wasn't really affecting us firsthand. It was just all very American-based drug use.* (female, year 10, high SES)

> *We watch a lot of short films and the problems will always be caused by drugs or alcohol. But I think a lot of the time, people drink alcohol and then it's fine, and they [filmmakers] just said, 'Pretty much if you drink this, your life is going to be over.'* (female, year 11, low SES)

Participants described preferred delivery approaches they deemed to be engaging and effective. First, students described the effectiveness of relatable and relevant real-life stories in helping young people apply AOD information to their personal context.

> *I like it when my teacher gives real examples of things that happened. Like, if she'll tell us what happened to someone in Perth who drank too much or something. I remember that stuff more than I do statistics or the facts.* (female, year 10, high SES)

> *Incorporate personal stories into that, makes it more believable.* (male, year 11, low SES)

> *We had someone come in and do a speech. It [was] someone who got his leg amputated on a train when he was drunk… And his speech was real[ly] good as well. It wasn't a boring speech, it was a good speech. It's better than just like telling you, 'If you are really drunk, you might go onto a train track'. He actually shows you and it's interesting.* (male, year 10, mid SES)

Second, some participants described enjoying interactive discussions and activities when learning about AOD, as they perceived this style of delivery to be more fun and engaging.

> *I actually like the classes where you'll physically [interact] – it's like role play. I like engaging more in it … . It makes it more interesting rather than just getting a worksheet and doing it"* (female, year 9, high SES)

> *What our teacher did was they broke us off into groups. You know, you go research this one thing and then bring it all back in again. So you only needed to focus on one and then just share what you found with everyone … . You know you can work together and then it makes it really easier.* (male, year 10, high SES)

> *I feel like I learned more when it's the whole class having fun and learning about it.* (female, year 9, high SES)

AOD education content

Participants recalled learning about AOD categories including depressants, stimulants, and hallucinogens. They also described how lessons tended to focus on alcohol (e.g. alcohol content and standard drink sizes) and 'hardcore' drugs such as methamphetamine and heroin, and less focus on more common substances such as cannabis. Further, students described content being limited to facts and statistics, with limited in-depth information on the risks of AOD use.

> *They kind of only teach about the more hardcore drugs like – I mean, they teach about all of them but they make it a big thing not to do meth or heroin, and all that. But, I don't know, when they're talking about weed and the stuff that's more common, they don't really seem to be serious about it almost. They just talk about it for a minute and then move on to everything else. And I don't know, I feel like to stop the use of it, they need to be more informative of the risks of it.* (female, year 9, high SES)

> *I thought we learnt more on alcohol than we have on drugs.* (male, year 10, low SES)

> *They don't really go into specifics, like 'this drug does this'. It's just the categories, really.* (male, year 11, mid-SES)

> *I think it definitely gets repetitive, just throwing out facts and statistics – oh, they're the same thing. Just trying to scare you away from it and that just gets repetitive.* (female, year 12, mid SES)

Some participants described their experience with school-based AOD education that adopted an abstinence or 'don't do it' approach, commenting further that they felt this approach can oftentimes be counter-productive in that it can drive some young people to rebel and engage more with AOD. A harm reduction approach was perceived as being far more effective than promoting abstinence in AOD school-based education.

> *'Don't do it,' is just, if anything, makes you want to do it more.* (female, year 12, mid SES)

> *When you're told not to do something, then you want to do it.* (male, year 10, mid SES)

> *And they kind of go with the idea that even if I tell you all this bad stuff about it, you're never going to do it, where in reality, I think 30% in Australians have tried weed at least once. I think it will be interesting if they told you how to do it as safely as possible like we're seeing now with heroin safe injection rooms. If it's going to happen, try and minimise the risks.* (female, year 11, low SES)

> *And they tell you 'Don't drink. Don't do it', whereas you can, just you [have] got to do it sensibly.* (female, year 12, mid SES)

When asked about perceived gaps in school-based AOD education, participants expressed a desire to learn more about the effects of AOD use, strategies to overcome social pressure to use AOD and harm reduction strategies. Overall, students were in favour of learning practical strategies as they felt they could apply knowledge and skills to their own lives and context, therefore being more memorable and impactful than traditional content delivery.

