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The long-term effectiveness of a selective, personality-targeted prevention program in reducing alcohol use and related harms: a cluster randomized controlled trial

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Background: This study investigated the long-term effectiveness of Preventure, a selective personality-targeted prevention program, in reducing the uptake of alcohol, harmful use of alcohol, and alcohol-related harms over a 3-year period. **Methods:** A cluster randomized controlled trial was conducted to assess the effectiveness of Preventure. Schools were block randomized to one of two groups: the Preventure group ($n = 7$ schools) and the Control group ($n = 7$ schools). Only students screening as high-risk on one of four personality profiles (anxiety sensitivity, negative thinking, impulsivity, and sensation seeking) were included in the analysis. All students were assessed at five time points over a 3-year period: baseline; immediately after the intervention; and 12, 24, and 36 months after baseline. Students were assessed on frequency of drinking, binge drinking, and alcohol-related harms. Two-part latent growth models were used to analyze intervention effects, which included all students with data available at each time point. This trial is registered with the Australian New Zealand Clinical Trials Registry (ACTRN12612000026820; www.anzctr.org.au). **Results:** A total of 438 high-risk adolescents (mean age, 13.4 years; $SD = 0.47$) from 14 Australian schools were recruited to the study and completed baseline assessments. Relative to high-risk Control students, high-risk Preventure students displayed significantly reduced growth in their likelihood to consume alcohol [$b = -0.225$ (0.061); $p < .001$], to binge drink [$b = -0.305$ (.096); $p = 0.001$], and to experience alcohol-related harms [$b = -0.255$ (0.096); $p = .008$] over 36 months. **Conclusions:** Findings from this study support the use of selective personality-targeted preventive interventions in reducing the uptake of alcohol, alcohol misuse, and related harms over the long term. This trial is the first to demonstrate the effects of a selective alcohol prevention program over a 3-year period and the first to demonstrate the effects of a selective preventive intervention in Australia. **Keywords:** Prevention; personality; alcohol abuse; adolescence; school.

Introduction

Alcohol use is a major contributor to the global burden of disease and imposes considerable economic strain on society (Gore et al., 2011; Whiteford et al., 2013). It is estimated that at least 240 million adults worldwide suffer from an alcohol use disorder (Gowing et al., 2015) and that early initiation to drinking is associated with an increased risk of developing a disorder (Grant, Stinson, & Harford, 2001; Sartor, Lynskey, Heath, Jacob, & True, 2007). Given that for each year we delay the onset of drinking, we reduce the odds of developing alcohol dependence by 9%; effective prevention is critical if we wish to reduce the substantial disability, harm, and social costs caused by alcohol misuse (Catalano et al., 2012; Grant et al., 2001).

In recent years, we have seen an emergence of evidence-based programs to prevent alcohol use among adolescents. Systematic reviews have shown that universal school-based programs, delivered to entire groups regardless of the level of risk, can produce small to moderate effects on behavior change (Foxcroft & Tsertsvadze, 2011; Kyrrestad Strøm, Adolfsen, Fossum, Kaiser, & Martinussen, 2014). Selective prevention programs, targeted to individuals at greater risk for developing problems with alcohol, generally yield larger effects; however, such programs have often been overlooked due to practical limitations and the possibility of stigmatization (Offord, 2000). One selective program that has overcome these limitations and has shown to be effective in preventing alcohol misuse is the Preventure program (Conrod, Castellanos, & Mackie, 2008, 2011; Conrod, Stewart, Comeau, & Maclean, 2006; Conrod et al., 2013; O'Leary-Barrett, Mackie, Castellanos-Ryan, Al-Khudhairy, & Conrod, 2010). Preventure adopts a personality-targeted approach to prevention by specifically targeting youth with one of four personality traits linked to alcohol misuse: proneness to depression (negative thinking), anxiety

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sensitivity, impulsivity, and sensation seeking (Castellanos & Conrod, 2012; Krank et al., 2011). This approach aims to equip young people with personality-specific coping skills prior to the natural onset of drinking behavior with the aim of reducing the likelihood that alcohol will be used for coping over the adolescent years. Preventure is the first selective program proven to be effective among adolescents in Canada and the United Kingdom in preventing and reducing drinking rates and problematic drinking up to 2 years following the interventions (Conrod et al., 2006, 2008, 2011, 2013; O'Leary-Barrett et al., 2010). This study aims to extend this research by examining the long-term effects of Preventure. Few studies have demonstrated sustained alcohol prevention effects beyond 2 years, and these have all been universal programs (Foxcroft & Tsertsvadze, 2011). Assessing the long-term durability of preventative effects is a crucial step, yet to date the effects of selective prevention beyond 2 years have not been examined. In addition, there has been no trial of an effective selective alcohol prevention program in Australia (Teesson, Newton, & Barrett, 2012), a country with one of the highest rates of alcohol use disorders worldwide (Teesson et al., 2010).

