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Journal article

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Acceptability and feasibility of a computer-based application ('App') to help Aboriginal and Torres Strait Islander Australians to describe their alcohol consumption

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The authors have no conflicts to declare.

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ABSTRACT

We examined acceptability and feasibility of a tablet application ('App') to record self-reported alcohol consumption among Aboriginal and Torres Strait Islander Australians. Four communities (1 urban; 3 regional/remote) tested the App, with 246 adult participants (132 males, 114 females). The App collected a) completion time; b) participant feedback; c) staff observations. Three research assistants were interviewed. Only six (1.4 %) participants reported that the App was 'hard' to use. Participants appeared engaged, to require minimal assistance; and nearly half verbally reflected on their drinking or drinking of others. The App has potential for surveys, screening or health promotion.

BACKGROUND

Globally, alcohol use was the leading risk factor for burden of disability and death for individuals aged between 15 and 49 years in 2016 (GBD 2016 Risk Factors Collaborators 2017). This is an important consideration for younger populations such as indigenous peoples. For example Aboriginal or Torres Strait Islander (Indigenous Australian) peoples have a median age of 23 years compared with 38 for other Australians (Australian Bureau of Statistics 2017) and Aboriginal Canadians have a median age of 27 years, compared to 40 for the general population (Statistics Canada 2006). Indigenous peoples who have been colonised also face increased risk of harms from alcohol associated with their historic and current experience of discrimination, socio-economic disadvantage, grief and loss (Kirmayer, Brass et al. 2000, Ministerial Council on Drug Strategy 2006). For example, Indigenous Australians face up to eight times the risk of hospitalisations for alcohol-related issues compared with their non-Indigenous counterparts (Australian Institute of Health and Welfare 2011). Despite this, there is a lack of good data on alcohol consumption itself in this group (Chikritzhs and Brady 2006, Lee, Chikritzhs et al. 2014).

There are challenges collecting self-reported data on alcohol consumption in household surveys (Dawson and Room 2000) or clinical (Saunders, Conigrave et al. 2016) settings in any population. These challenges are amplified for marginalised and vulnerable populations or those who are culturally distinct from the majority population (Bonfim de Souza, de Oliveira et al. 2018). Racist stereotyping of Indigenous Australians being 'drunks' (Ministerial Council on Drug Strategy 2006) and fears of child removal policies (Hirsch, Dietrich et al. 2002) can increase barriers

to accurately answering questions about alcohol on surveys (Lee, Chikritzhs et al. 2014) or screening tools (Clifford, Shakeshaft et al. 2012) with face-to-face administration. The need for participants to convert consumption to numbers of standard drinks or units can also result in misreported alcohol consumption. This conversion requirement assumes comfort with mental arithmetic (Lee, Chikritzhs et al. 2014). Furthermore, survey and screening tools also often ask about a 'usual' pattern of drinking (Dawson and Room 2000), but some populations have irregular and varying drinking patterns. Among Indigenous Australians, episodic and stop-start drinking patterns can be common [7]. External circumstances such as funerals, or travel from 'dry' areas to regions with alcohol supply can impact on drinking patterns (Lee, Chikritzhs et al. 2014).

Touch-screen tablet devices have been proposed to increase respondents' interaction with surveys and their assurance in confidentiality and anonymity (Perlis, Des Jarlais et al. 2004, Hunter, Travers et al. 2007, Islam, Topp et al. 2012). We found just two Australian studies that used a touch-screen device to ask an Indigenous Australian population about their drinking. In one, participants in an Aboriginal community controlled health service in New South Wales (NSW) recorded their drinking using a retrospective seven-day diary, and a modified version of question three from the Alcohol Use Disorders Identification Test (AUDIT) (Noble, Paul et al. 2014, Noble, Paul et al. 2015). A (non-interactive) reference guide helped participants estimate the number of standard drinks consumed when using common container types (e.g. wine glass, kitchen tumbler). More than nine in ten participants found the touch-screen computer easy to use, said the questions were easy to understand, and felt comfortable answering them (Noble, Paul et al. 2014).