> *Delve more into it. Just telling us what they are, it doesn't really help anyone because most kids already know what the main ones are, so just telling us, it doesn't really do anything. You should go more into real specifics, like what's going to happen, [if] you do decide to do this [AOD].* (male, year 12, mid SES)

> *I think also because they don't really explain how it affects you that much, it's like, 'Oh, this might happen', so I feel like if they did it more from a biological sense and explained how it's working, it might be more effective.* (female, year 12, mid SES)

Yeah, putting more practical examples would help become more aware about it [be]cause I find that's particularly what I want to learn about, the actual awareness about it in real life, you know what's happening around me, not the facts [be]cause I'm not going to remember them. (male, year 10, high SES)

Referring to strategies to overcome social pressure:

I think also they [could] give you strategies to overcome peer pressure… more of that would be good. (male, year 12, mid SES)

Having stuff you can say but stuff that you'd actually say, [be]cause in the schools, they make you have like weird sentences you never actually [say]. (female, year 12, mid SES)

[For example] 'Stop, I don't like it' kind of thing. (male, year 11, mid SES)

Really unnatural stuff. So, if there's a way to have it more realistic, so we can actually use it, I think that'd be cool. (female, year 12, mid SES)

There's a lot of people in my year, a lot of my friends that are just straight up say[ing] 'no,' and they don't give a reason. I think people actually respect you more if you say 'no' and don't add an excuse on the end … I think there's a risk of you getting excluded but at the same time, your real friends and people that actually understand [and] respect you more. And if they hate you for it, then they are not your friend in the first place. (male, year 11, mid SES)

Referring to practical harm reduction strategies:

Maybe how you deal with a situation where you see someone having a negative effect, you know how you'd react accordingly. (male, year 9, low SES)

Maybe identifying people who are in danger, using party drugs, like ecstasy and stuff. I wouldn't know if someone is just on a drug and having a good time, but you couldn't tell if they're actually in trouble. I've seen a lot at festivals, you can pass someone by and they look really messed up and you're like, 'Oh, is that normal? Do they need help?' (female, year 12, high SES)

Helping an addicted friend or the point of view of the person that's addicted. (female, year 10, low SES)

I think if they had more on what you should do if your friend is drunk or something, how you could keep them safe, keep yourself safe, and when to call ambulances and stuff. I think there needs to be more awareness of that. (male, year 12, mid SES)

Finally, most participants reflected that many young people would hesitate in calling for an ambulance if a friend was having an adverse reaction to alcohol or other drugs, mainly due to concerns about getting into trouble with parents or the police.

I think the friends would panic and not know what to do but, as I said, we don't get taught any problem-solving strategies. (female, year 12, low SES)

I think though in a lot of situations young people don't call the ambulance just because we're not really educated on what happens after that ambulance is called, what do the police do? (female, year 12, mid SES)

I think you'd be too scared because you'd be worried about do you call the ambulance or do you not want your parents to find out. (male, year 10, mid SES)

General game design preferences

Three clear preferences were identified with respect to general game design specifications in consideration of an AOD serious game. These included a desire for in-game social interaction, player choice, and accomplishment and optimal challenge.

Social interaction

When discussing digital games, the social element of games was highlighted as a key enjoyable component. Participants described a preference for multi-player games as it allows for social interaction and reduces boredom that can occur in single-player games.

I think I like games that aren't single player. You can work with other people, so you do it with friends. I think they're definitely more engaging. (female, year 12, mid SES)

It's fun to play with friends but I do also enjoy it when you meet up with a bunch of strangers online and you'll work together. (male, year 10, low SES)

It doesn't really ever get boring because it's always like you're talking to someone. (male, year 10, mid SES)

Player choice

Participants described enjoying playing entertainment-based games that provided a range of options and/or meaningful decision-making opportunities. Indeed, it seemed having options and choice, which helped provide a sense of agency or autonomy, appealed to students with some students suggesting narrative and decision branching designs were suitable for an AOD serious game.

Being given options of what to do and picking out of your options what you do. (female, year 12, mid SES)

I thought maybe a 'choose your adventure' game. Maybe you come across situations or scenarios where you have to make a choice and depending on what choice you make depends on what happens. It could end up with someone being dead or caught up with you being called by your parents or could end up without everything going well. (male, year 10, mid SES)

Accomplishment and optimal challenge

Participants described enjoying entertainment and serious games that incorporated a sense of achievement and the importance of feeling challenged (at an optimal level) in remaining interested and engaged.