In this article, we conducted a cluster randomized controlled trial (RCT) to determine the effectiveness of Preventure in preventing alcohol misuse and related harms among Australian adolescents, relative to treatment as usual. We hypothesized that the Preventure intervention, targeting youth with one of four high-risk personality dimensions of anxiety sensitivity, negative thinking, impulsivity, and sensation seeking, would be more effective than treatment as usual in reducing the growth and severity of alcohol misuse and related harms. This article reports the 36-month outcomes of Preventure, the longest follow-up assessment ever conducted internationally of a personality-targeted intervention program, and the first trial of a selective program in Australia.

Methods

Study design

The sample was derived from a four-arm cluster RCT designed to investigate the relative effectiveness of universal, personality-targeted selective and combined school-based interventions to prevent alcohol use and misuse (Newton, Teesson, Barrett, Slade, & Conrod, 2012). A total of 190 schools were selected randomly from a list of all schools in New South Wales and Victoria, Australia, to participate in this research on September 2011. We assessed all behaviors at an individual level with a structured self-report questionnaire administered in one classroom session on five occasions: at baseline (preintervention); immediately postintervention; and 12, 24, and 36 months after baseline. The universal effects within the total sample are reported elsewhere (Teesson et al., under review). This article focuses on high-risk students in two arms of the trial (the Preventure and Control groups) to investigate the efficacy of a personality-targeted intervention program, relative to treatment as usual, a primary aim of the study (Newton et al., 2012). This article provides the first report on outcomes within the high-risk sample.

Participants

Participants were Year 8 students (13–14 years of age) attending school in February 2012. Only consenting students who also received parental consent were eligible to participate. Some schools ($n = 10$) required passive parental consent, whereas students at other schools ($n = 4$) needed written active consent due to ethical requirements. The research protocol (Newton et al., 2012), including informed consent procedures, was approved by the University of New South Wales Human Ethics Committee, the Sydney Catholic Education Office, and the New South Wales Department of Education. This trial is registered with the Australian New Zealand Clinical Trials Registry (ACTRN12612000026820; www.anzctr.org.au). Informed consent was obtained for each participating student, and all data were anonymized.

Randomization and masking

Blocked randomization was conducted by an external researcher using the online program Research Randomiser (www.randomiser.org). Participating schools were randomly assigned to one of two study conditions: (a) 'Control' or (b) 'Preventure'. The schools were unaware of the interventions undertaken in the other trial groups.

Screening

At baseline, all students completed the Substance Use Risk Profile Scale (SURPS), a 23-item questionnaire which assesses personality along four dimensions: sensation seeking (SS), impulsivity (IMP), anxiety sensitivity (AS), and negative thinking (NT, Woicik, Stewart, Pihl, & Conrod, 2009) and has been validated in Australia (Newton et al., 2016). Students scoring 1 standard deviation (*SD*) above the school mean on any of the four personality risk subscales were categorized as high risk. Students with elevated scores on more than one subscale were allocated to the personality group where they deviated most from the mean, according to z scores. This article focuses on baseline and all four subsequent follow-up assessments. As Figure 1 demonstrates, study retention was high.

Procedures

Preventure is a personality-targeted, selective intervention which was modified for Australian youth in 2011–2012 (Barrett, Newton, Teesson, Slade, & Conrod, 2015). Only high-risk students as determined by the SURPS were invited to participate in the interventions. The Preventure program comprised two 90-min group sessions delivered 1 week apart. In the first session, psychoeducational strategies were taught to educate students about the target personality style (AS, NT, IMP, and SS) problematic coping behaviors. Students were encouraged to explore the ways of coping with their personality through a goal-setting exercise. Subsequently, they were introduced to the cognitive behavioral model by analyzing a personal experience according to the physical, cognitive, and behavioral responses. In the second session, participants were encouraged to identify and challenge personality-specific cognitive thoughts that lead to problematic behaviors.