The other study reported on acceptability of a tablet computer versus telephone to collect data from 69 outpatients of an alcohol or drug treatment unit in NSW (Hobden, Bryant et al. 2017). Alcohol consumption was recorded using a 14-day Timeline Followback approach (Sobell, Brown et al. 1996) and the Quick Drinking Screen, a quantity-frequency summary measure (Sobell, Agrawal et al. 2003). Acceptability was high across both modes of data collection. Consent and completion rates were significantly higher for the tablet survey than for the telephone interview. However, costs to design and conduct the survey were significantly higher for the tablet survey (\$89.59 per completed tablet survey versus \$22.07 per completed phone interview).

Until the current study, no electronic surveys of alcohol consumption have been studied in a remote Indigenous Australian setting where language, cultural and numeracy differences (compared with the remainder of the country) may be considerable (Donoghue, Patton et al. 2014).

Elsewhere in the world, touch-screen devices have been used to conduct alcohol screening (Karlsson and Bendtsen 2005) or to provide behavioural treatments (Weitzel, Bernhardt et al. 2007, Khadjesari, Murray et al. 2011, Carey, Scott-Sheldon et al. 2012, Giroux, Goulet et al. 2017) for general populations. A recent systematic review of electronic interventions for hazardous drinkers also found electronic screening and brief intervention effective for reducing alcohol consumption for up to a year (Donoghue, Patton et al. 2014).

In the current study a touch-screen computer application, the Grog Survey App ('App') was developed to help Indigenous Australians (aged 16+) in remote, regional and urban sites to describe their alcohol consumption. 'Grog' is an Australian colloquial term for 'alcohol'. This App was designed to be visual, interactive, and engaging. It was also designed to cater for sharing of drinks, and for use of non-standard drinking containers (e.g. a 750mL sports bottle or 1.25L soft drink bottle). The App has been found to be a reliable and accurate method to assess alcohol consumption compared with a clinical interview conducted by an Indigenous health professional (Lee, Conigrave et al. 2018). This paper considers the acceptability and feasibility of the Grog Survey App for collecting detailed self-report data on alcohol consumption in Indigenous Australians.

METHODS

Overview

Study methods were designed by the investigators in consultation with the Aboriginal Drug and Alcohol Council of South Australia (ADAC); the Aboriginal Drug and Alcohol Network New South Wales (ADAN), representing Aboriginal alcohol and other drug workers in New South Wales (NSW); and the Aboriginal Health Council of South Australia (AHCSA), the peak body for Aboriginal community controlled health services in South Australia (SA).

Setting and participants

From August 2016 to May 2017, a pilot version of the survey App was administered in three sites in South Australia (SA; total N=145; 2 remote and 1 regional) and one urban site in Queensland (N=100). Participants (aged 16 years+) were recruited

using convenience sampling and age and sex quotas from the local Indigenous health service (primary health or drug and alcohol). Interviewers set out to recruit set quotas of non-drinkers (n=20), non-dependent drinkers (n=40) and dependent drinkers (n=40).

Five Indigenous field research assistants with professional expertise in health and/or alcohol and other drug use, who had cultural connections to, or were known in, each study site, recruited participants (SA: N=3, 2 female & 1 male; Queensland: N=2, female).

Grog Survey App

Survey development

An iterative and consultative process was used to develop the Grog Survey App. This development process for the survey items has been described elsewhere (Lee, Wilson et al. 2017). Participants were asked to describe their last four drinking occasions within the past year. Participants used a visual timeline to show when these occasions were. Commonly understood reference points were used to help 'anchor' their answers in time (e.g. 'since Easter last year'). Participants then selected pictures of the type of alcohol they drink, the container they drank from, how full the container was, and the number of containers. The survey also allowed participants to describe sharing of alcohol (Clifford, Shakeshaft et al. 2012, Islam, Tosin et al. 2018). Australian standard drinks were calculated by the App itself. On completion of the survey, individual feedback was provided to participants via the App using a visual adaptation of a World Health Organization brief intervention, modified for Aboriginal Australians in New South Wales (Conigrave, Freeman et al.