So, you could pick it up [learning to type] and it encouraged you to keep going [be]cause you felt like you're achieving something, the little thing dances and you were like, 'I'm doing great'. This is good, you keep going. (female, year 12, high SES)

I guess the rewards probably do make them more interesting because then you actually play more or do more. (male, year 10, mid SES)

I think once you've gotten good at the game, if there's not any progression, levels and whatnot, yeah, it can get boring, and you know what to do, you know all the levels, you know all the missions. (female, year 12, high SES)

I guess sometimes they can get a bit repetitive, if it's just the same thing over and over again, just focusing on the same skill. (male, year 11, high SES)

Specific game design preferences

Beyond describing game design specifications, participants discussed the importance of including relatable characters and relevant setting and scenarios for promoting engagement in young people when designing serious games. Further, participants provided specific suggestions and examples of character traits and scenarios for consideration.

Relatable characters

Students described the importance of including relatable characters and provided examples of characteristics that capture their attention and maintain engagement in games, television shows, and movies. Several

participants described the importance of including characters with flaws and imperfections allowing them to better relate to the characters making games or television shows more engaging.

> *Don't make them [game characters] perfect, have normal teenage things like acne or being overweight. I feel like in a lot of games they're all so perfect and it's not really engaging.* (female, year 10, high SES)

> *I found this character with similar interests so, I guess, the character likes listening to music or just drawing, or likes playing basketball or whatever. Just making it seem more realistic rather than kind of like invincible, you know, this perfect character.* (male, year 9, low SES)

> *I like how movies are now giving characters a lot of character flaws and whatnot that give them a personal journey. I relate more to the characters who have a few little flaws or whatever than the ones who are seen just like perfect.* (female, year 12, high SES)

> *All the characters are flawed, but you also love them for each of their individual qualities, and you'd empathise with them and understand them when they go through hardships and things. So, it's more interesting to me than just a regular, happy family.* (female, year 12, high SES)

Relevant setting and scenarios

When asked specifically what a suitable setting for an AOD serious game would be, a house party setting was the most popular suggestion. The importance of the relevance and believability of scenarios included in the game was also highlighted as an important factor for promoting engagement.

> *Parties would be a good setting because that's probably the main area where people would experience such a thing.* (male, year 12, high SES)

> *Parties or gatherings, that's going to most likely appeal for most people, you know, teenagers. So, that's more relatable and more engaging. If it's something more irrelevant, then they're not going to engage with it as much. So, yeah, just placing importance into the scenario and who's with the people, what's around and what's going on. Are there parents there? Are they not?* (male, year 9, high SES)

> *I think if you want a more realistic setting, I don't think a night club would really suit that. People have fake IDs but not a lot of people have fake IDs. So, I think something in a very uncontrolled environment where a lot of things could go wrong.* (male, year 11, low SES)

> *Something that could be helpful in terms of the game aspect is if you're seeing certain signs in a person, it's like, 'Do you call an ambulance or do you do this?' and role-playing through how you would help them so that when you go to it in real life, you'd have more of an idea.* (female, year 12, mid SES)

Discussion

This study sought to explore considerations for the effective promotion and engagement in AOD serious games for adolescents. Participants described the use of real-life stories in AOD education as memorable and engaging, allowing deeper level understanding of the consequences of AOD use and applicability of AOD information to their own context. Participants also expressed enjoying and engaging with interactive classroom activities including role-play and group work, and made comparisons to traditional didactic delivery styles such as PowerPoint slides and reading facts about AOD which were perceived as being less engaging. These findings support previously reported research whereby student-centred activities that focus on real-life contexts and challenges are more likely to be effective in school-based AOD education than non-interactive and information-only styles of delivery.[18,43] Further, students described relating to, and engaging with, characters in games and shows that had characteristic flaws and imperfections. Relatability of characters was identified as a key improvement area in a recent study exploring adolescent perspectives of an online AOD education program[44] and may be an important consideration for future AOD serious games. Incorporating real-life stories and relatable characters may promote engagement in serious games aimed to reduce AOD-related harms.