The interventions are provided by a qualified facilitator and a cofacilitator who were trained according to the training protocol described in O'Leary-Barrett et al. (2010). The two facilitators (registered clinical psychologists) and three cofacil-

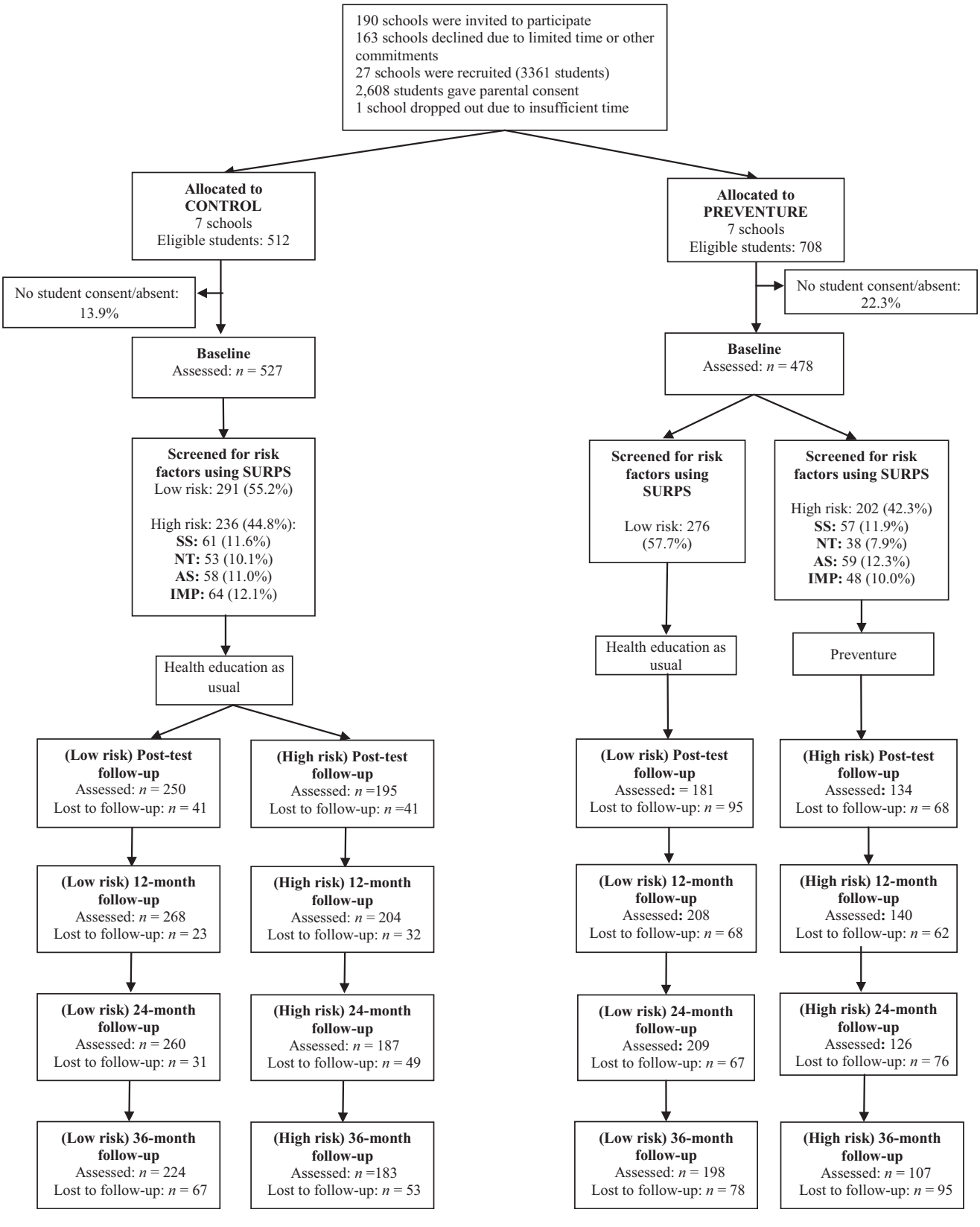

Figure 1 Trial profile – CONSORT figure for participant flow in the Preventure and Control groups, at baseline, immediate posttest, and 12-, 24-, and 36-month follow-up. SS = sensation seeking; NT = negative thinking; AS = anxiety sensitivity; IMP = impulsivity

itators (minimum training: Bachelor of Psychology Honours degree) participated in a 3-day training workshop run by one of the authors (PC), who developed the original interventions. In addition, the facilitators were supervised by PC in the delivery of the full intervention at two pilot schools with students in each personality high-risk group. Further details on the Preventure program are described elsewhere (Conrod et al., 2013; Newton et al., 2012).

Control group. Schools randomized to the active Control condition received their usual health education classes over the year including lessons on drugs and alcohol. In Australia,

drug and alcohol education is a mandatory part of the Year 8 health curriculum, and all control schools reported delivering drug and alcohol education lessons during this trial. Teachers were asked to provide details about the number and format of these lessons.