2012).

Audio / language

Four audio tracks were provided – male or female voice, in English and Pitjantjatjara (an Aboriginal language commonly spoken in parts of central Australia).

Survey administration

Each participant was presented with a tablet and headphones and supported by an Indigenous research assistant to open the survey. The assistant then sat a little distance away to ensure privacy.

Data collection

This mixed methods study involved analysis of qualitative and quantitative data collected during the testing of the Grog Survey App:

- a) Time taken to complete the survey (collected on the App)
- b) Experience of using the App as rated by survey participants (n=246): This last item asked: “How did you find using this tablet to answer these questions on grog?” (Response categories: easy, ‘OK’, hard)
- c) A daily feedback survey completed on the App by Indigenous field research assistants (n=5): An App notification reminded assistants to complete a survey at the end of each day that they administered at least one survey. Thirteen structured questions asked about:
 - Numbers of individuals who declined to take part in the survey App study.
 - How participants seemed to engage with the App including: did they seem to enjoy using it?; how hard did they find it to use?; the number who: asked for

help once they had started the survey App, commented on whether the App got them thinking about their drinking, asked about where people can get help for their drinking, commented on their experience of using the App (e.g. response options: 'that was fun', 'that was hard or confusing', 'that was interesting'; or 'other' comments).

- How often each of a range of problems was observed, including: participant seemed confused by the interface; tablet stopped working; issues with the tablet screen, audio or language.
- Any other comments

d) In-depth semi-structured phone interviews with a smaller group (n=3 across Qld and SA) of lead field research assistants was conducted (by KL and KC) on completion of data collection to gauge:

- What was good and not so good about the App? (e.g. compared with paper-based surveys previously administered)
- How easy or hard was it to set up participants with the survey and to explain how to use it?
- What kinds of issues did participants ask for help on?
- What aspects of the App seemed to cause participants confusion or frustration?
- Did participants seem to take the App seriously or did they race through?
- Were there alcohol types that participants asked for that were not on the App?
- Did many participants use the audio track and headphones?
- Suggested improvements and potential uses for the App.

Ethics

Ethical approval was obtained from the Aboriginal Health Council of South Australia's Aboriginal Health Research Ethics Committee and Metro South Health Human Research Ethics Committee in Queensland.

Analysis

Descriptive analyses of quantitative data were performed in R (R Core Team 2018). Differences in ease of use were analysed using Spearman correlation coefficient for binary and ordinal variables (e.g. gender and age). Chi-square tests were used to compare frequencies across categories (i.e. geographical location). To compare significant differences between medians, the Wilcoxon rank sum test was used.

In-depth interview transcripts from phone interviews of research assistants were manually coded and analysed thematically. This technique involves interpretation of descriptive data to elucidate meanings (Morse and Field 1995). The analysis began with two researchers (KL and MA) independently coding the data using a process of constant comparison (Morse and Field 1995). The researchers met to discuss category coding and to compare and refine categories until consensus was reached on key themes and sub-themes (Glaser and Strauss 1967). Models were generated to map patterns across the data. Geographical differences between research assistants in urban (Qld) versus regional or remote (SA) sites, and differences for participants across the lifespan were noted.

RESULTS

Feedback from survey App participants

In total, 246 participants (114 female) were recruited covering a broad range of ages (18-78; median = 38.9, $SD = 14.0$). More than half of the participants who completed the survey App were aged between 20 and 39 years ($n=131/246$, 53.5%) and seven in ten had completed at least Year 10 at secondary school ($n=170/245$, 69.4%; Table 1).