Participants perceived AOD education focusing on abstinence approaches as unengaging and to be less effective in reducing AOD use. These perceptions align with decades of research examining the effectiveness of abstinence approaches on AOD use and harm[43,45–47]; however, abstinence and fear-inducing approaches appear to still be adopted in school-based AOD education despite the evidence against focusing on these approaches. Participants highlighted gaps in AOD education and a desire to learn more about the risks associated with AOD use (particularly more common substances such as cannabis), practical strategies to reduce AOD harm (including feeling confident helping friends and calling an ambulance when necessary), and how to overcome social pressure without feeling judged by peers. Harm reduction approaches have been adopted in AOD education in recent years[12] and programs focusing on social influence approaches including resistance skills whilst maintaining relationships and social standing have demonstrated effectiveness in alcohol-related learning outcomes risks, and reducing risky drinking and harms among young females,[17,32] School-based online programs based on harm reduction and social learning principles have the potential to reduce AOD use and intentions to use in the future.[21]

Participants recommended a house party as the setting for an AOD serious game since it provided a realistic backdrop for AOD use among adolescents. Participants also suggested specific examples of practical scenarios and strategies (e.g. identifying people in danger, knowing when to call for an ambulance) to consider in an AOD serious game. Developing situations that are close to the user's real environment assists learners in transferring and applying knowledge[48] therefore setting an AOD serious game at a house party and incorporating relevant harm reduction scenarios (e.g. identifying adverse reactions and calling an ambulance) may be important considerations for promoting student learning.

Key game design preferences highlighted by students included incorporating a social element, player choice in the way of opportunity for making meaningful decisions within the game, and accomplishment and optimal challenge. It has been suggested that enhancing social aspects of serious games may promote enjoyment and engagement, particularly in males.[26] Social elements that encourage students to work towards a common goal, share and communicate, can cultivate and promote collaborative learning.[48] It is also reported that perceived in-game relatedness (interaction between players), autonomy (opportunity to make choices) and competence (challenging but not overwhelmingly difficult) can contribute to greater enjoyment, presence and future play.[49] A branching narrative design with interactive elements or in-class discussions may be conducive to these preferences[50] and assist in promoting engagement in AOD education thereby promoting buy-in and effective learning.

Beyond incorporating a branching narrative design with interactive elements, future researchers and developers may also consider theoretical frameworks in the development of AOD serious game interventions. By understanding theoretical constructs, researchers can appropriately target intervention strategies and effectively measure mechanisms of change and outcome behaviours.[30,51] Game preferences highlighted by students in this study align with the basic psychological needs of perceived relatedness (e.g. social element), autonomy (e.g. in-game choices) and competence (e.g. accomplishment) of *Self Determination Theory (SDT)*.[52] Health interventions targeting satisfaction of basic psychological needs (e.g. sense of competence and autonomy) have been found to contribute to increased enjoyment and engagement.[49,53] A desire from students to gain strategic knowledge and learn refusal skills aligns with improving self-efficacy, a key component of *Social Cognitive Theory (SCT),*[54] the *Theory of Planned Behaviour (TPB)*[55] and the *Transtheoretical Model of Health Behaviour Change* (TM).[56] AOD education programs targeting self-efficacy and that adopt social learning or social cognitive principles (e.g. *Social Learning Theory*[57]), have been shown to be effective in reducing AOD use.[21,58].

Findings from this study will be used to inform the development of an AOD serious game for Australian adolescents. Specifically, an iterative user-centred approach will be adopted, game design will be based on a branching narrative with interactive elements, and development will consider theoretical constructs from SDT, SCT, TPB and TM with the goal of promoting engagement and learning, and reducing AOD use and harm.

Limitations

This study included a sample of adolescents from the Perth metropolitan area in Western Australian. Although the sample included students from a range of SES backgrounds range and secondary schools (both public and private), exploring the perspectives of students in regional and rural areas, interstate and internationally may assist in increasing generalisability of factors for promoting engagement on an AOD serious game across a broader adolescent population. Further, this study focused on student perceptions only. Future research could benefit from exploring parent and teacher perspectives of AOD education in the context of serious games.

Conclusions

This study sought to identify preferences and considerations to promote engagement in AOD serious game for adolescents, an important step in user-centred approaches for promoting high user engagement and acceptability.[30,31] A focus on meaningful realistic scenarios, relatable characters, relevant information and practical skills may promote engagement with AOD content, and game designs incorporating social interaction, player choice, and accomplishment and optimal challenge may be conductive to promoting engagement and facilitating effective learning in AOD-focussed serious games. Findings from this study can be used by researchers and game designers for the development of future AOD serious games targeted at Australian adolescents.

Funding

This research was funded by not-for-profit organisation Sideffect Australia.

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Supporting Information

Additional supporting information may be found in the online version of this article:

Supplementary File 1: Focus group guide.