Outcomes

A self-report questionnaire was administered to all students in a classroom setting. Demographic data were obtained (e.g. gender, age, and country of birth). Student responses were linked over time using a unique identification code to ensure confidentiality.

The primary outcomes were frequency of drinking; binge drinking and alcohol-related harms at postintervention; and 12-, 24-, and 36-month follow-up. Frequency of drinking was assessed by asking students to report how often they consumed a standard alcoholic drink in the past 6 months according to a six-point scale ('never' to 'daily or almost daily'). *Binge drinking* was assessed by asking students to indicate how often they consumed five or more standard alcoholic drinks on one occasion in the past 6 months on a six-point scale ('never' to 'daily or almost daily'). Alcohol-related harms, experienced in the past 6 months, were assessed using an abridged version of the Rutgers Alcohol Problem Index that has been employed in previous studies of this kind (Conrod et al., 2008, 2013). The nine items in this abridged scale were summed to create a composite score of alcohol harms, with higher scores reflecting more harms experienced.

Statistical analysis

Details on sample size calculations are described elsewhere (Newton et al., 2012). As a preliminary analytic step, to determine whether significant differences existed between the two conditions, baseline characteristics were analyzed using chi-square tests for categorical data and analysis of variance for continuous data. These analyses were conducted in IBM SPSS v22 (IBM Corp., Armonk, NY).

Latent growth models (LGM; also called latent growth curve modeling) using Mplus version 7.3 were used to investigate the effectiveness of Preventure on high-risk students' uptake of alcohol, harmful use of alcohol, and alcohol-related harms, relative to high-risk students in the Control group. LGM is a flexible analytic approach that is well-suited for modeling change over time. Using this approach, baseline measurements serve as the reference point, and latent intercept and slope factors are estimated to represent participant-specific starting points and change (growth) over time. Thus, the effect of intervention group on the intercept factor captures baseline differences between groups, and the slope factor captures the intervention effect, controlling for baseline differences. Given the preponderance of zero responses in outcome data, two-part models were estimated to allow for examination of intervention effects on both the likelihood of alcohol use/harms and the frequency of that behavior when present. Two-part LGM involves decomposing the original distribution of the alcohol use outcomes into two distinct but related variables (see Figure S1, available online).

To address the efficacy of the Preventure intervention in delaying the onset of alcohol use or problems, Part 1 of the growth model (also called u, binary, or the dichotomous part) involved creating a binary variable indicating use versus nonuse. These binary variables were analyzed as a random-effects logistic growth model with the log odds of use regressed on the growth factors. To examine intervention effects on growth of alcohol use or problems, Part 2 of the growth model (also called y or the continuous part) involved creating continuous variables representing the frequency of nonzero responses. These continuous variables were analyzed using traditional latent growth curve modeling, and a log transformation was performed to reduce skew and improve scaling for the Mplus estimation procedure.

Full-information maximum likelihood (FIML) estimation was used to handle missing data in accordance with the intention-to-treat (ITT) principle, which includes all randomized participants. FIML uses all available information to estimate parameters rather than deleting cases with missing data. It is superior to traditional methods (i.e. listwise/pairwise deletion, Schafer & Graham, 2002) and has been employed in numerous studies applying two-part LGM to alcohol use outcomes (Brown, Catalano, Fleming, Haggerty, & Abbott, 2005; Ichiyama et al., 2009).

We utilized a stepwise analytic approach to estimate the two-part LGMs. First, the two parts of the model were fit separately as unconditional models to identify the growth functions (i.e. intercept only, linear, or quadratic). These different growth functions model the starting point of alcohol use or problems (i.e. the intercept) and change in alcohol use as a constant process (i.e. linear growth) or gradual acceleration or deceleration in use (quadratic growth). Part 1 was evaluated using a chi-square difference test of the log likelihood values. Part 2 was evaluated using the Akaike information criterion (AIC), Bayesian information criterion (BIC), sample-size adjusted BIC (SSABIC), and root mean square error of approximation (RMSEA). Lower AIC and BIC values indicate better model fit, and RMSEA values <0.08 indicate good model fit (Browne & Cudeck, 1993). Second, intervention status was included in the conditional two-part LGMs. Correlations between all growth factors were permitted to account for association between initial level and change during follow-up (Brown et al., 2005).