(Insert Table 1 about here)

How easy was it to use the App?

Most participants who completed the survey App reported (on the App) that it was either OK or easy to use ($n = 239$, 97.6%). Ease of using the App did not vary by gender ($r_s = -.09$, $p = .15$), or by age ($r_s = -.1$, $p = .12$). Additionally, a chi-square test showed that similar numbers of people from urban, regional and remote communities found the App easy to use ($X^2 = 8.1$, $df = 4$, $p = 0.09$). However, participants tended to find the App harder to use if they had completed fewer years of schooling ($r_s = .23$, $p < 0.01$; Figure 1), or if they had not completed university or TAFE (technical and further education; $r_s = .14$, $p = .03$). Drinkers who reported consuming more standard drinks per day, also reported that the App was more difficult to complete ($r_s = -.21$, $p < 0.01$, $n = 188$). This correlation remained after controlling for the number of different containers each user reported consuming alcohol from ($r_s = -.19$, $p < 0.01$, $n = 188$).

(Insert Figure 1 about here)

How long did it take to complete the App?

Participants took an average of 9.5 minutes to complete the survey App (SD = 4.7). Perceived ease of use was not correlated with completion time ($r_s = -0.06$, $p = 0.3$), or whether the audio track (that read out questions and answers) was used or not ($r = .01$, $p = 0.9$). However, participants who opted to describe their drinking as a share of a group's drinking (rather than as their individual consumption) took significantly longer to complete the App (12 minutes ($IQR = 8$) versus 10 minutes ($IQR = 10$) respectively; $p = 0.03$ on Wilcoxon rank sum test).

Participants took similar amounts of time to complete the App in Queensland and South Australia (average of 9 minutes ($IQR = 5$) and 8 minutes ($IQR = 6$) respectively). The App took a median of 11 minutes ($IQR = 6$) for participants who consumed more than two standard drinks each day, compared with 8 minutes ($IQR = 5.5$) for those who consumed two or fewer standard drinks each day ($r_s = .54$, $p < 0.01$).

Feedback from research assistants

Five research assistants completed a total of 61 feedback forms. Forms were completed on most occasions (72.6%) when they administered the App, which included sessions when a total of 191 participants had used the App. Research assistants reported that around 10% of individuals who were approached, declined to take part in the study.

How easy was it to use the App?

Research assistants reported that generally, participants were able to use the App with minimal assistance. On most days when the App was administered (93.4% $n =$

57), assistants reported that participants found the App 'Neutral', 'Easy' or 'Really easy' to use. There were only four occasions where research assistants observed the App to be hard to use and no occasions where participants seemed to find the App 'really hard' to use. In general, participants appeared able to use the App with little or no assistance. Older participants from urban Qld were reported to need more explanation than their younger counterparts. In regional and remote SA, research assistants reported participants of all ages appeared able to navigate the App's functions with little or no assistance:

"Everyone really enjoyed the App and said how easy it was to use, even the couple of people who [were] using a tablet for the very first time." (SA research assistant; feedback survey)

How was the App received?

Research assistants reported that the tablet helped provide participants with privacy so that they would not have to share their responses if they were not comfortable to. They reported that the use of pictures and visual interface with interactive elements on the App appeared to be well received (e.g. the sliding meter to indicate change in group size from one person to ten or more in drinking group, with images of people that increase in numbers accordingly; Figure 2). Furthermore, research assistants reported that more than half of participants (50.3%, n=96/191), after completing the survey, volunteered a statement that suggested that the App made them reflect on their drinking or on the drinking of someone else. For example, one participant commented "I didn't know I drank that much".

(Insert Figure 2 about here)

Audio / language

In the remote recruitment site, which included an Indigenous drug and alcohol drop-in centre in SA, participants typically used the audio for questions but preferred to play it out aloud (instead of using headphones). Many participants in regional and remote SA liked that the App offered two languages, with male and female versions of each language. In one remote site (SA), one research assistant reported to the authors (to SW and JP) that participants described that this was the first time they had heard their own language (Pitjantjatjara) coming out of a piece of computer equipment. Research assistants reported that in SA, many participants listened to the Pitjantjatjara audio but younger participants listened to the English audio. No comments were made by research assistants about English literacy levels of SA participants.

In contrast, according to research assistants, in the urban site (Queensland), most people chose to switch off the audio and to read the questions themselves.

Research assistants observed that participants overall seemed comfortable with reading, and believed that reading was faster for these participants than listening.

Technical issues

Few technical issues were reported by research assistants with the tablets or the App. Informal communication revealed that on 2-3 occasions difficulty was experienced when synchronising ('syncing') the tablets back to the university server (personal communication with KC). Syncing also became slow as the amount of data

collected grew. Three participants were observed to have difficulties with glare on the tablet screen, and one reported that a tablet had 'frozen'.

Suggestions to improve the App

Research assistants expressed frustration with the timeline used to record the last four occasions of alcohol consumption (in the past year; Figure 3). The timeline interface appeared as a single line of days that the user dragged 'left' to go backwards in time. In some cases, participants needed to drag left repeatedly to record dates that were further back in time from the date of interview. To improve user experience, research assistants suggested replacing the timeline's linear layout with a calendar format. The collection of consumption data on four discrete drinking occasions (the adapted Finnish method) was perceived as being repetitive for participants and caused some confusion. Research assistants suggested asking about the past two (instead of the past four) drinking occasions in addition to asking about a 'heavy' drinking occasion.

Potential uses of the App

The three lead research assistants suggested that the App could potentially be used as a screening tool in routine adult health checks in primary health care settings. For example, a client could complete the App while waiting to see their health professional. This personalised alcohol history could then be shared with their health professional, with the client's permission, and the clinician could use this as the basis for offering a brief alcohol intervention.

(Insert Figure 3 about here)

DISCUSSION

To our knowledge, this is the first computer-based tool designed to record detailed self-reported data on alcohol consumption in an indigenous population worldwide. The vast majority of participants reported that they found the App okay or easy to use. The visual and interactive elements of the App were observed by research assistants to be a key strength, such as being able to drag a slider up and down to demonstrate how full a container was with alcohol. More than half of the participants commented to research assistants that the App encouraged them to reflect on their drinking, or on the drinking of someone else which suggests the potential value of the App for adaptation as a brief intervention tool.

Past studies of computerised questions on drinking used among Indigenous Australians include simple question and answer format, with limited interactivity or graphics. For example, 12 alcohol questions were asked as part of a much larger survey in regional New South Wales (Noble, Paul et al. 2014). Similarly the 10-item AUDIT (Alcohol Use Disorders Identification Test) was asked as part of a touch-screen module on broader health risk behaviours (Hunter, Travers et al. 2007). However, none had the degree of interactivity or visual interface of the Grog Survey App. These visual elements and its ease of use were reportedly key to its acceptability and engagement.

For other indigenous peoples, we were unable to find accounts of alcohol assessment tools (rather than screening tools) that were designed to be computer-based. The last four occasions method seemed suited to the irregular patterns

which are common in Indigenous Australian drinking. However research assistants noted the repetitiveness involved in this approach. Further analysis will also examine how well items suggested by the research assistants for App shortening (asking about just the last two occasions and a heavy drinking occasion) compare with summary data from the full last four occasions (Finnish) method.