Given the clustered nature of the data (i.e. students clustered within schools), outcomes of individuals within a given cluster are likely to be correlated. Failure to account for within-cluster dependencies can result in artificial minimization of standard errors, misleadingly narrow confidence intervals, low *p*-values, spuriously elevated Type I errors, and an underpowered study (Preisser, Reboussin, EY, & Wolfson, 2007). The intracluster (or intraclass) correlation coefficient (ICC) provides a useful indication of the degree of similarity within schools. While the magnitudes of ICCs in this study were low: frequency of drinking, ICC = 0.03; binge drinking, ICC = 0.03; alcohol-related harms, ICC = 0.11, clustering was nevertheless taken into account as a conservative measure. The Mplus 'Complex' and 'Cluster' terms were specified in all models.

Results

Preliminary analyses: descriptive data and student attrition

A total of 438 high-risk adolescents attending school in February 2012 were recruited and competed baseline assessments. The CONSORT diagram (Figure 1) summarizes participant flow and retention rates through the study for both conditions. The mean age of students at baseline was 13.4 years (*SD* = 0.47). In total, 85.6% of participants were born in Australia, 8.9% were born in another English-speaking country, and 5.5% were born in a non–English-speaking country. Details of participant's baseline characteristics on the outcome variables are presented in Table 1. More boys participated in the Preventure schools (81.2%) compared with the Control schools (36.2%). Further, at baseline,

Table 1 Baseline characteristics of the intention-to-treat population

	High-risk Control (n = 236)		High-risk Preventure (n = 202)	
Baseline behavior	*N*	%	*N*	%
Frequency of drinking (past 6 months)				
Never	195	82.6	152	75.2
Less than monthly	31	13.1	36	17.8
Once a month	6	2.5	7	3.5
2–3 times a month	3	1.3	2	1.0
Weekly	0	0.0	0	0.0
Daily or almost daily	0	0	2	1.0
Missing	1	0.4	3	1.5
Frequency of binge drinking (past 6 months)				
Never	223	94.5	177	87.6
Less than monthly	9	3.8	13	6.4
Once a month	3	1.3	5	2.5
2–3 times a month	0	0.0	1	0.5
Weekly	0	0.0	1	0.5
Daily or almost daily	0	0.0	2	1.0
Missing	1	0.4	3	1.5
	M	*SD*	*M*	*SD*
Alcohol-related harms	0.98	1.10	1.54	1.11

Estimates based on log-transformed variables.

students in the Preventure group reported higher levels of binge drinking and more alcohol-related harms than those in the Control group. Primary analyses assessed the impact of the intervention on rate of change or growth over time from these baseline levels, which are estimated by the 'intercept' factor. Table 2 provides the mean scores for high-risk Preventure and Control students for all outcome measures of interest over time.

Attrition analyses were conducted to assess comparability of high-risk students in the Preventure and Control groups who were present only at baseline versus students who completed a follow-up assessment. Attrition resulted from students being absent on the day of the survey, failing to remember their username and password to complete the survey online, or using the incorrect code to complete the survey via paper-and-pencil or answering fewer than 80% of the items on any scale. Only a small number of students (n = 22, 5.0%) were present at baseline only. There were no significant differences between students who were present only at baseline versus students who completed at least one follow-up assessment in the high-risk Preventure and Control groups on any of the alcohol outcome measures (binge drinking: $F(1,432) = 0.010$, $p = .920$; frequency of drinking: $F(1,432) = 0.167$, $p = .683$; alcohol-related harms: $F(1,429) = 0.116$, $p = .733$). Furthermore, there was no evidence of differential attrition on the outcome measures for the high-risk Preventure and Control conditions (binge drinking: $F(1,436) = 1.370$, $p = .242$; frequency of drinking: $F(1,432) = 3.622$, $p = .058$; alcohol-related harms; $F(1,436) = 1.961$, $p = .162$).

Two-part modeling

As the first step in modeling alcohol use (i.e. unconditional model), we estimated the growth function of each part of the two-part LGM model separately. Linear functions representing change in drinking variables generally provided the best fit to the data (see fit statistics presented in Table S1). Accordingly, change was modeled as linear growth in the conditional LGM model and intervention status was added to both parts of the model. Parameter coefficients and standard errors for the conditional LGMs are displayed in Table 3 (fit statistics are presented in Table S3).