Tablet versus paper-and-pen administered surveys

Research assistants reported that the visual and engaging touch-screen interface appeared to help participants to feel comfortable to report on their drinking and to stay engaged. Many previous studies conducted with Indigenous Australians asked participants to describe their consumption in standard drinks (e.g. “How many standard drinks did you have yesterday?”) or used non-interactive standard drinks guides to help participants estimate consumption (Watson, Jillian et al. 1988, Hunter, Travers et al. 2007, Noble, Paul et al. 2015). Such guides still require the participant, or the research assistant or clinician, to convert consumption into standard drinks. The App allowed participants to estimate their drinking by selecting from a range of potential alcohol types, and a range of potential drinking containers (e.g. from empty soft drink or juice bottles through to commercially produced wine or beer glasses), then the App itself did the conversion to standard drinks.

Many participants chose not to use the audio in an urban setting. However, in that setting most participants typically spoke English as a first language and were observed to be competent readers. In a remote setting, where traditional language is more common, the tablet offers a way to standardise the audio translation of complex and sensitive health concepts (Islam, Topp et al. 2012). This provides an

alternative to translating the survey in real time. Audio presentation of survey items has previously been successfully used in studies that have sought to engage marginalised young people who may not speak a mainstream language or who may have poorer literacy (Kickbusch 2001).

Surveys that use a portable touch-screen tablet may allow participants greater privacy (Islam, Topp et al. 2012, Noble, Paul et al. 2014), and anonymity, with low or no potential for self-report data to be linked to the participant. Automatic data entry also greatly reduces the potential for missing data (Kypri, Saunders et al. 2004) and makes 'skip' instructions unnecessary. These approaches are important given the diversity of Indigenous communities targeted by this survey – where up to 80% of participants in one remote site speak an Indigenous Australian language at home (Australian Bureau of Statistics 2017).

Helping individuals reflect on their drinking

The App was observed by research assistants to prompt more than half of participants to comment about drinking (their own or someone else's drinking). This is in keeping with past research that shows that simply completing a survey on drinking can prompt a reduction in drinking by participants (McCambridge and Kypri 2011). The anonymity, the interactive elements of the App, and the immediacy of individualized feedback on drinking may have increased the likelihood of a participant reflecting on their drinking. The feedback component of the App was based on a WHO brief intervention, which had previously been adapted into a visual form for Indigenous Australians (Conigrave, Freeman et al. 2012). In the study in which this adapted brief intervention was developed, a static form of these visual

resources was used as a tool for group education and discussion on drinking in a community setting. When combined with confidential feedback to participants on their AUDIT scores, the group activity was observed to promote discussion and reflection on drinking (Conigrave, Freeman et al. 2012).

The potential of the Grog Survey App as a health promotion or electronic screening and brief intervention tool warrants further study. The anonymity of such a tool would also have particular benefit for Indigenous Australians. This is important, given sensitivities around asking about alcohol because of experiences of discrimination, shame related to experience of harms from alcohol, and also concerns about adverse consequences of admitting to risky drinking. This includes fear of child removal, given a history up till the 1970s of removal of Indigenous Australian children by the government, often on the basis of race alone.

There is a broader need for tools to make screening and brief intervention easier. Even in general populations, less than 50% of individuals with unhealthy alcohol use are typically detected in general practice or hospital settings. The same is true of primary health care services for Indigenous Australians, where there are many competing health and social priorities (Stewart, Sanson-Fisher et al. 2014).

Limitations

A convenience sample of participants was recruited. However, age, sex and drinker classification quotas were used to ensure a range of individuals took part in the study (non-drinker/past drinkers, non-dependent drinkers, dependent drinkers). Only a small proportion (10%) of individuals refused to take part in the study, although

financial reimbursement for participation may have increased response rate. Additional demographics and reasons for refusal were not collected. Acceptability data presented is based on a single survey item asked of participants on the App, and on daily observations recorded by Aboriginal field research assistants of their experiences of administering the App. Additional questions could have enquired into participants' feedback on other aspects of the tablet interface (Noble, Paul et al. 2014, Hobden, Bryant et al. 2017). However, we were constrained by a need to keep the survey as brief as possible (maximum duration of 20 minutes was recommended during consultations). In-depth interviews with research assistants may have been affected by social desirability bias, as they were conducted by two authors who were known to the interviewees.

Conclusions

Interactive touch-screen technologies provide solutions to some of the challenges of collecting data on alcohol consumption, particularly in indigenous peoples, and in marginalized or disadvantaged populations. An appealing and dynamic interface can make reporting of drinking more enjoyable, and can take away the need for comfort with literacy or mathematics. Apps also provide opportunities for individualized feedback about drinking and this App appeared to prompt individuals to reflect on their drinking. More research is needed to determine the feasibility and acceptability of use of touch-screen survey tools among Indigenous or marginalised populations worldwide for health promotion, electronic screening or brief intervention.

Figure legends

- Figure 1. Ease of using the Grog Survey App by educational attainment (as reported by participants on the App; n = 246)
- Figure 2. Example of the visual and interactive interface of the Grog Survey App
- Figure 3:.Timeline used to identify the last four drinking occasions in the past year on the Grog Survey App

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Table 1. Characteristics of Aboriginal or Torres Strait Islander participants who completed the Grog Survey App (n=246)

Variable	n	Percent
Sex		
Male	132	53.7
Female	114	46.3
Age (years)		
16-19	9	3.7
20-39	132	53.7
40-59	81	32.9
60+	24	9.8
Remoteness		
Regional	41	16.7
Remote	105	42.7
Urban	100	40.7
Highest completed school year		
Year 9 or below	75	30.5
Year 10 or Year 11	113	45.9
Year 12	58	23.6
Employment status		
Employed*	86	35.0
Unemployed	160	65.0
Total	246	100.0

* Full-time, part-time or casual employment or participation in a community development employment program (CDEP), which is similar to a 'work for the dole' scheme.

Figure 1. Ease of using the Grog Survey App by educational attainment (as reported by participants on the App; n=246).