Frequency of drinking. For frequency of drinking, the dichotomous portion of the model (Part 1) revealed that high-risk Preventure students were more likely to consume alcohol at baseline compared with high-risk Control students [$b = 0.455$ (0.101), $p < .001$]. However, high-risk Preventure students demonstrated significantly lower growth in their likelihood to consume alcohol over time, compared with high-risk Control students [$b = -0.225$ (0.061), $p < .001$]. In the continuous part of the model (Part 2), no significant differences were observed in rates or growth of drinking between the conditions. There was a significant, positive correlation between the intercept and slope for the dichotomous (Part 1) of the model ($r = 0.22$, $p < .001$), suggesting that a higher propensity toward drinking at baseline was associated with greater likelihood of drinking over time. In the continuous part of the model (Part 2), there was no significant correlation between the intercept and slope factors.

Binge drinking. For binge drinking, the dichotomous portion (Part 1) of the model indicated that high-risk Preventure students were more likely to binge drink at baseline compared with high-risk Control students [$b = 0.652$ (0.209), $p = .002$]. Noteworthy, a significant intervention effect was observed with high-risk Preventure students displaying significantly lower growth in their likelihood to binge drink over time [$b = -0.305$ (0.096), $p = .001$] relative to high-risk Control students. In the continuous part of the model, high-risk Preventure students engaged in significantly more binge drinking at baseline, compared with high-risk Control students [$b = 0.290$ (0.138), $p = .035$; $\beta = 0.600$]. No significant findings were observed for growth in binge drinking over time in the continuous part (Part 2) of the model. There was no evidence of a significant correlation between the intercept and slope factors within the dichotomous (Part 1) or continuous (Part 2) portion of the model.

Alcohol-related harms. Finally, for alcohol-related harms, the dichotomous portion (Part 1) of the model revealed that high-risk Preventure students had

Table 2 Summary table of primary alcohol outcome by time and intervention status

	Frequency of alcohol use: binary portion of the model		Frequency of alcohol use: continuous portion of the model[a]	
Time	High-risk Control % Prevalence	High-risk Preventure % Prevalence	High-risk Control *M* (*SE*)	High-risk Preventure *M* (*SE*)
Baseline	17.0	23.6	0.73 (0.54)	1.91 (6.00)
6 months	19.5	30.3	2.32 (6.64)	3.10 (7.81)
12 months	24.1	29.1	1.64 (4.24)	3.14 (7.91)
24 months	43.5	42.7	1.85 (4.63)	3.46 (7.74)
36 months	63.8	57.7	1.89 (3.99)	3.18 (7.31)
	Binge drinking: binary portion of the model		Binge drinking: continuous portion of the model[b]	
Time	High-risk Control % Prevalence	High-risk Preventure % Prevalence	High-risk Control *M* (*SE*)	High-risk Preventure *M* (*SE*)
Baseline	5.1	11.1	0.63 (0.23)	3.55 (8.60)
6 months	9.2	17.4	3.89 (9.50)	6.13 (11.24)
12 months	11.3	13.4	2.20 (6.11)	5.86 (11.16)
24 months	28.0	26.6	3.22 (7.85)	3.70 (8.52)
36 months	41.6	40.4	1.56 (3.55)	3.27 (7.58)
	Alcohol-related harms: binary portion of the model		Alcohol-related harms: continuous portion of the model[c]	
Time	High-risk Control % Prevalence	High-risk Preventure % Prevalence	High-risk Control *M* (*SE*)	High-risk Preventure *M* (*SE*)
Baseline	49.6	72.6	8.05 (6.13)	9.33 (6.37)
6 months	45.1	68.7	6.47 (5.25)	9.23 (7.10)
12 months	43.8	59.0	5.43 (4.94)	7.94 (6.83)
24 months	47.6	52.4	5.35 (4.29)	7.45 (6.80)
36 months	55.8	56.7	5.21 (4.36)	7.12 (7.55)

[a]Among those who reported use in the past 6 months, ordinal five-item scale including 1 = 'less than monthly', 2 = 'once a month', 3 = '2–3 times a months', 4 = 'weekly', and 5 = 'daily or almost daily'.
[b]Among those who reported bingeing in the past 6 months, ordinal five-item scale including 1 = 'less than monthly', 2 = 'once a month', 3 = '2–3 times a months', 4 = 'weekly', and 5 = 'daily or almost daily'.
[c]Among those who reported harms in the past 6 months, continuous scale ranging from 0 to 32.

significantly higher rates of alcohol-related harms at baseline compared with high-risk Control students [$b = 0.837$ (0.189), $p < .001$]. However, high-risk Preventure students demonstrated significantly lower growth in their likelihood to experience alcohol-related harms over time, compared with high-risk Control students [$b = -0.255$ (0.096), $p = .008$]. The continuous portion (Part 2) of the model revealed that high-risk Preventure students had significantly more alcohol-related harms at baseline, relative to high-risk Control students [$b = 0.297$ (0.094), $p = .002$; $\beta = 0.279$]. No significant findings were observed for growth in alcohol-related harms over time in the continuous part of the model. Within the dichotomous part of the model (Part 1), there was no evidence that the intercept factor was correlated with the slope factor. There was a significant, negative (albeit small) correlation between the intercept and slope for Part 2 of the model ($r = -0.06$, $p < .001$), suggesting that a lower mean frequency of alcohol-related harms at baseline corresponds to more growth over time.