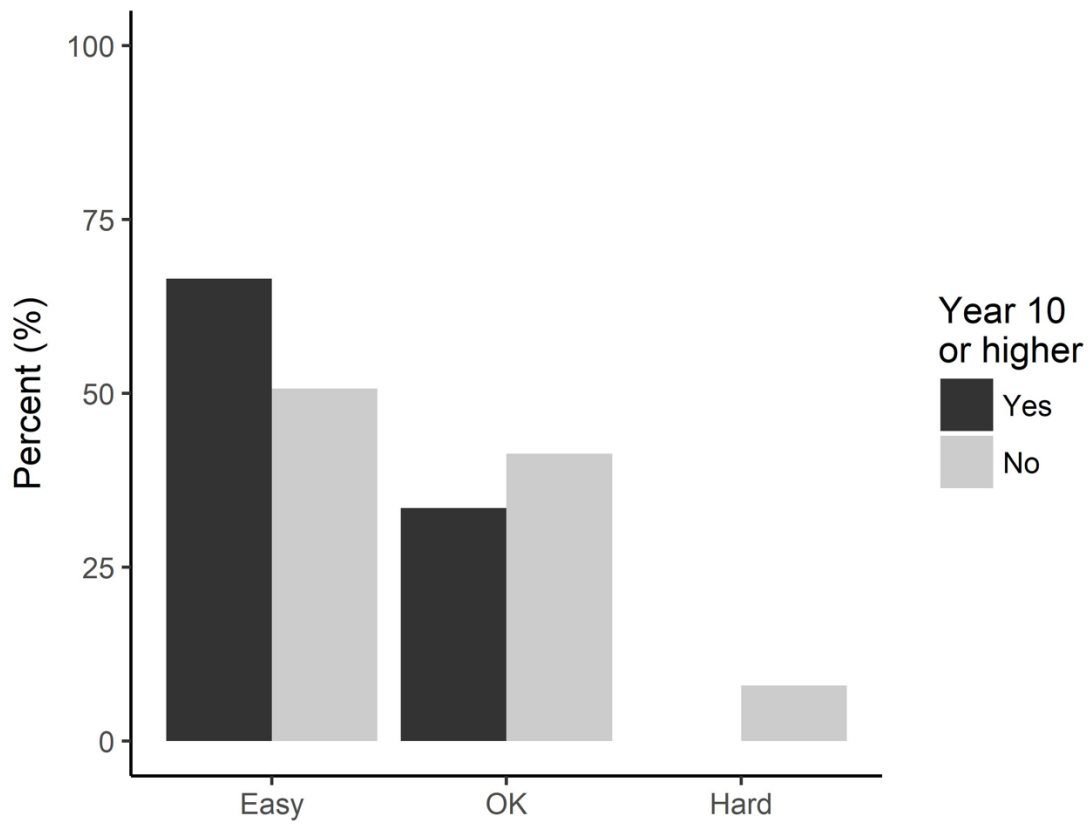


Figure 2. Example of the visual and interactive interface of the Grog Survey App.

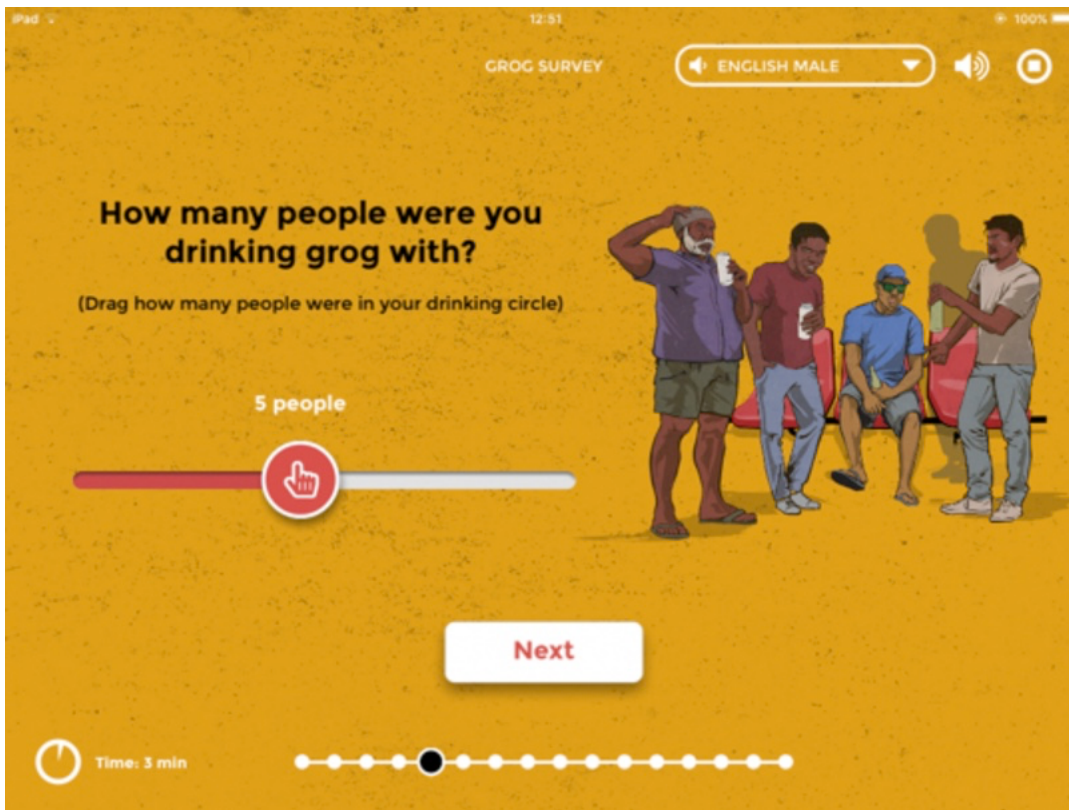


Figure 3. Timeline used to identify the last four drinking occasions in the past year on the Grog Survey App.