In light of the baseline gender differences reported earlier, as a conservative step, the analyses for the three outcome variables were repeated controlling for gender. The findings indicated little, if any, effect of gender (Tables S4–S6).

Fidelity and program evaluation

Attendance and implementation fidelity of Preventure. Of the students randomized to receive the Preventure group ($n = 478$), 202 were classified as high risk on the SURPS and placed into groups (negative thinking = 38; anxiety sensitivity = 59; impulsivity = 48; sensation seeking = 57). These groups were run between March and November 2012. A total of 36 groups (72 sessions) were completed, with an average of 5.6 students per group. The majority of students attended the sessions [first session = 85% ($n = 171$); second session = 81% ($n = 164$)].

The 'Facilitation Criteria Scale' was used to assess the treatment fidelity and therapist competence in the trial (Al-Khudhairy & Conrod, 2007). Overall, five groups were scored using this scale, representing 14% of the total groups conducted in the trial. The facilitator was rated as adhering 'totally' to the

Table 3 Two-part latent growth model parameters and standard errors examining the effects of high-risk Preventure students compared with high-risk Control students on the likelihood and severity of binge drinking, frequency and quantity of drinking, and alcohol-related harms

	b (SE)	*p* Value	*b* (SE)	*p* Value	
Alcohol outcome	Part 1: Binary		Part 2: Continuous		ß
Binge drinking					
Intercept					
High-risk Preventure	**0.652 (0.209)**	**.002**	**0.290 (0.138)**	**.035**	**.600**
High-risk Control *(referent)*					
Slope					
High-risk Preventure	**−0.305 (0.096)**	**.001**	−0.054 (0.061)	.375	−.169
High-risk Control *(referent)*					
Frequency of drinking					
Intercept					
High-risk Preventure	**0.455 (0.101)**	**.000**	0.150 (0.083)	.070	.253
High-risk Control *(referent)*					
Slope					
High-risk Preventure	**−0.225 (0.061)**	**.000**	−0.051 (0.032)	.112	−.069
High-risk Control *(referent)*					
Alcohol-related harms					
Intercept					
High-risk Preventure	**0.837 (0.189)**	**.000**	**0.297 (0.094)**	**.002**	**.279**
High-risk Control *(referent)*					
Slope					
High-risk Preventure	**−0.255 (0.096)**	**.008**	−0.013 (0.057)	.816	−.034
High-risk Control *(referent)*					

For ease of interpretability, standardized estimates are reported for the continuous portion (Part 2, cf. Ichiyama et al., 2009; Wood et al., 2010). Bolded estimates are statistically significant.

content of the Preventure manual in 35% of the sessions, and 'almost totally' in the remaining 65% of the sessions. The facilitators rated that they had established a good rapport in 81% of the sessions, were unsure about the rapport in 15% of the cases, and did not believe that they had established a good rapport in only 4% of the sessions. They rated that they used language and vocabulary that was easily understood by students in all sessions. Overall, the groups had a high level of treatment fidelity and excellent therapist competence. Further details are provided in Table S2.

Program evaluation. At the completion of the program, students were asked to provide anonymous feedback on the relevance, usefulness, and acceptability of the program. In total, 172 students completed the student evaluation questionnaire. Almost all students (94%) rated the Preventure program as 'Good' or 'Very Good' overall. The majority of students reported that they found the information in the program helpful (84%) and believed the skills they received in the Preventure program would help them to deal more effectively with situations in the future (92%).

Standard alcohol and other drugs curriculum (control group). The control schools completed their Personal Development, Health and Physical Education (PDHPE) lessons as usual over the course of the year. The New South Wales PDHPE and the Victorian Health and Physical Education syllabuses mandate that alcohol and other drugs education is taught to all Year 8 students, and thus all control schools reported implementing some form of universal alcohol and other drug education throughout the year. Teachers were asked to provide details about the amount and format of any drug education they delivered to their Year 8 students. The number of lessons varied between schools (ranging from 2 to 10), and the average length of each lesson spent on alcohol and other drug education was 62 min. More than half of teachers (57%) reported using computers or the Internet to teach alcohol and other drug education topics. The main content areas covered by control schools were types of drugs, the short- and long-term effects of alcohol, alcohol and drug-related laws, decision-making, risk-taking behaviors, patterns of use among young people, and the influence of peers and the media.

Discussion

This study demonstrated the long-term effectiveness of Preventure, a selective personality-targeted preventive intervention, in reducing the uptake of alcohol use, alcohol misuse, and alcohol-related harms among adolescents over 3 years. Analyses showed that compared with the control group, high-risk students who received the Preventure interventions displayed reduced uptake of alcohol consumption and binge drinking, as well as reduced alcohol-

related harms. Over the 3-year study period, no significant effects were observed in the continuous part of the models for any of the outcomes. This is perhaps due to the low frequency of use among this age group (e.g. the majority of the sample, 94.4%, had consumed alcohol less than monthly at baseline). As exposure to alcohol increases and the legal age of alcohol purchase is approached, differences between groups may become even more apparent. This highlights the need for a long-term follow-up of this cohort. In addition, it may be that implementing Preventure within this young age group is effective in reducing the *uptake* of alcohol use, whereas implementing the interventions at a later age (when alcohol use is more common) may also assist young people to reduce their *frequency* of use and harmful use of alcohol. Future research may wish to explore under which circumstances and times such interventions may be most effective.

Nonetheless, this trial is the first to demonstrate long-term effects of a selective alcohol prevention program over a 3-year period and the first to demonstrate the effectiveness of Preventure outside the United Kingdom or Canada. In addition, it is the first trial of an effective selective prevention program in Australia (Teesson et al., 2012), indicating that the Preventure program is feasible in an Australian context.

Strengths of the study include the diverse sample of Independent, Government, and Catholic schools involved in the trial, the high retention rate over the 3-year follow-up, and the sophisticated intention-to-treat analysis techniques allowing us to map the different trajectories of alcohol use between groups over a developmentally critical time. A potential limitation of this study is that it relies solely on self-report data from adolescents. However, student self-report is well-accepted in substance use prevention trials and has been shown previously to be reliable and valid, especially when assurances of confidentiality are provided and students self-administer the survey online (Brener, Billy, & Grady, 2003), both of which occurred in this study. In addition, some schools required active parental consent which may have implications for the generalizability of our results. Although active consent procedures can introduce selection bias (Shaw, Cross, Thomas, & Zubrick, 2015), other studies found no differences in alcohol use among students with passive and active consent (Anderman et al., 1995). More than half of the students in this study (57%) received passive parental consent. If future trials require active consent, attempts should be made to maximize consent rates using recommended strategies (Wolfenden, Kypri, Freund, & Hodder, 2009). Finally, randomization led to an imbalance in the sex split across the groups, but we are reassured by sensitivity analyses adjusting for sex which indicated this made no material difference to the pattern of results or study conclusions.

Conclusion

Given that for every 1 year we can delay initiation to drinking, we can reduce the odds of developing an alcohol use disorder by almost 10% (Grant et al., 2001), delivering effective prevention is essential. An array of effective school-based programs, such as Preventure, now exist and have proven to reduce the uptake and harmful use of alcohol. It is imperative that schools implement evidence-based prevention to reduce the significant burden of disease and social costs attributed to alcohol misuse in the community.

Supporting information

Additional Supporting Information may be found in the online version of this article:

Figure S1. Path diagram for a two-part latent growth model of alcohol outcomes in the CAP study.

Table S1. Fit indices for the intercept only, linear, and quadratic models for the two-part latent growth drinking variables.

Table S2. Information on treatment fidelity of the Preventure and Control groups in the CAP study.

Table S3. Model fit indices for the dichotomous and continuous parts of four models of drinking behavior.

Table S4. Parameter estimates and standard errors for binge drinking, controlling for gender.

Table S5. Parameter estimates and standard errors for frequency of drinking, controlling for gender.

Table S6. Parameter estimates and standard errors for alcohol-related harms, controlling for gender.

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Key points

- This trial is the first to demonstrate the effects of a selective alcohol prevention program over a 3-year period and the first to demonstrate the effects of a selective preventive intervention in Australia.
- Findings from this study support the use of selective personality-targeted preventive interventions in reducing the uptake of alcohol, alcohol misuse, and related harms over the long term.
- An array of effective school-based programs, such as Preventure, now exist and have now been proven to reduce the uptake and harmful use of alcohol.
- It is imperative that schools implement evidence-based prevention to reduce the significant burden of disease and social costs attributed to alcohol misuse in the community.

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